CANADA

DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

PRELIMINARY SERIES

SHEET 82 I (West Half)

Adjoins Preliminary Map 55-7, "Beiseker"

LEGEND

CENOZOIC

QUATERNARY

RECENT

10 Alluvium, modern stream deposits: gravel, sand, silt, clay; minor till and bedrock exposures; 10a, mostly gravel, minor sand and silt

9 Wind deposits, including areas of blow-outs: sand

PLEISTOCENE AND RECENT

8 Lake deposits, coarse: sand, silt

7 Lake deposits, fine: silt, minor clay, locally varved

PLEISTOCENE

6 Alluvium, floodplain or delta deposits: sand, silt, clay, minor gravel; 6a, coarse: mostly gravel

5 Outwash and kame deposits: gravel, sand, silt; 5a, esker delta deposits; 5b, kame deposits; 5c, outwash; including pitted plains

4 Hummocky moraine: till; minor amounts of gravel, sand, silt

3 Ground moraine: till; 3a, modified by stream and lake erosion or deposition

TERTIARY AND EARLY QUATERNARY

2 Alluvium: pre-glacial gravel and sand; includes 'Saskatchewan gravel and sand'

MESOZOIC AND CENOZOIC

CRETACEOUS AND TERTIARY

1 Bedrock: sandstone, shale; locally covered by thin drift, slump, or alluvium

Geological boundary (defined, approximate, assumed)

Ice-flow markings: drumlins, drumlinoid ridges, furrows, flutings, gouges; individual features or groups of features defining direction of ice-movement; (symbol represents actual length of feature)

Esker ridge: till, gravel, sand, silt, clay (direction of stream flow defined)

Limit of quartzose conglomerate boulder train

Buried valley (edge approximate)

Geology by A. MacS. Stalker, 1954 and 1955

Main highway

Secondary road

Other roads

Township boundary

Intermittent lake and stream

Marsh

Contours (interval 200 feet)

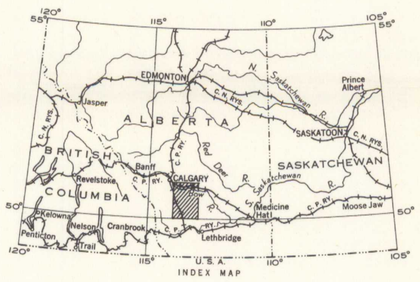
Height in feet above mean sea-level

Approximate magnetic declination, 21° 34' East

Cartography by the Geological Cartography Unit, 1957

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

In response to public demand for earlier publication, Preliminary Series maps are now being issued in this simplified form, thereby effecting a substantial saving in time. There is no loss of information, but the maps will be clearer to read if all or some of the map-units are hand-coloured.



INDEX MAP

DESCRIPTIVE NOTES

The High River area has been glaciated by both Laurentide and Cordilleran ice. Laurentide glaciers overrode the whole area, including points up to 5,400 feet above sea-level on one or more occasions. Cordilleran ice, generally as valley glaciers, reached western parts of the area at least once, but subsequent Laurentide ice overrode all districts affected by Cordilleran glaciers. Thus Laurentide drift everywhere covers Cordilleran drift. The latter is confined mostly to buried valleys, such as the former Bow Valley southeast of Calgary (section 4, township 23, range 29), and perhaps locally in valleys in the Porcupine Hills. The Laurentide glaciers, especially the last (Wisconsin) ice-sheet, received much Cordilleran ice from valley glaciers north of the area, and the Laurentide drift in the western parts of the area contains much Cordilleran material.

The last or Wisconsin Laurentide glacier apparently did not advance as far westward as did one or more of the earlier Laurentide glaciers. The limit of its maximum advance probably was just to the west of the quartzose conglomerate boulder train. It may have reached a general elevation of about 4,500 feet above sea-level, and within the map-area did not have much contact with Cordilleran ice. Most of the glacial features shown were formed during the retreat of the Wisconsin Laurentide glacier. The substages of the Wisconsin stage, and minor rejuvenations and retreats, were reflected by thickening and thinning of the ice-sheet rather than by extensive advances and retreats of its margin. This was due to the presence of steeply rising land on the west that limited the expansion of the glacier.

Meltwater and run-off from the Foothills and Rocky Mountains drained southward along the western margin of of the Laurentide ice-sheet. These marginal rivers cut a remarkable system of short valleys, now dry, through ridges and high land of the Porcupine Hills, but crossed over ice and hence left no record where the glacier occupied interridge low areas. One valley through a high ridge (section 6, township 13, range 28) is 700 feet deep, and many of the others in the Porcupine Hills are 100 to 300 feet deep. As the ice-level fell and the margin retreated, new, lower valleys formed farther to the east and the earlier channels were abandoned. These later valleys were longer and more continuous as the glacier margin on the plains was more regular than in the Porcupine Hills. These valleys, eastward as far as the Little Bow Valley, roughly represent successive margins of the glacier.

The overall movement of the last large glacier appears to have been southward to southeastward, or nearly parallel to the edge of the foothills of the Rocky Mountains. Locally the direction of movement was affected by wastage along the western margin of the ice-sheet, which induced southwestward movement in the marginal zone. Such movement was particularly pronounced where large ice-marginal streams were present, as in the case of the Little Bow River east of Cayley. Topographic control on local movement was particularly effective south of the Bow River, where ice flowed through passes in the high land between the town of Okotoks and Buffalo Hill and fanned out to the east and west upon reaching low land to the south. The largest southward flow was in the valley now occupied by the West Arrowwood River, but movement in the valley now occupied by Highwood River at Aldersyde caused a conflicting trend near Frank Lake. Various directions of local flow are indicated by ice-flow markings formed near high land as the glacier surface lowered, and these directions commonly conflict with those formed in low land during the final movements of the ice.

The large buried valley that corresponds approximately to the present Bow Valley represents the pre-glacial course of the Bow River. Where the present valley cuts the buried valley it contains good sections through the Pleistocene deposits. The modern river has not yet cut to the base of its former valley. The pre-glacial valleys of the Sheep and Highwood Rivers and of Mosquito Creek apparently joined east of High River, and probably flowed northeastward into the former Bow River through the West Arrowwood Valley. Thick drift is reported along much of this latter valley. Pre-glacial gravel and sand is not reported in the buried valley at Carmangay and this valley is probably of interglacial age. Other buried valleys may be present. These buried valleys contain most of the old drift of the area.

The pre-glacial alluvium (2) includes the best gravel in the area. The isolated deposits probably represent an old, high level channel of the former Bow River. Much more of this gravel is present near the base of the fill in the pre-glacial valleys of the Bow, Highwood, and Sheep Rivers.

The ground moraine (3) averages about 15 feet in thickness. It also underlies most of the lake deposits.

Much of the hummocky moraine (4) was deposited on high areas as the ice surface lowered, locally the ice became thin and stagnant, and active ice brought the morainal material into these areas from several directions.

The outwash and kame deposits (5) and the eskers supply much of the gravel used at present. These deposits were laid down in the stagnant marginal zone of the glacier. The esker deltas in particular were largely formed at the margin of the glacier in glacial-lake Carmangay.

Alluvium (6) supplies much good gravel, chiefly from deltas built by meltwater streams where they emptied into glacial lakes.

Most of the lake deposits (7, 8) were laid down in glacial-lake Carmangay, which covered much of the southeastern part of the area during retreat of the last glacier. Silt is the commonest material, but locally clay or varved silt and clay is present at the surface.

Wind deposits (9) include both sand dunes and interdunal areas. Southwesterly or west-southwesterly winds formed most of the dunes. Many of them are of fairly recent origin and some duning is still taking place. The dunes are generally small, and they are found chiefly in the basin of glacial-lake Carmangay.

The pebbly quartzose conglomerate boulder train is a string of large, angular, distinctive erratics, seemingly brought from the north. It is part of a much larger boulder train that extends northwestward along the Foothills from the United States border to at least the latitude of Edmonton. The individual boulders in the area range up to 40 feet in longest dimension above ground.

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MAP 14-1957

SURFICIAL GEOLOGY

HIGH RIVER

WEST OF FOURTH MERIDIAN

ALBERTA

Scale: One Inch to Four Miles = $\frac{1}{253,440}$

Miles

4 2 0 4 8 12

MAP 14-1957
HIGH RIVER
ALBERTA
SHEET 82 I (West Half)