

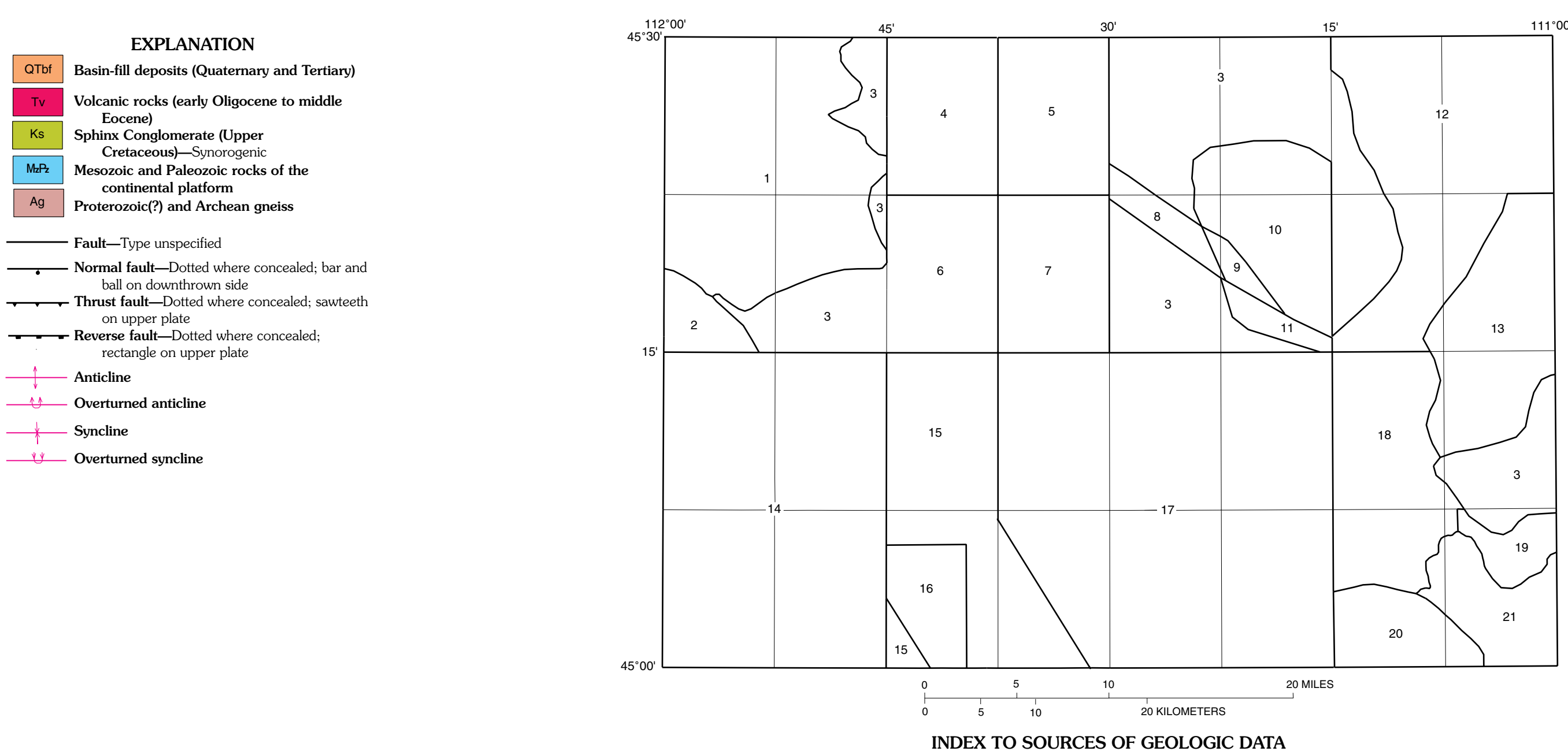
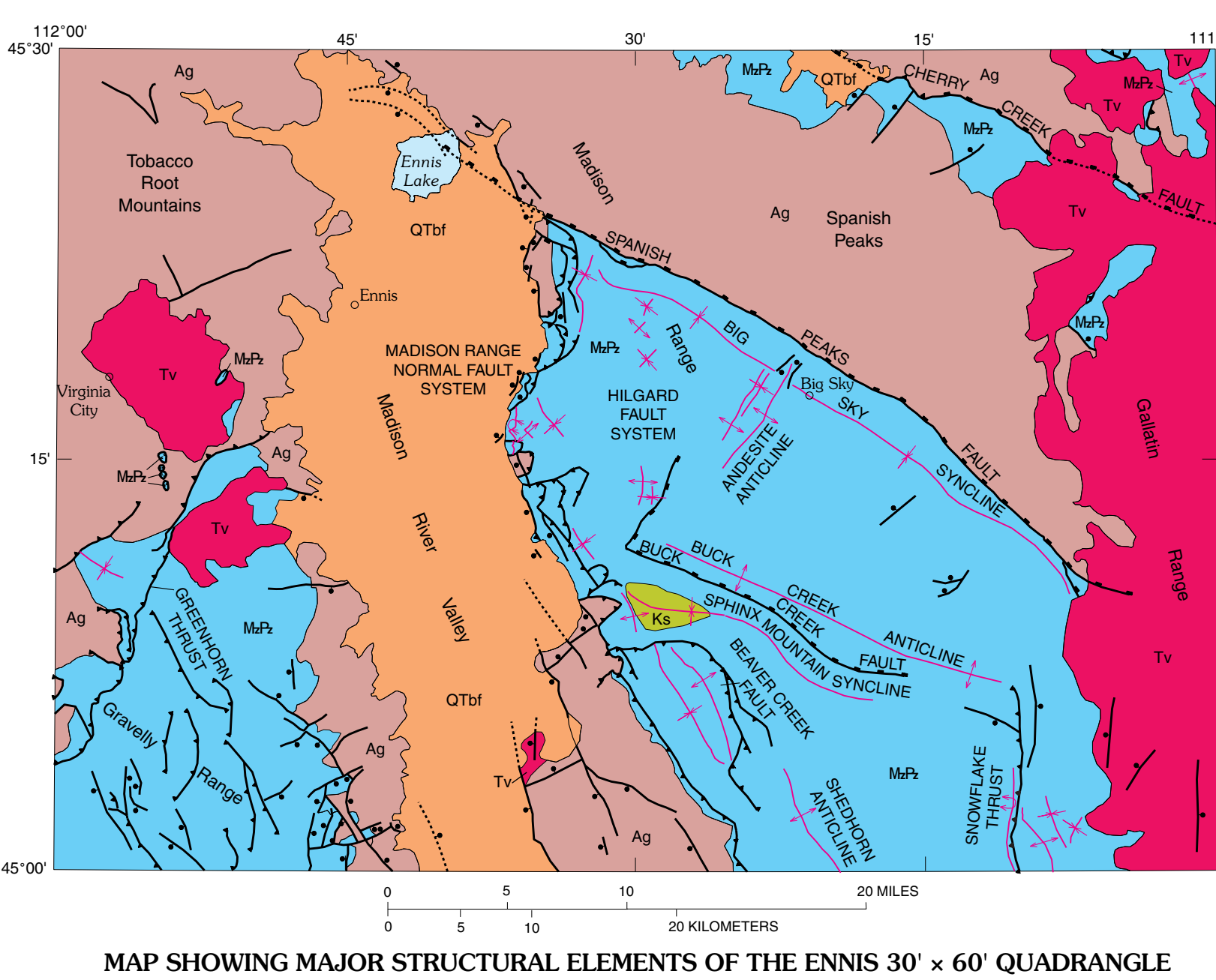


Base from U.S. Geological Survey, 1989
Projection and 10,000-meter grid, zone 12
Universal Transverse Mercator
25,000-foot grid ticks based on Montana
coordinate system, south zone
1907 North American Datum

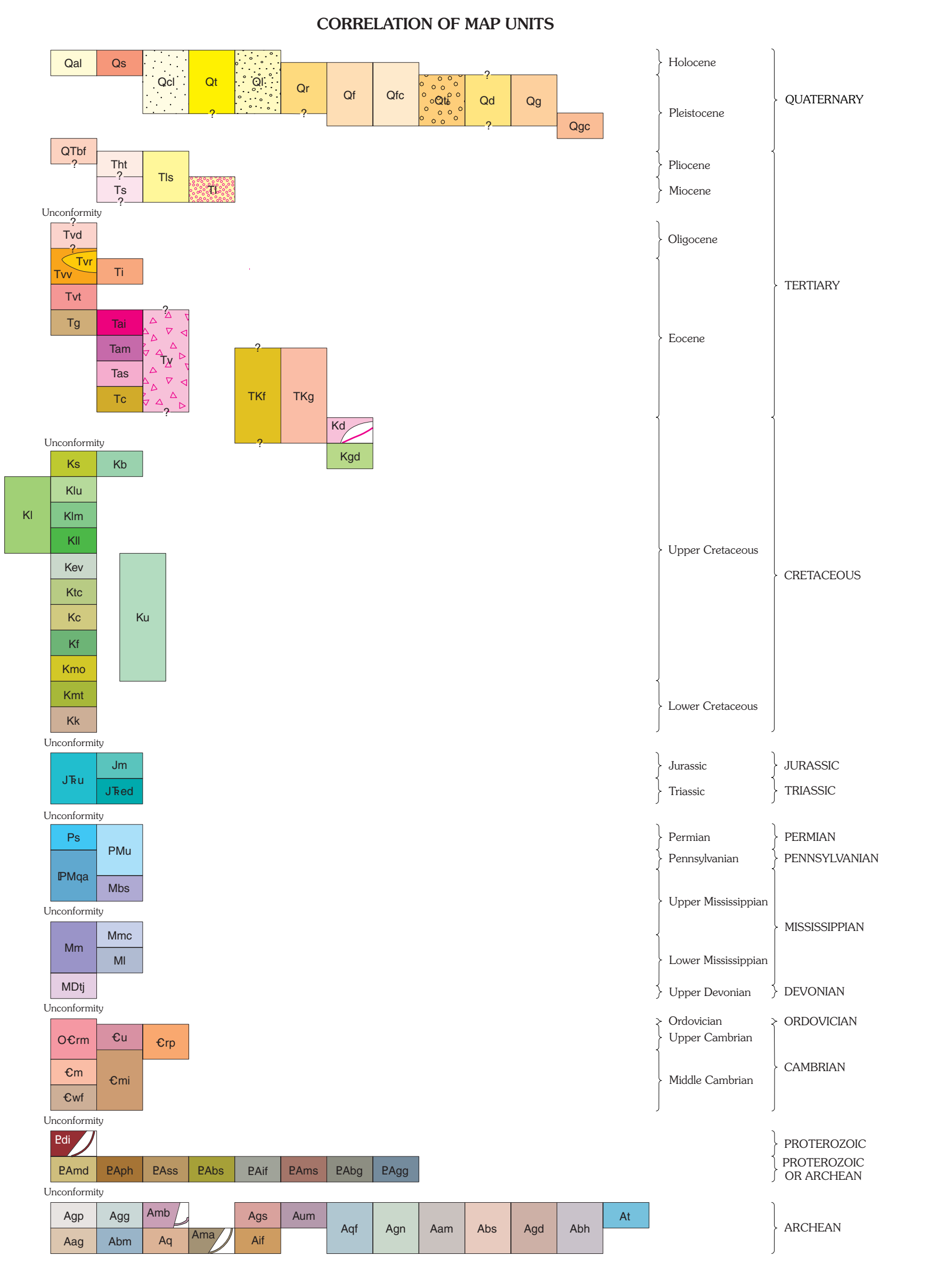
SCALE 1:100,000
2 1 0 1 2 3 4 5 6 7 8 9 10 MILES
2 1 0 1 2 3 4 5 6 7 8 9 10 KILOMETERS
CONTOUR INTERVAL 50 METERS
NATIONAL GEODETTIC VERTICAL DATUM OF 1929

MONTANA
QUADRANGLE LOCATION

Assisted in the field by Robert Burger, Alicia Groger, Steven Hunt, Kathy Lick, Brian Lund, John Miller, Jeanine Pinnow, David Taylor, and Angela Vasez. Assistance in digital cartography by O.D. Young, Michael Wellman, and Jeremy Workman.
Edited by Diane E. Lane
Additional digital cartography and color design by Denny Welp
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- Vitaliano and Cordua, 1979
 - Wier, 1982
 - Kellogg, K.S. unpub. mapping, 1994-96
 - Kellogg, 1993b
 - Kellogg, 1993a
 - Kellogg, K.S. unpub. mapping, 1993
 - Kellogg, 1992
 - Mogk, D.W., unpub. mapping, 1991
 - Salt, 1987
 - Kellogg, K.S., Lageson, D.W., and O'Neill, J.M., (1994-95), unpub. mapping
 - Tysdal, R.G. (1984-86), and Kellogg, K.S. (1994-95), unpub. mapping
 - McMannis and Chadwick, 1964
 - Simons and others, 1985
 - Hadley, 1969b
 - Hadley, 1969a
 - Vargo, 1990
 - Tysdal, 1990
 - Hall, 1961
 - Modified from Todd, 1969
 - Laue, 1967
 - U.S. Geological Survey, 1972
- Contact—Showing dip. Dashed where approximately located, dotted where concealed.
- Fault—Predominantly normal movement. Dashed where approximately located, dotted where concealed. Bar and ball on downthrown side where known.
- Thrust fault—Dashed where approximately located; dotted where concealed. Sawtooth on upper plate. Significant backsliding (normal movement) may have occurred along some thrust faults.
- Reverse fault—Dashed where approximately located; dotted where concealed. Rectangles on upthrown plate. Dip greater than 45°.
- Low-angle normal fault—Shown only in northern Gravely Range, where Mission Canyon Limestone overlies, with fault contact. Archean rocks.
- Anticline or syncline—Trace of axial plane, dotted where concealed.
- Overturned anticline or antiform—Trace of axial plane, dotted where concealed; small arrows show dip directions of limbs.
- Synform or syncline—Trace of axial plane, dotted where concealed.
- Overturned syncline or synform—Trace of axial plane, dotted where concealed. Small arrows show dip directions of limbs.
- Strike and dip of beds
- Inclined
- Vertical
- Overturned
- Horizontal
- Strike and dip of foliation
- Inclined
- Vertical



- LIST OF MAP UNITS
- | | | | |
|------|---|-----|--|
| Qal | Alluvium (Holocene) | Pmu | Shedhorn Sandstone (Lower Permian), Quadrant Sandstone (Pennsylvanian), and Ansdon Group (Lower Pennsylvanian and Upper Mississippian), undivided |
| Qs | Swamp deposits (Holocene) | PMa | Shedhorn Sandstone (Lower Permian) |
| Qd | Colluvium and loess (Holocene and upper Pleistocene) | PMs | Quadrant Sandstone (Pennsylvanian), Ansdon Group (Lower Pennsylvanian and Upper Mississippian), and Snowcrest Range Group (Upper Mississippian), undivided |
| Qa | Talus deposits (Holocene and upper Pleistocene) | Mbs | Big Sioux Group (Upper Mississippian) |
| Qr | Rock glacier deposits (Holocene and upper Pleistocene) | Mm | Madison Group, undivided (Upper and Lower Mississippian) |
| Qf | Fan deposits (Holocene and upper Pleistocene) | Mmc | Mission Canyon Limestone (Upper and Lower Mississippian) |
| Qlc | Fan deposits of the Cedar Creek alluvial fan (Holocene and upper Pleistocene) | MI | Lodgepole Limestone (Lower Mississippian) |
| Qd* | Terrace-gravel deposits (upper Pleistocene) | MDi | Three Forks Formation (Lower Mississippian and Upper Devonian) and Jefferson Formation (Upper Devonian), undivided |
| Qg | Diamicton (upper? Pleistocene) | Ocm | Bighorn Dolomite? (Ordovician), Red Lion Formation (Upper Cambrian), Pilgrim Dolomite (Upper Cambrian), and Park Shale (Middle Cambrian), undivided |
| QOTf | Terrace-gravel deposits of the Cameron bench (Pleistocene) | Cu | Red Lion Formation and Pilgrim Dolomite, undivided (Upper Cambrian) |
| Th | Huckleberry Ridge Tuff (Pliocene) | Crp | Red Lion Formation (Upper Cambrian), Pilgrim Dolomite (Upper Cambrian), and Park Shale (Middle Cambrian), undivided |
| Tis | Old landslide deposits (Pliocene and Miocene) | Cmi | Park Shale, Meagher Limestone, Wolsey Formation, and Flathead Sandstone, undivided (Middle Cambrian) |
| Ts | Limestone, sandstone, conglomerate, and ash deposits (Miocene?) | Cm | Meagher Limestone (Middle Cambrian) |
| Ti | Freshwater limestone (Miocene) | Cw | Wolsey Shale and Flathead Sandstone, undivided (Middle Cambrian) |
| Tvd | Volcanic rocks of Virginia City volcanic field (Oligocene and Eocene) | Rdi | Dike (Proterozoic) |
| Tkv | Diatreme (Oligocene?) | | |
| Tvv | Andesite and basalt flows (Oligocene and Eocene) | | |
| Tvw | Rhyolite flows (Oligocene or Eocene) | | |
| Tv | Felsic tuff (Eocene) | | |
| Tg | Volcaniclastic sandstone and gravel deposits (Eocene) | | |
| Tu | Volcanic rocks of undetermined affinity (Oligocene and/or Eocene) | | |
| Am | Andesite and basalt flows | | |
| Am* | Dacite porphyry sills and stocks (Eocene) | | |
| Am* | Absaroka Volcanic Supergroup (Eocene) | | |
| Tam | Intrusive rocks | | |
| Tas | Mt. Wallace Formation | | |
| Tc | Basal conglomerate and siltstone (lower Eocene) | | |
| TKi | Intrusive lssite (lower Tertiary or Upper Cretaceous) | | |
| TKg | Gabbro sills (Eocene to Late Cretaceous) | | |
| Kgd | Dacite porphyry of Fan and Lone Mountains (Late Cretaceous) | | |
| Ks | Granodiorite of Tobacco Root batholith (Late Cretaceous) | | |
| Kc | Sphinx Conglomerate (Upper Cretaceous) | | |
| Kd | Beaverhead Group (Upper Cretaceous) | | |
| Ki | Livingston Formation, undivided (Upper Cretaceous) | | |
| Klu | Upper member | | |
| Klm | Middle member | | |
| Kl | Lower member | | |
| Ke | Everts Formation, Virgelle Sandstone, Telegraph Creek Formation, Cody Shale, Frontier Formation, and Mowry Shale, undivided (Upper Cretaceous) | | |
| Klc | Telegraph Creek Formation (Upper Cretaceous) | | |
| Kc | Cody Shale (Upper Cretaceous) | | |
| Kf | Frontier Formation (Upper Cretaceous) | | |
| Kmo | Mowry Shale (Upper Cretaceous) | | |
| Kmt | Muddy Sandstone and Thermopsis Shale, undivided (Lower Cretaceous) | | |
| Kk | Kootenai Formation (Lower Cretaceous) | | |
| Jks | Morrison Formation (Upper Jurassic), Ellis Group (Upper and Middle Jurassic), and Woodside Siltstone and Dinwoody Formation (Lower Triassic), undivided | | |
| Jm | Morrison Formation (Upper Jurassic) | | |
| Jkd | Suitt Sandstone, Rendon Limestone, and Saulteau Formation of Ellis Group (Upper and Middle Jurassic), Woodside Siltstone (Lower Triassic), and Dinwoody Formation (Lower Triassic), undivided | | |
| Am* | Metadiorite | | |
| Am* | Dacite porphyry sills and stocks (Eocene) | | |
| Am* | Absaroka Volcanic Supergroup (Eocene) | | |
| Am* | Intrusive rocks | | |
| Am* | Mt. Wallace Formation | | |
| Am* | Basal conglomerate and siltstone (lower Eocene) | | |
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