



LEGEND

- RECENT**
- EROSIONAL FEATURES**
- 17 Slump: mixed glacial and bedrock materials; unstable slope
  - 16 Gully, creek valley: thin colluvial cover on valley slopes; thin alluvial materials along streams
- ALLUVIAL DEPOSITS**
- 15 Alluvial fan: bedded silt, sand and clay; variable thickness, overlying glacial deposits
  - 14 Stream alluvium: mainly sand along Athabasca River; sand and silty sand along other streams
  - 13 Athabasca River delta: alluvial sand, silt and clay, calcareous
  - 12 Peace River delta: alluvial silt, sand and clay, calcareous
  - 11 Small stream delta: sand, silt and clay
  - 10 Early Athabasca River sediments and terraces: medium- to coarse-grained sand, overlying thin gravel and lag gravel
- AEOLIAN DEPOSITS**
- 9 Aeolian sand, dunes: medium-grained quartzitic sand in sheet and dune form; thick in dunes, 2 to 10 feet in sheet sand

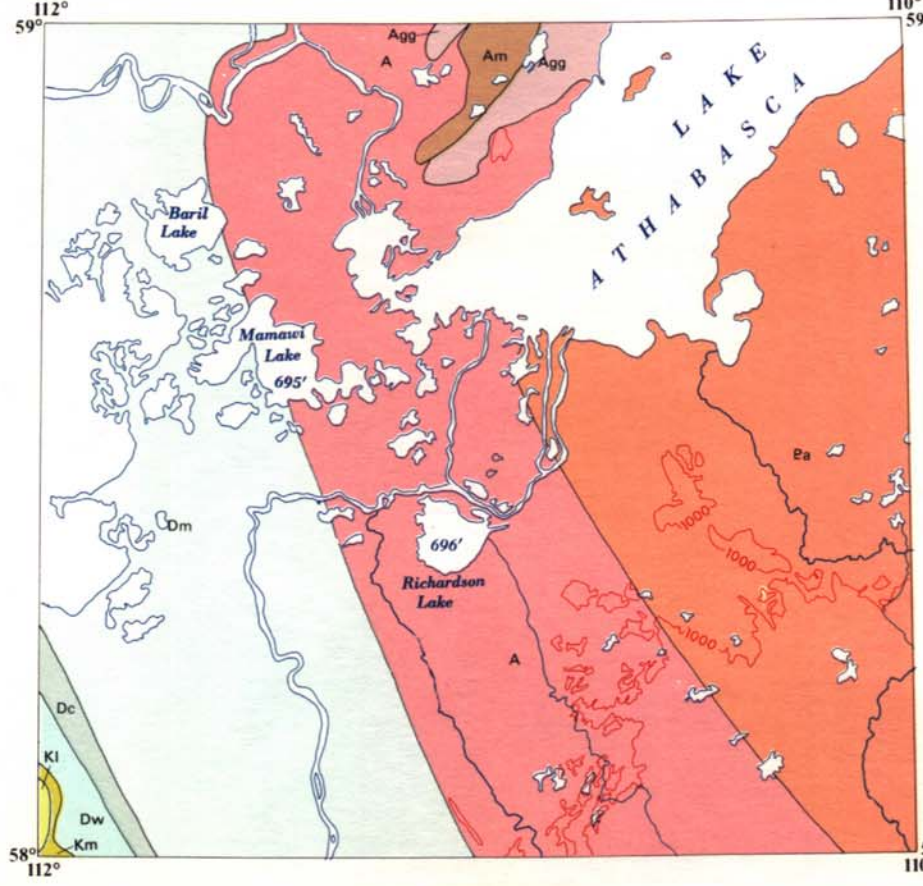
- PLEISTOCENE**
- GLACIOLACUSTRINE DEPOSITS**
- 8 Sand: thin, over glacial outwash sand and gravel
  - 7 Sand: thick, medium- to fine-grained sand with scattered silt and clay beds
- GLACIOFLUVIAL DEPOSITS**
- 6 Meltwater channel sediment: medium- to coarse-grained sand, overlying thin gravel and lag gravel
  - 5 Outwash sand: medium- to coarse-grained sand with pebbles and small gravel lenses; surface level to gently undulating
  - 4 Outwash sand and gravel: medium- to coarse-grained sand and gravel, with many large boulders; generally thin with some outcrops of Athabasca sandstone; topography undulating to rolling
  - 3 Outwash sand and gravel overlain by glacier: fluted and drumlinized outwash of sand and gravel to gravel, with many large boulders; generally thick to very thick; topography undulating to rolling
  - 2 Ice-contact deposits: sand and gravel to gravel, numerous very large boulders; rolling topography; individual hills reach heights of several hundred feet; includes kame moraine, eskers, moutin kames, crevasse fillings, and other related ice-contact glaciofluvial deposits; form end moraines of glacier advances

- PRECAMBRIAN**
- 1 Granite, gneiss and metasedimentary rocks: outcrops form hills and knolls; generally bare, locally covered with thin drift
- Geological boundary: defined, approximate, assumed
- Abandoned beach
- Channel scarp (ticks indicate downslope side)
- Athabasca sandstone outcrop
- Crevasse filling
- Drumlin (outline to scale)
- Glacial fluting

Geology by L. A. Bayrock, 1969, 1970

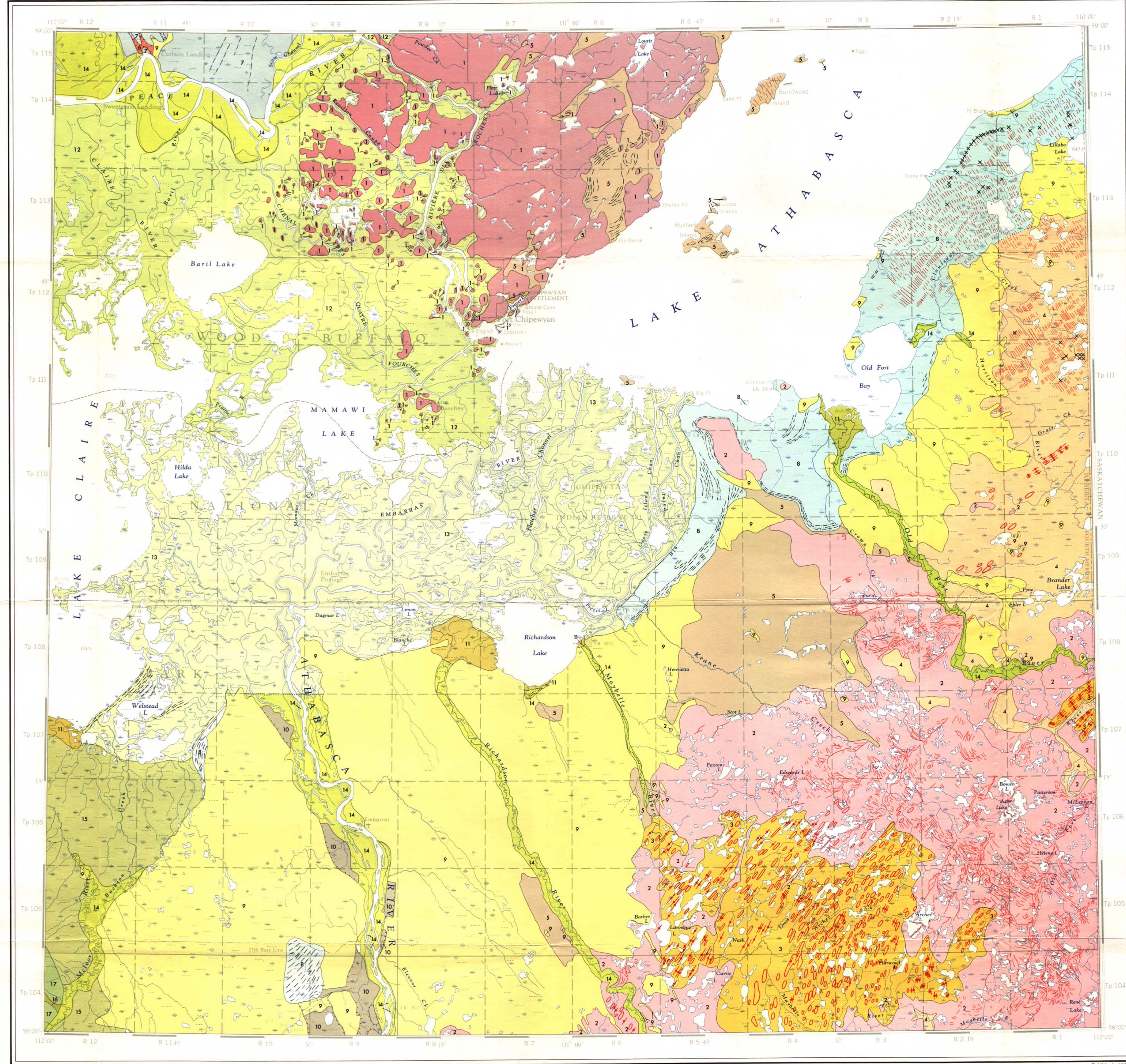
BEDROCK GEOLOGY

M.A. Carrigy and R. Green, 1965  
L. A. Bayrock and J. D. Godfrey, 1969



LEGEND

- CRETACEOUS**
- Kl Loon River Formation: dark grey shale
  - Km McMurray Formation: oil-impregnated quartz sand
- DEVONIAN**
- Dw Waterways Formation: grey shale, argillaceous limestone
  - Dc Slave Point Formation: limestone and dolomitic limestone, minor shale and gypsum
  - Dm Middle Devonian (undivided): dolomite, gypsum, anhydrite
- PRECAMBRIAN**
- Pa Athabasca Formation: quartzose sandstone, minor conglomerate and shale
  - Am Metasedimentary rocks: quartzite, schist, phyllite
  - Ag Granite gneiss
  - Ap Granitic plutonic rocks
- Geological boundary
- Surface contour (contour interval 500 feet)

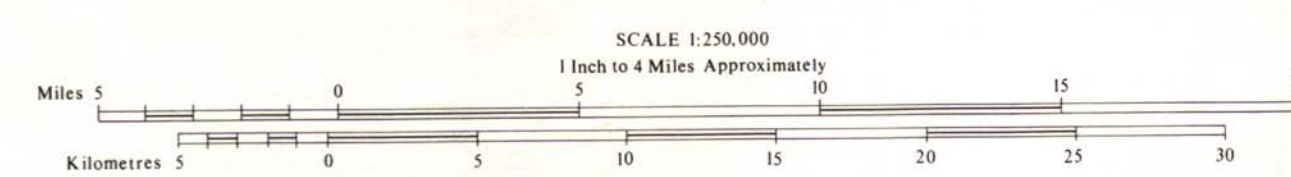


Base map provided by Surveys and Mapping Branch, Department of Energy, Mines and Resources; modified by Surveys Branch, Alberta Department of Highways and Transport

Cartographic editing by J. D. Root

Drawn by F. L. Copeland

- LEGEND**
- River or stream
  - Intermittent river or stream
  - Lake
  - Marsh or swamp
  - Township boundary: surveyed, unsurveyed
  - National Park boundary, Indian Reserve boundary



SURFICIAL GEOLOGY  
FORT CHIPEWYAN  
NTS74L

DESCRIPTIVE NOTES

BEDROCK GEOLOGY

Precambrian rocks underlie the eastern two thirds of the area, although exposures in the heavily drift-covered terrain south of Lake Athabasca are few. The oldest rocks are crystalline Shield rocks which outcrop extensively in the Peace-Athabasca delta region and north of Lake Athabasca. They are divisible into three general types: granitic plutonic rocks, granite gneiss of various types, and metasedimentary quartzite, schist, and amphibolite. These rocks are overlain unconformably by nearly flat-lying quartzose sandstone and minor conglomerate of the Late Precambrian Athabasca Formation, which apparently extends under Lake Athabasca and the drift-covered area to the southeast.

Strata of Middle to Late Devonian ages are inferred to underlie the marshy lowlands along the western part of the region, although no outcrops were observed within the map area boundaries. From observations in nearby areas, the strata are assumed to comprise a succession of interbedded carbonate and evaporite deposits divisible into the three units described in the accompanying legend. They are overlain in the southwest corner of the area by Lower Cretaceous sandstone and shale exposed along the lower slopes of Birch Mountains.

SURFICIAL DEPOSITS AND LANDFORMS

**Glaciofluvial Deposits**

*Ice-contact deposits* form the surficial sediments in the southeast part of the map area, comprising a complex of kame moraines, eskers, moutin kames, and crevasse fillings. Kame deposits, with local relief ranging between 100 and 300 feet, are composed of sand and gravel to coarse boulder gravel, forming a series of northwest-trending end moraines in continuation with the Cree Lake Moraine of northwestern Saskatchewan. Crevasse fillings associated with kame moraines are relatively high and sinuous, grading into small eskers. Most are composed of gravel. Centered in this complex of ice-contact deposits is a large area underlain by fluted and drumlinized outwash sand and gravel, containing materials together with small drumlins, which trend northeast-southwest, are well shaped and mantled by a layer of large boulders. Flutings also are well developed and grade in places into drumlins; they extend together with small drumlins onto the flat outwash plain south of Lake Athabasca. There, the outwash deposits cover an older drumlinized and fluted terrain, not entirely obscured by the younger sediments.

*Outwash plains* with nearly flat to gently undulating surfaces are widely exposed in the area south of Lake Athabasca, extending to the southeast under a cover of aeolian sand, adjacent to the Athabasca River delta. The outwash plain east of Old Fort River and extending to the Saskatchewan border is composed in places of large boulders of Athabasca Formation sandstone (quartzite) with few Shield erratics. It has little interstitial material and presumably overlies bedrock at shallow depths, in view of the frequency of bedrock outcrops in this area. Relatively short, straight crevasse fillings associated with the northern part of the outwash plain also are composed of large boulders of Athabasca Formation sandstone, among which bedrock outcrops of the same material are found. The outwash plain west of Old Fort River contains mainly medium- to coarse-grained sand derived from the Athabasca Formation. These deposits are thicker than those to the northeast: approximately 65 feet of outwash sand is exposed on the Athabasca River near Embarras airport, and similar thicknesses were observed on the Richardson and Maybelle Rivers to the east. Smaller bodies of outwash sand cover low areas in the Canadian Shield northeast of Fort Chipewyan as well as Bustard and Burntwood Islands in Lake Athabasca.

The high terraces along the Athabasca River and related channels adjacent to them, and small channels near Carlson Landing on the Peace River are interpreted here as *meltwater channel landforms*, although some of the associated sediments may have been deposited by nonglacial streams. The deposits are similar in that they contain a gravel layer at the base (thin or absent in places) overlain by variable thicknesses of fluvial sand. The channels are bounded by erosional scarps transected in places by the valleys of younger, postglacial streams.

**Glaciolacustrine Deposits**

Thin deposits of *glaciolacustrine sand* cover a wide expanse of flat ground along the south shore of Lake Athabasca, and flanking the east margin of the Athabasca River delta. Smaller areas of lacustrine sand are found west of the Athabasca River southeast of Lake Claire, and north of the Peace River in the vicinity of Carlson Landing. The deposits range from 2 to 5 feet thick and are associated in places with sandy beach ridges from 5 to 10 feet thick. The sediments were formed by reworking of older glacial deposits (mainly outwash) when Lake Athabasca covered a much larger area than at present, reaching elevations approximately 300 feet above the current lake level.

**Aeolian Deposits**

*Aeolian sheet and dune sands* derived from nearby outwash deposits cover a large area south of Lake Athabasca and the adjacent delta complex, extending from the Saskatchewan border in the northeast to the margin of the Birch Mountains in the southwest. Dunes are well developed in many parts of the area, although most are now stabilized by vegetation. Some dunes attain heights of more than 100 feet, and trend in a northwest-southeast direction. Two large active dunes are located in the vicinity of Richardson and Maybelle Rivers, and smaller active dunes are found along the shore of Lake Athabasca. Blowouts also are present on the crests of some of the larger stabilized dunes. In general, most of the dune sand is fine to medium grained, although coarse sand is present in the dunes in township 105, range 6.

**Alluvial Deposits**

*Deltaic sediments* deposited by the Peace and Athabasca Rivers cover much of the lowlands adjacent to Lakes Athabasca and Claire in the west-central part of the map area. The deltas have converged, forming a continuous complex of sand, silt, clay, and organic deposits covered by a series of shallow lakes and swamps. Most of the Athabasca River bedload, composed mainly of silty sand, is deposited along the delta front near the distributary mouths. The silt and clay are deposited in the subaqueous part of the delta, although some material is carried to the Slave River through the Riviere des Rochers. In contrast, the Peace River delta contains much more silt and clay, for most of the bedload is carried downstream into the Slave River. Locally, the delta surficial deposits vary widely in sand, silt, and clay content: generally the levees contain more sand than the interlevee areas, many of which contain shallow lakes and swamps.

*Recent stream sediments* occupy the valleys of the Peace, Athabasca, and smaller rivers. The floodplain sediments of the two larger rivers are predominantly silt and sand with a small amount of clay, whereas those of the smaller rivers (Richardson, Maybelle, and Old Fort Rivers) are mainly sand. An exception is the floodplain of the McIvor River, which contains abundant silt and clay derived from the Birch Mountains to the southwest.

*Alluvial fan sediments* cover an area of approximately 100 square miles in the southwest corner of the area, skirting the flank of the Birch Mountains. They range in thickness from a few to more than 20 feet, thickening towards the Birch Mountains escarpment. Locally, the deposits are highly variable in texture, consisting of interbedded sand, silt, and clay derived from Cretaceous shales and sandstones underlying the upland to the southwest.

**Erosional Features**

Large-scale erosional features (*slump, colluvium*) are confined to the slopes of the Birch Mountains in the extreme southwest corner of the area.

**Organic Deposits**

Postglacial accumulations of organic materials, commonly called *muskeg*, mantle most of the surficial deposits described above. In general, these deposits are thin, although locally they may attain a thickness of 20 feet or more.

