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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.

Red Canyon fault, Maple Creek section (Class A) No. 657c

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Synopsis	**General:** Even though the largest historic earthquake in Montana resulted in surface rupture of part of this fault, little is known about its paleoseismic history. The Hebgen Lake earthquake (Mw7.3) of 1959 resulted in surface rupture on this fault and the nearby Hebgen fault [656]. The majority of published data are in reports dating from the early 1960s from studies initiated due to the 1959 Hebgen Lake earthquake. **Sections:** This fault has 3 sections. The sections defined in this compilation are based on distinct differences in timing of most recent surface faulting along the strike of the fault. The westernmost section [Red Canyon, 657a] ruptured in the 1959 Hebgen Lake earthquake; the other two sections [Richards Creek 657b, Maple Creek 657c] are prehistoric and are located to the east in Wyoming. The central section [657b] has postglacial

	offset, and the easternmost section [657c] displaces 0.63-Ma Lava Creek Tuff.
Name comments	**General:** Pardee (1950 #46) noted morphology indicative of a fault-controlled range front along the northeastern side of Hebgen Lake but did not report a fault name. The earliest use of this fault name was probably from the numerous publications resulting from studies following the 1959 Hebgen Lake earthquake (Woodard, 1960 #653; Witkind and others, 1962 #633; Witkind, 1964 #247; Myers and Hamilton, 1964 #250; Witkind and others, 1964 #629; Witkind, 1969 #468). Myers and Hamilton (1964 #250) refer to the part of this fault southeast of the mouth of Red Canyon as the "Corey Spring fault zone." The Red Canyon fault extends from about 1 km northeast of the intersection of Kirkwood Creek and Hebgen fault [656], east to a point about 4 km into Wyoming and Yellowstone National Park. **Section:** Named for Maple Creek, which the fault crosses just east of the floor of West Yellowstone basin. Mapped extent is only about 4 km and it lies entirely within Wyoming. **Fault ID:** Refers to number 7 (Red Canyon fault) of Witkind (1975 #317), number 43 (Red Canyon fault) of Johns and others (1982 #259) and number 14 (Red Canyon fault) of Stickney and Bartholomew (1987 #85).
County(s) and State(s)	PARK COUNTY, WYOMING
Physiographic province(s)	NORTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:125,000 scale. *Comments:* Mapped at 1:125,000 scale where it offsets the 0.63 Ma Lava Creek Tuff (U.S. Geological Survey, 1972 #639; Christiansen, 2001 #1784). Surficial geology mapped at 1:125,000 scale by Pierce (1973 #3805). Traces of faults digitized from combination of these 1:125,000-scale maps.
Geologic setting	This high-angle, down-to-the-southwest, arcuate fault is one in a belt of active faults that extends westward from Yellowstone and that Pierce and Morgan (1992 #539) relate to the easterly track of the Yellowstone hotspot. The fault extends along the southwest flank of Kirkwood Ridge, continuing south along northeastern

	side of Red Canyon, northern side of Grayling Arm of Hebgen Lake, and extends into the glacial outwash plain west of Yellowstone basin. The fault generally parallels the strike of bedrock units (Witkind, 1964 #247; Myers and Hamilton, 1964 #250). Locally, the western section the fault follows the contact between massive limestone and thin-bedded shale (Doser, 1985 #22). Witkind (1964 #247), indicating that the net cumulative throw is several thousand feet along the central part of main fault section [657a], but the exact amount is indeterminable.
Length (km)	This section is 4 km of a total fault length of 29 km.
Average strike	N73°W (for section) versus N63°W (for whole fault)
Sense of movement	Normal
Dip Direction	S
Paleoseismology studies	
Geomorphic expression	Bedrock escarpments developed on 0.63 Ma Lava Creek Tuff; fault is mapped as not offsetting Pinedale glacial till (Pierce, 1973 #3805).
Age of faulted surficial deposits	0.63 Ma Lava Creek Tuff.
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Youngest offset not well constrained, could be late Pleistocene (<130 ka) and possibly might be post-glacial (<15 ka).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Lava Creek Tuff (0.63 Ma) is offset as much as 100 m, which yields a maximum long-term slip rate that falls within this category.

Date and Compiler(s)	1993 Kathleen M. Haller, U.S. Geological Survey
References	#1784 Christiansen, R.L., 2001, The Quaternary and Pliocene Yellowstone Plateau volcanic field of Wyoming, Idaho, and Montana: U.S. Geological Survey Professional Paper 729-G, 145 p., 3 pls., scale 1:125,000. #22 Doser, D.I., 1985, Source parameters and faulting processes of the 1959 Hebgen Lake, Montana, earthquake sequence: Journal of Geophysical Research, v. 90, no. B6, p. 4537-4555. #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. #245 Murphy, L.M., and Brazee, R.J., 1964, Seismological investigations of the Hebgen Lake earthquake, *in* The Hebgen Lake, Montana, earthquake of August 17, 1959: U.S. Geological Survey Professional Paper 435-C, p. 13-17. #250 Myers, W.B., and Hamilton, W., 1964, Deformation accompanying the Hebgen Lake earthquake of August 17, 1959, *in* The Hebgen Lake, Montana, earthquake of August 17, 1959: U.S. Geological Survey Professional Paper 435-I, p. 55-98. #46 Pardee, J.T., 1950, Late Cenozoic block faulting in western Montana: Geological Society of America Bulletin, v. 61, p. 359-406. #3805 Pierce, K.L., 1973, Surficial geologic map of the Mount Holmes quadrangle and parts of the Tepee Creek, Crown Buttes, and Miner quadrangles, Yellowstone National Park, Wyoming and Montana: U.S. Geological Survey Miscellaneous Geologic Investigations I-640, 1 sheet, scale 1:62,500. #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.

#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.

#639 U.S. Geological Survey, 1972, Geologic map of Yellowstone National Park: U.S. Geological Survey Miscellaneous Geologic Investigations I-711, 1 sheet, scale 1:125,000.

#247 Witkind, I.J., 1964, Reactivated faults north of Hebgen Lake, *in* The Hebgen Lake, Montana, earthquake of August 17, 1959: U.S. Geological Survey Professional Paper 435-G, p. 37-50.

#468 Witkind, I.J., 1969, Geology of the Tepee Creek quadrangle, Montana-Wyoming: U.S. Geological Survey Professional Paper 609, 101 p., 2 pls.

#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.

#629 Witkind, I.J., Hadley, J.B., and Nelson, W.H., 1964, Pre-Tertiary stratigraphy and structure of the Hebgen Lake area, *in* The Hebgen Lake, Montana, earthquake of August 17, 1959: U.S. Geological Survey Professional Paper 435-R, p. 199-207.

#633 Witkind, I.J., Myers, W.B., Hadley, J.B., Hamilton, W., and Fraser, G.D., 1962, Geologic features of the earthquake at Hebgen Lake, Montana, August 17, 1959: Bulletin of the Seismological Society of America, v. 52, p. 163-180.

	#653 Woodard, F.W., 1960, Red Canyon fault Hebgen Lake, Montana, earthquake August 17,1959, *in* Campau, D.E., and Anisgard, H.W., eds., West Yellowstone—Earthquake area: Billings Geological Society, 11th Annual Field Conference, September 7-10, 1960, p. 49-55.