

Base map from U.S. Geological Survey
Black Mountain 7.5' topographic quadrangle
Map date: 1985
Projection: Lambert Conformal Conic
UTM zone 12; 1927 NAD
UTM Grid Declination: 0°52' West
1988 Magnetic North Declination: 17° East

Map symbols

--- Fault: dashed where approximately located; dotted where concealed, bar and half on downthrown side (the side that moved down during faulting)

--- ? --- Inferred fault based on topographic expression

The purpose of this map is to provide those involved with development in this area descriptions of surface materials uncluttered with geologic jargon. For information on the geology of this area, see Montana Bureau of Mines and Geology Open-File Report 587, Geologic Map of the Black Mountain 7.5' quadrangle, southwestern Montana. The descriptions of bedrock and unconsolidated material are based on observations made during the preparation of this geologic map and may not accurately represent the material over its entire indicated extent.

Montana Bureau of Mines and Geology
Special Publication 119

Surface Materials Map of the
Black Mountain 7.5' Quadrangle,
Lewis & Clark and Jefferson
Counties, Montana

by Richard B. Berg

GLOSSARY

Definitions given here apply to the usage of these terms in these descriptions and not necessarily their general geologic usage.

Alluvial fan—Deposit of sand and gravel at the mouth of a gulch where the carrying capacity of the tributary stream decreased abruptly when it emerged from the confines of the gulch.

Calcite—A common mineral that consists of calcium and carbonate. Limestone is composed of calcite.

Dolomite—A mineral that consists of calcium, magnesium, and carbonate. A rock that is composed mainly of dolomite is called dolomite. (Some nomenclature in geology is simple.) Dolomite is physically similar to limestone.

Glacial outwash—Material that consists of boulders, cobbles, and finer material deposited by the meltwater from a glacier.

Granite—A common igneous rock formed by the slow cooling of molten rock, usually dominated by crystals of quartz and feldspar.

Hornfels—A hard, flinty rock formed where igneous rocks have heated and baked adjacent rock. Most notable where a much softer rock such as shale has been baked.

Igneous rock—A rock such as a volcanic rock or granite formed by the cooling of molten rock or magma.

Limestone—A sedimentary rock that consists of calcite.

Marble—Marble is formed by the metamorphism of limestone or dolomite. Typically marble is more nearly white than the unmetamorphosed limestone.

Metamorphic rock—A rock changed by heat and/or pressure. In this area some rocks were metamorphosed by cooling magma that formed granite.

Quartzite—A hard rock formed by the metamorphism of sandstone.

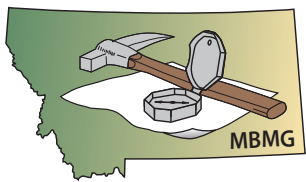
Sedimentary rock—A rock formed by one of the following processes: deposition of rock or mineral particles in material such as sand, silt, or clay that becomes a rock through compaction and cementation; deposition of animal or plant remains; or material precipitated from solution such as salt from a saline lake.

Silicate minerals—A group of minerals that are usually harder than calcite or dolomite because they contain the element silicon.

REFERENCES

Berg, R.B. (compiled and mapped by) 2009. Geologic map of the Black Mountain 7.5' quadrangle, southwestern Montana: Montana Bureau of Mines and Geology Open-File Report 587, Scale 1:24,000.

Knopf, A. 1963. Geology of the northern part of the Boulder batholith and adjacent area, Montana: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-381, Scale 1:48,000.



Maps may be obtained from:
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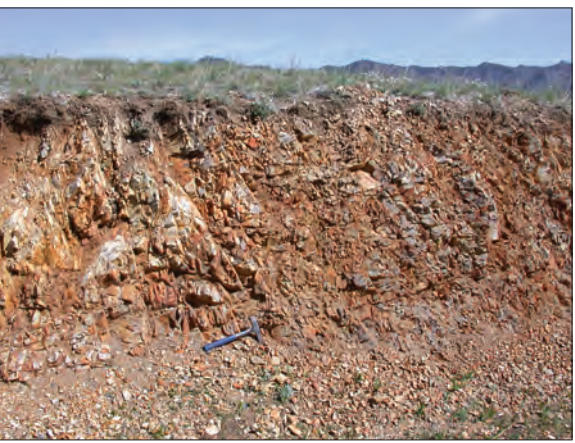
LEGEND

Igneous Rocks

Granite knobs—Same rock as granite, but is limited to isolated outcrops surrounded by coarse, sandy soil formed from decomposed granite.



Igneous rock—Small bodies of a fine-grained igneous rock that weathers reddish-brown, generally does not form prominent outcrops, and is exposed in only a few small areas.



GR **Granite**—Granite and granite-like rock are included in this category. This rock is hard and generally forms prominent outcrops. Northwest from the Baxendale Fire Station, where the granite has well-developed fractures (joints), blocks were quarried for building stone.

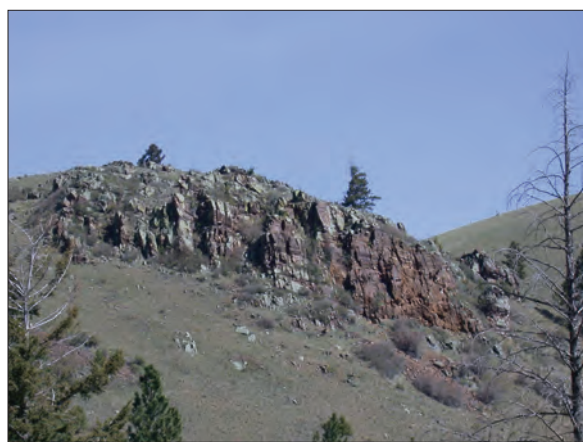


V **Lava flows and associated volcanic rocks**—They range from hard black rock that forms cliffs and prominent talus piles of angular blocks to softer rock that is not well exposed. Small areas of granite are included within this unit.



Metamorphic Rocks

MS **Metamorphosed sedimentary rocks**—Within this sequence of rocks that were originally sedimentary, metamorphism has changed sandstone beds to hard quartzite beds. Other sedimentary rocks are softer even though metamorphosed.



M **Marble (both calcitic and dolomitic)**—Forms rounded to irregular outcrops somewhat granular on the surface, but much harder below the surface. There are two types of marble—one that consists of the mineral calcite (metamorphosed limestone), and the other that consists of the mineral dolomite (metamorphosed dolomite).



HR **Hornfels (mixed)**—Hard rock, in layers less than 1 foot thick, that form jagged ridges surrounded by softer rock.



MD **Marble (dolomitic)**—Forms white, rounded outcrops that are crumbly on the surface, but harder at depth. Some of this marble is reported to be a high-grade dolomite, but no specific chemical analyses have been reported (Knopf, 1963).



VH **Very hard rock (hornfels)**—Extremely hard, flinty rock.



MI **Marble (impure)**—Forms blocky outcrops that have an irregular surface. Unlike the other described marbles, this marble has hard layers of silicate minerals interlayered with calcite and dolomite layers.



Q **Quartzite**—Hard, flinty rock that consists almost entirely of quartz. Typically forms ridges and breaks into angular blocks.



MM **Marble (mixed)**—Hard, fine-grained marble with some beds of softer rock and some quartzite layers. Vertical height of exposure shown is about 10 feet.



QM **Quartzite (mixed)**—Quartzite with other beds of softer rock.



Unconsolidated Material

G G **Very large granite boulders**—Very large granite boulders as much as 20 feet across deposited by the glacier that occupied part of the present Tenmile Valley.



GAF **Gravel of alluvial fans**—This gravel is found only at the mouths of gulches. These deposits usually contain boulders as well as much finer material including sand and silt derived from the bedrock exposed up the gulch. Vertical distance of exposure is about 8 feet.



GB **Gravel with boulders (glacial outwash)**—Covers a large area in the Tenmile Creek Valley and contains large amounts of granite boulders. Boulders as large as 4 feet have been excavated during construction in the western part of the Black Mountain quadrangle where the Tenmile Creek Valley widens out downstream. Granite boulders decrease in abundance and size to the east. This gravel was deposited by meltwater from the glacier that occupied the upper part of the Tenmile Creek Valley.



CG **Clay and gravel**—Cobbles of hard rock such as quartzite, marble, igneous rock, and hornfels in dark brown clay. This gravel was mined for gold along Blue Cloud Creek.



GSS **Gravel with sand, silt, and clay**—This material is mainly confined to active creeks. Along Tenmile Creek much of the coarser material in the gravel was derived by erosion and redeposition of the glacial outwash described above. In Nelson Gulch (next gulch east of Colorado Gulch), erosion of bedrock along both sides of the gulch provided the material in this gravel. Some of this gravel was mined for gold in Nelson Gulch.



SG **Sparse gravel**—On slopes where bedrock is not exposed, the gravel may be only a few feet thick. This gravel is derived from bedrock sources generally directly uphill. Photo of gravel cleared from a field.



SC **Silt and clay**—Not exposed, but inferred to underlie a meadow along Moose Creek. This material was deposited in a glacial lake formed when the outlet of Moose Creek was dammed by a glacier in the Tenmile Creek Valley.