CANADA
DEPARTMENT OF MINES AND RESOURCES
MINES AND GEOLOGY BRANCH
BUREAU OF GEOLOGY AND TOPOGRAPHY
GEOLOGICAL SURVEY

LEGEND

MESOZOIC

CRETACEOUS

UPPER CRETACEOUS

BEARPAW FORMATION: grey shale; fine-grained sand and sandstone, in part glauconitic; volcanic ash

OLDMAN FORMATION: medium- and fine-grained sand and sandstone; grey shale, carbonaceous shale, and lignite

Observed rock outcrop ..... ×

Well drilled for oil and gas (abandoned) ..... ø

Geology by R. T. D. Wickenden, 1943

DESCRIPTIVE NOTES

The geology shown on this map is a preliminary interpretation of data from water wells and a very few outcrops. Most of the area has a cover of glacial drift that ranges in thickness from a few feet to 400 feet. For this reason formational contacts are not only indefinite, but the Bearpaw formation may, in many places, be missing as a result of glacial erosion.

Sub-Surface Formations. The lithologic details of the lower part of the Oldman and of underlying formations are not yet known for this area. A deep well, the Fusilier, was drilled in 1916 in the N. half sec. 23, tp. 34, rge. 28, W. 3rd mer., about six and one half miles north of the station of Court. However, the samples from this well are poor, and there are long intervals without samples. Judging from the samples available, the top of the Lea Park is at a depth of about 1,000 feet; the top of the Alberta is above 1,970 feet, probably between 1,700 and 1,800 feet; and the Lower Cretaceous sand members are above 2,700, and probably near 2,500, feet. There are no outcrops near the well, but it is probable that the surface, at the well, is at a stratigraphic horizon 200 to 300 feet above the base of the Bearpaw formation. In view of this assumption, drilling in most of the area should reach the Lower Cretaceous sands at depths of from 2,200 to 2,600 feet.

Oldman Formation. In conformity with usage in areas to the south, the Oldman formation of this map-area corresponds to the upper part of the Pale and Variegated beds in adjacent areas to the north. Exposures are all small, and no complete section was observed. The upper part of the formation consists of shale and fine-grained sandstone, and a few thin beds of coal or carbonaceous shale. In the southwestern part of the map-area this part of the formation is about 70 feet thick; to the north the thickness could not be determined, but it is probably about the same and, in any case, not more than 100 feet. Below these fine-grained strata is a series of medium- to fine-grained sandstones with some shale lenses. In many places these sandstone beds are water-bearing. Fossil bone fragments are fairly common, especially in the southern part of the area. The lower part of the Oldman section and its contact with underlying Foremost beds was not observed in outcrops, and well samples have yielded no information.

Exposures of the upper part of the Oldman were observed on the southeast and north sides of Elemer Lake and in the valley northeast of the lake. Some of the sandstone beds that underlie the fine-grained upper beds are exposed along the railway about a mile west of Elemer Lake. Exposures of the upper part of the Oldman formation also appear in the N.E. quarter sec. 12, tp. 35, rge. 26.

Bearpaw Formation. Only the lower part of the Bearpaw formation is exposed in the map-area, and it is doubtful if there is more than 300 feet of Bearpaw at any locality.

The contact of the Bearpaw with the underlying Oldman formation is transitional, and is placed, arbitrarily, beneath all known marine beds. The basal Bearpaw beds are glauconitic sands and sandy shales for at least 100 feet above the Oldman formation. The glauconitic sands are water-bearing in much of the northeastern part of the area, and water wells furnish much information that is useful in determining structure. Some of these sands contain small chert pebbles, usually less than an inch in diameter. Also, among the sands and sandy shales are one or more beds that consist of or contain much volcanic ash.

Above the basal Bearpaw beds is a thick series of medium to dark grey shales that contain many gypsum crystals (selenite) and, usually, melanterite or ochreous incrustations on the weathered parts.

Structure. The few localities in the map-area where the approximate elevation of the Oldman-Bearpaw contact could be determined indicate a broad anticlinal structure with the axis extending northwest from the south-central part of the area. The contact is at an elevation of about 2,050 feet in exposures just west of the southwest corner of the area. Water wells near Alsask indicate that the contact there is at about 2,300 feet, and west of Pinkham outcrops of the lower part of the Bearpaw suggest that this contact is at 2,200 feet or less. Water wells between Superb, Saskatchewan, and Compeer, Alberta, show that the glauconitic, water-bearing, beds of the Bearpaw rise to the west from an elevation of about 2,200 feet to 2,300 feet. This indicates that the high part of this broad anticline is near the western edge or west of the map-area in the vicinity of Compeer.

In places some evidence of local structures was obtained, and may warrant further investigations. The glauconitic, water-sand beds of the Bearpaw are about 200 feet lower in the N.W. quarter sec. 10, tp. 33, rge. 25, than in the N.E. quarter sec. 12, tp. 35, rge. 26. East of the former locality the beds rise to or near the surface somewhere in the vicinity of the highway between secs. 17 and 18, tp. 35, rge. 24. Between there and Shallow Lake wells penetrated the fine-grained sediments of the upper part of the Oldman formation near the surface. These beds lie at an elevation of about 2,200 feet or less on the west and south sides of Shallow Lake and in wells in the S.E. quarter sec. 25, tp. 34, rge. 24, and the S.E. quarter sec. 30, tp. 34, rge. 23. In the vicinity of Elemer Lake they occur at an elevation of less than 2,200 feet, and along the railway west of Elemer Lake exposures of sandstone that is believed to underlie these beds outcrop at about 2,230 feet. A well on a farm, in the S.W. quarter sec. 28, tp. 3, rge. 23, passed through 80 feet of sand without reaching any coal. A small supply of water was obtained from this well at a level that did not rise above the level at which it was first tapped. These facts are interpreted as indicating a local anticline. The strata rise from the west, southwest, and east to the crest of the indicated anticline in the vicinity of the farm well in section 28 at a rate of about 50 feet a mile, and the closure from these directions is at least 100 feet. Unfortunately there are no outcrops, and no wells that penetrate known strata north and northwest of the outcrop along the railway, so that it is not known if there is closure in these directions.

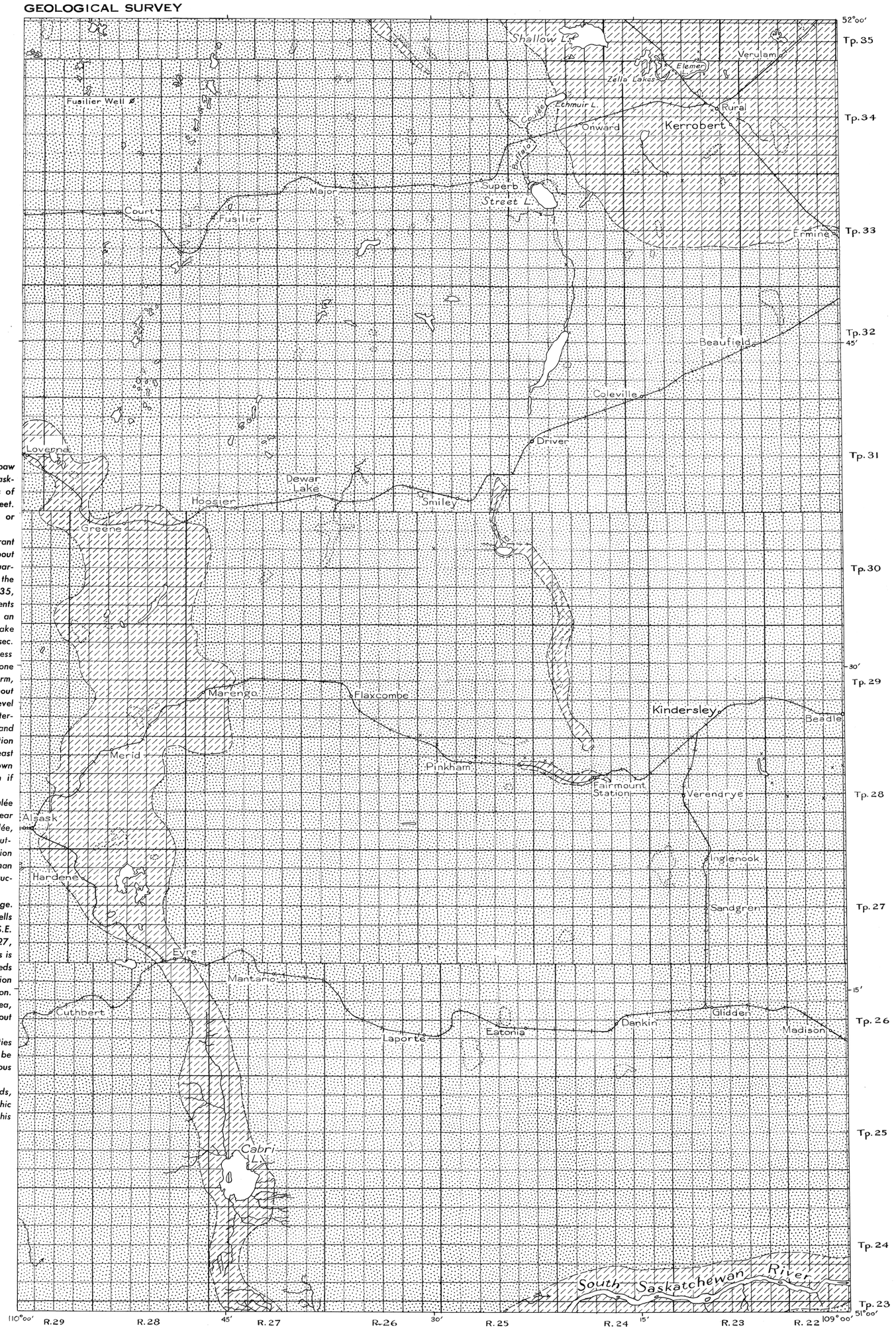
A suggestion of another, small, high structure was observed along the coulée west of Fairmount. In the N.W. quarter sec. 29, tp. 28, rge. 24, beds that appear to belong to the Oldman formation outcrop fairly high upon the side of the coulée, whereas, at the same, or a little lower, elevation, about half a mile west, are outcropping strata that belong a little higher stratigraphically, and lie in the transition between the Oldman and the Bearpaw formations. East of the occurrence of Oldman beds there are no exposures for several miles, and no other indications that a structure may exist.

About 6 miles southeast of Kindersley, in the southwestern part of tp. 28, rge. 22, water wells obtain a supply in glauconitic sand. The water horizon in these wells indicates that the beds rise to the east or northeast from about 2,240 feet, in the S.E. quarter sec. 5, tp. 28, rge. 22, to about 2,340 feet, in the S.E. quarter sec. 27, tp. 28, rge. 22. North of Beadle the wells indicate that the elevation of the beds is lower. To the east, in the coulée in the S.W. quarter sec. 24, tp. 28, rge. 22, beds nearly 100 feet stratigraphically above the glauconitic sand outcrop at an elevation of about 2,280 feet, and it appears that there may be a little closure in this direction.

Undoubtedly there are similar local structures in other parts of the map-area, but the heavy mantle of glacial drift makes it impossible to recognize them without considerable test drilling.

Oil and Gas Possibilities. The Fusilier well did not yield commercial quantities of oil or gas, but several occurrences of gas were reported from beds that may be near the base of the Alberta formation or from the upper part of the Lower Cretaceous sands.

The surface structures may be indicative of structure in Lower Cretaceous beds, where the sands are good reservoir rocks. These sands may, also, form stratigraphic traps for oil or gas. The economic possibilities of the Palaeozoic formations in this area are, however, unknown.



Compiled by the Topographical Survey
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PRELIMINARY MAP 45-3

KINDERSLEY

WEST OF THIRD MERIDIAN

SASKATCHEWAN

Scale: 1 inch to 4 miles

4 2 0 4 8 12

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