

EXPLANATION

RECENT

Qal

ALLUVIUM

Post-glacial fluvial deposits of clay, sand, gravel, and other detrital material. A layer of alluvium rich in humus is along the flanks and in the bottoms of many of the larger undrained depressions. Others of the alluviated depressions, at times partly filled with water, are high in salines, predominantly sodium sulfate.

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PARTLY-FILLED GLACIAL CHANNELS

In some of the glacial channels a heavy veneer of alluvium conceals completely the glacially derived sand and gravel originally deposited. The alluvial fill in these channels consists of black dense plastic clays rich in humus.

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GLACIAL OUTWASH SAND AND GRAVEL

Extensive deposits of glacio-fluvial sand and gravel. Varying amounts of this material are indigenous to the pre-Pleistocene formations of the area. This Pleistocene gravel consists predominantly of 60% dolomite and limestone, approximately 12% of pink granite, and about 8% of basic igneous rocks. The remainder has fragments of metamorphic mica schist, biotite gneiss, as well as miscellaneous fragments of limonite concretions, silicified wood, chert, chalcedony and poorly consolidated limy sand and clay fragments derived from the Fort Union formation. Most of the sand and gravel is poorly sorted. The size of material ranges from silt to glacial boulders 1-1/2 feet in diameter. Average size of the pebbles is 1/2 inch. Long sinuous tracts of this sand and gravel can be traced between valley walls of till. In many localities recent erosion has left the former outwash bottoms as terraces and has exposed the underlying till.

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KAME TERRACES

Glacio-fluvial deposits of sand and gravel probably formed marginal to ice lobes. Lithologically, the rock types are similar to those deposited by the ice. The size of the particles comprising the kame terraces ranges from silt to pebbles 1-1/2" in diameter. The bedding, where exposed, ranges from well-bedded to poorly bedded. Cobbles and glacial boulders are scattered through the terrace deposits and over their surface. In several localities blocks of till are included in the sand and gravel. Undrained depressions and marshes on the surfaces of these terraces suggest burial and subsequent melting of blocks of ice probably derived from the enclosing ice mass.

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TILL TERRACE

A surface fluvially cut on till and free of sand and gravel.

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CREVASSE FILLINGS

Linear ridges of varying lengths and heights composed of a heterogeneous mixture of sand, gravel, glacial boulders, and blocks of till. Crevasse fillings have been differentiated from eskers in this area by their extreme straightness. Lithologically, the rock types included are similar to those found in other glacio-fluvial features. No bedding is apparent in road cuts or gravel pits. Most crevasse fillings in this area average 30 feet high and approximately 1/2 mile long.

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ESKERS

Narrow, elongate, sinuous ridges of glacio-fluvial sand and gravel deposited on, within, or under ice by meltwaters. Ridge crests are very uneven. Predominant rock types include dolomite, limestone, granite, schist, and gneiss. There are lesser amounts of chert, quartzite, chalcedony, and other durable fragments. Pebbles range up to 1-1/2 inches in size. Most of the material is poorly bedded. Some cobbles are also present. In many places the eskers are veneered with till; elsewhere there is a very heavy concentration of glacial boulders along the crests and flanks.

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TILL

Most of the area is covered by one or more layers of till. Lithologic and other evidence suggests the presence of at least three drifts in this area. Drift borders cannot be precisely determined, hence are not shown on the map. The till is blue-gray, clayey, and calcareous on fresh surfaces. Where it has been exposed to the air for a considerable period of time, it is light brown. The depth of oxidation is a function of topographic position. Embedded within the till and littering its surface are rocks including dolomite, limestone, pink granite, black and white biotite gneiss, mica schist, basalt, quartzite, and anorthosite. These range in size up to eight feet in diameter. The finer fraction of the till may include considerable sand and clay probably derived from the underlying Fort Union formation. Secondary gypsum is present in many of the joints and cracks near the surface of the till.

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OLD FLUVIAL GRAVEL

A gravel layer that superficially resembles the much older Flaxville gravel in color, lithologic appearance, and mode of outcrop. In this gravel, quartzite, quartz, and chert predominate, and minor amounts of limestone, dolomite, granite, gneiss, and schist are disseminated through the formation. It probably owes its origin to reworking of the Flaxville gravel by glacial meltwaters. Like the Flaxville gravel, this gravel layer is between till and bedrock. It averages 10 feet in thickness although it may reach a maximum of 18 feet. The gravel is unconsolidated with little evidence of cementation, although caliche is common on most of the pebbles near the surface. Loose sand fills the interstitial spaces in the gravel, and discontinuous sand seams are between the coarser gravel layers. The bedding ranges from well-bedded to poorly bedded and many of the pebbles stand on end; these facts imply a tumultuous period of deposition.

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FORT UNION FORMATION

Light-tan to buff-colored layers of sand, silt, and clay. These lighter colored sediments alternate at irregular intervals with darker shales, carbonaceous seams, and lignite beds. Interspersed heterogeneously throughout the formation are ferruginous limy concretions more resistant to weathering than the enclosing mass. As a result these concretions weather out as rounded log-like or spheroidal bodies. Many of the lignite beds are economically valuable. Most of them average 8 feet in thickness, although several beds are thicker and a good many are mere lenses along much of their outcrop. Although the lignite seams are numerous, their discontinuity seldom permits their use for stratigraphic correlation. Where these lignite beds have burned, the overlying clay beds have been baked and fused to a red clinker, known locally as "sooria". This cherry-red clinker is commonly underlain by a thin layer of gray-white ash, the residue of the burned lignite bed. Gypsum is disseminated throughout many of the cracks and joints of the bedrock where exposed at the surface.

CONTACTS

Accurate contact

Approximate contact

Gradational or indefinite contact

TILL-BURIED CHANNELS

IMPOUNDED WATER

INTERMITTENT STREAMS

KETTLES (UNDRAINED DEPRESSIONS)

LAKES

Sal.

MARSH

SALINE LAKES

Lakes now occupying undrained depressions whose waters show a concentration of salts, principally sodium sulfate.

LIGNITE MINE SHAFT-ACTIVE

LIGNITE MINE SHAFT-INACTIVE

GRAVEL PIT

LIGNITE MINE - ACTIVE

URCH

LIGNITE MINE - INACTIVE OR ABANDONED

CEMETERY

SCHOOL HOUSE

FARM

BM 2046

BENCH MARK

A single symbol represents a group of farm buildings and includes the dwelling unit as well as all barns, stables, garages, and other out-buildings.

COUNTY LINE

TEMPORARY BENCH MARK (Spot Elevation)

STATE LINE

ROADS

GRAVELED - All weather.

GRADED - Dirt

UNIMPROVED

PLEISTOCENE

PALEOCENE

QUATERNARY

TERTIARY

