

Base modified from U.S. Geological Survey topographic quadrangle. Culture revised by Roger B. Colton from 1949 aerial photographs.



Geology by Roger B. Colton, and Conrad R. Appledorn, assisted by James McElroy and Leo Wanek, 1951

EXPLANATION

This is a master explanation for Miscellaneous Geologic Investigations Maps 1-361-371. Only map units present in this quadrangle are colored. An asterisk (*) precedes the explanation for symbols not present in this quadrangle.

Quaternary

- Qts** Landslide deposits. Areas of recent landsliding. Deposits are composed of the various formations affected by the landsliding.
- Qal** Alluvium. Fine- to coarse-grained flood-plain deposits of Missouri River and major tributaries. Mainly silt with local gravel lenses. Deposits average 50 feet in thickness but may be more than 100 feet thick under Missouri River flood plain.
- UNCONFORMITY**
- Qki** Kintyre Formation. Buff to brown clay, silt, and sand; thickness up to 150 feet. Bedding planes folded and faulted.
- Qk₁** Kame deposits. Sand and gravel, rapidly stratified and poorly sorted ice-contact deposits. Contain boulders as much as 2 feet in diameter. Maximum thickness, 100 feet. Qk₁ kame deposits of early(?) Wisconsin age, and Qk₂ kame deposits of late Wisconsin age.
- Qe₂** Esker deposits. Long sinuous ridges of poorly sorted stratified ice-contact sand and gravel as much as 60 feet thick. Contain boulders as much as 2 feet in diameter. Qe₂ esker deposits of early(?) Wisconsin age, and Qe₁ esker deposits of late Wisconsin age.
- Qac** Fan alluvium and colluvium. Slope-wash deposits derived from topographically higher deposits. The part derived from Flaxville Formation is largely gravel, that from Bearpaw Shale is almost entirely clay, that from the Hell Creek Formation and the Fox Hills Formation is chiefly silt and sand, and that from till is pebbly to gravelly clay. Generally tan to dark brown. Thickness of deposits highly variable, but observed maximum of 80 feet. May include rocks of Pliocene age.
- Qd** Dune sand. Well-sorted and stratified deposits of sand up to 30 feet thick. May include rocks of Pliocene age.
- Ql** Lake and pond deposits. Dark-gray clay and silty clay containing a few pebbles deposited in intermittent bodies of water by water, wind, and slope wash. As much as 16 feet thick. May include rocks of Pliocene age.

Pleistocene

- Qt₂** Till. Unstratified, compact, highly impervious, heterogeneous mixture of rock particles ranging in size from clay to boulders. Generally 15 feet thick; locally as much as 250 feet thick; Qt₁ older till and Qt₂ younger till.
- Qo₂** Outwash deposits. Sandy gravel and silt, as much as 60 feet thick, consisting mainly of rounded brown quartzite pebbles derived from the Flaxville Formation. A small percentage of limestone, dolomite, and granitic pebbles present. Some deposits formed as deltas in lakes. Qo₁ outwash deposits of early(?) Wisconsin age, and Qo₂ outwash deposits of late Wisconsin age.
- UNCONFORMITY**
- Qs** Sprole Silt*. Buff poorly bedded to massive silt deposits east and north of Poplar. Up to 100 feet thick.
- Qw** Wiota Gravels. Sand, silt, clay and gravel. Gravel similar to that found in the Flaxville and small percent glacially derived. Five to 25 feet thick and generally overlain by till. May include rocks of Pliocene age.

Miocene or Pliocene

- Tf** Flaxville Formation. Quartzite sand and gravel, clay, sand and silt, marl, and volcanic ash. Locally cemented. Generally less than 50 feet thick but up to 160 feet thick in northern part of area. Includes younger rocks.
- UNCONFORMITY**
- Tu** Fort Union Formation. Continental strata consisting of interbedded gray clay, buff silt, lignite, buff calcareous sandstone, brown carbonaceous clay, olive-gray sand, bentonitic gray clay, and silty limestone concretions. Well sorted and stratified. Marked lateral variation in lithology. Only lower 600 feet present in area.

Paleocene

- Khc** Hell Creek Formation. Gray to tan shales, siltstones, sandstones, and carbonaceous shales about 200 feet thick. Lower 50 to 100 feet is predominantly medium-ton sand or sandstone. A few quartzite pebbles found in basal conglomeratic lenses.
- UNCONFORMITY**
- Kfh** Fox Hills Formation. Consists of upper sandstone 25 to 60 feet thick underlain by transitional marine shale 60 feet thick.
- Kb** Bearpaw Shale. Dark olive-gray marine shale approximately 1,100 feet thick. Only upper 200 feet exposed. Upper 100 feet includes a few brownish sandy shale beds. Thin bentonitic beds are present and bentonite is disseminated through some shale zones.

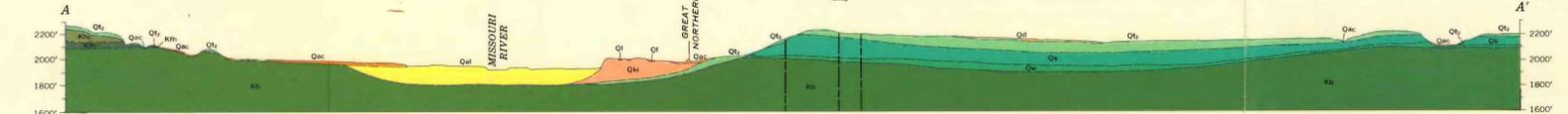
Upper Cretaceous

- Montana Group**

Geologic Symbols:

- Contact: Dashed where approximately located.
- Gradational contact: Dotted where approximately located.
- Fault: Dashed where approximately located; dotted where concealed. U, upthrown side; D, downthrown side.
- Lineation on aerial photograph: Surface trace of probable fault.
- Strike and dip of beds: Indicated by a line with a perpendicular tick mark.
- Traces of topographic breaks in slope on till surface inferred to reflect buried channel: Indicated by a line with a perpendicular tick mark.
- Segments of melt-water channel: Arrow indicates direction of flow.
- Direction of flow of melt water in outwash channel: Indicated by a line with a perpendicular tick mark.
- Ice-crack moraines: Long low ridges of till 10 to 15 feet high, 50 to 100 feet wide, and as much as 2 miles long.
- *Trend of crest of moraine: Includes washboard and other recessional moraines, lateral moraines, and end moraines.
- Drumlin: Line shows orientation of long axis.
- Scarp: Indicated by a line with a perpendicular tick mark.
- Abandoned lignite mine: Indicated by an 'X'.
- Gravel pit: Indicated by a triangle.
- Abbreviated columnar section: Shows thickness, in feet, and stratigraphic sequence of geologic units. Data based on natural and artificial exposures, and on test drilling. Apex of triangle shows location. >, more than.

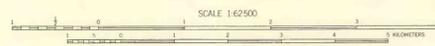
¹ The Sprole Silt is here named for an exposure 2 miles northwest of Sprole, a siding on the Great Northern Railroad (NW 1/4, SW 1/4, sec. 2, T. 27 N., R. 51 E.). Measured and estimated thickness ranges from 60 to 100 feet, thinning to the west where it was not mapped locally. The silt is yellowish gray, brown, or reddish brown, clayey, plastic, thin bedded, and locally limonitic. It is locally mud folded and faulted, probably by the above. The lower half is well stratified silt and clay, and contains pebbles; bedding is less pronounced in upper half. In some areas the silt has little structure and resembles loess. No fossils were found in the formation, and its age is determined only on the basis of stratigraphic position; at the type locality it overlies at least 6 feet of Wiota Gravels and underlies 15 feet of till, both of Wisconsin age. The silt was deposited in a lake formed when the ice advanced and blocked the Missouri River. It has not been found above an altitude of 2,200 feet—the assumed upper limit of the lake, which may have been 15 miles wide and may have extended 60 miles west of the type locality to Nashua; it may also have extended a short distance up the Poplar River valley.



SECTION ALONG LINE A-A'
VERTICAL SCALE EXAGGERATED

GEOLOGIC MAP OF THE POPLAR QUADRANGLE, ROOSEVELT, RICHLAND AND MC CONE COUNTIES, MONTANA

By
Roger B. Colton



CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL
1963