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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.

Big Gypsum Valley graben (Class B) No. 2288

Last Review Date: 1997-09-04

Compiled in cooperation with the Colorado Geological Survey

citation for this record: **Widmann, B.L., compiler, 1997, Fault number 2288, Big Gypsum Valley graben, 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 03:02 PM.**

Synopsis	The Big Gypsum Valley graben was formed at the crest of a salt-cored anticline in response to flowage and dissolution of underlying Pennsylvanian evaporite rocks beneath the area (Cater, 1970 #2672). Williams (1964 #2789) mapped Quaternary alluvial deposits as being offset by these faults, and Cater (1970 #2672) mapped Quaternary landslide deposits as being offset by the faults. Cater (1955 #2664; 1955 #2666; 1955 #2667) alluded to small faults and folds in Quaternary deposits which may indicate continued collapse and readjustment of the system. The faults may not extend to seismic depths, thus they are herein considered to be class B structures.

Name comments	The Big Gypsum Valley anticline is a salt-cored structure with a collapsed crest that is called the Big Gypsum Valley graben. Multiple northwest-trending faults form the Big Gypsum Valley graben which is on the northern edge of Island Mesa and continue southeast across the Dolores River and past Gypsum Gap. Williams (1964 #2789) referred to the graben as the Big Gypsum Valley. The salt-cored anticline was referred to as the Gypsum Valley anticline by Cater (1970 #2672). **Fault ID:** Fault 92 in Kirkham and Rogers (1981 #792) and fault number Q38 of Widman and others (1998 #3441).
County(s) and State(s)	SAN MIGUEL COUNTY, COLORADO MONTROSE COUNTY, COLORADO
Physiographic province(s)	COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* The faults of the Big Gypsum Valley graben were mapped at a scale of 1:24.000 by Cater (1955 #2664; 1955 #2666; 1955 #2667), 1:62,500 by Cater (1970 #2672), and 1:250,000 by Williams (1964 #2789). The trace used herein is from Williams (1964 #2789).
Geologic setting	The Big Gypsum Valley graben is on the crest of a salt-cored anticline. Formation of the anticline is believed to be controlled by major subsurface faults that displace bedrock beneath the evaporitic Paradox Formation. The graben is a collapse feature that formed in response to flowage and dissolution of underlying evaporitic rocks (Cater, 1970 #2672). Faults in this area are generally high-angle normal and downthrown towards the graben, although some faults may be antithetic. The faults may not extend to seismic depths, thus they are herein considered to be class B structures.
Length (km)	33 km.
Average strike	N54°W
Sense of movement	Normal *Comments:* Kirkham and Rogers (1981 #792) indicated normal movement on these faults.

Dip Direction	SW; NE
Paleoseismology studies	
Geomorphic expression	Faults associated with the Big Gypsum Valley graben coincide with the walls of Big Gypsum Valley. Minor folds are present along the southwest rim of the valley and are thought to be related to collapse of the anticline structure (Cater, 1955 #2667; Shawe, 1970 #2742). Collapse may have occurred near the end of the Laramide or early Tertiary (Cater, 1955#2667) or as recently as the Pleistocene (Shawe, 1970 #2742). Cater (1955 #2664; 1955 #2666; 1955 #2667) alluded to small faults and folds in Quaternary deposits which may indicate continued collapse and readjustment of the system.
Age of faulted surficial deposits	Williams (1964 #2789) mapped Quaternary alluvial deposits as being offset by and as concealing these faults. Cater (1970 #2672) mapped Quaternary landslide deposits as being offset by and as concealing these faults, but mapped all Quaternary alluvial deposits as concealing the faults. Cater (1955 #2664; 1955 #2666; 1955 #2667) alluded to small faults and folds in Quaternary deposits but did not specifically map any such features. These faults primarily offset Pennsylvanian to Cretaceous bedrock with offset generally less than 150 m (Shawe, 1970 #2742). Only about 10 percet of the fault system extends into or beneath Quaternary deposits.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Williams (1964 #2789) and Cater (1970 #2672) both mapped offset of Quaternary deposits. Shawe (1970 #2742) suggested that major collapse of the Gypsum Valley anticline took place during the middle to late Tertiary and possibly Pleistocene. Although faulted Quaternary deposits were not mapped by Cater (1955 #2664; 1955 #2666; 1955 #2667), accompanying text stated that small folds and faults are in fact present within these deposits. Cater postulated that the presence of these features in Quaternary deposits indicates possible present-day collapse and readjustment of the system. Kirkham and Rogers (1981 #792) postulated possible Holocene movement on these faults. Colman (1985 #1953) indicated Quaternary movement on these faults.

	Without more specific evidence the most recent paleoevent on this fault system is herein considered to have occurred during the Quaternary (<1.6 Ma).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Widmann and others (1998 #3441) placed this structure within the <0.2 mm/yr slip-rate category.
Date and Compiler(s)	1997 Beth L. Widmann, Colorado Geological Survey
References	#2664 Cater, F.W., Jr., 1955, Geology of the Anderson Mesa quadrangle, Colorado: U.S. Geological Survey Geologic quadrangle Map GQ-77. #2666 Cater, F.W., Jr., 1955, Geology of the Gypsum Gap quadrangle, Colorado: U.S. Geological Survey Geologic quadrangle Map GQ-59. #2667 Cater, F.W., Jr., 1955, Geology of the Hamm Canyon quadrangle, Colorado: U.S. Geological Survey Geologic quadrangle Map GQ-69. #2672 Cater, F.W., Jr., 1970, Geology of the salt anticline region in southwestern Colorado, with a section on stratigraphy by F.W. Cater and L.C. Craig: U.S. Geological Survey Professional Paper 637, 80 p. #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. #2742 Shawe, D.R., 1970, Structure of the Slick Rock District and vicinity, San Miguel and Dolores Counties, Colorado: U.S. Geological Survey Professional Paper 576-C, 18 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. #2789 Williams, P.L., 1964, Geology, structure, and uranium deposits of the Moab quadrangle, Colorado and Utah: U.S. Geological Survey Miscellaneous Geologic Investigations I-360.