CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH

BUREAU OF GEOLOGY AND TOPOGRAPHY

GEOLOGICAL SURVEY

LEGEND

CENOZOIC

TERTIARY

OLIGOCENE

9 — *CYPRESS HILLS FORMATION: conglomerate and sandstone*

PALEOCENE

8 — *RAVENSCRAG FORMATION: sand, silt, shale; lignite*

MESOZOIC

CRETACEOUS

UPPER CRETACEOUS

7 — *FRENCHMAN FORMATION: mainly coarse sandstone*
BATTLE FORMATION: black and green bentonite, shale, silt

6 — *WHITEMUD FORMATION: white kaolinized sandstone, light coloured clay and silt; lignite*

5 — *EASTEND FORMATION: buff to brown silt and fine sand; grey shale; lignite*

4 — *BEARPAW FORMATION: dark marine shale, sandstone, bentonite; concretionary beds*

3 — *OLDMAN FORMATION: sandstone, shale; lignite*

2 — *OLDMAN AND FOREMOST FORMATIONS: sandstone, shale; lignite*

1 — *LEA PARK FORMATION. dark marine shale with concretionary layers and bentonite beds*

Outcrops of Belanger member of Bearpaw formation
Outcrops of Oxarart member of Bearpaw formation
Outcrops (bedding horizontal, inclined)
Fault
Well (dry hole)

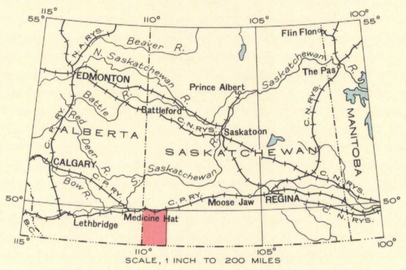
Post Office
Railway Station and Post Office
International boundary
Township boundary
Forest Reserve boundary
Park and Indian Reserve boundary
Section line
Irrigation canal
Intermittent lake and stream
Stream (position approximate)
Marsh
Contours (interval 100 feet)
Contours (position approximate)
Depression contour
Height in feet above Mean sea-level

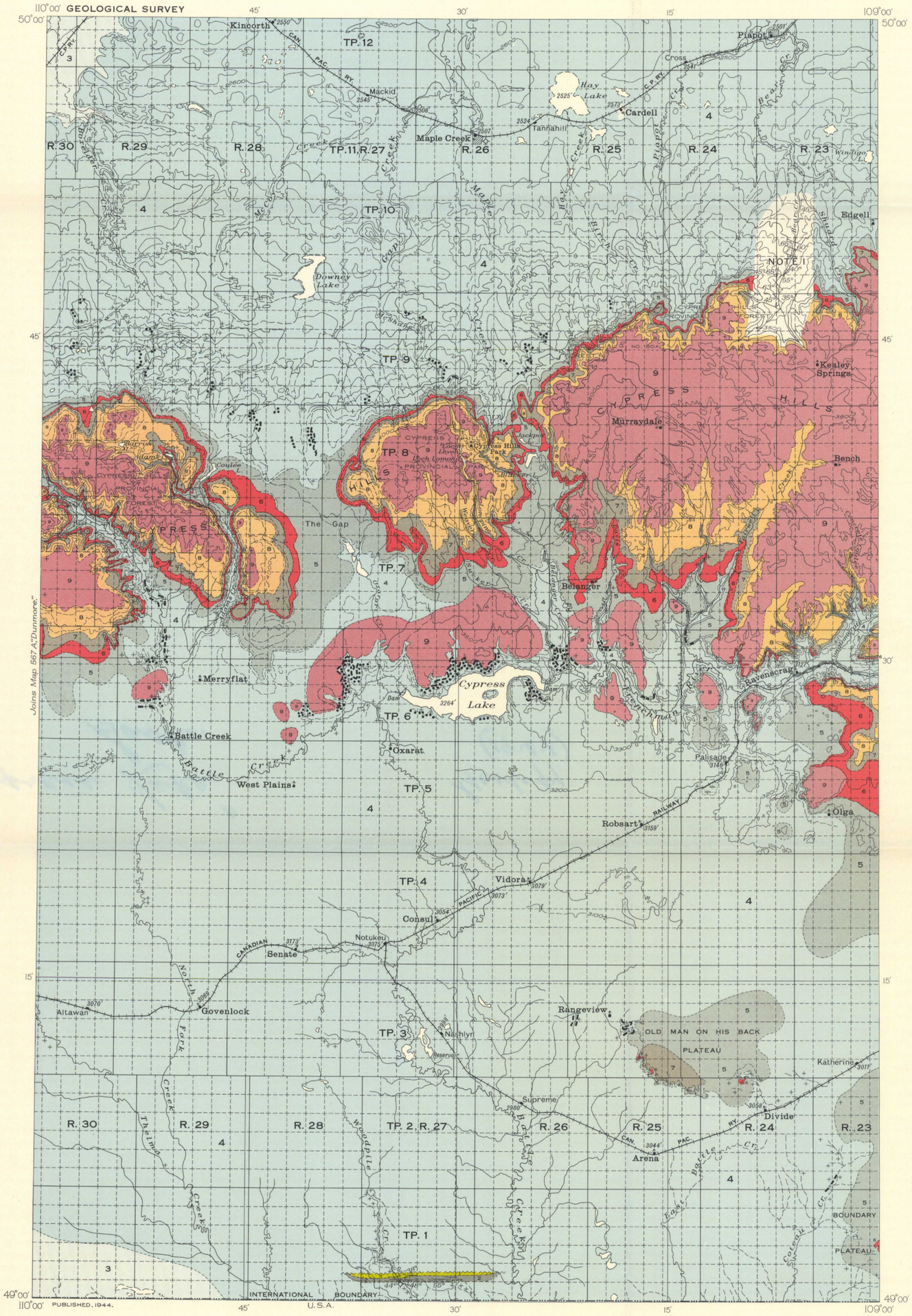
Geology by G.M.Furnival, 1940, 1941.

Base-map compiled by the Topographical Survey, 1943, from information supplied by Federal Government Departments and by the Government of the Province of Saskatchewan, with additions by the Geological Survey. Cartography by the Drafting and Reproducing Division, 1944.

DIAGRAM OF TOWNSHIP SHOWING NUMBERING OF SECTIONS

31	32	33	34	35	36
30	29	28	27	26	25
19	20	21	22	23	24
18	17	16	15	14	13
7	8	9	10	11	12
6	5	4	3	2	1





DESCRIPTIVE NOTES

The oldest exposed rocks are dark grey shales, sandy shales and minor amounts of shaly sand of the Lea Park formation (1). These include the equivalents of the Pakowki, Milk River, and part of the Foremost formations of southern Alberta. Glauconite is common in the sandy beds and the formation appears to be largely of marine origin. Contacts with other formations are not exposed but well borings within the map-area indicate a thickness of 750 feet.

Beds of the Oldman and Foremost formations of southern Alberta are exposed in two limited areas. In the faulted section along Woodpile Creek parts of both formations (2) are incompletely exposed and cannot be differentiated. Only the upper few feet of the Oldman formation (3) is exposed in the northwest corner of the map-area. Massive, thick sandstones appear fairly abundant in the lower part of the Woodpile Creek section; shales and organic beds are numerous in the upper portion. Lignite seams, some of which have been mined, are common in the upper 160 feet. Both marine and brackish water fossils are present. The Boundary well, at Woodpile Creek, commenced in and penetrated 980 feet of upturned and faulted beds of Oldman and Foremost age. The Twin Provinces No. 1 well, at the northwest corner of the map-area, penetrated a section representing a true, combined thickness of 695 feet of these beds. Glauconite is common in the sands of the lower 360 feet. Interbedded with these are beds of organic shale, lignite, and dark grey shale. This part of the section represents a transition to the underlying marine-shales of the Lea Park.

The Bearpaw formation (4) underlies much of the map-area but at no place is a complete section exposed nor do any wells penetrate the entire formation. From a composite section measured along Boxelder Creek it is estimated that the Bearpaw is 930 feet thick. It consists mainly of dark marine shale but contains occasional sandstone and sandy strata. Two sandstone members, the Oxarart and the Belanger, have proved to be valuable horizon markers and were used to investigate the structure of this part of the Cypress Hills. The Oxarart is composed of fairly massive, grey to buff sandstone that, at the top, is hard, rusty, and greenish-grey and contains much white fossilized wood, plant impressions, worm burrowings, etc. In it, at places, are seams of lignite, as much as 2.5 feet thick, and occasional oyster beds. The Oxarart thickens from more than 20 feet on Davis Creek to 65 feet one mile west of Oxarart Creek, and to 90 feet on Boxelder Creek. The top appears to be everywhere 190 to 200 feet below the Bearpaw-Eastend contact. The Belanger member lies 25 feet above the Oxarart and is uniformly 20 to 25 feet thick. It consists of brown and grey sandstone and dark shale, and contains a calcareous concretionary layer, rich in fossils, that commonly outcrops as a prominent ledge, in general 35 to 40 feet above the hard ledge-forming surface of the Oxarart member.

The Eastend formation (5) consists mainly of buff to brown and grey very fine sands, with some silts and grey shale. Organic laminae are numerous and to the west lignite seams are present. Contacts are transitional into the underlying marine Bearpaw and the overlying non-marine Whitemud formations. The Eastend is consequently considered to represent a transition from marine to non-marine conditions of sedimentation. It ranges in thickness from 65 feet to 100 feet.

The Whitemud formation (6) is from 50 to 75 feet thick. The name is here restricted to the mainly refractory, light coloured and white, kaolinized feldspathic sandstone, silt, and clay beds that comprise zones 1, 2, and 3 of the formation as described from the type sections at Whitemud, Saskatchewan. The formation has originated under conditions of alluvial or subaerial deposition.

The Battle formation (7, in part), where present, is as much as 30 feet thick. The name is here given for the first time and applies to strata that occur at places between the Whitemud and the Frenchman formations. It includes the black bentonitic shale, formerly referred to the No. 4 zone of the Whitemud, and olive green bentonite, shale, and silt lying above the black bentonitic shale.

The Frenchman formation (7, in part) ranges in thickness from 25 feet to 225 feet. The name is here applied for the first time to the beds that lie above an erosional unconformity within what was formerly called the Lower Ravenscrag. The formation consists mainly of coarse, cross-bedded and massive, compacted to indurated brown and greenish brown sandstone, with minor amounts of green and grey shale, silt, bentonitic shale, and bentonite. It is of non-marine origin. Dinosaur remains have been collected from it at widely scattered points.

The Ravenscrag formation (8) is 250 to 280 feet thick. The name is here used to apply only to strata that previously comprised the Upper Ravenscrag. They are conformable with underlying Frenchman beds. The formation is of non-marine origin and consists of buff and grey fine sands, silts, and shales, with numerous lignitic seams. It is divisible into an upper buff facies and a lower grey facies.

The Cypress Hills formation (9) lies unconformably above the Ravenscrag and all older formations down to and including the Bearpaw. It consists of thick beds of coarse conglomerate and massive cross-bedded hard grey coarse sandstone, generally underlying the plateau-like surface of the Cypress Hills.

The strata exposed in the Cypress Hills drop in elevation at an average rate of 13 feet per mile eastward, in the distance between the east and west boundaries of the map-area. North of the hills the regional dip is northeastward. The apparent northward dip, measured in a north-south section, increases from 10 feet per mile, near the northern border of the map-area, to 50 feet per mile in the southern part of township 9. On the south slopes of Cypress Hills, outcrops of the Oxarart and Belanger members of the Bearpaw formation, as measured along five north-south vertical sections, are from 50 to over 100 feet lower than outcrops of the same members on the north slopes of the hills.

The top of the Whitemud formation at Boundary Plateau in sec. 15, tp. 1, rge. 23, is 213 feet below the same horizon on the north side of Frenchman River Valley in sec. 26, tp. 6, rge. 23. The base of the Whitemud at the west end of Old Man On His Back Plateau, is at an elevation of 3,450 feet. As the formation is here at least 55 feet thick, the elevation of its top would be 3,505 feet, as compared with 3,212 feet at Boundary Plateau. The difference in elevation between these two points represents an average drop of 16.5 feet per mile southeast.

The Belanger member outcrops at an elevation of 3,237 feet at the west end of Old Man On His Back Plateau, in sec. 15, tp. 3, rge. 25, as compared with 2,944 feet in Coteau Creek, in sec. 6, tp. 2, rge. 23. The difference represents an average fall of 21.7 feet per mile between these two points. What may be the Belanger member outcrops at an elevation of 3,142 feet in sec. 19, tp. 3, rge. 25. The average fall in elevation between there and sec. 15, tp. 3, rge. 25, is 35 feet per mile, suggesting a possible sharp reversal in dip or faulting.

The elevation of the contact of the Bearpaw and Oldman formations has been measured at the following localities:

Twin Province No. 1 well.....2512 feet
Gem Dome Oil and Gas well (the contact is estimated to lie at 110 feet below the bottom of the well).....2638 feet
Well drilled for water by town of Senate, NE.¼, sec. 3, tp. 4, rge. 28.....2665 feet
Woodpile Creek, sec. 4, tp. 1, rge. 27 (on south or upthrown side of thrust fault).....2635-2650 feet

The cumulative evidence indicates that the general structure may be an easterly plunging, broad, gentle anticline.

NOTE 1. The strata within the uncoloured area dip at high angles and are slickensided (particularly bentonite beds), crumpled, and drag-folded to such an extent as to indicate deformation under pressures much greater than could be attributed to slumping. A northward-trending thrust fault probably lies immediately west of the outcrops indicated within this area.

MAP 784A

CYPRESS LAKE

WEST OF THIRD MERIDIAN

SASKATCHEWAN

Scale, 1/253,440 or 1 Inch to 4 Miles

Miles 4 0 8 12

Approximate magnetic declination, 20° East.

784A