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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.**

## Carmichael fault (Class A) No. 695

**Last Review Date: 1994-03-28**

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

***citation for this record:*** **Haller, K.M., compiler, 1994, Fault number 695, Carmichael 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 02:02 PM.**

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| **Synopsis** | Little is known about the Quaternary history of this fault; primary source of data is Johns and others (1982 #259). |
| **Name comments** | Garihan and others (1983 #686) show this part of the fault zone as the Carmichael fault; however, Schmidt and Garihan (1983 #692) clearly show that the Carmichael fault terminates near Pony and the southern extension of this fault zone is the Pony fault. Earlier sources of the name are unknown. The part of the fault that is inferred to have Quaternary movement extends from Norwegian Creek southeastward to about 2 km northwest of Hot Springs Creek, but the Pony-Carmichael fault zone extends nearly 30 km farther northwest of trace shown here. |

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| | **Fault ID:** Refers to number 7 (Carmichael 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<br>Compiled at 1:250,000 scale.<br><br>*Comments:* Even thought trace of fault is compiled from 1:250,000-scale map of Garihan and others (1983 #686), it is uncertain that this is the location of scarps documented by Johns and others (1982 #259). They show the fault having a more southerly strike, and thus, their trace is as much as 1 km south of trace shown here. |
| **Geologic setting** | Inferred down-to-northeast, normal Cenozoic movement is confined to a short part of this long, steeply dipping Laramide-age structure that originally had reverse (down-to-south) sense of motion and possibly a similar style of deformation during the Precambrian. Amount of stratigraphic displacement unknown. |
| **Length (km)** | 7 km. |
| **Average strike** | N49°W |
| **Sense of movement** | Normal<br><br>*Comments:* (Johns and others, 1982 #259) |
| **Dip Direction** | NE |
| **Paleoseismology studies** | |
| **Geomorphic expression** | Johns and others (1982 #259) document a scarp between Norwegian Creek and Hot Springs Creek, but Stickney and Bartholomew (1987 #242; written commun. 1992 #556) do not include it in their compilations because they found no evidence suggesting late Quaternary faulting. If this scarp is on the trace of the fault presented here, it opposes the general topography of the area. |
| **Age of faulted** | |

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| **surficial deposits** | |
| **Historic earthquake** | |
| **Most recent prehistoric deformation** | undifferentiated Quaternary (<1.6 Ma)<br><br>*Comments:* Johns and others (1982 #259) indicate this part of the fault is Holocene, based on the presence of a "fresh fault scarp" and the location of a 1980 earthquake. 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 here. |
| **Recurrence interval** | |
| **Slip-rate category** | Less than 0.2 mm/yr<br><br>*Comments:* Inferred low slip rate is based on lack of detailed data indicating otherwise. |
| **Date and Compiler(s)** | 1994<br>Kathleen M. Haller, U.S. Geological Survey |
| **References** | #686 Garihan, J.M., Schmidt, C.J., Young, S.W., and Williams, M.A., 1983, Geology and recurrent movement history of the Bismark-Spanish Peaks-Gardiner fault system, southwest Montana, *in* Lowell, J.D., ed., Rocky Mountain foreland basins and uplifts: Denver, Colorado, Rocky Mountain Association of Geologists, p. 295-314.<br><br>#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.<br><br>#692 Schmidt, C.J., and Garihan, J.M., 1983, Laramide tectonic development of the Rocky Mountain foreland of southwestern Montana, *in* Lowell, J.D., ed., Rocky Mountain foreland basins and uplifts: Denver, Co., Rocky Mountain Association of Geologists, p. 295-314. |

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| | #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.<br><br>#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. |