



LEGEND

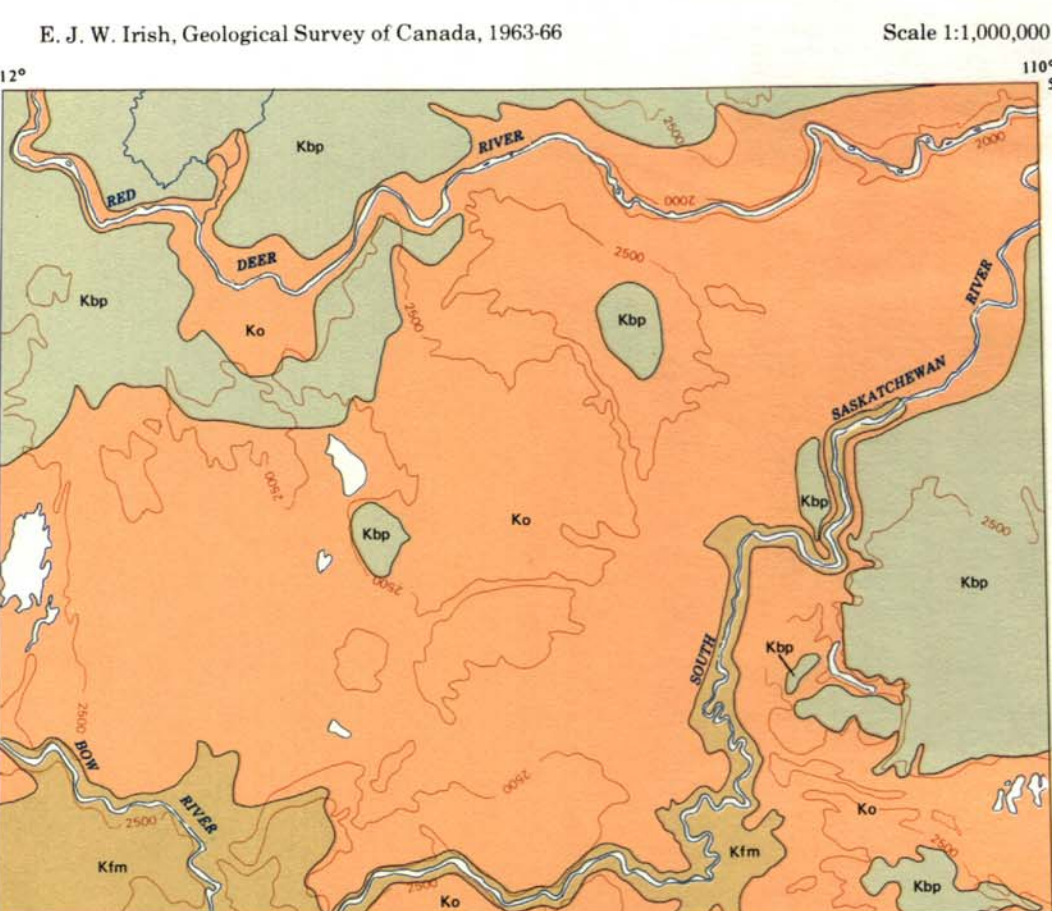
RECENT

- EROSIONAL FEATURES**
 - 16 Eroded slope: mainly bedrock with thin colluvium in places; slumping common; includes extensive badlands along the South Saskatchewan and Red Deer Rivers
- ALLUVIAL DEPOSITS**
 - 15 Stream alluvium: thin deposits of silt and clay with minor sand and gravel along stream valleys; this colluvium cover on valley slopes
 - 14 Alluvium: river terrace and floodplain gravel, sand, and silt
- LACUSTRINE DEPOSITS**
 - 13 Sand: adjacent to Many Island Lake
 - 12 Silt and clay: associated with alluvial sediments along many of the meltwater channels
- AEOLIAN DEPOSITS**
 - 11 Aeolian sand: medium to fine-grained sand in sheets and parabolic dunes; blowouts and minor loess
- PLEISTOCENE**
 - GLACIOFLUVAL DEPOSITS**
 - 7 Outwash sand and gravel: forms outwash plains; surface level to gently undulating
 - 6 Meltwater channel sediment: sand and gravel overlain in many places by thin alluvial deposits
 - 5 Kame, kame moraine: sand and gravel with scattered till lenses
 - 4 Eskers, crevasse fillings: mainly sand with scattered lenses of gravel and till
 - GLACIAL DEPOSITS**
 - 3 Hummocky moraine: till composed of sand, silt, and clay with gravel, generally thick; topography undulating to gently rolling
 - 2 Hummocky and ridged end moraine: till, generally thick; present as closed and linear ridges and depressions, and aligned knobs
 - 1 Ground moraine: till composed of sand, silt, and clay with gravel; variable thickness; topography level to undulating

Geology by T. E. Berg, 1966, 1967, 1968
R. A. McPherson, 1970, 1971

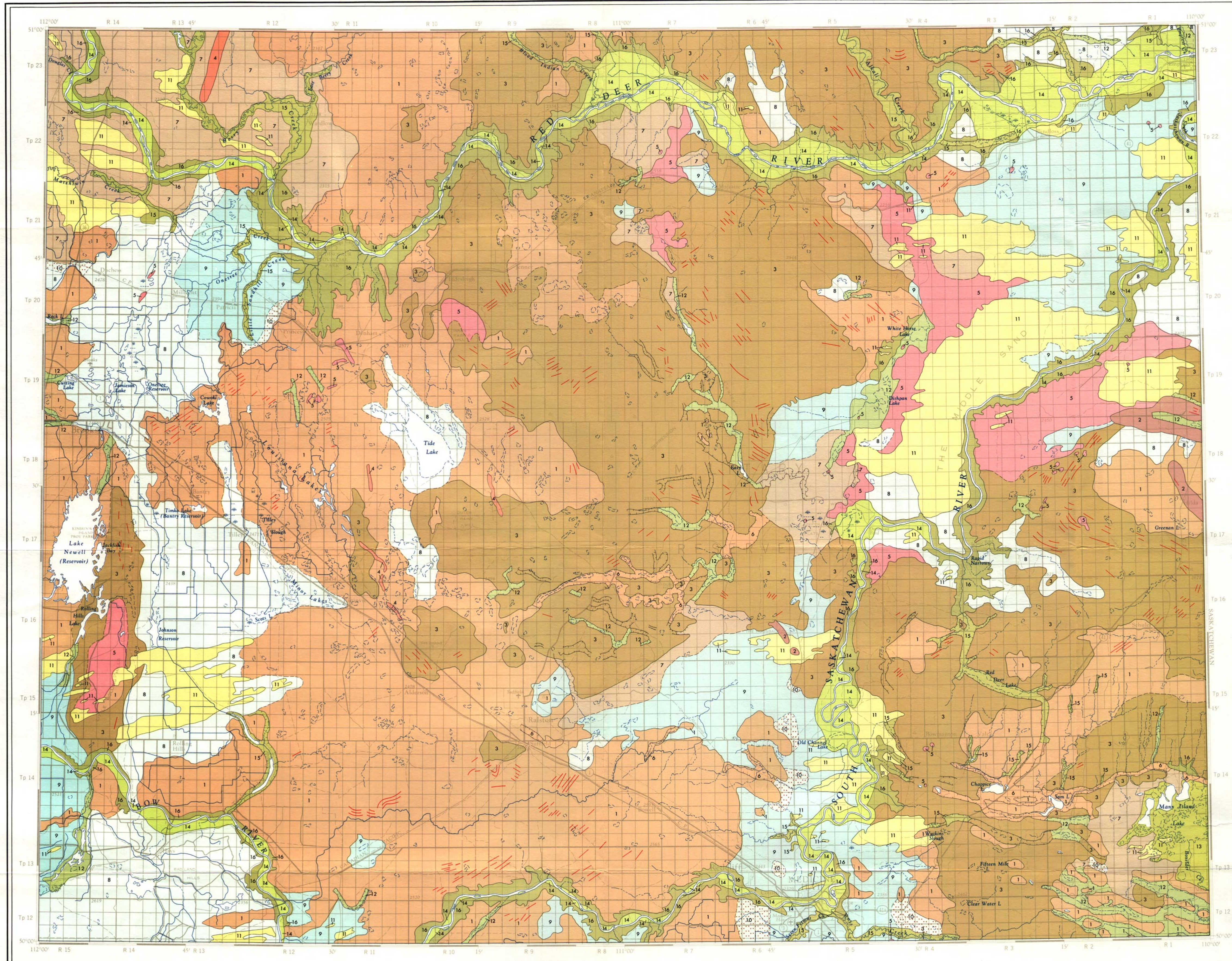
Map compilation and descriptive notes by R. A. McPherson

BEDROCK GEOLOGY



LEGEND

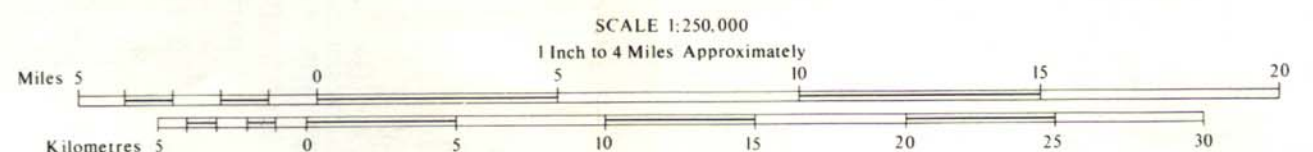
- CRETACEOUS**
 - Kmp Bearpaw Formation: dark grey bentonitic shale, silty shale, and argillaceous sandstone; thin concretionary ironstone and bentonite beds; marine
 - Ko Oldman Formation: thick cross-bedded, pale grey sandstone, siltstone, and shale with concretionary ironstone beds; Lethbridge coal member near top; nonmarine
 - Kfm Foremost Formation: pale grey sandstone, siltstone, and shale; thin coal seams and concretionary ironstone beds; nonmarine
- Geological boundary
- Surface contour (contour interval 500 feet)



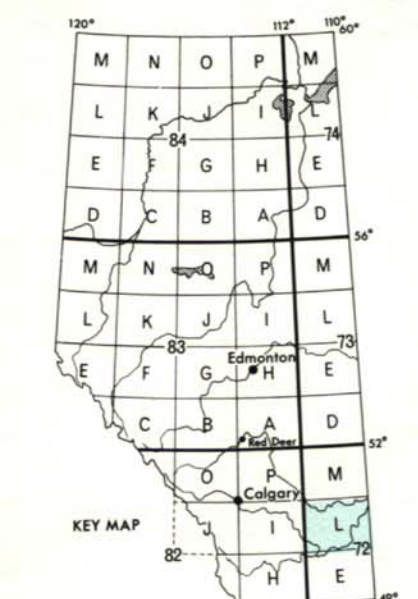
Base map provided by Surveys and Mapping Branch, Department of Energy, Mines and Resources, modified by Surveys Branch, Alberta Department of Highways and Transport

Cartographic editing by J. D. Root
Drawn by D. E. Jacobs

- River or stream
- Intermittent river or stream
- Lake
- Intermittent lake
- Road, hard surface, all weather
- Railway
- Township boundary
- Section line



SURFICIAL GEOLOGY
MEDICINE HAT
NTS 72L



DESCRIPTIVE NOTES

BEDROCK GEOLOGY

Quaternary deposits are underlain by a succession of Upper Cretaceous strata consisting of the Foremost, Oldman, and Bearpaw Formations. Bedrock outcrops are confined primarily to major river valleys but are present in isolated localities elsewhere, especially along meltwater channels.

The Foremost Formation underlies the drift in the southwest corner of the area. It also is exposed along the South Saskatchewan River valley from the southern part of the area to approximately 4 to 5 miles north of Medicine Hat. It is composed of interbedded sandstone, siltstone, and shale containing coal seams and concretionary ironstone beds.

The Oldman Formation underlies the major portion of the area in a wide northeast-trending band. Exposures are present in the South Saskatchewan River valley near Empress, and in the Red Deer River valley, especially in the northwest portion of the area, where erosion of Oldman beds has resulted in badland topography. Much of the badland region is now included in Dinosaur Provincial Park. The Oldman beds consist of sandstone, siltstone, and shale containing concretionary ironstone beds. The strata are low in carbonaceous matter except for the Lethbridge coal member near the top of the formation.

The Bearpaw Formation is present primarily in the northwest and east-central portions of the area, and in isolated localities elsewhere. It consists of a succession of argillaceous sandstone, silty shale, and shale containing concretionary ironstone bands and thin bentonite beds. The bedrock topography of the region is characterized by upland areas, which coincide with present-day upland areas, and by bedrock channels of preglacial drainage systems, which generally coincide with broad depressions in the existing land surface. Two major preglacial valleys are present (Carlson, 1970): the Calgary Valley, which approximately parallels the course of the Red Deer River, and the Lethbridge Valley, which trends northward across the area. Both valleys have a number of tributaries which form a preglacial dendritic drainage pattern.

SURFICIAL DEPOSITS AND LANDFORMS

Glacial Deposits

Till, which is unsorted material deposited from a glacier, is divided on the basis of topography: *ground moraine* has local relief less than 15 feet; *hummocky moraine* has local relief greater than 15 feet, consisting of closed and linear, unaligned ridges and depressions; and *hummocky and ridged end moraine* has local relief greater than 15 feet, consisting of aligned knobs, closed and linear ridges and depressions exhibiting ice flow control.

Ground moraine widespread in the western half of the area, whereas hummocky moraine is found in the north-central and south-eastern parts. End moraines include a 3-mile long segment of moraine situated 30 miles north of Medicine Hat (called the Hogback), a 7-mile long portion of the Fox Valley moraine north of Hilda, and a 5-mile long segment of end moraine near Hilda which is part of the Bigstick moraine complex of Saskatchewan.

At least three till sheets are recognized in the area; the best exposures are located along the South Saskatchewan River valley north of Medicine Hat.

Glaciofluvial Deposits

Ice-contact deposits are widespread in the area and consist of kames, kame moraine, eskers, and crevasse fillings. The deposits vary widely in grain size: kame moraine near the Little Rolling Hills is composed primarily of sand and silt; outwash sand contains sand with a high percentage of till, and south and north of Atlee is composed of gravel and sand. In the vicinity of the Middle Sand Hills, the kame deposits vary considerably in grain size; in some instances gravel predominates and in others sand.

Isolated kames, eskers, and crevasse fillings are present throughout the area; they generally are composed of sand with minor gravel pockets. *Outwash deposits* are common in the area. The largest deposit is found in the northwest corner of the area and covers approximately 270 square miles. Sand predominates; however, thin scattered gravel pockets are found overlying till and in certain localities along the Red Deer River course gravel deposits greater than 25 feet thick are present. North and south of Atlee, outwash gravel with minor sand is associated with kame moraine. Outwash sand is fairly extensive in the Juniper Flats area and northeast of Hilda. Outwash sand and gravel also are present adjacent to Many Island Lake.

Meltwater channel sediments are found primarily in the central and southeastern portions of the area and in scattered localities elsewhere. They consist primarily of sands and gravels with pockets of till and lacustrine sediments. Some are overlain by alluvial and lacustrine sediments.

Glaciolacustrine Deposits

Fine-grained sediments of lacustrine origin have been divided into three units: those composed of mainly silt and clay; sand and silt; and sand, silt, and clay with pebbles and lenses of siltlike material. The glacial lake north and south of Brooks consists of primarily silt and clay, except for a sandy portion in the Patricia area. Glacial lake sediments composed primarily of sand and silt are extensive south of Empress and north and south of Medicine Hat. In the Medicine Hat area till-like deposits and pebbles are present in the lake sediments, having been derived from ice rafting and mud flows.

Aeolian Deposits

Medium to fine-grained sand of aeolian origin is found in various parts of the area, being especially widespread in the northwest corner of Little Rolling Hills, in the Middle Sand Hills, and along the South Saskatchewan River north of Medicine Hat. They are found as sheet deposits and parabolic dunes; blowouts and small areas of loess also are present. The aeolian sediments have been derived from outwash deposits and lacustrine sands. The dunes are relatively stable at the present time, having been formed shortly after deglaciation when the prevailing winds were from the west-southwest.

Recent Lacustrine Deposits

Recent lacustrine sand deposits a few feet thick are present adjacent to Many Island Lake. Recent lacustrine silt and clay are found along many of the meltwater channels where they are associated with alluvial sediments.

Alluvial Deposits

Alluvium consisting of river terrace and floodplain gravel, sand, and silt is extensive along the Bow, South Saskatchewan, and Red Deer Rivers.

Stream alluvium consists of recent sediments, mainly silt and clay with minor pockets of sand and gravel, that are found along many of the present-day streams. They are generally only a few feet thick. Alluvial fan deposits are associated with most of the streams and meltwater channels in the area, but they have too limited a distribution to be shown on the map.

Erosional Features

These features, in addition to stream valleys, include eroded slopes and slumps. Eroded slopes are common along most of the major rivers in the area, where bedrock is exposed in many places in the form of badland topography. Slumps are common on steep slopes, particularly where the streams have cut through the drift into weak shaly bentonitic beds.

REFERENCE: Carlson, V.A. (1970): Bedrock topography, Medicine Hat area. Res. Coun. Alberta map, scale 1:250,000.

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