

# 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](#).

## Spokane Hills fault, piedmont section (Class A) No. 679b

Last Review Date: 1993-04-23

### Compiled in cooperation with the Montana Bureau of Mines and Geology

*citation for this record:* Machette, M.N., compiler, 1993, Fault number 679b, Spokane Hills fault, piedmont section, 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 02:04 PM.

#### Synopsis

**General:** The range-bounding normal faults [679a] form a prominent escarpment on Tertiary bedrock along the eastern margin of Helena Valley and locally show evidence of late Quaternary movement. The piedmont scarp [679b] shows clear evidence of late Quaternary movement. Johns and others (1982 #259) indicate that a splay of the Helena Valley fault extends about 6 km southward along Spokane Creek and is a structural control for the creek. This splay is not included here because it lacks evidence of Quaternary movement.

	<p><b>Sections:</b> This fault has 2 sections. Informally named sections defined here include the main range-bounding faults [679a] and a short piedmont scarp [679b].</p>
<p><b>Name comments</b></p>	<p><b>General:</b> The first use of this name appears to have been by Schmidt (1986 #533). The faults were included as the southwestern part of the Helena Valley (St. Marys) fault by Witkind (1975 #317) and Johns and others (1982 #259). The structure consists of two range-bounding splays and a piedmont scarp that together extend from about 1 km northwest of Hauser Lake where Spokane Creek enters southward to a point about 1 km north of U.S. Highway 287.</p> <p><b>Section:</b> This informally named section is comprised of a single short piedmont scarp about 4 km east of Louisville and 1 km north of U.S. Highway 285. This scarp is parallel to and about 1 km west of the main trace of the fault [679a].</p> <p><b>Fault ID:</b> Refers to parts of fault 50, St. Mary's fault, of Witkind (1975 #317), fault 121, Helena Valley fault, of Johns and others (1982 #259), fault 24, Spokane Hills fault, of Stickney (1987 #251), and Stickney and Bartholomew (1987 #85; 1987 #242; written commun. 1992 #556).</p>
<p><b>County(s) and State(s)</b></p>	<p>BROADWATER COUNTY, MONTANA</p>
<p><b>Physiographic province(s)</b></p>	<p>NORTHERN ROCKY MOUNTAINS</p>
<p><b>Reliability of location</b></p>	<p>Good Compiled at 1:250,000 scale.</p> <p><i>Comments:</i> Based on 1:50,000-scale geologic map of Stickney (1987 #251).</p>
<p><b>Geologic setting</b></p>	<p>This zone of subparallel, generally down-to-the-southwest, range-bounding and piedmont normal faults form the western margin of the Spokane Hills along the eastern side of Helena Valley. The main fault [679a] has two echelon parts that place pre-Tertiary bedrock on the east against Tertiary sedimentary rocks and Quaternary sediment on the west. A subsidiary fault, on the piedmont, cuts Tertiary and perhaps Quaternary sediment.</p>
<p><b>Length (km)</b></p>	<p>This section is 1 km of a total fault length of 14 km.</p>

<b>Average strike</b>	N25°W (for section) versus N39°W (for whole fault)
<b>Sense of movement</b>	Normal
<b>Dip Direction</b>	SW
<b>Paleoseismology studies</b>	
<b>Geomorphic expression</b>	Johns and others (1982 #259) mention offset deposits that are probably associated with the 4- to 5-m-high fault scarp (Stickney and Bartholomew, 1987 #85) that was mapped on the piedmont by Stickney (1987 #251).
<b>Age of faulted surficial deposits</b>	Johns and others (1982 #259) stated that upper Pleistocene loess and Quaternary pediment deposits are offset about 6 m (T. 4 N., R. 1 W. Sec. 4 and 9). Stickney (1987 #251) and Stickney and Bartholomew (1987 #85) cite offset of upper to middle Pleistocene deposits, but Holocene to upper Pleistocene sediment extends across the trace of the fault on their map.
<b>Historic earthquake</b>	
<b>Most recent prehistoric deformation</b>	late Quaternary (<130 ka)  <i>Comments:</i> Based on geomorphic expression (presence of scarp) and age of faulted deposits.
<b>Recurrence interval</b>	
<b>Slip-rate category</b>	Less than 0.2 mm/yr  <i>Comments:</i> Slip rate is inferred on the basis of a 4- to 5-m-high scarp and about 6 m of offset of deposits that are late Pleistocene (>10-130 ka) or older (Stickney and Bartholomew, 1987 #85). These data indicate a maximum slip rate of 0.6 mm/yr, although it could be closer to 0.05 mm/yr (6 m in 130 k.y.) if the deposits are of early late Pleistocene age.
<b>Date and Compiler(s)</b>	1993 Michael N. Machette, U.S. Geological Survey, Retired
<b>References</b>	#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.

#533 Schmidt, R.G., 1986, Geology, earthquake hazards, and land use in the Helena area, Montana—A review: U.S. Geological Survey Professional Paper 1316, 64 p., 3 pls., scale 1:48,000 and 1:25,000.

#251 Stickney, M.C., 1987, Quaternary geologic map of the Helena valley, Montana: Montana Bureau of Mines and Geology Geologic Map 46, 1 pl., scale 1:50,000.

#242 Stickney, M.C., and Bartholomew, M.J., 1987, Preliminary map of late Quaternary faults in western Montana: Montana Bureau of Mines and Geology Open-File Report 186, 1 pl., scale 1:500,000.

#85 Stickney, M.C., and Bartholomew, M.J., 1987, Seismicity and late Quaternary faulting of the northern Basin and Range province, Montana and Idaho: Bulletin of the Seismological Society of America, v. 77, p. 1602-1625.

#556 Stickney, M.C., and Bartholomew, M.J., 1992 written commun., Preliminary map of late Quaternary faults in western Montana (digital data): Montana Bureau of Mines and Geology (digital version of MBMG Open-File Report 186), 1 pl., scale 1:500,000.

#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.

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