GEOLOGIC MAP OF THE LAME DEER 30' x 60' QUADRANGLE, EASTERN MONTANA

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Montana Bureau of Mines and Geology
Open File Report MBMG 428

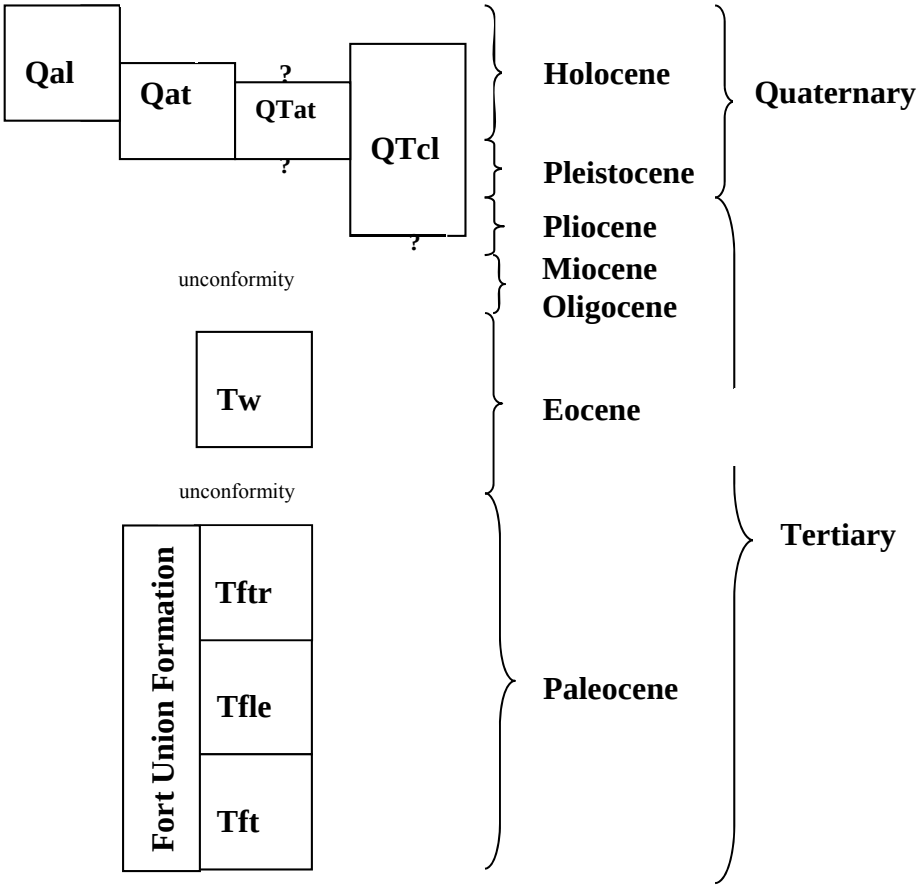
2001

Map revised: 11/07

This report has had preliminary reviews for conformity with Montana Bureau of Mines and Geology's technical and editorial standards.

Partial support has been provided by the STATEMAP component of the National Cooperative Geologic Mapping Program of the U.S. Geological Survey under contract Number 00-HQ-AG-0115.

CORRELATION DIAGRAM
LAME DEER 30’ x 60’ QUADRANGLE



DESCRIPTION OF MAP UNITS
LAME DEER 30’ x 60’ QUADRANGLE

Note: Thicknesses are given in feet because original field maps were on 7.5’ quadrangles with contour intervals in feet. To convert feet to meters (the contour interval unit on this map), multiply feet x 0.3048.

Qal **Alluvium (Holocene)—**Light-gray and light-brown gravel, sand, silt, and claydeposited in stream and river channels and on their flood plains. Clastsare poorly to well sorted, and most are well rounded. Deposits are poorlyto well stratified. Thickness as much as 35 ft under larger floodplains, butgenerally less than 15 ft.

Qat **Alluvial terrace deposit (Holocene and Pleistocene)—**Light-gray to light-brown gravel, sand, silt, and clay in terrace remnants at elevations from 30–200 ft above Rosebud Creek, Tongue River, and their tributaries. Clasts are generally well rounded. Deposits are poorly to well stratified and poorly to well sorted. Clasts are composed of Fort Union Formation sandstone and clinker; brown quartzite; and gray chert. Thickness generally less than 15 ft, but locally as much as 50 ft.

QTat **Alluvial terrace deposit (Pleistocene and/or Pliocene)—**Light-brown and light- gray gravel and sand at an elevation of about 3,400–3,700 ft. Clasts are generally well sorted and most are well rounded, and dominantly pebble and cobble size, but also boulders greater than a foot in diameter. Deposits are moderately to well sorted, and well cemented at the base into a conglomerate. Clasts are composed of igneous rocks including granite, basalt and andesite porphyry; agate; silicified wood; and Fort Union Formation clinker (Dobbin, 1930). Thickness about 60 ft.

QTcl **Clinker (Holocene, Pleistocene, and Pliocene?** [Coates and Heffern, 2000]**)—**Red, pink, orange, black, and yellow, very resistant metamorphosed sandstone, siltstone, and shale of the Fort Union Formation. Bedrock was baked by natural burning of underlying coal, and collapsed into voids created by burning. Locally, baked rock was melted and fused to form buchite, a black, glassy, vesicular or scoriaceous rock. Thickness 10–230 ft.

Tw **Wasatch Formation (Eocene)—**Yellowish gray to light gray siltstone and medium- to coarse-grained, massive, or cross-bedded sandstone interbedded with medium gray and brown carbonaceous shale and coal. Local basal coal and clinker. Formation typically weathers light gray to tan, and has a distinct heavy-mineral suite (Connor and others, 1976; Denson and others, 1990). At least four different stratigraphic criteria have been used previously to define the Wasatch-Tongue River contact (Seeland and others, 1993). The contact on this map follows that of Heffern and others (1993). Only basal part of formation exposed. Exposed thickness about 100 ft).

Fort Union Formation (Paleocene)

Tftr Tongue River Member—Yellow, orange, or tan, fine-grained sandstone with thinner interbeds of yellowish brown, orange, or tan siltstone; light-colored mudstone, and clay; and coal beds. The most prominent coal beds in the map area are the Robinson, McKay, Rosebud, Knobloch, and Sawyer (Derkey, 1986). Clay dominantly non-swelling. Sandstone massive or crossbedded. Thickness of as much as 640 ft exposed in map area.

Tfle Lebo Member—Gray, smectitic shale and mudstone that contain lenses of gray and yellow, very fine- to medium-grained sandstone, ironstone concretion zones from 1 to 12 inches thick, and a few thin coal beds. Thickness of member 95–200 ft.

Tft Tullock Member—Light-yellow and light-brown, planar-bedded, very fine- to medium-grained sandstone and minor amounts of gray shale. Two or three coal beds in the upper 110 ft of member, and in many places, a coal bed at the base. Thickness of member 240–260 ft.

MAP SYMBOLS

Contact—Dotted where concealed.

Fault—Ball and bar on downthrown side, dashed where inferred, dotted where concealed.

GEOLOGIC MAP SOURCES and INDEX OF 7.5' QUADRANGLES
LAME DEER 30' X 60' QUADRANGLE

107º 106º 46º

2, 5 McClure Creek	2, 5 Trail Creek School	2, 5 Colstrip West	2, 5, 7 Colstrip East	5, 7 Hammond Draw NW	5, 7 John Hen Creek	1, 5, 7 Brandon-berg NW	1, 5, 7 H S School
2, 5 Sarpy School	2, 5 Rough Draw	2, 5 Colstrip SW	1, 2 ,5 Colstrip SE	1, 5 Hammond Draw SW	1, 5 Hammond Draw	1, 5 Brandon-bert	1, 5 Hayes point
2, 3, 8 Chalky Point	2, 3, 8 Black Spring	2, 3, 4 Jimtown	1, 3, 4, 5 Badger Pead	1, 3, 4, 5 Garfield Peak	1, 3, 4, 5 Ashland NE	1, 5 Cook Creek Reservoir	1, 5 Beaver Creek School
3, 8 Busby	3, 8 Painted Hill	3, 4 Lame Deer	3, 4 Fisher Butte	3, 4 Holly-wood Creek	1, 3, 4 Ashland	5, 9 Willow Crossing	1, 5 Coleman Draw

45º30'

Numbers below correspond to index map above.

1. Bass, N.W., 1932, plate 3, scale 1:63,500.
2. Dobbin, C.E., 1930, plate 7, scale 1:250,000.
3. Heffern, E.L., 1980, p. 77.
4. Lewis, B.D. and Roberts, R.S., 1978, scale 1:250, 000.
5. Matson, R.E., and Blumer, J.W., 1973, plates 11, 13, 14, 22, 23, 26, 29, and 30.
6. McKay, E.J., 1976, scale 1:24,000
7. Pierce, W.G., 1936, plate 11, scale 1:62,500.
8. Thom, W.T., Jr., Hall, G.M., Wegemann, C.H., and Moulton, G.F., 1935, plate 1, scale 1:90,080.

Entire map

Bergantino, R.N., 1980, scale 1:250,000.

Ellis, M.S. and Colton, R.B., 1993, scale 1:500,000.

Heffern, E.L., Coates, D.A., Whiteman, J., and Ellis, M.S., 1993, scale 1:175,000.

Stoner, J.D. and Lewis, B.D., 1980, scale 1:500,000.

Vuke, S.M., and Bergantino, R.N., 1990, scale 1:100,000.

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