CANADA
DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

SHEET 82 P (West Half)

LEGEND

QUATERNARY

RECENT

11 — ***Modern stream deposits:*** *gravel, sand, silt, clay; minor till and bedrock exposures*

10 — ***Wind deposits, including areas of blow outs:*** *sand*

PLEISTOCENE AND RECENT

9 — *Lake deposits, fine: silt, clay, minor sand; locally varved*

8 — ***Lake deposits, coarse:*** *gravel, sand, silt*

PLEISTOCENE

7 — ***Floodplain and delta deposits, coarse:*** *gravel and sand*

6 — ***Floodplain and delta deposits, fine:*** *sand, silt, clay; minor gravel*

5a-5d — *Outwash and inwash:* **5a**, *outwash; sand and silt*
5b, *outwash; gravel*
5c, *esker delta deposits; gravel, sand, silt*
5d, *inwash; sand and silt*

4 — ***Knob and kettle moraine:*** *till; minor gravel, sand, silt*

3 — ***Ground moraine:*** *till;* **3a**, *modified by stream and lake action*

TERTIARY AND EARLY QUATERNARY

2 — ***Stream deposits:*** *gravel and sand; includes 'Saskatchewan' gravel and sand*

CRETACEOUS AND TERTIARY

1 — ***Bedrock:*** *sandstone, shale, coal seams;* **1a**, *exposed by erosion;* **1b**, *exposed or thinly covered, as left by the glaciers*

CENOZOIC

MESOZOIC AND CENOZOIC

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

Esker ridge: till, gravel, sand, silt, clay (direction of stream flow defined, not defined)

Limit of quartzose conglomerate boulder train

Buried valley (edge defined, edge assumed)

Geology by A. MacS. Stalker, 1952-54

Main highway

Secondary roads

Township boundary

Intermittent lake and stream

Marsh

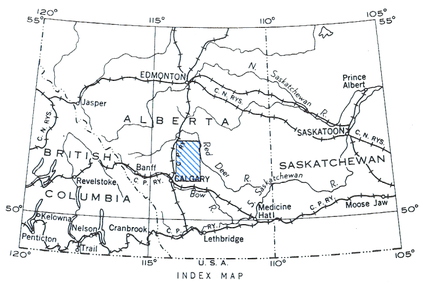
Contours (interval 200 feet)

Height in feet above mean sea-level

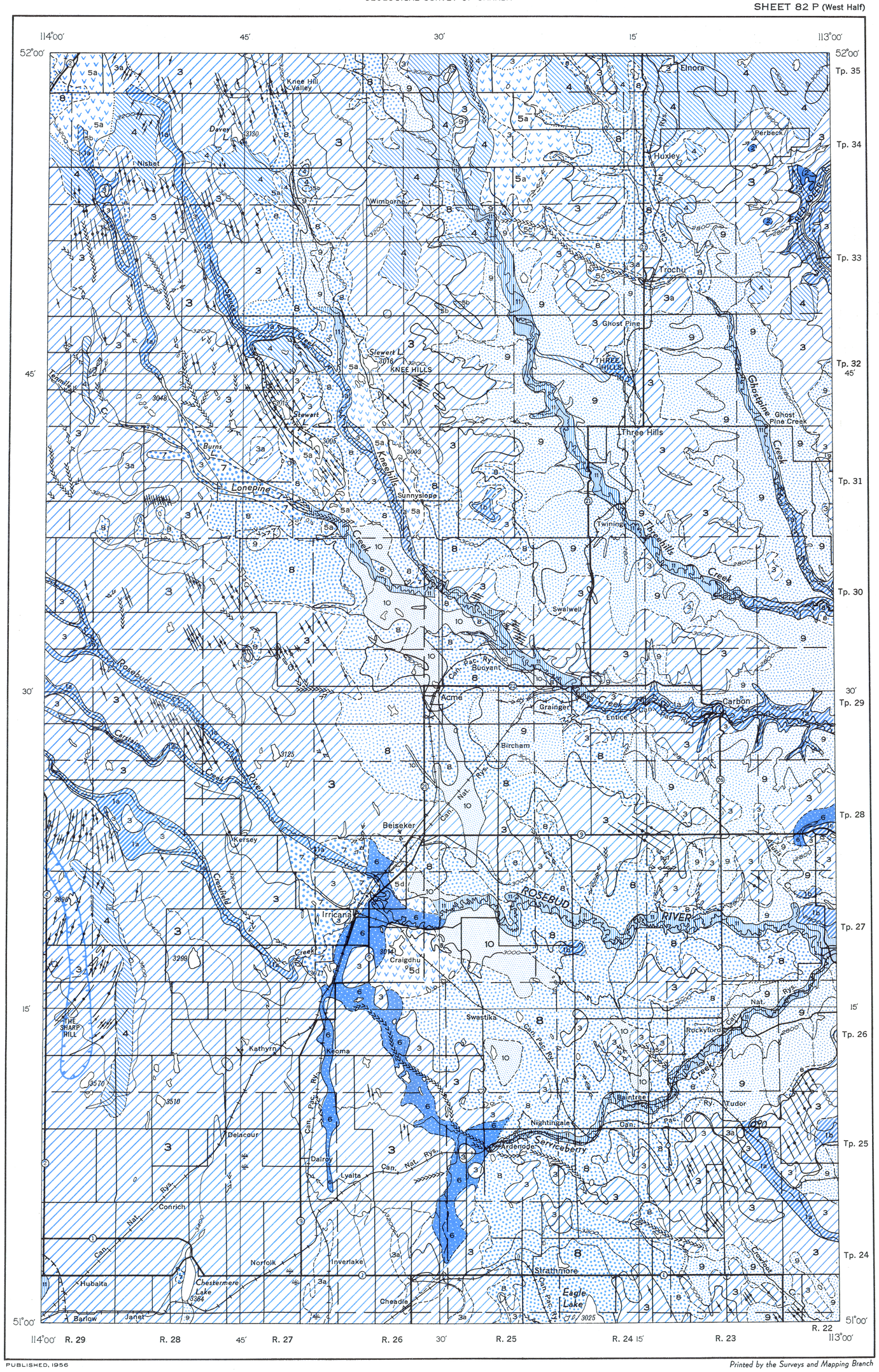
Approximate magnetic declination, 22° 24' East

Cartography by the Geological Cartography Unit, 1956

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



INDEX MAP



PUBLISHED, 1956

Printed by the Surveys and Mapping Branch

PRELIMINARY MAP 55-7

SURFICIAL GEOLOGY

BEISEKER

WEST OF FOURTH MERIDIAN

ALBERTA

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

Miles

4 2 0 4 8 12

DESCRIPTIVE NOTES

SEQUENCE OF EVENTS

The final disappearance of the glaciers in the Beiseker area took place chiefly by thinning, and hence there were several local, gradually lowering, ice margins around the upland areas rather than a single, major, retreating ice-front. The wasting ice-sheet underwent one known rejuvenation (presumably late Wisconsin), which resulted in readvance and a thickening of the ice-sheet of more than 500 feet. The ice had largely, if not entirely, melted from the map-area prior to this rejuvenation, but any ice-free interval was of short duration.

Most of the features mapped are the result of the glacial and allied processes involved with the freshening of the glacier and with its final disappearance. Almost all the features that indicate direction of ice movement were moulded by this readvance. A few such features in townships 34 and 35, range 28, remain from an earlier ice advance and indicate that it had moved in a more westerly direction.

The over-all ice movement during the readvance in this part of Alberta was southward, but topography locally deflected the flow. The lowland in the east-central part of the area caused an increasingly eastward component in the movement there, until it was nearly parallel with the natural stream drainage and regional slope. Near The Sharp Hill (township 26, range 29) the western border of the ice-sheet in this glacial stage was close at hand and there was a local southwestward movement of the thin ice on the high land.

Following the period of readvance the ice stagnated, and wastage of the ice steadily increased the extent of ice-free land in upland areas. The ice lying in low areas blocked the natural eastward drainage, so that streams flowed southward into high level glacial lakes situated south of the map-area. When about one-half of the map-area was free of ice, ponding commenced along the western edge of the ice and to the north in the valleys of Kneehills and Threehills Creeks. The ponding north of township 24 (the first stage of glacial-lake Drumheller) was most important. It started at an elevation of 3,050 feet or higher. With continued wastage of the ice the water level dropped, with temporary halts at elevations of about 3,000, 2,975, 2,925, 2,850, and 2,775 feet, as indicated by the relative positions of both the deposits and the outlet channels. An outlet southeast of Tudor (township 25, range 23) controlled the 2,975- and 2,925-foot lake levels; broad, shallow outlets in townships 24 and 25, ranges 24, 25, and 26, controlled the higher levels; and outlets east of the area controlled the lower lake levels. The lake levels below 2,975 feet elevation were longer lived than the higher ones. At various stages, as the water level dropped and the lake migrated eastward, it was divided by areas of high ground, only to become a single lake again upon further retreat of the ice. These high areas are chiefly east of Beiseker (township 28, range 26), and near Swalwell (township 30, range 24). A major divide along the border of townships 24 and 25 permanently separated the lakes in township 24 from those farther north.

Wind action was widespread following the disappearance of both ice-sheet and lakes, and dunes were developed over a wide area.

DESCRIPTION OF DEPOSITS

The buried valley in the southwestern part of the area is the assumed course of the pre-glacial Bow River. The river is thought to have been diverted by the first glaciation of the area. The fill in this valley is 50 to 150 feet thick, and consists of till, gravel, and sand. It includes most of the old, probably pre-Wisconsin, till in the area, and also the only example of Cordilleran till noted.

The boulder train in the vicinity of The Sharp Hill is a string of numerous, large, angular, distinctive erratics. These are composed of quartzose conglomerate and seemingly have been brought from the north. It is part of a much larger boulder train found elsewhere in Alberta. The individual boulders range up to 35 feet in longest dimension above ground, and up to 1,000 tons.

Some of the esker ridges are composed of stream deposited gravel, sand, and silt. Most, however, consist of till with only minor pockets of gravel and sand, and these are thought to have been formed by till that was forced laterally and upwards, by the weight of the adjoining ice, into the sub-glacial openings formerly occupied by the esker streams. The ridges contain perhaps 1,500,000 cubic yards of gravel, almost all of poor quality and mostly in the stream deposited ridges.

The pre-glacial alluvium (2) includes several small (about 30,000 cubic yards altogether) deposits of good quality gravel in townships 33 and 34, range 22. Although other minor deposits of this gravel may exist, no large deposits are known except those deeply buried in the old Bow River valley.

The ground moraine (3) averages about 10 feet in thickness. It forms the surface material of a large part of the area and underlies most of the lake deposits.

The knob and kettle moraine (4) averages between 20 and 40 feet in thickness.

The outwash (5a and 5b) consists of hills of stony sand and silt, commonly overlying till hills. Small amounts of poor quality gravel are present. The esker delta deposits (5c) consist largely of flat-topped sand and silt hills. A few ice-rafted stones are present. The deposits represent deltas built by ice-confined rivers upon entering glacial lakes. The inwash (5d) consists of fairly thick, even-topped, deposits of sand and silt. It was laid down by streams flowing towards the ice, and thus rafted pebbles are rare in it. As it was deposited over isolated ice blocks and the thin, marginal zone of the glacier, kettle-holes and depressions are common.

The coarse Pleistocene alluvium (7) includes most of the gravel in the area, and also much good sand. The gravel and sand is mostly in the deltas formed by surface streams flowing from the north and west into glacial-lake Drumheller at Irricana (township 27, range 26); in township 31, range 27; and south of Sunnyslope (township 31, range 26). The deposits contain between 25,000,000 and 75,000,000 cubic yards of gravel and sandy gravel, much of it of good quality. The gravel mantles an area of about 20 square miles. It is improbable that other large deposits of this gravel exist.

The lake deposits (8 and 9) above 2,950 feet elevation are patchy, generally less than 5 feet thick, and are largely sand. Elsewhere silt and clay, commonly varved, is of major importance, although much sand is present. The late stage lake deposits in the low districts in the eastern part of the area are generally more than 40 feet thick, and at many places northeast of Rockyford (township 26, range 23) are more than 100 feet thick.

The areas mapped as aeolian sand (10) include both the sand of the dunes themselves and various other deposits that surround the dunes. The dunes are mostly small and indicate many wind directions. They occur on lake, alluvial, outwash, and inwash sands.

PRELIMINARY MAP 55-7
SURFICIAL GEOLOGY
BEISEKER
ALBERTA
SHEET 82 P (West Half)