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Quaternary Fault and Fold Database of the United States

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East-Side Chase Gulch fault (Class A) No. 2317

Last Review Date: 1997-11-17

Compiled in cooperation with the Colorado Geological Survey

citation for this record: **Widmann, B.L., compiler, 1997, Fault number 2317, East-Side Chase Gulch 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 03:00 PM.**

Synopsis	The East-Side Chase Gulch fault lies between Schoolmarm Mountain and the Puma Hills on the west side of Eleven Mile Canyon Reservoir. Due to its close proximity to Spinney Mountain Dam, several strands of the Chase Gulch fault system were studied in detail by Shaffer (1980 #2739) who excavated eleven trenches. The fault trace is marked by a low scarp visible in low sun-angle photography. Trenching investigations revealed Pinedale pediment gravels offset by the fault. Latest movement on the fault is believed to have occurred between 13 to 30 ka, as early Pinedale deposits are offset by about 2.4 m. The East-side fault is a section of an older fault system called the Chase Gulch fault, which most likely connects with the Laramide Elkhorn

	thrust fault at depth (Shaffer, 1980 #2739).
Name comments	This is a northwest-trending fault in South Park that is parallel to, but west of Chase Gulch. The fault begins west of Schoolmarm Mountain, continues south past Spinney Mountain and onto the southwest side of Eleven Mile Canyon Reservoir. It ends at the southeast end of the Puma Hills in the Front Range. The East-Side fault and associated West-Side fault are closely linked to the Laramide Chase Gulch fault system. The term Chase Gulch--East-Side fault was first used by Shaffer (1980). Unruh and others (1994 #2778) refered to this fault as the Chase Gulch fault. **Fault ID:** Fault 177 in Kirkham and Rogers (1981 #792) and fault number Q65 of Widman and others (1998 #3441).
County(s) and State(s)	PARK COUNTY, COLORADO
Physiographic province(s)	SOUTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* The fault was mapped in detail by Shaffer (1980 #2739) at scale of 1:12,000. It was also mapped at a scale of 1:250,000 by Scott and others (1978 #2735) and Bryant and others (1981 #2645). The trace used herein is from Scott and others (1978 #2735) and Bryant and others (1981 #2645).
Geologic setting	The fault is high-angle normal, down to the northeast. The fault is linked to the Laramide Chase Gulch fault system and steepens at depth before merging with the Laramide Elkhorn Thrust (Shaffer, 1980 #2739; Shaffer and Williamson, 1986 #2740). The fault is within the Laramide age South Park basin, which is bounded by the Mosquito Range on the west, the Front Range on the north and east, and the Thirtynine Mile volcanic field on the south.
Length (km)	31 km.
Average strike	N41°W
Sense of movement	Normal *Comments:* Shaffer (1980) reported normal movement on this fault.

Dip	50°-90° NE *Comments:* The minimum dip near the surface is 50?, the fault steepens to nearly vertical at depth (Shaffer, 1980 #2739).
Paleoseismology studies	Shaffer (1980 #2739) conducted a detailed site investigation of the East-Side fault due to its proximity to the Spinney Mountain Dam. Of the eleven trenches excavated, only trenches T-407, T-408, and T-409 reported information that applies to the East-Side fault. These sites are herein labeled 2317-1 through 2317-3, respectively. Other methods of investigation included low sun-angle photo analysis, geologic mapping, radiocarbon dating, drilling, electrical resistivity surveys, and seismic refraction surveys. Site 2317-1 (T-407): In this trench, the fault contact between Precambrian bedrock and alluvium dips 48? E. The upper part of slip planes are rolled over to a dip of 25? to 30? W. Site 2317-2 (T-408): The upper part of slip planes in this trench are rolled over to a dip of 25? to 30? W. Bull Lake terrace gravel is offset 9.1 m. A faulted carbonate-cemented zone in the Bull Lake deposits was estimated to be 28 ka ? 1.5 ka. Site 2317-3 (T-408A): Bull Lake terrace gravel is offset 9.1 m in this trench. Data from these trenches as well as other trenches not specifically described by Shaffer (1980 #2739) revealed about 2.5 m of fault offset within the past 35,000 year. Shaffer (1980 #2739) concluded that "the controlling tectonic structure was the East-Side fault, whose surface rupture was estimated to be along a 16-km-long trace roughly coincident with a portion of the old Chase Gulch fault.
Geomorphic expression	The fault trace is marked by lineaments and scarps (Unruh and others, 1994 #2778). Scarp heights on Bull Lake and early Pinedale deposits typically range from 1.2 to 1.8 m, but one scarp 1.5 miles east of Spinney Mountain Dam has about 9.1 m of vertical relief.
Age of faulted surficial	Pinedale pediment gravel is offset as much as 2.4 m, and Bull Lake terrace gravel is offset about 9.1 m (Shaffer, 1980 #2739;

deposits	Shaffer and Williamson, 1986 #2740). Less detailed maps by Scott and others (1978 #2735) and Bryant and others (1981 #2645) did not show offset of Quaternary deposits.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Shaffer (1980 #2739; 1981 #2475) and Shaffer and Williamson (1986 #2740) concluded that the fault has not been active since the end of the Pinedale glaciation about 13,000 years ago, with latest movement on the fault occurring between 13 ka to 30 ka. Kirkham and Rogers (1981 #792) and Colman (1985 #1953) also reported late Quaternary movement on the East-Side fault.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Shaffer (1980 #2739) calculated a slip rate of <0.14 mm/yr for the East-Side fault.
Date and Compiler(s)	1997 Beth L. Widmann, Colorado Geological Survey
References	#2645 Bryant, B., McGrew, L.W., and Wobus, R.A., 1981, Geologic map of the Denver 1° x 2° quadrangle, north-central Colorado: U.S. Geological Survey Miscellaneous Geologic Investigations I-1163. #1953 Colman, S.M., 1985, Map showing tectonic features of late Cenozoic origin in Colorado: U.S. Geological Survey Miscellaneous Geologic Investigations I-1566, 1 sheet, scale 1:1,000,000. #792 Kirkham, R.M., and Rogers, W.P., 1981, Earthquake potential in Colorado: Colorado Geological Survey Bulletin 43, 171 p., 3 pls. #2735 Scott, G.R., Taylor, R.B., Epis, R.C., and Wobus, R.A., 1978, Geologic map of the Pueblo 1° x 2° quadrangle, south-central Colorado: U.S. Geological Survey Miscellaneous Geologic Investigations I-1022.

	#3475 Shaffer, M.E., 198, Earthquake hazard studies for Spinney Mountain dam, Park County, Colorado, *in* Junge, W.R., ed., Colorado tectonics, seismicity and earthquake hazards—Proceedings and field trip guide: Colorado Geological Survey Special Publication 19, p. 26. #2739 Shaffer, M.E., 1980, Seismic hazard evaluation, Spinney Mountain project, Park County, Colorado: Technical report to R.W. Beck and Associates, Report 78-5129, 77 p. #2740 Shaffer, M.E., and Williamson, J.V., 1986, Seismic evaluation of Spinney Mountain Dam, *in* Rogers, W.P., and Kirkham, R.M., eds., Contributions to Colorado tectonics and seismicity—A 1986 update: Colorado Geological Survey Special Publication 28, p. 104-121. #2778 Unruh, J.R., Wong, I.G., Hitchcock, C.S., Bott, J.D.J., Silva, W.J., and Lettis, W.R., 1994, Seismotectonic evaluation, Pueblo Dam, Fryingpan-Arkansas Project, south-central Colorado: U.S. Bureau of Reclamation, 134 p. #3441 Widmann, B.L., Kirkham, R.M., and Rogers, W.P., 1998, Preliminary Quaternary fault and fold map and database of Colorado: Colorado Geological Survey Open-File Report 98-8, 331 p., 1 pl., scale 1:500,000. #2790 Williamson, J.V., and Shaffer, M.E., 1982, Seismic analysis of Spinney Mountain Dam: International Commission on Large Dams, Rio de Janeiro, Brazil, Proceedings, p. 643-660.