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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.

Villa Grove fault zone (Class A) No. 2319

Last Review Date: 1998-07-10

Compiled in cooperation with the Colorado Geological Survey

citation for this record: **Kirkham, R.M., and Haller, K.M., compilers, 1998, Fault number 2319, Villa Grove fault zone, 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 Villa Grove fault zone is a northwest-trending series of faults that cut obliquely across the northern end of San Luis Valley from near Valley View Hot Springs to the town of Villa Grove (Scott and others, 1978 #2735; McCalpin, 1981 #2723; 1982 #791; Kirkham and Rogers, 1981 #792). The fault zone is comprised of about 40 scarps on the east side of San Luis Creek that generally face southwest (McCalpin, 1981 #2723; 1982 #791), and six scarps west of San Luis Creek that face east or northeast (Scott and others, 1978 #2735). The faults offset pre-Bull Lake, Bull Lake, and Pinedale alluvium as much as14 m, and appear to be related to deep-seated basement structures (Stoughton, 1977 #2750; Huntley, 1976 #2698; 1976 #2699; McCalpin, 1981

	#2723). McCalpin (1981 #2723; 1982 #791) measured several scarp profiles and excavated one trench across the Villa Grove fault zone. Colman and others (1985 #1954) also described profiles across the fault zone.
Name comments	The Villa Grove fault zone is comprised of a series of northwest-trending faults and fault scarps that cross the northern end of San Luis Valley from near Valley View Hot Springs to the town of Villa Grove. **Fault ID:** Fault 118 in Kirkham and Rogers (1981 #792), fault 132 in Witkind (1976 #2792), and fault number Q67 of Widman and others (1998 #3441).
County(s) and State(s)	SAGUACHE COUNTY, COLORADO
Physiographic province(s)	SOUTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* The fault traces east of San Luis Creek are modified from McCalpin (1982 #791; scale 1:125,000). Fault traces west of San Luis Creek are from Scott and others (1978 #2735; scale 1:250,000). McCalpin (1981 #2723) mapped part of the Villa Grove fault zone at scales of 1:15,840 and1:50,000. Colman (1985 #1953) mapped these faults as part of a regional study at 1:1,000,000 scale.
Geologic setting	The Villa Grove fault zone is a northwest-trending series of faults that cut obliquely across the Rio Grande Rift in the northern end of San Luis Valley. Most of the faults are down to the southwest on the east side of San Luis Creek (McCalpin, 1981 #2723; 1982 #791), and down to the east or northeast on the west side of San Luis Creek (Scott and others, 1978 #2735). Colman and others (1985 #1954) do not show the fault scarps on the west side of San Luis Creek. The scarps displace pre-Bull Lake, Bull Lake, and Pinedale alluvium as much as 14 m, and appear to be related to basement structures (Stoughton, 1977 #2750; Huntley, 1976 #2698; 1976 #2699; McCalpin, 1981 #2723).
Length (km)	19 km.

Average strike	N42°W
Sense of movement	Normal *Comments:* Witkind (1976 #2792), Kirkham and Rogers (1981 #792), and McCalpin (1981 #2723; 1982 #791) indicated normal movement on these faults.
Dip Direction	SW; NE *Comments:* Most faults dip southwest, but a few may dip to the northeast (McCalpin, 1981 #2723; 1982 #791).
Paleoseismology studies	Site 2319-1, paleoseismic teaching trench (McCalpin, 2010 #7821) was excavated across one of numerous sub parallel fault scarps that offset the large latest Quaternary fan surface west of Valley View Hot Springs. There is evidence for a minimum of two coseismic surface ruptures.
Geomorphic expression	The fault zone is expressed as a series of low scarps on various aged alluvial deposits (McCalpin, 1981 #2723; 1982 #791). Most scarps face southwest, but several small, northeast-facing antithetic scarps are present, forming small horst ang graben features (McCalpin, 1981 #2723).
Age of faulted surficial deposits	Pre-Bull Lake, Bull Lake, and Pinedale alluvium are offset by strands of the Villa Grove fault zone, but Holocene alluvium along San Luis Creek is not offset (McCalpin, 1981 #2723; 1982 #791; Scott and others, 1978 #2735).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Timing is based upon offset of middle to late Pinedale fans (about 13 ka) and scarp morphology (McCalpin, 1981 #2723; 1982 #791).
Recurrence interval	60–100 k.y. *Comments:* McCalpin (1982 #791) suggested the recurrence interval for ruptures on the Villa Grove fault zone ranges from about 60 to 100 ka based on frequency of events that offset dated deposits.

Slip-rate category	Less than 0.2 mm/yr *Comments:* Widmann and others (1998 #3441) placed this fault in the <0.2 mm/yr slip-rate category.
Date and Compiler(s)	1998 Robert M. Kirkham, Colorado Geological Survey Kathleen M. Haller, U.S. 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. #1954 Colman, S.M., McCalpin, J.P., Ostenaa, D.A., and Kirkham, R.M., 1985, Map showing upper Cenozoic rocks and deposits and Quaternary faults, Rio Grande Rift, south-central Colorado: U.S. Geological Survey Miscellaneous Geologic Investigations I-1594, 2 sheets. #2698 Huntley, D., 1976, Groundwater recharge to the aquifers of the northern San Luis Valley, Colorado: Golden, Colorado School of Mines, Ph.D. dissertation T-1864, 298 p. #2699 Huntley, D., 1976, Ground water recharge to aquifers of northern San Luis Valley, Colorado—A remote sensing investigation: Colorado School of Mines Remote Sensing Report v. 76-3, 247 p. #792 Kirkham, R.M., and Rogers, W.P., 1981, Earthquake potential in Colorado: Colorado Geological Survey Bulletin 43, 171 p., 3 pls. #2723 McCalpin, J., 1981, Quaternary geology and neotectonics of the west flank of the northern Sangre de Cristo Mountains, south-central Colorado: Golden, Colorado School of Mines, unpublished Ph.D. dissertation, 287 p. #791 McCalpin, J.P., 1982, Quaternary geology and neotectonics of the west flank of the northern Sangre de Cristo Mountains, south-central Colorado: Colorado School of Mines Quarterly, v. 77, no. 3, p. 1-97. #7821 McCalpin, J.P., 2010, Paleoseismology of the Sangre de Cristo and Villa Grove fault zoned, San Luis Valley, Colorado:

	Geological Society of America Annual Meeting, Quaternary Geology and Geochronology of the Uppermost Arkansas Valley, Field Trip 405, October 29–30, 2010, http://paleoseismicity.org/wp-content/uploads/2016/06/Intra-Meeting-Field-Trip-guide-COLOR.pdf. #7791 Ruleman, C.A., and Grauch, V.J.S., 2013, Identifying buried segments of active faults in the northern Rio Grande Rift using aeromagnetic, LiDAR, and gravity data, south-central Colorado, USA: International Journal of Geophysics, Article ID 804216, 26 pages, doi:10.1155/2013/804216. #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. #2750 Stoughton, D., 1977, Interpretation of seismic reflection data from the San Luis Valley, south-central Colorado: Golden, Colorado School of Mines, M.S. thesis T-1960, 100 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. #2792 Witkind, I.J., 1976, Preliminary map showing known and suspected active faults in Colorado: U.S. Geological Survey Open-File Report 76-154.