Base map produced by the United States Geological Survey
Cadotte Creek 1:24,000-scale quadrangle map, 1963
Control by: USGS, and USC&GS
Compiled from aerial photographs taken 1961
Field checked: 1973
Projection: Polyconic
Grid:1000 meter Universal Transverse Mercator Zone 12
Vertical Datum: National Geodetic Vertical Datum of 1929
Horizontal Datum: 1927 North American Datum
Shaded relief created in 2019 from 10 meter digital elevation model from U.S. Geological Survey National Elevation Dataset.

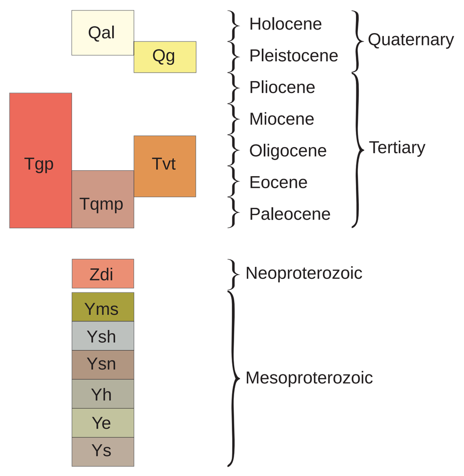
UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24,000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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
http://mbmg.mtech.edu

CORRELATION DIAGRAM



MAP SYMBOLS

Contact: dashed where approximately located, dotted where concealed

Fault: dashed where approximately located, dotted where concealed

Normal fault: dashed where approximately located, dotted where concealed, bar and ball on downthrown side

38 Strike and dip of inclined beds

⊕ Horizontal bedding

Figure 1. Diorite (Zdi) outcrop along Alice Creek Road in N½, sec. 4, T. 15 N., R. 7 W. Hat for scale.

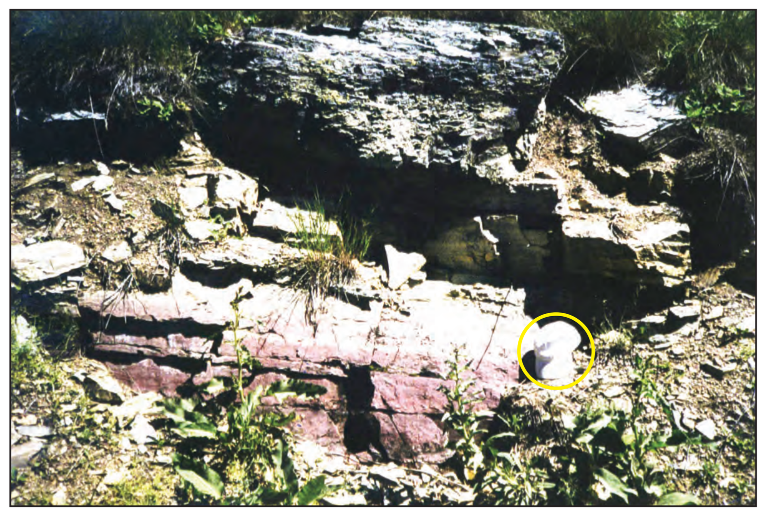


Figure 2. Contact along dirt road between maroon Spokane Formation (Ys) below, and Empire Formation (Ye; green shale), above. Near center of sec. 3, T. 15 N., R. 7 W. Hat (lower right in yellow circle) for scale.

Figure 3. View southwest from top of ridge in SW ¼, sec. 30, T. 15 N., R. 63 W., toward Lincoln, Montana. Outcrops of the maroon Spokane Formation (Ys) exposed along the ridge in foreground.

Map Units

Qal **Alluvium (Holocene and Pleistocene)**—Gravel, sand, silt, and clay, poorly to moderately sorted, unconsolidated, including colluvium that has migrated downslope into stream valleys.

Qg **Glacial deposits (Pleistocene)**—Boulders, cobbles, gravel, sand, silt, and clay, includes poorly sorted till and moderately sorted outwash confined mostly to the southwestern corner of the map area.

Tgp **Granite/rhyolite porphyry (Tertiary?)**—Granite to rhyolite, pink, phaneritic to aphanitic, found in the central-eastern part of the quadrangle north of the Blackfoot River basin.

Tvt **Volcanic rock of Crater Mountain (Oligocene and Eocene?)**—as described by Whipple and others (1987). Gray and pale pink rhyodacite tuff containing subhedral to euhedral crystals of quartz and sanidine. Occurs on the west side of the quadrangle along the southern edge.

Tqmp **Quartz monzonite porphyry (Eocene and Paleocene?)**—as described by Whipple and others (1987). Brownish gray, coarsely porphyritic monzonite containing white phenocrysts of oligoclase as much as 0.75 in (2 cm) long in a fine-grained groundmass of oligoclase, orthoclase, hornblende, magnetite, biotite, and quartz.

Zdi **Diorite sills (Neoproterozoic)**—Diorite, dark gray, greenish black, and black, medium grained, equigranular. The center of the sills are coarse-grained and may be better described as a gabbro. The upper and lower contacts of the sills, where injected into the Spokane Formation, have produced obsidian in the Rogers Pass quadrangle to the east; however, no obsidian was noted in this quadrangle. Diorite is composed of andesine–labradorite, augite, biotite, and magnetite. It weathers to a characteristic light rusty brown soil. Sills are commonly 200–450 ft (60–137 m) thick in the area and are found only within the Spokane Formation within the quadrangle (fig. 1).

Yms **Mount Shields Formation (Mesoproterozoic, Belt Supergroup)**— Reddish brown to brick red and grayish green interlaminated and interbedded, feldspathic sandstone, shale, and siltstone. Includes ripple marks and mudcracks. The maximum thickness of the Mount Shields Formation is reported to be about 2,000 ft (609 m). This unit is only found in an anticlinal structure in the northeastern corner of the quadrangle in the lower plate of the Hoadley Thrust Fault.

Ysh **Shepard Formation (Mesoproterozoic, Belt Supergroup)**—Interbedded yellowish gray and buff calcareous and dolomitic siltstone, shale, and calcareous sandstone. Maximum thickness is 450 ft (137 m). This unit is only found in the northeastern corner of the quadrangle in an anticlinal structure in the lower plate of the Hoadley Thrust Fault.

Ysn **Snowslip Formation (Mesoproterozoic, Belt Supergroup)**—Buff-weathering, interbedded reddish brown and dark green shale and siltstone. Approximately 600 ft (183 m) thick.

Yh **Helena Formation (Mesoproterozoic, Belt Supergroup)**—Blue to bluish gray dolomitic limestone, weathering light green to buff. It has the distinctive acid reaction of dolomite on the fresh specimen and on scratches in the weathered specimen. It is about 400 ft (122 m) thick in the area, and is found along the tops of many ridges.

Ye **Empire Formation (Mesoproterozoic, Belt Supergroup)**—Argillite and shale, grayish green and light green, laminated to thin bedded with few individual beds thicker than a few feet (fig. 2). The maximum thickness is approximately 1,000 ft (304 m).

Ys **Spokane Formation (Mesoproterozoic, Belt Supergroup)**—Argillite and shale, primarily maroon, with minor red fine-grained sandstone beds (figs. 2, 3). The shale is ripple-marked on some layers, and displays mudcracks on others. Minor thin beds of dark green shale and siltstone are sporadically interbedded throughout the formation. Where intruded by the diorite sill (Zdi), the Spokane becomes increasingly dark when approaching the sill toward both the upper and lower contact. The normally maroon shale becomes light purple, then dark purple, then dark gray, and then black just before the contact. Relict bedding is present in this dark zone. This zone of color change is approximately 100–200 ft (30–60 m) wide away from either contact. The Spokane is approximately 2,000 ft (609 m) thick in the quadrangle.

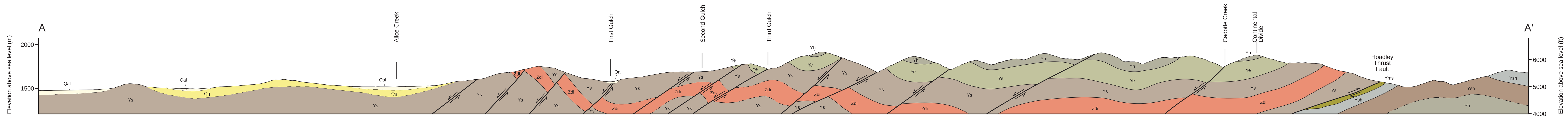
Normal faults in the area were mapped according to any or all of the following criteria: Offsets in lithologies, breaks in slope, fault scarps if present, rubble zones, hydrothermal alteration of Spokane Formation rubble to a yellow-orange alteration of the original maroon color by frictionally heated fluids that ascended along the fault zones.

The main fault of this type is the sinuous down-to-the-west Rogers Pass fault (Whipple and Bregman, 1981), along the eastern border of this quadrangle and the western border of the adjacent Rogers Pass 7.5' quadrangle, which turns east at the southeastern corner of the Cadotte Creek 7.5' quadrangle into the southwestern corner of the Rogers Pass quadrangle, and then continues southeast through the Wilborn (Bregman, 2017), Mitchell Mountain (Bregman, 2015), and Sheep Creek (Bregman, 1981) 7.5' quadrangles as the Hilger Valley Fault. Throw on this fault is more than 1,000 ft in the Sheep Creek quadrangle and less in the Rogers Pass, Wilborn, and Cadotte Creek quadrangles.

References

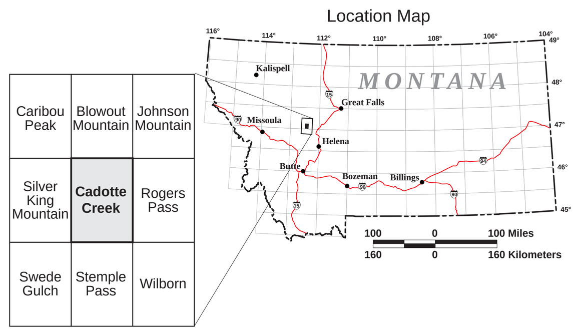
Bregman, M.L., 1981, Structural geology of the Sheep Creek and Rattlesnake Mountain quadrangles, Lewis and Clark County, Montana: Montana Bureau of Mines and Geology Geologic Map 26, 24 p., 1 sheet, scale 1:24,000.
Bregman, M.L., 2015, Geologic map of the Mitchell Mountain 7.5' quadrangle, west-central Montana: Montana Bureau of Mines and Geology Open-File Report 663, 1 sheet.
Bregman, M.L., 2017, Geologic map of the Wilborn 7.5' quadrangle, west-central Montana: Montana Bureau of Mines and Geology Open-File Report 691, 1 sheet, scale 1:24,000.
Whipple, J.W., and Bregman, M.L., 1981, Geologic map of the Rogers Pass quadrangle, Lewis and Clark County, Montana: U.S. Geological Survey Miscellaneous Field Studies Map MF-1309, 1 sheet, scale 1:24,000.
Whipple, J.W., Mudge, M.R., and Earhart, R.L., 1987, Geologic map of the Rogers Pass area, Lewis and Clark County, Montana: U.S. Geological Survey Miscellaneous Investigations Map 1-1642, 1 sheet, scale 1:48,000.

Cross Section A–A'



No vertical exaggeration

SCALE: 1:24,000



GIS production: Yiwen Li and Paul Thale, MBMG.
Map layout: Susan Smith, MBMG. Editing: Susan Barth, MBMG.

MBMG Open-File Report 728

Geologic Map of the Cadotte Creek 7.5' Quadrangle, West-Central Montana

Martin Bregman

2020