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Quaternary Fault and Fold Database of the United States

As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the interactive fault map.

Tobacco Root fault (Class A) No. 649

Last Review Date: 1994-05-09

Compiled in cooperation with the Montana Bureau of Mines and Geology

citation for this record: **Haller, K.M., compiler, 1994, Fault number 649, Tobacco Root fault, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 02:03 PM.**

Synopsis	Most of the fault has only received preliminary reconnaissance investigation. In general, little detailed evidence is published about the nature, timing, or extent of displacement. Published maps reveal significant differences even in the location of the fault.
Name comments	Pardee (1919 #765; 1950 #46), as well as Tansley and others (1933 #768), speculated about the existence of a range-front fault along the Beaverhead-Jefferson basin, but neither named the fault. Source of the name may be Berg (1959 #761) as cited by Chadwick and Leonard (1979 #762). Fault extends from 2 km east of Renova, Montana, southward to 6.5 km east of Twin Bridges, Montana. The southern part of the fault coincides with

	the trace of the Georgia Gulch fault [667]. Johns and others (1982 #259) show a longer fault, which extends from north of the Jefferson River southward, across the Ruby River and joins the intersection of Ruby Range western [665] and northern [666] border faults. **Fault ID:** Refers to number 53 (unnamed fault along east side of Jefferson valley) of Witkind (1975 #317), number 6 (Tobacco Root Mountains western border fault) of Johns and others (1982 #259).
County(s) and State(s)	MADISON COUNTY, MONTANA
Physiographic province(s)	NORTHERN ROCKY MOUNTAINS
Reliability of location	Poor Compiled at 1:250,000 scale. *Comments:* Trace is compiled, with minor modifications, from 1:250,000-scale geologic map of Ruppel and others (1993 #646). Location of fault presented here differs significantly from that of Witkind (1975 #320) and Johns and others (1982 #259).
Geologic setting	High-angle, down-to-the-west, range-front normal fault bounding the western side of the Tobacco Root Mountains. Pardee (1950 #46) suggests displacement may be 1.5-1.8 km based on projection of offset erosional surfaces, and Johns and others (1982 #259) cite a personal communication with Schofield who suggested that the Tertiary fill may be 4-5 km thick near the southern end of the fault based on gravity data. Kuenzi and Fields (1971 #757) estimate about 1.8 km of post-mid-Pliocene stratigraphic throw based on comparison of dips for Sixmile Creek strata, but concede that separation may only be about 0.9 km.
Length (km)	32 km.
Average strike	N20°E
Sense of movement	Normal *Comments:* (Witkind, 1975 #317; Johns and others, 1982 #259)
Dip Direction	W

Paleoseismology studies	
Geomorphic expression	Slightly eastward tilted range block, abrupt and imposing range front, faceted spurs with aligned bases (Pardee, 1950 #46). No scarps on alluvium are reported.
Age of faulted surficial deposits	Miocene-Pliocene Sixmile Creek Formation (Johns and others, 1982 #259)
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Johns and others (1982 #259) inferred Quaternary movement on this fault, but provide no substantiating data. Witkind (1975 #320) indicated this fault is probably late Cenozoic but does not rule out Quaternary activity. Pardee (1950 #46) suggested that the majority of faulting may have been completed during the Tertiary, but the degree of faceted-spur preservation suggests Pleistocene displacement. Kuenzi and Fields (1971 #757) suggest that faulting ceased prior to the late Pleistocene. Pierce and Morgan (1992 #539) indicate that this fault was active during the Tertiary but do not preclude Quaternary movement. Bartholomew and Stickney examined several sites along the fault and found no evidence suggesting late Quaternary faulting (M.J. Bartholomew, written commun. 1997). Because details are lacking, the fault is included in this compilation. Due to the lack of agreement in the timing of the most recent movement, a Quaternary age is assigned herein. The timing of the most recent event is inferred here to be possibly Quaternary based on the young movement to the south, on the nearby Georgia Gulch fault [667]. No studies to date have addressed the fault described here.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Inferred low slip rate based on the absence of scarps.
Date and Compiler(s)	1994 Kathleen M. Haller, U.S. Geological Survey
References	#761 Berg, A.B., 1959, The geology of the northwestern corner of

the Tobacco Root Mountains, Madison County, Montana: Minneapolis, University of Minnesota, unpublished M.S. thesis, 75 p.

#762 Chadwick, R.A., and Leonard, R.B., 1979, Structural controls of hot-spring systems in southwestern Montana: U.S. Geological Survey Open-File Report 79-1333, 25 p.

#259 Johns, W.M., Straw, W.T., Bergantino, R.N., Dresser, H.W., Hendrix, T.E., McClernan, H.G., Palmquist, J.C., and Schmidt, C.J., 1982, Neotectonic features of southern Montana east of 112°30' west longitude: Montana Bureau of Mines and Geology Open-File Report 91, 79 p., 2 sheets.

#757 Kuenzi, W.D., and Fields, R.W., 1971, Tertiary stratigraphy, structure, and geologic history, Jefferson basin, Montana: Geological Society of America Bulletin, v. 82, p. 3373-3393.

#765 Pardee, J.T., 1919, Some manganese deposits in Madison County, Montana, *in* Contributions to economic geology 1918: U.S. Geological Survey Bulletin 690, p. 131-143.

#46 Pardee, J.T., 1950, Late Cenozoic block faulting in western Montana: Geological Society of America Bulletin, v. 61, p. 359-406.

#539 Pierce, K.L., and Morgan, L.A., 1992, The track of the Yellowstone hot spot—Volcanism, faulting, and uplift, *in* Link, P.K., Kuntz, M.A., and Platt, L.B., eds., Regional geology of eastern Idaho and western Wyoming: Geological Society of America Memoir 179, p. 1-53, 1 pl.

#646 Ruppel, E.T., O'Neill, J.M., and Lopez, D.A., 1993, Geologic map of the Dillon 1° x 2° quadrangle, Idaho and Montana: U.S. Geological Survey Miscellaneous Investigations Map I-1803-H, 1 sheet, scale 1;250,000.

#768 Tansley, W., Schaefer, P.A., and Hart, L.H., 1933, A geological reconnaissance of the Tobacco Root Mountains, Madison County, Montana: Montana Bureau of Mines and Geology Memoir 9, 57 p.

#317 Witkind, I.J., 1975, Preliminary map showing known and suspected active faults in western Montana: U.S. Geological

	Survey Open-File Report 75-285, 36 p. pamphlet, 1 sheet, scale 1:500,000. #320 Witkind, I.J., 1975, Preliminary map showing known and suspected active faults in Idaho: U.S. Geological Survey Open-File Report 75-278, 71 p. pamphlet, 1 sheet, scale 1:500,000.