

Geologic Map Units

Alkum	Renova Formation, undivided	Granite, granophytic	Three Forks Formation	Laford Formation, argillite and siltite facies
Palustrine deposit	Renova Formation, Cabbage Patch Member	Tonalite	Jefferson Formation	Laford Formation, coarse facies
Alkum and colluvium	Renova Formation, Bone Basin Member	Intusive rocks, undivided	Mayerwood and Red Lion Formations, undivided	Laford Formation, albitite fan and fan-delta facies
Talpa deposit	Renova Formation, Duster Creek Member	Monzonite	Mayerwood Formation	Laford Formation, shelf facies
Alkum fan deposit, younger than Cut	Renova Formation, Clinging Arrow Member	Quartz monzonite	Sedimentary rocks, undivided	Laford Formation, slope facies
Alkum, older than Cut	Volcanic rocks, undivided	Quartzite, leucocratic	Red Lion Formation	Laford Formation, submarine-canyon facies
Alkum fan deposit	Lowest Creek Volcanics	Quartz diorite and tonalite	Hammak Formation	Laford Formation, inner submarine fan facies
Rock glacier deposit	Basalt	Granite	Pilgrimage Formation	Laford Formation, middle submarine fan facies
Gravel deposit	Stratite rocks, undivided	Andesite	Park Formation	Laford Formation, outer submarine fan facies
Alkum terrace deposit	Stratite rocks, undivided	Diabase	Shagler Formation	Mafic dikes and sills
Podsol deposit	Andesite	Laford Formation	Silver Hill Formation	Igneous and metamorphic rock, undivided
Alkum fan deposit, older than Cut	Granite	Blackfoot Formation	Wibaux and Flathead Formations, undivided	Ultramafic rock
Alkum terrace deposit, older than Cut	Lamprophyre	Blackfoot Formation, Vaughn Member	Wibaux Formation	Biotite-garnet gneiss
Alkum terrace deposit, older than Cut	Elkhorn Mountains Volcanics	Blackfoot Formation, Flood Member	Flathead Formation	Mylonitic biotite gneiss
Alkum	Andesite	Kootenai Formation	Blackfoot and argillite	Garnet gneiss and schist
Debris-flow deposit	Diabase	Montana Formation	Quartzite of Grace Lake	Quartzite-mylonite gneiss and schist
Gravel	Basalt	Erik Group, undivided	Quartzite of Granddick Mountain	Androschistite gneiss
Sediment or sedimentary rocks, undivided	Syenite	Blackfoot Group, undivided	Dibbsan	Amphibole and hornblende gneiss
Alkum terrace deposit	Quartzite porphyry	Onmodey Formation	Quartzite of Bone Knob	Ambrosite schist
Debris-flow deposit	Diabase	Phosphor Formation	Black Lion Formation	Hornblende plagioclase gneiss and amphibole
Gravel	Quartzite	Quadrant Formation	Reask Group	Mylonite
Sediment or sedimentary rocks, undivided	Diabase	Stovewood Range Formation	Greyson Formation, upper calcareous member	Quartzite-mylonite gneiss
Alkum terrace deposit	Quartzite	Madsen Group, undivided	Greyson Formation	Ultramafic rock
Debris-flow deposit	Granodiorite	Mission Canyon Limestone	Laford Formation, undivided	Hydrothermally altered rock
Gravel deposit, coarse grained	Monzogranite	Lodgepole Limestone	Laford Formation, dark argillite and carbonaceous facies	
Granite	Granodiorite, leucocratic	Three Forks and Jefferson Formations, undivided	Laford Formation, quartzite facies	
Granite	Granodiorite, porphyritic			

Map symbols

- Contact: long dash where approximately located, short dash where inferred
- Fault: unknown sense of movement, dashed where approximately located, dotted where concealed
- Normal fault: dashed where approximately located, dotted where concealed, bar and ball on downthrown side
- Strike-slip fault: dashed where approximately located, dotted where concealed, arrows along fault trace indicate relative strike-slip displacement
- Reverse or thrust fault: teeth on upthrown block, dashed where approximately located, dotted where concealed
- Bedding sub-parallel fault: unknown sense of movement, dashed where approximately located, dotted where concealed
- Reactivated fault: unknown sense of movement, dashed where approximately located, dotted where concealed
- Monocline: showing axial plane trace of anticlinal flexure and direction of plunge, dashed where approximately located, dotted where concealed
- Syncline: showing trace of axial plane and plunge direction where known, dashed where approximately located, dotted where concealed
- Anticline: showing trace of axial plane and plunge direction where known, dashed where approximately located, dotted where concealed
- Overtuned syncline: showing trace of axial plane and bedding dip direction, dashed where approximately located, dotted where concealed
- Overtuned anticline: showing trace of axial plane and bedding dip direction, dashed where approximately located, dotted where concealed
- Granitic dikes
- Diabase dikes
- Mafic dikes and sills in Archean gneisses
- Granitic dikes and sills in Archean gneisses
- Zone of tectonic brecciation, or brecciation and shearing
- Shear zone
- Strike and dip of inclined bedding
- Strike and dip of overturned bedding
- Horizontal bedding
- Strike and dip of bedding where stratigraphic tops were confirmed using primary sedimentary structures; may be upright or overturned
- Vertical bedding
- Strike and dip of foliation: gneissic banding in Archean rocks, or slaty or schistosity in Phanerozoic rock
- Strike and dip of foliation parallel to layering, usually bedding
- Vertical foliation
- Modified
- Sand and gravel

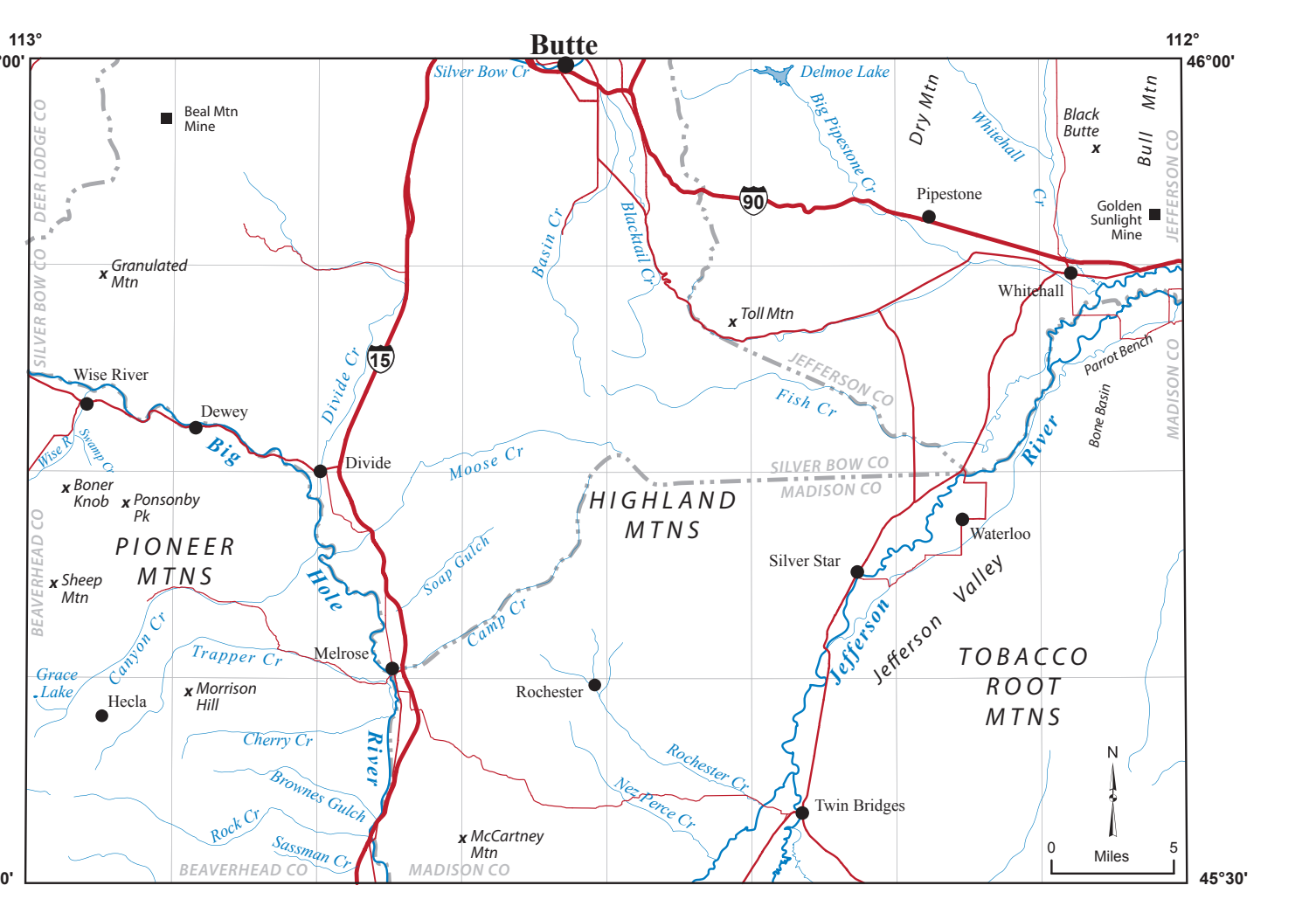
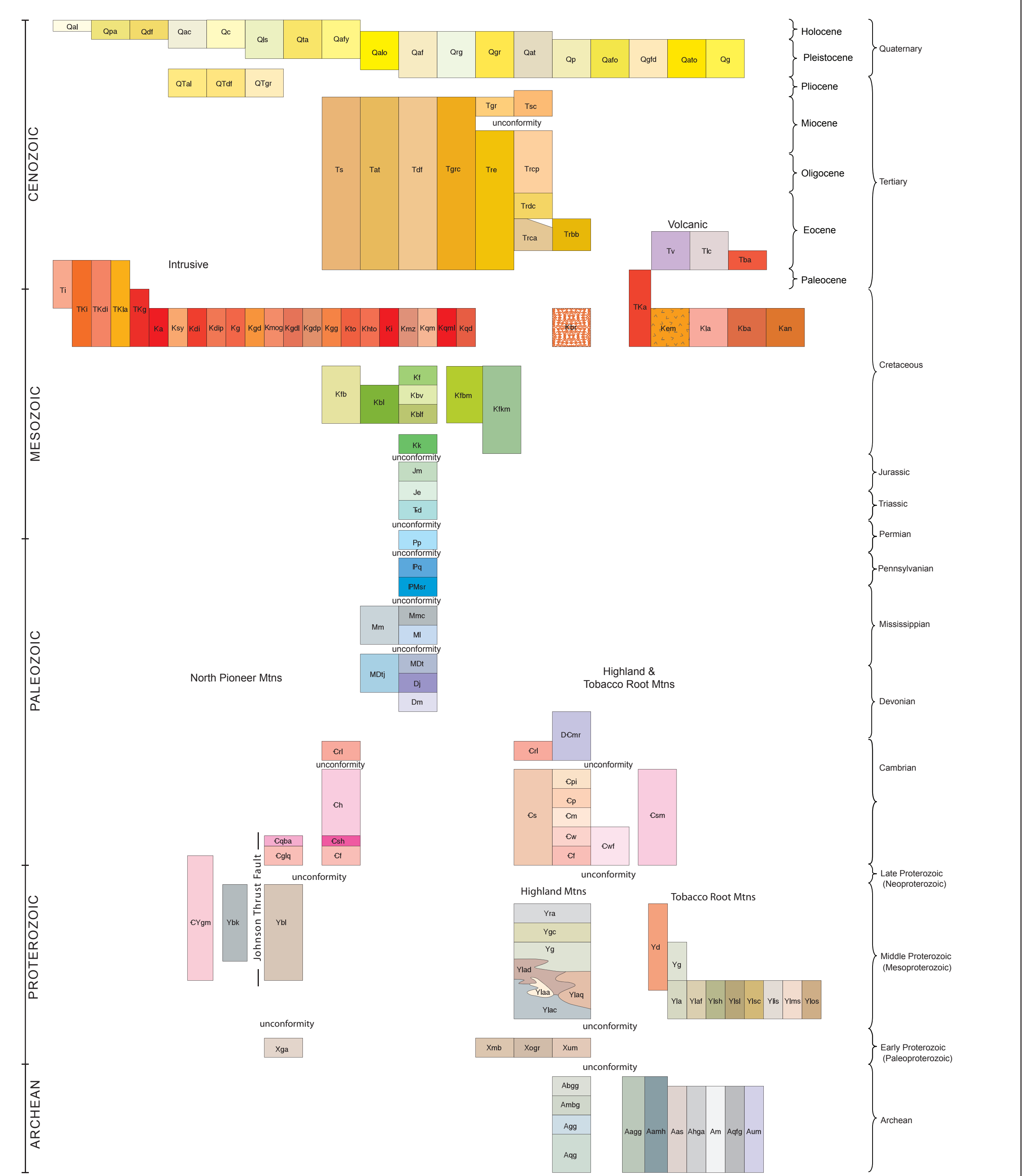


Figure 1. Geographic features in the Butte South 30' x 60' quadrangle. Light gray lines are U.S. Geological Survey 7.5' quadrangle boundaries.

Correlation of Map Units

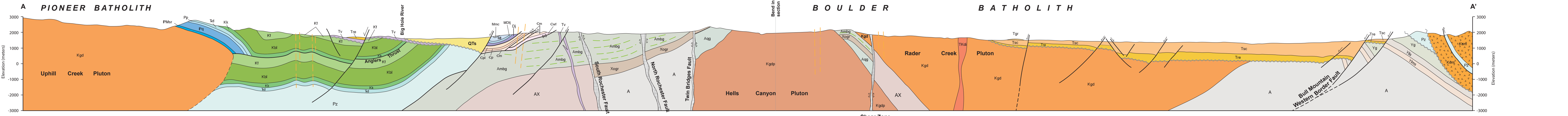


Base from U.S. Geological Survey
Butte South 30' x 60' topographic quadrangle
Map date: 1975
Projection: UTM zone 12, 1927 NAD
UTM grid declination: 1°04' West
1975 Magnetic North Declination: 19° East

SCALE 1:100,000
CENTIMETERS / METERS
METERS / FEET

Maps may be obtained from:
Publications Office
Montana Bureau of Mines and Geology
1300 West Park Street, Butte, Montana 59710-0097
Phone: (406) 496-4174 Fax: (406) 496-4451
http://www.mtweb.mt.gov

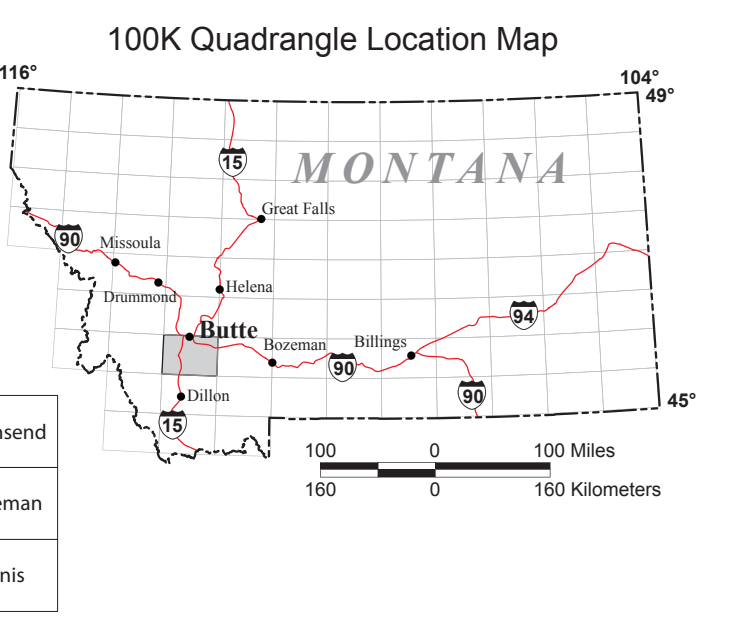
Cross Section A-A'



No vertical exaggeration
Surface units not shown

Faults
Angular unconformity
Regional cleavage
Mylonitic fabric

Cross section units not used on map
Qn Quaternary & Tertiary deposits, undivided
Pz Paleozoic rocks, undivided
Ar Archean & Proterozoic rocks, undivided
A Archean rocks, undivided



Butte South 30' x 60' Previous Mapping

Dickie Peak	Burnt Mountain	Buxton	Butte South	Homesake	Delmore Lake	Dry Mountain	Black Butte
11, 24, 25, 27, 28, 54	11, 27, 28, 54	5, 11, 33, 40, 46	5, 11, 19, 33, 44, 46	5, 11, 19, 44, 46	2, 8, 32, 46, 53	2, 22, 37, 53	1, 2, 7, 8, 22, 23, 36, 48, 55
Wiley River	Dewey	Tucker Creek	Mount Humboldt	Pipestone Pass	Grace	Vendover	Whitehall
11, 12, 17, 18, 23, 49	11, 14, 15, 27, 49, 52, 49, 52	11, 31, 45, 46, 52	5, 11, 31, 46, 52	5, 11, 31, 46, 52	31, 46, 53, 55, 46, 53	2, 3, 10, 11, 2, 23, 41, 53	
Vigand Park	Cattle Gulch	Melrose	Wickup Creek	Table Mountain	Silver Star	Walteno	Marshall Mountain
10, 16, 30, 36, 29, 14, 16, 28, 32, 34, 49, 55, 32, 49, 55	11, 31, 32, 46, 49, 52	11, 31, 32, 46, 49, 52	11, 31, 40, 42	11, 31, 40	10, 11, 31, 36, 43, 53	17, 30, 40, 53	10, 41, 51, 53
Mount Tappia	Storm Peak	Earls Gulch	Nez Perce Hollow	Twin Bridges	Twin Bridges SW	Old Baldy Mountain	Noble Peak
28, 32, 34, 39, 50, 56	30, 32, 36, 36, 46, 50	4, 8, 12, 31, 42, 31	3, 10, 31, 53	21, 31, 40, 51, 53	21, 31, 40, 51, 53	30, 47, 51	

- Alexander (1955)
- Amthor (1964)
- Kuonzi (1966)
- Bartholomew and others (1960)
- Brandon (1984)
- Berg and Hargrave (2004)
- Levine (1990)
- Burnbaugh (1972)
- Chadwick (1996)
- Cox (unpublished mapping)
- Dixon and Wolgram (1998)
- Orester (1996)
- Elliott and McDonald (2009)
- Felstein and Reed (2012)
- Fraser and Watkins (1972)
- Fowler (1955)
- Goussier (1941)
- Gulffurman (1952)
- Hansen and Wideman (1991)
- Hesspenholz (2003)
- Houston (2001)
- Hutchinson (1948)
- Johns (1961)
- Richardson (1966)
- Nilsen (1991)
- Nilsen (1991)
- Levine (1990)
- McDonald (2011)
- Mero (1962)
- Moore (1956)
- Noel (1956)
- Clair (1962)
- O'Neill (1983)
- O'Neill and others (1996)
- Richardson and Plafiee (1925)
- Patton (1985)
- Peerson and Zee (1985)
- Perkewich (1972)
- Peters (1971)
- Proctor (1966)
- Richard (1966)
- Ruppel and others (1993)
- Samuelson and Schmidt (1981)
- Schmidt (1975)
- Nilsen (1967a)
- Smedley (1967b)
- Smedley (1967c)
- Smedley (1967d)
- Smedley and others (1988)
- Smith (1970)
- Streeter (1983)
- Theodoss (1956)
- Tydel and others (1984)
- Vitaliano and Cordas (1979)
- Vuke (2004)
- Vuke and others (2004)
- Wilke (1986)
- Zee (1988)

Montana Bureau of Mines and Geology
Open-File 622
Geologic Map of the
Butte South 30' x 60' Quadrangle
Southwest Montana
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Jeffrey D. Lonn and Richard B. Berg
2012

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