Jump to Navigation

Quaternary Fault and Fold Database of the United States

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Ute Pass fault zone (Class A) No. 2327

Last Review Date: 1997-11-06

Compiled in cooperation with the Colorado Geological Survey

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Synopsis	The Ute Pass fault zone defines the west and southwest margins of the Rampart Range west of Colorado Springs. Tonal and vegetation lineaments and bedrock scarps are discontinuous along the southern trace of the fault, but are lacking along the northern trace. Late Cenozoic movement on the fault is strongly supported along most of the fault (e.g., Taylor, 1975 #2757; Scott and others, 1978 #2735; Kirkham and Rogers, 1981 #792; Dickson, 1986 #2685). However, Quaternary deposits do not appear to be offset across the north end of the fault (Bryant and others, 1981 #2645; Dickson and others, 1986 #2685). Scarps developed on Quaternary (Yarmouth to Illinoian age) rockfall deposits are cited as evidence for Quaternary fault activity on the southern part of

	the fault by Scott and Wobus (1973 #2738) and Kirkham and Rogers (1981 #792). Unruh and others (1994 #2778) did not recognize any evidence to support mid-Pleistocene to Holocene displacement. However, they did not address the scarps on rockfall deposits as previously presented by Scott and Wobus (1973 #2738) and Kirkham and Rogers (1981 #792). The most recent paleoevent on this fault is herein considered to have occurred during the middle to late Quaternary.
Name comments	The Ute Pass fault zone is defined by a series of five generally northwest-trending faults west of Colorado Springs. The main fault is parallel to the southwest flank of the Rampart Range and Fountain Creek. The faults begin east of Deckers near Devil's Head in the Rampart Range and terminate in a series of splay faults at the southern end of the east flank of the Front Range near Gray Back Peak. **Fault ID:** Fault 144 in Kirkham and Rogers (1981 #792), fault 142 in Witkind (1976 #2792), and fault number Q77 of Widman and others (1998 #3441).
County(s) and State(s)	TELLER COUNTY, COLORADO EL PASO COUNTY, COLORADO DOUGLAS COUNTY, COLORADO
Physiographic province(s)	SOUTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Faults in this zone were mapped by Wobus and Scott (1977 #2794) at a scale of 1:24,000, by Scott and Wobus (1973 #2738) at a scale of 1:62,500, and by Scott and others (1978 #2735) and Bryant and others (1981 #2645) at a scale of 1:250,000. The trace used herein is from Scott and others (1978 #2735) and Bryant and others (1981 #2645).
Geologic setting	The Ute Pass fault zone extends along the western margin of the Rampart Range from near Devils Head to Gray Back Peak and bounds the east side of the Pikes Peak massif west of Colorado Springs. Throw on the fault varies along its length. At the north end the fault plane is nearly vertical. The middle part of the fault near Woodland Park is defined by steeply dipping fault planes that form grabens. The south end of the fault is characterized by west-

	dipping reverse faults that dip as little as 30? (Epis and others, 1976 #2689). Throw can be generalized as down to west in the north, and down to the east in the south.
Length (km)	71 km.
Average strike	N29°W
Sense of movement	Normal, Reverse *Comments:* Witkind (1976 #2792) and Bryant and others (1981 #2645) showed the fault zone as high-angle normal. Harms (1959 #2696) and Epis and others (1976 #2689) mapped the middle section of the fault as moderate-angle reverse.
Dip	20° -50° NE, SW *Comments:* The fault dips southwest at the north end and northeast at the south end (Epis and others, 1976 #2689). Dip angles are considered to be between 20? -50? (Harms, 1959 #2696; Epis and others, 1976 #2689).
Paleoseismology studies	
Geomorphic expression	The fault zone is marked by subtle, discontinuous, anomalous lineaments (visible on aerial photos) that extend through rockfall deposits at the south end of the fault (Kirkham and Rogers, 1981 #792). A prominent scarp is onVerdos Alluvium at the south end of the fault (Scott and Wobus, 1973 #2738). Unruh and others (1994 #2778) reported discontinuous tonal and vegetation lineaments, as well as an east-facing bedrock scarp and a southwest-facing scarp along the south end of the fault.
Age of faulted surficial deposits	The fault is primarily in Precambrian bedrock. Scott and Wobus (1973 #2738) and Wobus and Scott (1977 #2794) mapped the fault as concealed by Quaternary deposits. Later, Scott and others (1978 #2735) mapped offset Pliocene and Miocene gravel deposits. Pleistocene fan alluvium abuts the fault according to Bryant and others (1981 #2645). The best evidence for Quaternary fault activity is limited to the south end of the fault zone near Cheyenne Mountain, where development of a prominent scarp on Verdos Alluvium and scarps extending across Pleistocene rockfall deposits indicated youthful fault activity to Kirkham and Rogers (1981 #792). Unruh and others (1994

	#2778), however, found no evidence of offset in late Pleistocene to Holocene deposits along the south end of the fault. Pleistocene to Holocene deposits are not disturbed across the north end of the fault (Dickson and others, 1986 #2685; Geotechnical Advisory Committee, 1986 #2691).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Neogene fault activity is apparent based on offset of Pliocene and Miocene gravels (Scott and Wobus, 1973 #2738), and 300 m of throw on the fault since the Eocene was recorded by Epis and Chapin (1975 #2689). Evidence for Quaternary movement is not observed north of Woodland Park (Dickson and others, 1986 #2685). Although evidence for Quaternary movement on the fault is not definitive, geomorphic features on the south end of the fault near Cheyenne Mountain suggest the possiblity of two ruptures during the Quaternary. Scarps on and lineations in rockfall deposits are believed to represent the second of the two ruptures, whereas the rockfalls themselves are interpretted as resulting from an earthquake during the Yarmouth interglacial period (Scott and Wobus, 1973 #2738). Howard and others (1978 #312) showed this as a fault with late Quaternary movement. Kirkham and Rogers (1981 #792) stated that the Slocum Alluvium is not offset across the fault, thus constraining the timing of the second period of activity to between the Yarmouth interglacial period and the Illinoian glacial period. Unruh and others (1994 #2778) found no evidence of offset in late Pleistocene to Holocene deposits along the south end of the fault and concluded that scarp features are fault-line scarps or the result of diferential erosion. Evidence against Quaternary movement provided by Unruh and others (1994 #2778) does not address all of the arguments for Quaternary movement presented by Scott and Wobus (1973 #2738), Kirkham and Rogers (1981 #792), and Dickson and others (1986 #2685) and is considered insufficient to warrant discounting the fault zone as a middle to late Quaternary structure.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr

	Comments: Despite the possibility of two events during the Yarmouth to Illinoian, a long-term slip rate of <0.2 mm/yr wasestimated for this fault by Widmann and others (1998 #3441) based on the small size of the scarps and the fact that the fault apparently has not ruptured since the initial deposition of the Slocum Alluvium (about 130 ka). Jack Benjamin and Associates and Geomatrix Consultants (1996 #2691) calculated a long-term average slip rate of 0.01 mm/yr for the Ute Pass fault zone.
Date and Compiler(s)	1997 Beth L. Widmann, Colorado Geological Survey
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#2794 Wobus, R.A., and Scott, G.R., 1977, Reconnaissance

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