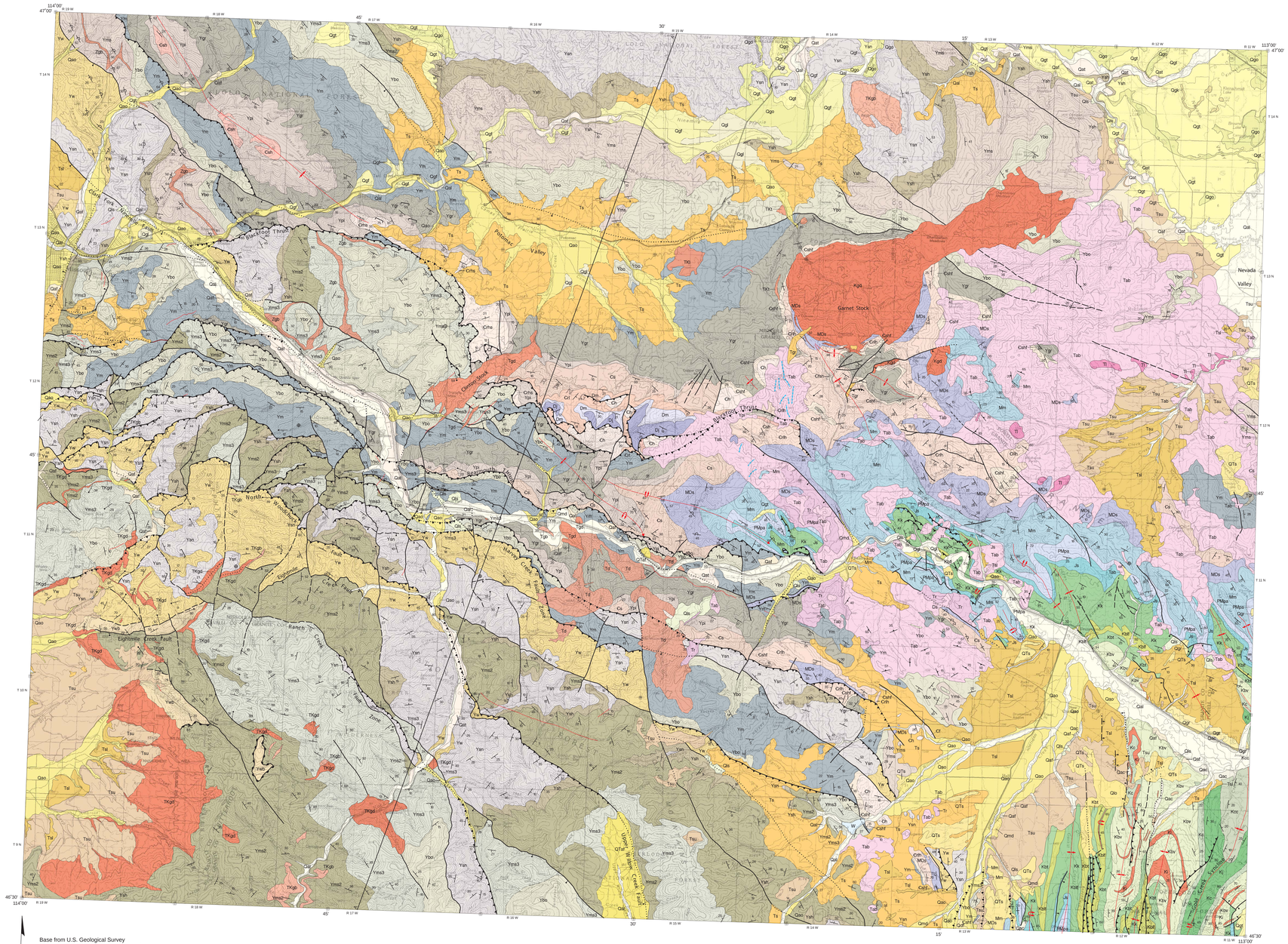


Base from U.S. Geological Survey
Missoula 30' x 60' topographic quadrangle
Base Map date: 1984
Projection: UTM zone 12; 1927 NAD
UTM grid declination 1°49' West
1984 Magnetic North declination 17.5° East

KILOMETERS 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
MILES 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13

SCALE 1:100 000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS

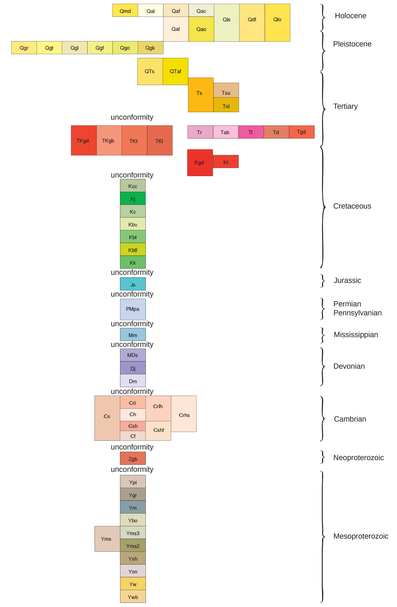
1000 0 5000 10 000 15 000 20 000 METERS
5000 0 10 000 20 000 30 000 40 000 50 000 60 000 70 000 FEET

MAP UNITS

- Qmd — Man-made deposits
- Qal — Alluvium of modern channels and flood plains
- Qaf — Alluvial fan deposit
- Qac — Alluvium and colluvium, undivided
- Qat — Alluvium of alluvial terrace
- Qao — Alluvium, older, undivided
- Qls — Landslide deposit
- Qdf — Debris flow deposit
- Qlo — Loess deposit
- Qgr — Gravel
- Qgl — Glacial till
- Qgl — Glacial lake deposit
- Qgf — Glacial flood gravels
- Qgo — Glacial outwash deposit
- Qgk — Glacial kame deposit
- QTs — Sediment, undivided
- QTaf — Alluvial fan deposit
- Ts — Sediment or sedimentary rocks, undivided
- Tsu — Sediment or sedimentary rocks, upper member
- Tsl — Sediment or sedimentary rock, lower member
- Tr — Rhyolite and rhyolitic sediment
- Tab — Andesite and Basalt
- Tl — Latite and porphyritic latite
- Td — Dacite, Intrusive and extrusive
- Tgd — Granodiorite
- TKgd — Granodiorite
- TKgb — Gabbroic and dioritic dikes and sills
- TKt — Trachyte
- TKl — Lamprophyre
- KJgd — Granodiorite
- KJ — Intrusive rocks, undivided
- Kcc — Carter Creek Formation
- Kj — Jens Formation
- Kc — Coberly Formation
- Kbv — Vaughn Member of Blackleaf Formation
- Kbt — Taft Hill Member of Blackleaf Formation
- Kbf — Flood Member of Blackleaf Formation
- Kk — Kootenai Formation
- Js — Sedimentary rocks, undivided
- PMpa — Phosphoria, Quadrant, and Amsden Formations, undivided
- Mm — Madison Group, undivided
- MDs — Sedimentary rocks, undivided
- Dj — Jefferson Formation
- Dm — Maywood Formation
- Cs — Sedimentary rocks, undivided
- Crl — Red Lion Formation
- Crh — Red Lion and Hasmark Formations, undivided
- Crhs — Red Lion, Hasmark, and Silver Hill Formations, undivided
- Ch — Hasmark Formation
- Csh — Silver Hill Formation
- Cshf — Silver Hill and Flathead Formations, undivided
- Cf — Flathead Formation
- Zgb — Gabbro and diorite, sills
- Ypl — Pilcher Formation
- Ygr — Garnet Range Formation
- Ym — McNamara Formation
- Ybo — Bonner Formation
- Yms — Mount Shields Formation
- Yms3 — Mount Shields Formation, third member
- Yms2 — Mount Shields Formation, second member
- Ysh — Shepard Formation
- Ysn — Snowslip Formation
- Yw — Wallace Formation
- Ywb — Wallace Formation, Breccia member
- W — Water

For a more detailed description of the map units and symbols, please refer to Plate 2.

CORRELATION DIAGRAM



Map Symbols

- Contact: dashed where approximately located; dotted where concealed
- Normal fault: dashed where approximately located; dotted where concealed; bar and ball on downthrown side
- Thrust fault: teeth on upthrown block; dashed where approximately located; dotted where concealed
- Low-angle normal fault: symbols on hanging wall
- Anticline: showing trace of axial plane and plunge direction where known; dotted where concealed
- Overturned anticline: showing trace of axial plane and direction of dip of bedding; dashed where approximately located, dotted where concealed
- Syncline: showing trace of axial plane and plunge direction where known; dotted where concealed
- Overturned syncline: Showing trace of axial plane and direction of dip of bedding; dashed where approximately located, dotted where concealed
- Tertiary andesite dikes
- Tertiary through Cretaceous gabbro and granodiorite dikes
- 55 Strike and dip of inclined beds
- Vertical bedding
- 45 Foliation
- Vertical foliation
- 45 Strike and dip of overturned bedding
- 22 Strike and dip of bedding where stratigraphic tops were confirmed using primary sedimentary structures
- 45 Strike and dip of overturned bedding where stratigraphic tops were confirmed using primary sedimentary structures
- 55 Cleavage
- Horizontal bedding

Horizontal scale same as map
No vertical exaggeration
Surficial units not shown
Datum is mean sea level

LOCATION

30' x 60' quadrangle index

PLAINS	SEELEY LAKE	DEARBORN RIVER
MISSOULA WEST	MISSOULA EAST	ELLISTON
HAMILTON	PHILIPSBURG	BUTTE NORTH

Maps may be obtained from
Publications Office
Montana Bureau of Mines and Geology
1300 West Park Street, Butte, Montana 59701-8997
Phone: (406) 496-4174 Fax: (406) 496-4451
http://www.mbmg.mtech.edu

Research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award number G09AC00186. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

GIS production: Ken Sandau and Paul Thale, MBMG. Map layout: Susan Smith, MBMG.

Montana Bureau of Mines and Geology
Open File MBMG 593, Plate 1

Geologic Map of the Missoula East 30' x 60' Quadrangle, Western Montana

Jeffrey D. Lonn[1], Catherine McDonald[1], James W. Sears[2], and Larry N. Smith[3]

2010

[1]Montana Bureau of Mines and Geology; [2]University of Montana, Missoula; [3]Montana Tech of The University of Montana