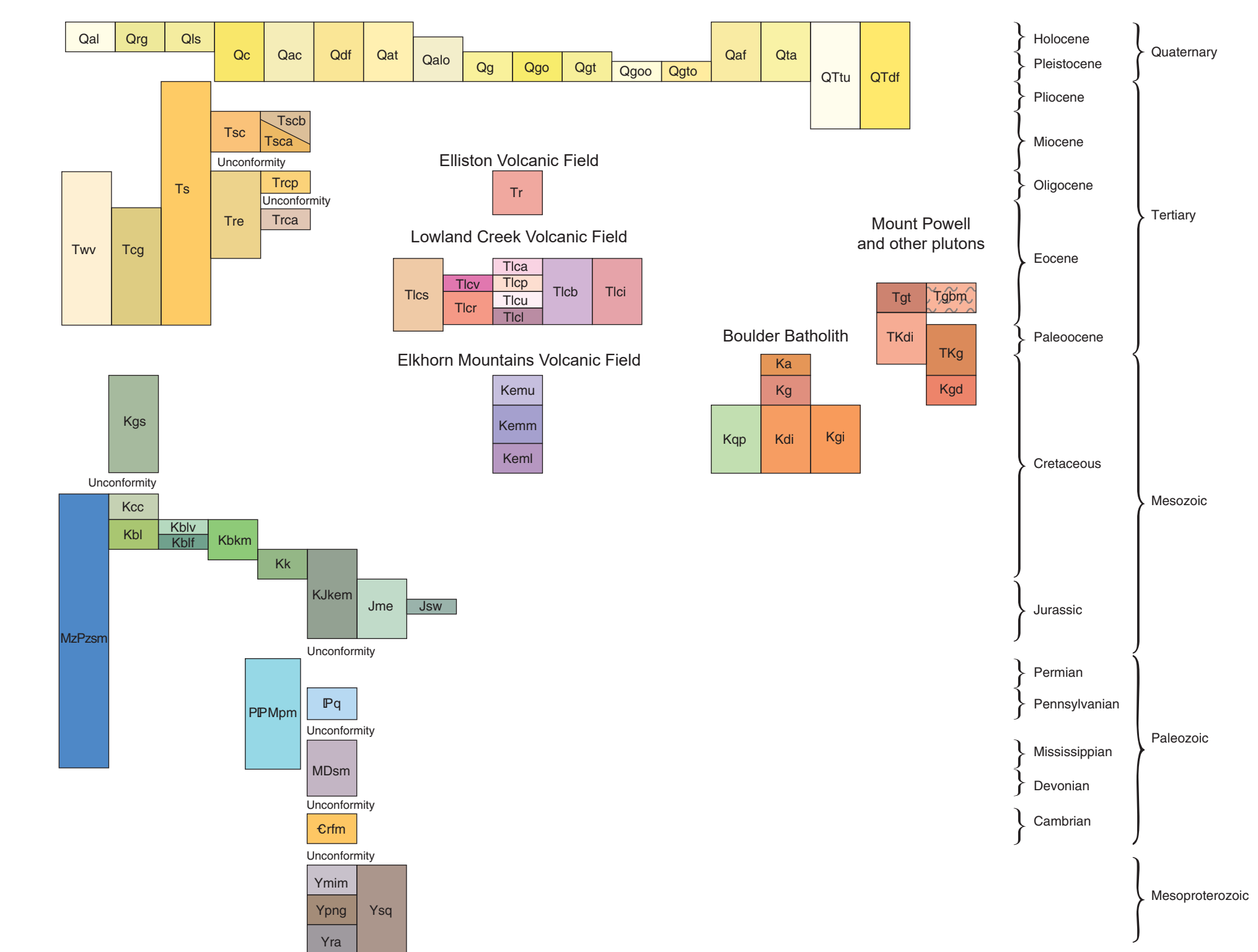


Correlation Chart



MAP SYMBOLS

- Contact, dashed where approximately located, dotted where concealed
 - Low-angle normal fault, ticks on hanging wall, dashed where fault merges into a broad zone of ductile shear, dotted where concealed
 - Thrust fault, teeth on upthrown block; dashed where approximately located
 - Fault, dashed where approximately located, dotted where concealed
 - Fault showing local normal offset—Bar and ball on downthrown side
 - Fault showing local right-lateral strike-slip offset—Arrows show relative motion
 - Inclined fault (1st option)—Showing dip value and direction
 - Inclined fault (2nd option)—Showing dip value and direction
 - Lineation on fault surface—Showing bearing and plunge
- Orientation Data Points**
- Small, minor inclined joint
 - Small, minor vertical or near-vertical joint
 - Horizontal bedding
 - Inclined bedding
 - Vertical bedding
 - Overturned bedding
 - Inclined bedding, where top direction of beds is known from local features
 - Inclined rheomorphic flow foliation in ignimbrites
 - Vertical rheomorphic flow foliation in ignimbrites
 - Inclined flow compaction foliation in volcanic rock
 - Vertical flow compaction foliation in volcanic rock
 - Lava flow indicator in volcanic rock
 - Bidirectional lava flow indicator in volcanic rock
 - Inclined flow banding in volcanic rock
 - Vertical flow banding in volcanic rock
 - Inclined slaty cleavage
 - Vertical slaty cleavage
 - Inclined mylonitic foliation with plunge and trend of lineation

Volcanic Features

- Caldera margin—Identify and existence certain, location approximate. Ticks point into caldera
- Caldera margin—Identify and existence questionable, location concealed. Ticks point into caldera

Other Symbols

- Geochronology Sample

Distribution of Map Units
For a more detailed description of the map units and symbols, please refer to the text accompanying this map.

Anthropogenic units

- Land modified during mining and/or reclamation activities

Sedimentary units

- | | | | | | |
|------|--|------|--|-------|---|
| Qal | Alluvium | Ts | Sediment and sedimentary rock, undivided | Kblm | Kootenai and/or Blackleaf Formation, metamorphosed |
| Qgl | Rock glacier | Tcc | Sixmile Creek Formation | Ks | Kootenai Formation |
| Qls | Landslide deposit | Tcb | Big Hole River Member | Kkum | Kootenai Formation and Ellis Group, metamorphosed |
| Qcl | Colluvium | Tcs | Sweetwater Creek Member | Jme | Morrison Formation and Ellis Group |
| Qdc | Alluvium and colluvium, undifferentiated | Tre | Renova Formation, undivided | Jsw | Swift Formation |
| Qdf | Debris flow deposits | Trp | Cabbage Patch member | PPMpm | Phosphoria and Quadrant formations and Madison Group, undivided |
| Qdt | Alluvial-terrace deposits | Tta | Climbing Arrow Member | Pq | Quadrant Formation |
| Qalo | Older alluvium | Ttw | West Valley breccia | MDm | Sedimentary rock metamorphosed to marble |
| Qg | Glacial deposits, undifferentiated | Tcg | Conglomerate | Tcs | Sediments related to the Lowland Creek volcanics |
| Qgo | Glacial outwash | Mfpm | Metamorphosed and Paleozoic sedimentary rocks, thermally metamorphosed | Kcc | Hasmark, Silver Hill, and Flathead Formations, metamorphosed, undivided |
| Qgl | Glacial till | Kgs | Golden Spike Formation | Ysm | Missoula Group metamorphosed |
| Qgo | Glacial outwash, older | Kcc | Carter Creek Formation | Yng | Calc-silicate gneiss, metamorphosed Piegan Group |
| Qgl | Glacial till, older | Kbl | Blackleaf Formation, undivided | Via | Ravalli Group |
| Qaf | Alluvial fan deposits | Kblv | Vaughn Member | Ysc | Schist and quartzite (Mesoproterozoic) |
| Qta | Talus | Kbf | Flood Member | | |
| Qtu | Tufa deposits | | | | |
| Qtdf | Debris flow deposits | | | | |

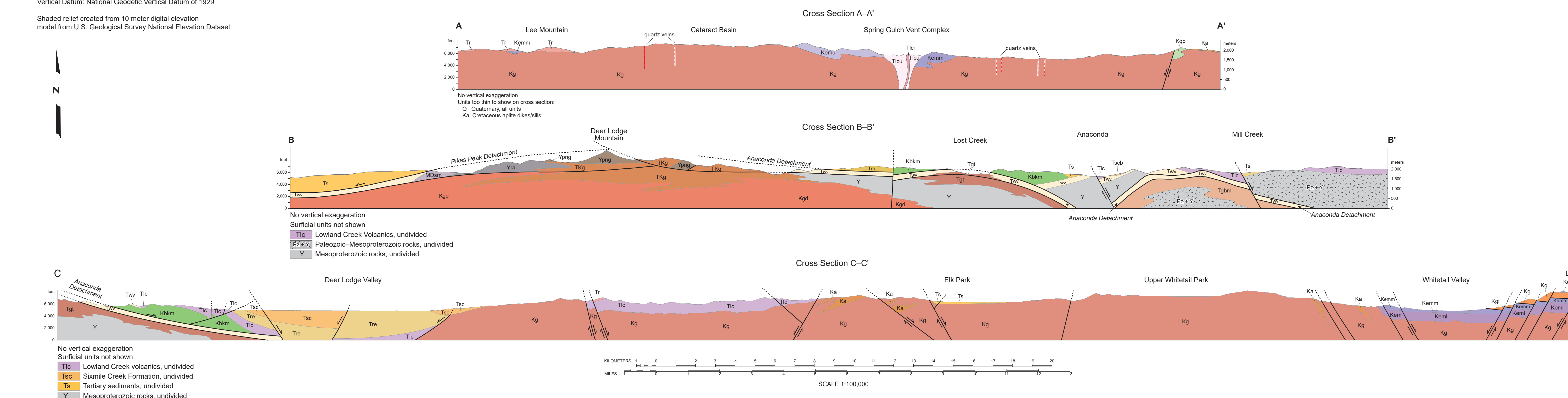
Igneous Units

- Elliston Volcanic Field**
- Tr
 - Rhyolite tuff, lavas, breccia, and vitrophyre
- Lowland Creek Volcanic Field**
- Tic
 - Intrusive to subvolcanic dike rocks
 - Tca
 - Andesite-dacite lavas that form small "turtle-back" lava dome complexes
 - Ttu
 - Upper rhyolite tuff and vent complexes
 - Ttp
 - Rhyodacite porphyry lava flows
 - Ttb
 - Breccia deposits
 - Ttv
 - Vitrophyre primarily related to rhyodacite porphyry lavas
 - Ttd
 - Lower rhyolite ignimbrite
- Elkhorn Mountains Volcanic Field**
- Ttu
 - Rhyolite ignimbrite, undifferentiated
 - Kum
 - Upper member
 - Kem
 - Middle member
 - Kml
 - Lower member
- Plutonic Units**
- Mount Powell and other plutons**
- Tgr
 - Granite, biotite-muscovite
 - Tgd
 - Biotite granite of the Lost Creek Stock
 - Tdi
 - Diorite of the Mount Powell Batholith
 - Tsp
 - Mount Powell
 - Tgrd
 - Foliated granodiorite
- Boulder batholith**
- Ka
 - Apilite and alaskite, alaskite porphyry, pegmatite, and other felsic intrusive rocks
 - Kg
 - Granite of the Boulder Batholith, undivided
 - Ks
 - Diorite intrusions
 - Kg
 - Gabbro intrusions
 - Kgp
 - Quartz porphyry intrusions

Base from U.S. Geological Survey
Butte North 30' x 60' topographic quadrangle
Map date: 1994
Projection: UTM zone 12
Horizontal Datum: 1927 North American Datum
UTM grid declination: 1°10' West
1994 Magnetic North Declination: 10° East
Contour interval: 50 meters
Vertical Datum: National Geodetic Vertical Datum of 1929

Shaded relief created from 10 meter digital elevation model from U.S. Geological Survey National Elevation Dataset.

Maps may be obtained from:
Publications Office
Montana Bureau of Mines and Geology
1300 West Park Street
Butte, Montana 59717-6997
Phone: (406) 496-4167
<http://mbmg.mtech.edu>



Montana Bureau of Mines and Geology
Open-File Report 715
Geology of the Butte North 30' x 60'
Quadrangle, Southwest Montana

Kaleb C. Scarberry, Colleen G. Elliott, and Petr V. Yakovlev

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