

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](#).

Lucky Boy fault (Class A) No. 2314

Last Review Date: 1997-09-29

Compiled in cooperation with the Colorado Geological Survey

citation for this record: Widmann, B.L., compiler, 1997, Fault number 2314, Lucky Boy 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 02:59 PM.

Synopsis	The Lucky Boy fault is a branch fault of the Western Boundary fault [2313], which forms the western rim of the Bonanza Caldera. The Lucky Boy fault originated as a reverse fault in the early to middle Oligocene with the collapse of the Bonanza Caldera, but has post-Oligocene movement associated with continued collapse and perhaps activity associated with the Rio Grande rift. Quaternary terrace gravel is reported as slightly offset across the fault (Marrs, 1973 #2721).
Name comments	The Lucky Boy fault is a northwest-trending fault that splays from the Western Boundary fault [2313] near Flagstaff Mountain and continues southeast into Little Kerber Creek on the west side

	<p>of the San Luis Valley.</p> <p>Fault ID: Fault 120 in Kirkham and Rogers (1981 #792) and fault number Q62 of Widman and others (1998 #3441).</p>
County(s) and State(s)	SAGUACHE COUNTY, COLORADO
Physiographic province(s)	SOUTHERN ROCKY MOUNTAINS
Reliability of location	<p>Good Compiled at 1:250,000 scale.</p> <p><i>Comments:</i> The fault was mapped at a scale of 1:20,000 by Marris (1973 #2721), at 1:62,500 by Knepper (1974 #2714), and at 1:250,000 by Tweto and others (1976 #2774). The trace used herein is from Tweto and others (1976 #2774).</p>
Geologic setting	<p>The Tertiary Bonanza Caldera is located along the western margin of the northern end of San Luis Valley. The Lucky Boy fault is a high-angle normal, listric fault that is down to the northeast. The fault is a branch fault of the Western Boundary fault [2313], which defines the western rim of the Bonanza Caldera. The Lucky Boy fault probably originated during the early to middle Oligocene as a reverse fault in response to doming of the Bonanza Caldera. Normal movement on the fault is related to collapse of the magma chamber and subsequent local readjustment (Marris, 1973 #2721).</p>
Length (km)	11 km.
Average strike	N29°W
Sense of movement	<p>Normal</p> <p><i>Comments:</i> The fault originated as a reverse fault in the early to middle Oligocene but has subsequent normal reactivation associated with the collapse of the Bonanza Caldera (Marris, 1973 #2721).</p>
Dip Direction	<p>NE</p> <p><i>Comments:</i> Marris (1973 #2721) described the Lucky Boy fault as a high-angle, concentric fault that dips northeast towards the Bonanza Caldera.</p>

Paleoseismology studies	
Geomorphic expression	A subtle, fault-controlled topographic change across the drainage was recognized on color aerial photographs by Marrs (1973 #2721). Lettis and others (1996 #4453) recognized subdued geomorphic indicators of late Pleistocene faulting in this area, but did not describe these indicators.
Age of faulted surficial deposits	Oligocene volcanic flows associated with the Bonanza Caldera and Quaternary terrace gravel are offset by the fault according to Marrs (1973 #2721). Knepper (1974 #2714), however, did not show Quaternary offset along the fault trace. Tweto and others (1976 #2774) mapped Oligocene to Miocene intrusives as being offset by the fault. The fault is almost entirely in Tertiary volcanics.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> Marrs (1973 #2721) reported Quaternary movement on the fault based on offset of Quaternary terrace gravel. Tweto (1978 #1956) mapped the Lucky Boy fault as a pre-Neogene fault. Kirkham and Rogers (1981 #792) classified this fault as a possible Quaternary fault. Colman (1985 #1953) and Lettis and others (1996) indicated the fault was active during at least the late Pleistocene. Latest movement on the fault is herein suggested to have occurred during the Quaternary (<1.6 Ma).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> Widmann and others (1998 #3441) placed this fault in the <0.2 mm/yr slip-rate category based on the subdued nature of geomorphic features indicative of possible youthful faulting in this area.
Date and Compiler(s)	1997 Beth L. Widmann, Colorado Geological Survey
References	#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.

#2714 Knepper, D.H., Jr., 1974, Tectonic analysis of the Rio Grande Rift zone, central Colorado: Golden, Colorado School of Mines, Ph.D. dissertation T-1593, 237 p.

#4453 Lettis, W., Noller, J., Wong, I., Ake, J., Vetter, U., and LaForge, R., 1996, Draft report, Seismotectonic evaluation of Colorado River storage project-Crystal, Morrow Point, Blue Mesa dams, Smith Fork project-Crawford dam, west-central Colorado: Technical report to U.S. Bureau of Reclamation, Denver, Colorado, 177 p.

#2721 Marrs, R.W., 1973, Application of remote-sensing techniques to the geology of the Bonanza volcanic center: Golden, Colorado School of Mines, Ph.D. dissertation T-1531, 281 p.

#1956 Tweto, O., 1978, Northern rift guide 1, Denver-Alamosa, Colorado, *in* Hawley, J.W., ed., Guidebook to Rio Grande rift in New Mexico and Colorado: New Mexico Bureau of Mines and Mineral Resources Circular 163, p. 13-27.

#2774 Tweto, O., Steven, T.A., Hail, W.J., Jr., and Moench, R.H., 1976, Preliminary geologic map of the Montrose 1° x 2° quadrangle, southwestern Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-761.

#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.

[Questions or comments?](#)

[Facebook](#) [Twitter](#) [Google](#) [Email](#)

[Hazards](#)

[Design Ground Motions](#)[Seismic Hazard Maps & Site-Specific Data](#)[Faults](#)[Scenarios](#)

[Earthquakes](#)[Hazards](#)[Data](#)[Education](#)[Monitoring](#)[Research](#)

[Home](#)[About Us](#)[Contacts](#)[Legal](#)