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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.

Middlegate fault zone (Class A) No. 1187

Last Review Date: 2000-09-19

citation for this record: **Lidke, D.J., compiler, 2000, Fault number 1187, Middlegate 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 02:17 PM.**

Synopsis	This north-striking, narrow zone of faults is mainly characterized by a relatively continuous fault that places bedrock of the Clan Alpine Mountains against Quaternary piedmont deposits of the Bench Creek Valley. Scarps are locally present along the range front fault, but they are sparse, generally poorly preserved, and discontinuous. The few scarps that are present are west-facing features that imply down-to-the-west offset along the fault zone. The fault zone is mapped as a relatively continuous major, down-to-the-west, range front fault. There is evidence for at least one Quaternary faulting event that is no older than late Pleistocene and the most recent faulting event might be as young as Holocene. However, the fault zone has not been studied in detail and little is actually known with certainty about its nature, character, and movement history. The principal sources of data consist of geologic mapping, reconnaissance photogeologic mapping, morphologic dating of fault scarps, and reconnaissance

	geomorphic study of fault scarps and basal fault facets.
Name comments	Refers to faults mapped by Willden and Speed (1968 #4370; 1974 #3645) and Dohrenwend and others (1992 #283) along the western side of a north-trending, spur-like ridge that extends south from the southeastern end of the Clan Alpine Mountains. Pearthree (1990 #148) portrayed and referred to these faults as the Middlegate fault zone. dePolo (1998 #2845) later called this fault Clan Alpine Mountains fault. The earlier name is used herein. The fault zone extends from about 6 km north of the head of Bench Creek (nearly at the crest of the Clan Alpine Mountains) south along the east side of Bench Creek to a point about 7 km south of the town of Middlegate. **Fault ID:** Refers to fault that dePolo (1998 #2845) portrayed and labeled MI2 (Clan Alpine Mountains fault).
County(s) and State(s)	CHURCHILL COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Location is from 1:250,000-scale map of Dohrenwend and others (1992 #283) that shows mapping based on photogeologic analysis of 1:58,000-nominal-scale, color-infrared photography which was transferred directly to 1:100,000-scale topographic maps enlarged to the scale of the photographs. The 1:100,000-scale fault maps were reduced and compiled at 1:250,000-scale for final publication.
Geologic setting	This north-striking, relatively narrow fault zone is principally a range front fault that occupies the shared eastern flank of the valley of Bench Creek and the western flank of a prominent south-trending spur (ridge) of the Clan Alpine Mountains. The range front fault shows down-to-the-west stratigraphic relations and places Tertiary bedrock of the Clan Alpine Mountains against Quaternary piedmont-slope deposits along the east margin of the Bench Creek valley (Willden and Speed, 1968 #4370; 1974 #3645; Dohrenwend and others, 1992 #283). Scarps are sparse and poorly preserved but consistently face west (Pearthree, 1990 #148; Dohrenwend and others, 1992 #283). Stratigraphic relations

	across the range front fault as well as the west-facing direction of the scarps imply mostly down-to-the-west Quaternary offset along the fault zone that probably reflects some continued Quaternary uplift of the Clan Alpine Mountains relative to adjacent valley areas. These faults are subparallel to, but west of, fault [1188]. Together they form a horst-like structure. The fault zone has not been studied in detail and other estimates of Quaternary offsets and slip rates have not been reported.
Length (km)	37 km.
Average strike	N34°E
Sense of movement	Normal *Comments:* Not specifically reported; however, the down-to-west range front fault and the west-facing scarps consistently indicate down-to-the-west offsets, which in this extensional regime probably reflect principally normal, dip-slip movement along west-dipping faults.
Dip Direction	W *Comments:* Not reported, but probably steep based on dip measurements of other Quaternary faults in localities nearby and elsewhere in the Basin and Range Province.
Paleoseismology studies	
Geomorphic expression	Fault zone is expressed mostly by a relatively continuous, down-to-the-west, range-front fault and by a few poorly expressed, preserved, and west-facing scarps (Pearthree, 1990 #148; Dohrenwend and others, 1992 #283). dePolo (1998 #2845) reported basal fault facets with a preferred maximum height of 207 m (183–232 m).
Age of faulted surficial deposits	Based on reconnaissance photogeologic mapping, Dohrenwend and others (1992 #283) assigned ages as young as late Pleistocene to faulted Quaternary deposits at a few localities along the fault zone.
Historic earthquake	
Most recent	late Quaternary (<130 ka)

prehistoric deformation	*Comments:* The timing of the most recent prehistoric faulting event appears to be relatively well constrained by relative dating methods. Reconnaissance photogeologic mapping by Dohrenwend and others (1992 #283) indicates that the most recent prehistoric faulting event is no older than late Pleistocene (<130 ka) in age. Pearthree (1990 #148) reported Holocene to late Pleistocene scarp age estimates (3–22 ka) based on morphologic dating analysis of a few scarp profiles that were measured across a scarp on alluvium north of the town of Middlegate.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* No detailed data exists to determine slip rates for this fault. dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.389 mm/yr based on an empirical relationship between his preferred maximum basal facet height and vertical slip rate. The size of the facets (tens to hundreds of meters, as measured from topographic maps) indicates they are the result of many seismic cycles, and thus the derived slip rate reflects a long-term average. However, late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, age of faulted deposits, etc.) suggest the slip rate during this period is of a lesser magnitude. Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	2000 David J. Lidke, U.S. Geological Survey
References	#2845 dePolo, C.M., 1998, A reconnaissance technique for estimating the slip rate of normal-slip faults in the Great Basin, and application to faults in Nevada, U.S.A.: Reno, University of Nevada, unpublished Ph.D. dissertation, 199 p. #283 Dohrenwend, J.C., Schell, B.A., and Moring, B.C., 1992, Reconnaissance photogeologic map of young faults in the Millett 1° by 2° quadrangle, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2176, 1 sheet, scale 1:250,000. #148 Pearthree, P.A., 1990, Geomorphic analysis of young faulting and fault behavior in central Nevada: Tucson, University

	of Arizona, unpublished Ph.D. dissertation, 212 p. #4370 Willden, R., and Speed, R.C., 1968, Geology and mineral deposits of Churchill County, Nevada: U.S. Geological Survey Open-File Report 68-329, 3 sheets, scale 1:200,000. #3645 Willden, R., and Speed, R.C., 1974, Geology and mineral deposits of Churchill County, Nevada: Nevada Bureau of Mines and Geology Bulletin 83, 95 p.