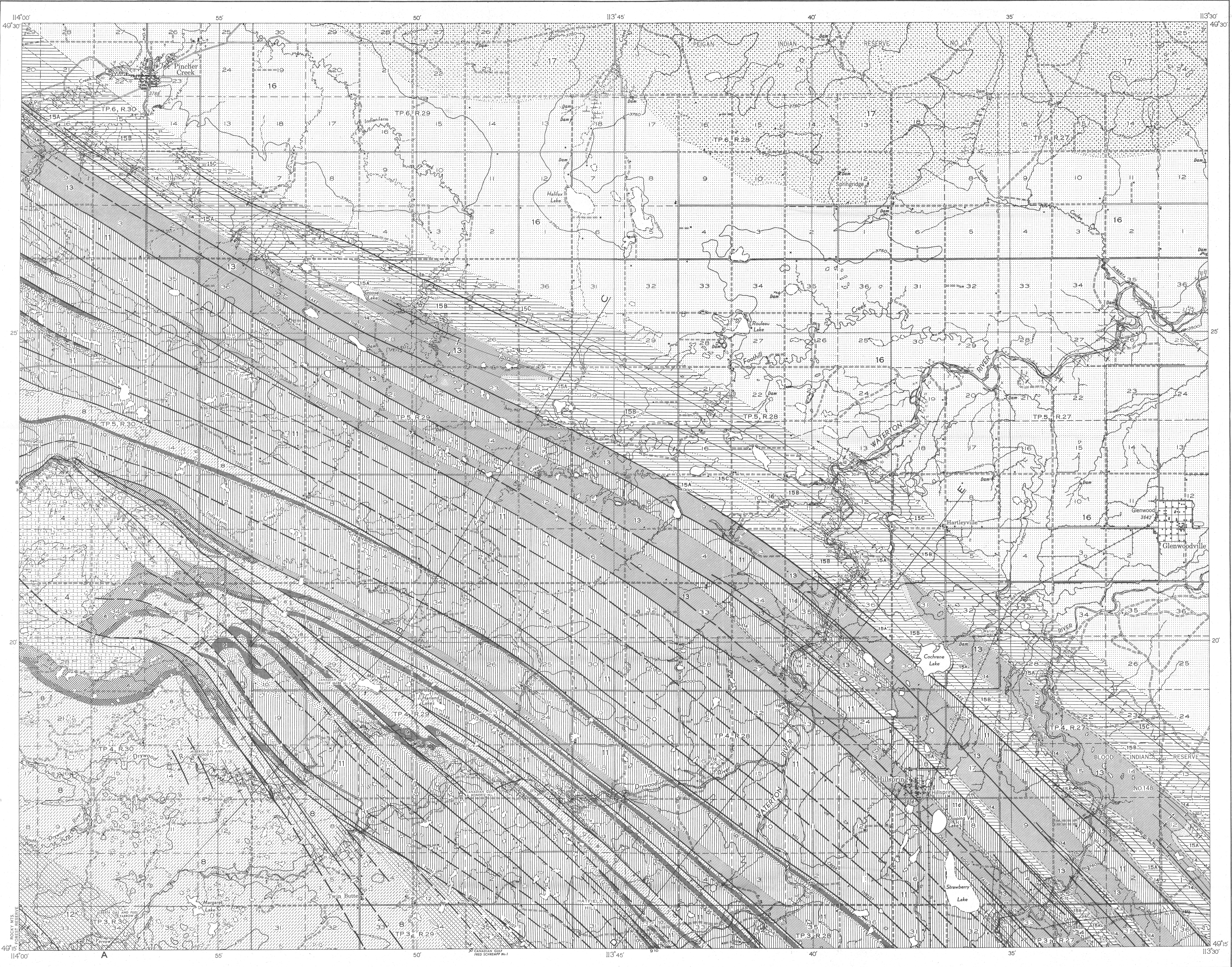


STRUCTURE-SECTIONS ALONG LINES A-B-C, AND D-E

SHEET 82 H



- LEGEND**
- TERTIARY PALEOGENE**
- 17 PORCUPINE HILLS FORMATION: non-marine, buff and brown weathering sandstones and shales
- CRETACEOUS AND/OR TERTIARY UPPER CRETACEOUS AND/OR PALEOGENE**
- 16 WILLOW CREEK FORMATION: non-marine, grey and buff weathering sandstones, and red, green, and grey shales
- CRETACEOUS UPPER CRETACEOUS**
- 15A ST. MARY RIVER FORMATION: 15A (Lower part), brecciated grey shale, coal sandstone; 15B (Middle part), non-marine, grey sandstones and green and grey shales; 15C (Upper part), non-marine, green and grey sandstones and shales
 - 14 BLOOD RESERVE FORMATION: massive-bedded marine sandstone; basal transition beds
 - 13 BEAUPAW FORMATION: marine, dark grey shale
 - 11 BELLY RIVER FORMATION (9-12): 11a, thick sandstones with interbedded shale; 11b, green shale; 11c, red shale; 11d, mainly shales; 11e, includes coal seams
 - 12 Undivided
 - 10 Lower Sandstone member: massive marine sandstone, indurated at top
 - 9 Transition beds: thin-bedded sandstone and silt shale
 - 8 ALBERTA GROUP (6-8): 8 WAPABIA FORMATION: marine, dark grey, sandy, silty, and fossiliferous shales; thin sandstones
 - 7 BIGHORN (Cadeau) FORMATION: marine sandstone, shale, and conglomerates
 - 6 BLACKSTONE FORMATION: marine, sandy, silty, and fossiliferous shales; thin sandstones
- UPPER CRETACEOUS (?)**
- 5 CROWNEST FORMATION (In structure-sections only)
- LOWER CRETACEOUS**
- 4 BLANCKNER GROUP: basal quartzite sandstones and limestones; green, grey, and maroon shales; green arkosic sandstones; includes undifferentiated Crownest formation
 - 3 KOOTENAY FORMATION: black sandstone; dark grey and carbonaceous shale; coal
- JURASSIC**
- FERNIE GROUP (In structure-sections only)
- MISISSIPPIAN**
- RUNDLE FORMATION (In structure-sections only)
- Geology by R. J. W. Douglas, 1949**
Base map by Topographical Survey, 1943
Approximate magnetic declination, 2° 22' East

DESCRIPTIVE NOTES

The map area extends across part of the southern Disturbed belt, from the southern Porcupine Hills in the northwest to near the Rocky Mountains at the southwest corner. Relief is low owing, in part, to the denudation being most common along the major streams and along the crests of the more prominent hills. Accordingly, in some parts of the area where bedrock is largely obscured, the structure and distribution of the formations shown are based on lengthy extrapolations of rather meagre data, in part from beyond the map area, and are intended only to indicate the probable nature and attitude of the underlying rocks and the approximate location of some of the faults that disrupt them.

The strata of the Disturbed belt for above four major thrust faults, which from southwest to northeast are the Twin Butte thrust, the Harland Lakes thrust, the Mill Creek thrust, and the Cochrane Lake thrust. Further northeast, the strata are folded and broken by small faults, some of which do not necessarily, the northeastern margin of the Disturbed belt lies near the crest of the St. Mary River and Willow Creek formations, beyond which the strata dip gently northward towards the axis of the Alberta syncline, which crosses Waterton River close to the eastern border of the map area.

The strata above the Twin Butte thrust, mainly gently dipping, range from those of the Belly River formation in the west to those of the Kootenay formation immediately above the thrust, and have been generated by two wells, the Alberta Gas and Fuel, Yarrow and Dynamid wells. The thrust is almost flat where it follows the Kootenay formation, but is more steeply inclined where it was encountered in the Canadian Gulf Pincher Creek and Fred Schwegel wells, south of the map area.

The Harland Lakes thrust shows the Twin Butte thrust sheet on the northeast, Belly River and upper Wapabian strata underlie its southwestern part, whereas to the northeast older formations rapidly pass, with Kootenay strata lying immediately above the fault plane on Alberta Ridge in the west-central part of the area. The Harland Lakes thrust and others to the southeast are moderately steeply inclined across most of the area, but rather abruptly and merge on Alberta Ridge where they reach the Kootenay formation. They also flatten and merge to the southwest, as shown by the Pincher Creek and Walter Man wells on the accompanying structure-sections.

Wapabian, Belly River, and Beaupaw strata occupy a narrow belt between the Harland Lakes and Mill Creek thrusts. To the northwest, in Beaver Mines region, this belt is considerably wider, and older rocks are exposed. The Mill Creek thrust sheet attains its maximum width and displacement, whereas in this area it appears to form only the frontal part of the Harland Lakes thrust sheet, as shown in structure-section D-E.

Northwest of the Mill Creek thrust, exposures are poor. Faults well established in the Beaver Mines area are extended across Pincher Creek map area as well with those shown elsewhere. The east-west extension of the Fernie group (2) is well shown in the well logs of the Pincher Creek and Walter Man wells, the formation has a thickness of some 50 feet. Older strata of the Fernie group (2) encountered in the wells consist of brown, medium-grained sandstone at the top grading down into fossiliferous, dark grey shale, with bituminous-bearing, glauconitic and laminar sandstone near the base and a basal quartzite sandstone, the whole totalling 350 feet in thickness as drilled. Below the Fernie group and above a conglomeratic limestone of the Rundle formation (3) were drilled, and encountered considerable quantities of natural gas and light petroleum distillate.

The Blainmore group (4) contains basal quartzite sandstones and limestones and a conglomeratic sandstone, 700 to 900 feet above the base, as recognizable markers within a sequence of green, grey, and maroon shales and greenish grey sandstones. It is about 1,000 feet thick in the southwest, including strata of the Crownest formation, and thins to about 1,200 feet to the northeast and southeast. Strata of the Crownest formation (5) are not exposed, but where encountered in drilling are volcanic tuffs and fine agglomerates, some of which have been reached by streams and contain quartz sands, and are interbedded with green, grey, and maroon shales. The formation is about 300 feet thick in the Yarrow well, but loses its identity in more easterly and southerly sections, appearing to grade laterally into upper Blainmore strata.

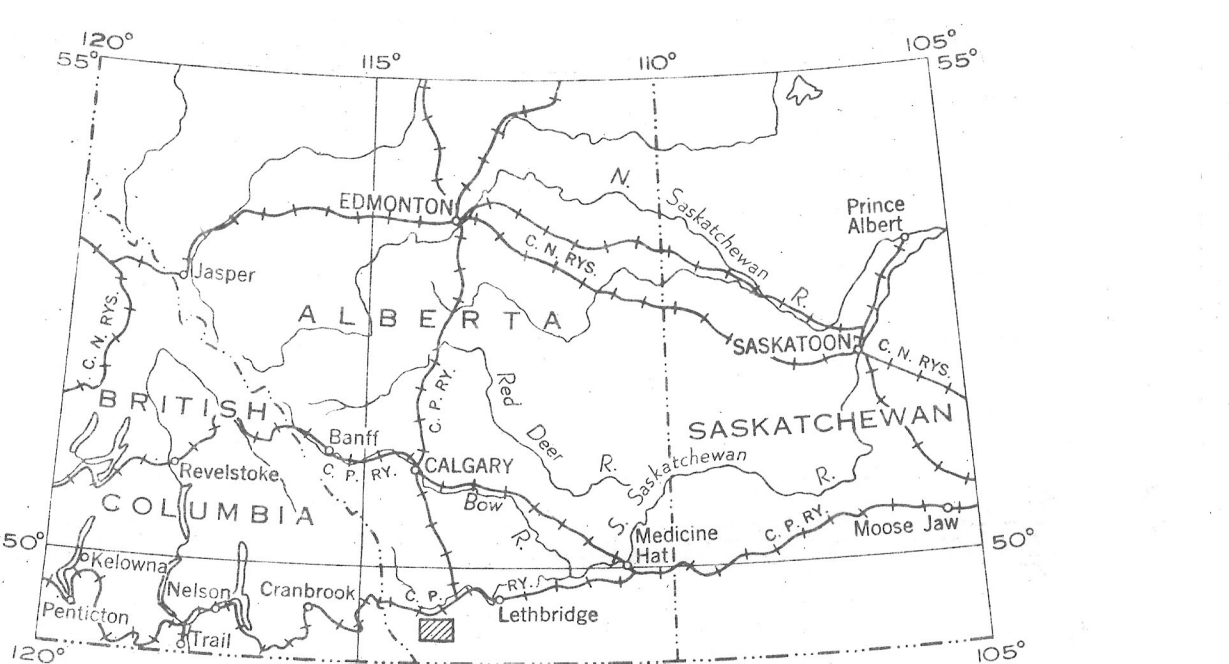
Only the uppermost few feet of the Blackstone formation (6) are exposed. In well sections in the southwest it is 350 feet thick, consisting of a basal sandstone and sandy shale zone, a lower, friable, fossiliferous, dark grey shale zone, a middle sandstone and grey sandy shale zone, and an upper zone of silty and sandy shale. The Bighorn formation (7), where exposed on Dynamid Creek, is 83 feet thick, and consists of a basal conglomeratic sandstone 29 feet thick, overlain by sandy and concretionary shales, the top being marked by a thin, lenticular, chert-bearing conglomerate. The Wapabian formation (8) consists of alternating zones of fossiliferous, silty, and sandy shales, some of which are concretionary or contain thin sandstone beds. Its thickness at the surface is not known, but is about 750 feet in the west.

The Belly River formation (12) is about 2,250 feet thick on Dynamid Creek, and is divisible into several lithologic zones. The basal Transition beds (9) are 350 feet thick. The Lower Sandstone member (10) consists of 700 feet of massive-bedded sandstone, its top marked by a resistant, calcareous, indurated bed, locally containing considerable concentrations of magnetite grains, and immediately overlain by fossiliferous dark grey shales and thin coal seams or carbonaceous shale. The remaining Upper part of the formation (11) is about 1,800 feet thick, and includes a basal sandy zone (11a) of prominent, thick-bedded sandstones, overlain by green and grey shale, 500 feet thick, a green shale zone (11b) of dominantly green shale, with thin sandstones, 300 feet thick, and a red shale zone (11c), 150 feet thick, characterized by red, maroon, and purple shale. This last is overlain by a zone (11d) consisting of 950 feet of green, grey and red shales, with interbedded thin sandstones and brown, nodular to concretionary limestones. The uppermost 50 feet of the Belly River formation (11e) contains coal seams, some of which have been mined commercially and are still used locally.

The Beaupaw formation (13) consists of fossiliferous, silty, dark grey, marine shale, with some sandy and concretionary zones. It is everywhere contorted and faulted, and although underlying local areas probably does not exceed 700 feet in thickness. The Lower Sandstone formation (14) is a massive-bedded sandstone, with underlying transition beds of alternating silty shales and sandstones, totalling about 100 feet in thickness, but varying greatly from silty to shaly. It is succeeded by 200 to 250 feet of fossiliferous, dark grey, and green shales, coal seams, oyster and other shell corals, and reddish brown weathering sandstones of the Lower part (15A) of the St. Mary River formation. The Middle part of the formation (15B) is 1,200 feet thick on Pincher Creek, and consists of green and grey, silty shales with very lenticular, soft, grey, massive-bedded, coarsely cross-bedded sandstones, the latter thicker and more abundant towards the top. In the Upper part (15C) of the St. Mary River formation, the sandstones are more persistent laterally, better, and more thinly bedded and cross-bedded. This part is 500 feet thick on Pincher Creek, but thins to 100 feet on Waterton River.

The Willow Creek formation (16) consists of grey, fine to medium-grained sandstones and green, grey, and red shales, with zones of abundant small limestone nodules in its lower part. In the upper part, the sandstones weather buff to brown, and red shales are scarce. Its thickness is in excess of 4,000 feet on Waterton River. Only the basal few hundred feet of the Porcupine Hills formation (17) are represented; they underlie the low hills in the northern part of the area. No shales are exposed, but the sandstones are thick and massively bedded, with large, wavy cross-beds, and weather buff to brown.

- Geological Symbols**
- Road outcrop
 - Bedding (horizontal, inclined, vertical, overturned)
 - Fault (showing direction of dip)
 - Anticlinal axis (showing direction of plunging)
 - Synclinal axis (showing direction of plunging)
 - Natural gas well
 - Abandoned well
 - Test hole (diamond drill)
 - Coal vein



- REFERENCE**
- Provincial Highway
 - Other roads
 - Roads not well travelled
 - Road along township boundary
 - Trail
 - Church
 - School
 - Post Office

PRELIMINARY MAP 51-22

PINCHER CREEK
WEST OF FOURTH MERIDIAN
ALBERTA

Scale: 1:40,000
Miles

- REFERENCE**
- Cemetery
 - Township boundary
 - Irrigation ditch
 - Intermittent lake and stream
 - Marsh
 - Sand
 - Contour (interval 250 feet)
 - Height in feet above mean sea-level

PUBLISHED 1951

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