

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](#).

West-Side Chase Gulch fault (Class A) No. 2316

Last Review Date: 1997-11-25

Compiled in cooperation with the Colorado Geological Survey

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Synopsis

The West-Side Chase Gulch fault is on the west side of Spinney Mountain in South Park basin. 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 that is visible on low sun-angle photographs. Trenching revealed Pinedale pediment gravel offset about 2.4 m. Latest movement on the fault is believed to have occurred between 13 ka and 30 ka. Shaffer (1980 #2739) theorized that fault movement occurred sympathetic to movement on the East-Side Chase Gulch fault [2317] and is related to the Laramide age Elkhorn thrust fault at depth.

Name comments	<p>The West-Side fault is a northwest-trending fault on the west side of Spinney Mountain, which along with the East-Side fault [2317], is associated with the Laramide age Chase Gulch fault system. The fault extends north from the South Platte River, northwest of Eleven Mile Canyon Reservoir, to the southwest flank of Spinney Mountain. The term Chase Gulch--West-side fault was first used by Shaffer (1980 #2739).</p> <p>Fault ID: Fault 178 in Kirkham and Rogers (1981 #792) and fault number Q64 of Widman and others (1998 #3441).</p>
County(s) and State(s)	<p>PARK COUNTY, COLORADO</p>
Physiographic province(s)	<p>SOUTHERN ROCKY MOUNTAINS</p>
Reliability of location	<p>Good Compiled at 1:250,000 scale.</p> <p><i>Comments:</i> The fault was mapped in detail by Shaffer (1980 #2739) at scale of 1:12,000. It was also shown at a scale of 1:250,000 by Scott and others (1978 #2735). The trace used herein is from Shaffer (1980 #2739), recompiled at 1:250,000 scale.</p>
Geologic setting	<p>The West-Side Chase Gulch fault lies on the west flank of Spinney Mountain, which is an erosional remnant of the hanging wall of the Elkhorn thrust fault, and may merge with it at depth (Shaffer, 1980 #2739). The West-Side fault has reverse movement and is down to southwest. The fault is in the South Park basin, which is a Laramide age feature. The basin 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.</p>
Length (km)	<p>3 km.</p>
Average strike	<p>N26°W</p>
Sense of movement	<p>Reverse</p> <p><i>Comments:</i> Shaffer (1980 #2739) reported reverse movement on the West-Side fault.</p>
Dip	<p>6°-43° NE</p>

Comments: Shaffer (1980 #2739) reported average dips of 6° and 21° for the north and south parts of the West-Side fault. The middle section of the fault is steeper with an average dip of 32° to 43°

Paleoseismology studies

Shaffer (1980 #2739) conducted a detailed site investigation of the fault due to its proximity to Spinney Mountain dam. Of the eleven trenches excavated, only trenches T-402, T-403, T-404 and T-405 reported information that applies to the West-Side fault. These trench sites are herein labeled 2316-1 through 2316-4, respectively. Other methods of investigation included low sun-angle photo analysis, geologic mapping, radiocarbon age dating drilling, electrical resistivity surveys, and seismic refraction surveys.

Site 2316-1: The average dip of the fault in this trench was 21° E and the average vertical offset was 7 m. One alluvial sand deposit observed in this trench was offset by about 1.2 m.

Site 2316-2: The average dip of the fault in this trench was 32° E and the average vertical offset was 10.7 m. Drag folding and rotation of cobbles was observed in alluvial gravels within the fault zone.

Site 2316-3: The average dip of the fault in this trench was 43° E and the average vertical offset was 15.2 m. Two slip planes were observed in this trench. About 6.1 m of offset was recognized across the upper slip plane.

Site 2316-4: The average dip of the fault in this trench was 6° E and the average vertical offset was 4.3 m.

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 years. He concluded that the fault was originally a secondary plane of the Elkhorn Thrust and now branches at depth from the East-Side fault plane. Movement on the fault is believed to have been sympathetic to movement on the East-Side fault Shaffer (1980 #2739).

Geomorphic expression

The West-Side fault is marked by a west-facing scarp on the west side of Spinney Mountain. Scarp heights on Bull Lake and early Pinedale deposits typically range from 1.2 to 1.8 m (Shaffer, 1980

	#2739).
Age of faulted surficial deposits	Pinedale pediment gravel is offset by about 2.4 m across the West-Side fault (Shaffer, 1980 #2739). The fault lies almost entirely in Pinedale deposits.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) <i>Comments:</i> Shaffer (1980 #2739; 1981 #3475) 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; the latest movement on the fault probably occurred between 13 ka and 30 ka (Shaffer, 1980 #2739).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> Shaffer (1980 #2739) calculated a slip rate of <0.14 mm/yr.
Date and Compiler(s)	1997 Beth L. Widmann, Colorado Geological Survey
References	#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, <i>in</i> 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.

#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.

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