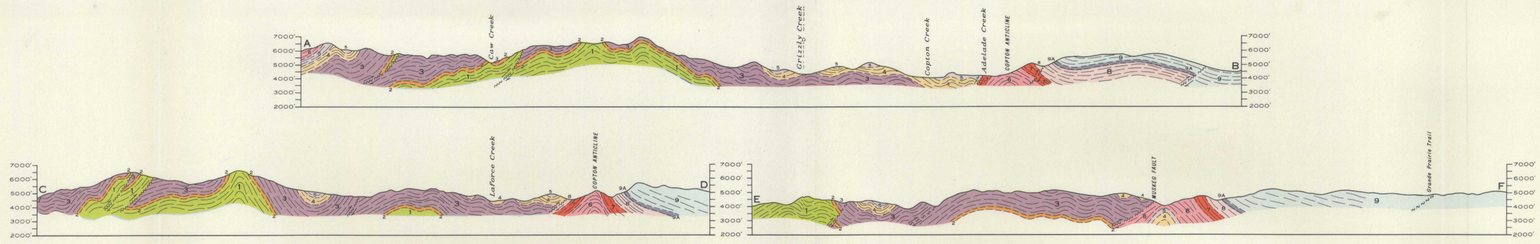
CANADA
DEPARTMENIT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OFF CANADA



Diagrammatic cross-sections along llines A-B, C-D and E-F

GEOLOGICAL SERIES

SHEET 83 1/3

LEGEND

MESOZOIC

CRETACEOUS

UPPER CRETACEOUS

9, 9A — *BRAZEAU FORMATION: sandstone, shale, pebble-conglomerate; probably includes some undifferentiated Paleocene beds*
9A. Solomon sandstone member at base of Brazeau formation

8 — *WAPIABI FORMATION: shale, sandy shale*

7 — *BIGHORN FORMATION: quartzitic sandstone, silty sandstone, sandy shale, shale*

6 — *BLACKSTONE (Kaskapau) FORMATION: shale, silty shale, calcareous siltstone*

5 — *DUNVEGAN FORMATION: sandstone, siltstone, silty shale*

LOWER CRETACEOUS

4 — *'FORT ST. JOHN' GROUP: shale, silty shale, sandstone*

3 — *LUSCAR FORMATION: sandstone, shale, conglomerate, coal; upper part probably includes beds equivalent to the Mountain Park formation*

2 — *CADOMIN FORMATION: conglomerate*

1 — *NIKANASSIN FORMATION: quartzitic sandstone, silty sandstone, shale*

Small rock outcrop, area of outcrop
Bedding (horizontal, inclined, vertical)
Fault (position defined, position approximate)
Fault (occurrence or position assumed)
Anticlinal axis
Synclinal axis
Coal outcrop
Fossil locality

Geology by E.J.W. Irish, 1949, 1950, 1951

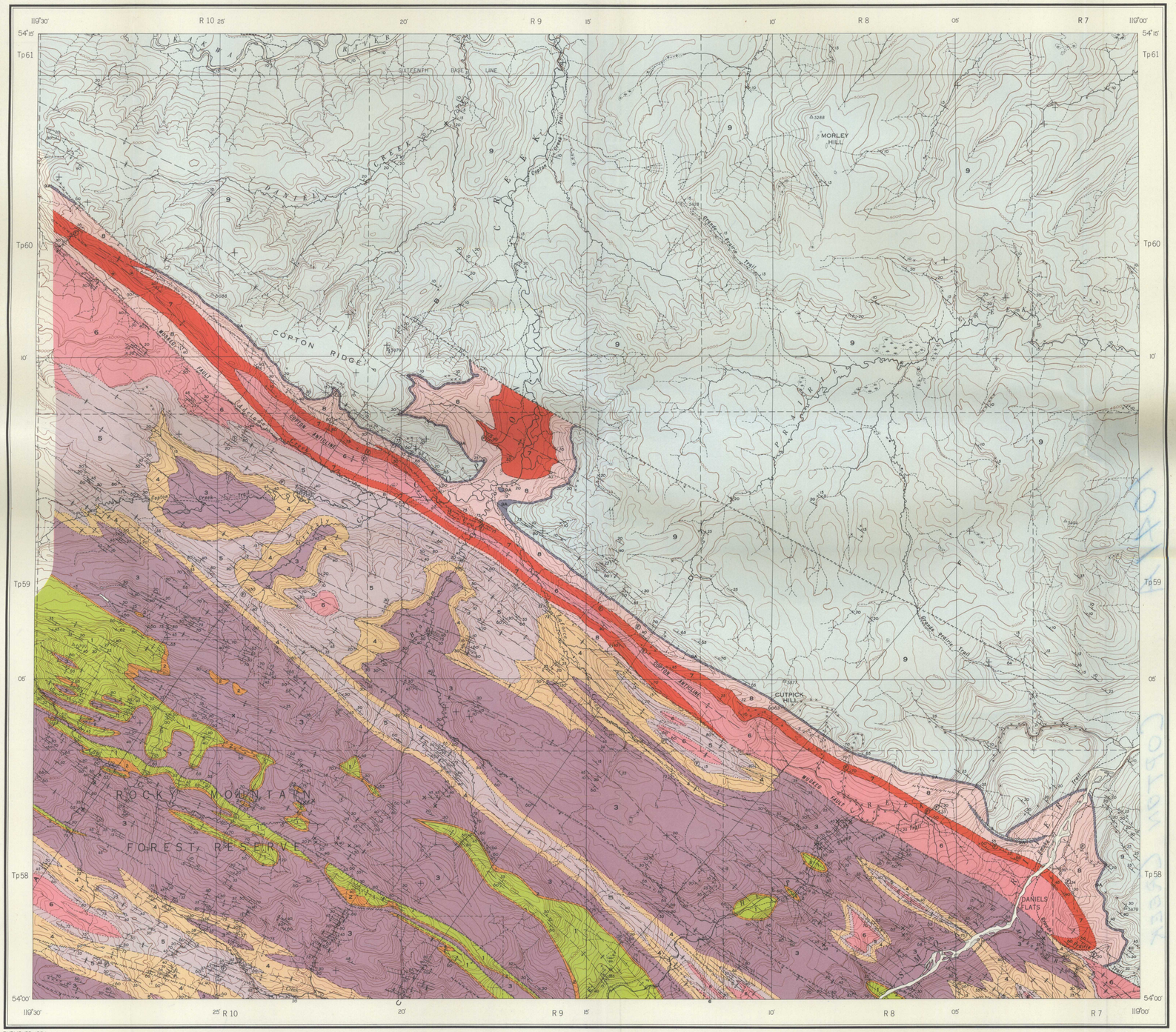
Cartography by the Geological Cartography Division, 1954

Trail
Building
Triangulation station
Township boundary (surveyed)
Township boundary (unsurveyed)
Forest Reserve boundary
Intermittent stream
Fall or rapid
Marsh or swamp
Sand or gravel bar
Contours (interval 100 feet)
Height in feet above mean sea-level 5979

Base-map surveyed by the Topographical Survey in 1945 and 1947. Compiled by the Topographical Survey from air photographs taken in 1944

Air photographs covering this map-area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario

Approximate magnetic declination, 26°½ East



PUBLISHED, 1954

MAP 1041A

COPTON CREEK

WEST OF SIXTH MERIDIAN

ALBERTA

Scale: One Inch to One Mile = 1/63,360

Miles 1 ¾ ½ ¼ 0 1 2 3

DESCRIPTIVE NOTES

Nearly one-half of the area is characterized by northwesterly trending, high, elongate ridges separated by steep-sided valleys. This alinement becomes less noticeable northeastward toward the Plains, where the ridges become progressively lower and more irregular in shape, and the valleys become wide and swampy. Timber-line is about 6,000 feet above sea-level and all ridges below this altitude are heavily forested except where the timber has been burned. Both elevation and relief increase to the southwest, the maximum relief for the area being about 4,100 feet.

The map-area is underlain by a succession of marine and non-marine strata ranging in age from Lower Cretaceous to, probably, Paleocene. The strata have been folded along northwesterly trending axes and displaced by strike thrust faults that parallel the axes of the folds. As a result, the formations are, in general, exposed as long, relatively narrow, northwest trending bands and tongues.

The NIKANASSIN formation (1), of Lower Cretaceous age, is the oldest exposed in the area. It outcrops in the southwestern part of the map-area as long, narrow, irregular bands exposed by erosion of anticlinal ridges, and as small ovate areas where the valleys of Smoky River and Sheep Creek cut through anticlinal folds. The formation is approximately 1,000 feet thick, but only the uppermost part outcrops within the map-area. The best exposure is near the head of Beaverdam Creek, where 600 feet of strata are exposed below the Cadomin formation. The observed Nikanassin rocks consist of hard, grey to dark grey, quartzitic, grey to buff weathering sandstones; brownish, buff weathering, silty sandstones; grey, silty shale; and black, carbonaceous shale. The sandstones are all fine to medium grained, and individual beds range in thickness from 6 inches to 3 feet. Ripple-marks are common in tfhese beds, and poorly preserved, carbonized plant remains occur in some.

The CADOMIN formation (2) lies, probably disconformably, above the Nikanassin. It is confined to the same areas as the Nikanassin and occurs as long, narrow, sinuous bands bordering these areas. The formation is distinctive, usually forms conspicuous outcrops, and is an excellent horizon marker. It is generally between 30 and 100 feet thick, and is a hard, well-cemented conglomerate, consisting of rounded pebbles of chert and quartzite ranging in diameter from ½ inch to 9 inches. Normally the formation consists of one band of conglomerate, but in some places it can be divided into a lower part, consisting of massive conglomerate, a middle part, composed of sandstone and siltstone; and an upper part, comprising conglomerate with intercalated sandstone beds and lenses.

The LUSCAR formation (3) underlies the greater part of the southwestern half of the map-area, and lies conformably above the Cadomin conglomerate. No complete section is exposed, but the total thickness is estimated to be between 2,000 and 2,300 feet. The formation consists of non-marine and brackish water, fine conglomerate; coarse-, medium-, and fine-grained, grey, greenish grey, and brownish sandstone; grey and black silty shale; coal seams from 6 inches to 23 feet thick; and thin, yellowish weathering ironstone bands, which are usually associated with shale. A fine, rusty weathering, chert conglomerate, ranging between 6 inches and 2 feet in thickness, occurs at the top of the Luscar beds. The strata show lateral variations in lithology within relatively short distances, but all sections are composed of similar types of rocks. The upper 200 to 400 feet of the Luscar contains no coal and includes a larger proportion of thick, massive beds than elsewhere in the formation. It is, probably, in part or entirely equivalent to the Mountain Park formation of areas farther southeast.

Lying conformably above the Luscar formation is about 500 feet of grey to black shale. No fossils were found in these strata, but their stratigraphic position below the Dunvegan formation suggests that they are equivalentt in age to an uppermost part of the Fort St. John group of the Peace River district. Consequently, this shale (4) is here referred to provisionally as representing the 'Fort St. John' group until a more definite correlation can be established. The shale outcrops mainly as two northwesterly trending t belts in the southwest half of the area, but farther northeast smaller exposures occur as a result of erosion of subsidiary folds on the major anticlines. The strata consist of dark grey to black, silty shale, within a 3-foot zone of thin sandstone beds about 40 feet above the base.

The DUNVEGAN formmation (5) conformably overlies the 'Fort St. John' group. Its beds outcrop in a synclinal belt in the extreme southwest corner of the map-area and also underlie a much larger region to the northeast. There they extend northwesterly across the map-area and are exposed both within a narrow syncline and capping the adjacent broad anticlinal area. The formation consists of marine and non-marine, hard, fine- to medium-grained, grey sandstone; fine- to medium-grained, brownish grey sandstone; and dark grey to black, silty shale. About 30 feet of hard, grey, quartzitic sandstone occurs at the base of the formation; it is crossbedded and contains abundant carbonized wood fragments. The total thickness of the formation is estimated at between 300 and 400 feet.

The BLACKSTONE (Kaskapau) formation (6), about 1,800 feet thick, rests conformably on the Dunvegan. The shales occupying the stratigraphic interval between the Dunvegan and Bighorn formations in Copton Creek map-area are probably the equivalent, or near-equivalent, of the Kaskapau formation of the Peace River district, although the nomenclature of southern Alberta is still applicable to the overlying Bighorn and Wapiabi formations. Further stratigraphic and palaeontological evidence may indicate either that the name 'Kaskapau' should be used for these strata or that an entirely new name would be more appropriate. These shales form a long, narrow, northwesterly trending band along the axis of the Copton anticline and underlie several small synclinal areas to the south. In addition, ea large region near the west border in the northern part of the map-area is probably underlain by Blackstone strata. The formation consists of black, fissile to thin-bedded shale and silty shale, with numerous, interbedded, hard, grey, yellow weathering, concretionary ironstone and calcareous siltstone beds, and with a sandy transition zone, 15 to 20 feet thick, at the top. Blackstone strata are nearly everywhere highly contorted.

The BIGHORN formation (7) conformably overlies the Blackstone shales, and outcrops mainly on either side of the Copton anticline. The strata occur as two, narrow, northwesterly trending bands, one, on the northeast flank of the fold, extending most of the way across the map-area, and the other, on the southwest flank, extending little more than half that distance. Bighorn strata are also exposed in a small area in the valley of Copton Creek where the creek has cut across a broad anticlinal structure. The formation consists of 600 feet of marine and brackish water beds comprising three lithologic units. The upper and lower units, consisting of hard, slabby, grey, quartzitic sandstone; softer, grey-brown, silty sandstone; grey, silty shale; and a little fine chert conglomerate are separated by nearly 200 feet of dark grey to black, silty, marine shale.

The WAPIABI formation (8) conformably overlies the Bighorn strata and, like the Bighorn formation, underlies two narrow, northwesterly trending bands midway of the map-area on either flank of the Copton anticline.. Wapiabi beds are also exposed in the valley of Copton Creek where it turns to flow north. The formation is 900 to 1,000 feet thick, and consists chiefly of marine, thin-bedded to fissile, dark grey to black shale and silty shale, with some interbedded, thin, concretionary, calcareous, buff weathering bands. The upper 200 feet of the formation is sandy.

The BRAZEAU formation (9), of late Upper Cretaceous age, overlies the Wapiabi conformably. The Solomon member (9A) at its base is an excellent horizon marker, consisting of 80 to 100 feet of distinctive, hard, grey to greenish grey, slabby, buff weathering sandstone, most if not all of which is of marine origin. Above this member is a transition zone, about 100 feet thick, consisting of grey and green, soft sandstone and silty shale. These strata are, in turn, overlain by about 5,000 feet of non-marine sandstone and shale, with minor amounts of interbedded conglomerate and thin coal seams. The zone of coarse, crossbedded conglomerate and pebble beds, which in map-areas farther southeast lies above the transition strata, does not appear to be as well developed in this map-area. The Brazeau underlies the greater part of the northeastern half of the map-area, but in the northeast corner probably includes undifferentiated Paleocene beds, and as such is essentially equivalent to the Wapiti group of northeastern British Columbia.

The dominant structural features of the southwestern half of the map-area are northwesterly trending, complex folds and strike thrust faults. Four major structural units can be recognized, two anticlinal and two synclinal. The anticlines are broad upwarped areas on which are superimposed numerous small *en echelon* folds, and these are separated by relatively narrow downfolds, which are essentially complex synclines. The Copton anticline, a narrow, simple, and nearly symmetrical fold crossing the area from southeast to northwest, roughly separates the contorted strata in the southwest from the gently dipping beds to the northeast. No folds of any consequence occur in the northeastern half of the map-area. The strata there have, in general, gentle dips to the northeast. Several strike thrust faults occur within the southwest half of the map-area and have displaced strata to the northeast. Most of these faults are small, but two of them extend beyond the borders of the map-area and represent considerable stratigraphic displacement. The regularity of the surface traces of all faults indicates steeply dipping fault surfaces. In general, the faults have broken the southwest limbs of the anticlines.

Numerous coal seams, ranging in thickness from 2 to 23 feet, are exposed in the map-area, and all but one of these occur within the Luscar formation. One seam, 2 feet thick, was observed in the Brazeau formation on Daniels Creek, and it is possible that other seams occur in that formation but are not exposed. Several of the seams exposed in the Luscar formation along Smoky River and Sheep Creek were prospected at one time, but the area is relatively inaccessible and no mining has been done. It is probable that large reserves of bituminous coal can be made available when required.

Several oil companies have made geological investigations of parts of the map-area in recent years, but no wells have been drilled for oil or gas. The formations in the southwestern half of Copton Creek map-area are closely folded and faulted, and those in the northeastern half show no structures favourable for oil accumulation, so that surface structures do not appear promising. Devonian and Mississippian strata, the most important oil-bearing rocks in Alberta are not exposed in this area and so could not be studied. Nor is any information available to indicate whether or not the Palaeozoic formations are disrupted by faults such as occur within the Cretaceous rocks. The subsurface possibilities are, therefore, unknown.