Montana Bureau of Mines and Geology
Open File No. 597

Geologic and Structure Contour Map
of the Circle 30' x 60' Quadrangle,
Eastern Montana

S. M. Vuke, P. A. Hargrave, and L. N. Smith

2011

To view a full scale version of this map, click here.

Digital data link

Note—This map was originally published at a scale of 1:100,000 but the page sizes have been modified to fit average printer capabilities (8½ x 14; legal size paper). There is a an eighth inch overlap on these pages. A full sized colored print of this map can be ordered from the MBMG Publication Sales Office, 1300 West Park Street, Butte, MT, 59701-8997.

Phone: 406-496-4167       Email: pubsales@mbmg.mtech.edu
Pierre (Bearpaw) Shale; data from Smith (1999).

The red line indicates depression.

SCALE 1:100 000

15 000 METERS

50 000 FEET

30 000

10 000

5000

0

1000

5000

1000

15°00'

47°00'

106° 105° 104° 103° 102° 101° 100° 99° 98° 97° 96° 95° 94° 93° 92° 91° 90° 89° 88° 87° 86° 85° 84° 83° 82° 81° 80° 79° 78° 77° 76° 75° 74° 73° 72° 71° 70° 69° 68° 67° 66° 65° 64° 63° 62° 61° 60° 59° 58° 57° 56° 55° 54° 53° 52° 51° 50° 49° 48° 47° 46° 45° 44° 43° 42° 41° 40° 39° 38° 37° 36° 35° 34° 33° 32° 31° 30° 29° 28° 27° 26° 25° 24° 23° 22° 21° 20° 19° 18° 17° 16° 15° 14° 13° 12° 11° 10° 9° 8° 7° 6° 5° 4° 3° 2° 1°
Datum: mean sea level

1155 Water or petroleum well. Number is e

Volcanic ash bed in Rimroad Format

Extent of Glacial Lake Circle; thin de

To convert feet to meters multiply by 0.3048.
To convert meters to feet multiply by 3.2808.

Maps may be obtained from
Publications Office
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Digital map preparation supported by the U.S. Geological
contained in this document are those of the authors and
GIS production: Ken Sandau and Paul Thale, MBMG. M
Elevation of top of Pierre Shale in feet above sea level.

Deposits not mapped

Map sources:

U.S. Geological Survey Open-file Report number indicated at bottom of each 7.5' quadrangle.

Map layout: Susan Smith, MBMG.
DESCRIPTION OF MAP UNITS

Qal ALLUVIUM OF MODERN CHANNELS AND FLOOD PLAINS (HOLOCENE) – Light brown and gray, well stratified and well sorted, stream deposited, clay, silt, sand, and gravel. As much as 6 m (20 ft) thick under the flood plains of major creeks to less than a few meters thick under flood plains of tributaries/small streams. Unit limited to areas characterized by meander or braided pattern on aerial photographs. Surface of unit may be subject to occasional flooding. Thickness generally averages about 3 m (10 ft).

Qac ALLUVIUM AND COLLUVIUM, UNDIVIDED (HOLOCENE) – Light brown and gray, poorly sorted and well stratified clay, silt, sand, and gravel deposited by gravitational movement and slope wash. Color and texture of the colluvium reflect up-slope parent material. May interfinger with alluvium (Qal); includes alluvial fan deposits and much windblown sand, silt, and sand. Soil profiles vary from well-developed to poorly developed silt, sand, granules, and pebbles. Thickness as much as 10 m (33 ft); generally less than 5 m (16 ft); locally less than 2-3 m (7-10 ft) thick.

Qe EOLIAN DEPOSIT (HOLOCENE) – Light to moderate brown, windblown sand and silt. Mapped only where dunes were identified on aerial photographs or small contour-interval topographic maps. In other places, light brown to light gray clay, silt, and sand which includes granules and pebbles carried up into the eolian deposits by bioturbation. Present mainly as a veneer as much as 2 m (6 ft) thick on terraces and fans of sand and gravel deposits; may be thicker on older

CITED REFERENCES AND SELECTED BIBLIOGRAPHY


LANDSLIDE DEPOSIT (HOLOCENE AND PLEISTOCENE) – Slumps and earthflows. Clast size ranges from clay and silt to boulders. Thickness as much as 12 m (40 ft), generally less than 3 m (10 ft); locally less than 2 m (6 ft).

ALLUVIAL TERRACE DEPOSIT (HOLOCENE AND PLEISTOCENE) – Light brown to light gray, well-stratified to poorly stratified, well-sorted to poorly sorted sand and gravel deposited on alluvial terraces of the Redwater River and its tributaries, and higher sand and gravel deposits (QTat). Thickness as much as 5 m (16 ft); generally less than 2 m (6 ft).

GLACIAL TILL (PLEISTOCENE) – Light olive brown to pale yellow mixture of clay-to-boulder-sized materials. Estimated size distribution in percent: clay 15-20, silt 25-30, sand 35-40, granules 15-20, pebbles 5-10, cobbles 1-2, boulders 1. Contains small clasts of coal and clinker. Lenses of varved clay as thick as 4 m (13 ft) indicate deposition in a glacial lake. Thickness as much as 15 m (50 ft), generally less than 5 m (16 ft).

CLINER (HOLOCENE TO PLEISTOCENE) – Red to orange baked shale, sandstone, and siltstone of the Fort Union Formation that was heat-metamorphosed by combustion of lignite to hard, dense porcellanite. Coal ash forms a gray or white layer as much as 60 cm (24 in) thick at the base of the porcellanite. Thickness as much as 12 m (40 ft), generally less than 3 m (10 ft); locally less than 2 m (6 ft).

ALLUVIAL TERRACE DEPOSIT (PLEISTOCENE and/or PLIOCENE) – Light brown to light gray, generally well stratified, but rarely poorly stratified, well sorted to poorly sorted fluvial sand and gravel deposited on alluvial terraces of the paleo-Yellowstone River and its tributaries. Unit was considered Pliocene on 7.5' quadrangle source maps based on relation with the Miocene-dated Rimrodf Formation and assumption of a steady rate of southeastward migration and downcutting by the Yellowstone River. Subsequently the Rimroad-Pliocene boundary has been extended from 1.8 Ma to 2.56 Ma (Gibbard and others, 2009) so the unit is now designated Quaternary and/or Tertiary. Unit generally limited to altitudes between 945 m (3,100 ft) and 760 m (2,500 ft). May contain thin Pleistocene sand and gravel deposits. Thickness as much as 12 m (40 ft), but generally less than 6.3 m (20-10 ft).

ALLUVIAL TERRACE DEPOSIT (MIOCENE) – Light brown to light gray, well stratified to poorly stratified, well sorted to poorly sorted sand and gravel deposited on terraces of the paleo-Yellowstone River (mapped as Tmg on 7.5' quadrangle source maps). May include some small, thin, Pliocene and Pleistocene sand and gravel deposits. Local calcium-carbonate cementation in the Lindsay SW 7.5' quadrangle. Thickness generally as much as 10 m (33 ft), but 24 m (80 ft) thick on Diamond G Butte in the Diamond G Butte 7.5' quadrangle.

RIMROAD FORMATION (MIocene) – Light brown to gray, well stratified, well sorted to poorly sorted, and well-stratified to poorly stratified sand and gravel deposited on the oldest alluvial terrace of the paleo-Yellowstone River. Deposition occurs as remnants along the drainage divide between the paleo-Yellowstone River south of the quadrangle, and Redwater Creek in the northwestern part of the
Correlation Diagram

Quaternary

Tertiary

Cretaceous

Eocene

Oligocene

Miocene

Pliocene

Pleistocene

Holocene

QTcl

Tat

Trm


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Geologic Map of the Circle 30' x 60' Quadrangle
Dawson, McCon, and Prairie Counties
Eastern Montana

Susan M. Vuke¹, Phyllis A. Hargrave¹, and Larry N. Smith²

2011

Map and text compiled with modification by S.M. Vuke and P.A. Hargrave from thirty-two 7.5' quadrangle geologic maps by R.B. Colton and others; structure contours added by L.N. Smith.

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