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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.

Independence Valley fault zone, southern section (Class A) No. 1582b

Last Review Date: 2006-10-05

citation for this record: **Sawyer, T.L., Oswald, J.A., Rowley, P.C., Anderson, R.E., and Haller, K.M., compilers, 2006, Fault number 1582b, Independence Valley fault zone, southern section, 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 02:36 PM.**

Synopsis	**General:** This zone of subparallel normal faults includes intermontane bedrock faults within the northern Pequop Mountains and range bounding faults separating the west flank of the range from the basin beneath Independence Valley. The fault extends from east of Holborn south, across Interstate 80, south to Brush Creek. Reconnaissance photogeologic mapping of fault related features and compilation geologic mapping are the sources of data; scarp profiles adequate for regression of scarp height against maximum scarp slope angle are reported for the southern section of the fault. **Sections:** This fault has 2 sections. The general movement history and geometry of the fault zone suggest two possible sections. The

	northern section extends from the north end of the Pequop Mountains southward as range-front, intermontane, and short piedmont faults to about 13 km south of Interstate 80. The southern section extends from near lat 41° N. south to Brush Creek and is expressed almost entirely by west facing scarps on surficial deposits or erosion surfaces along the west base of the range.
Name comments	**General:** Refers to faults mapped by Slemmons (1964, unpublished Wells 1:250,000-scale map), Coats (1987 #2861), and Dohrenwend and others (1991 #290; 1991 #286). Named the Independence Valley fault zone by Barnhard (1985 #428). The fault zone extends within, along, and near the western front of the Pequop Mountains from east of Holborn, south across Interstate 80, to Brush Creek. **Section:** This unnamed section extends along the western front of the Pequop Mountains from near lat 41° N. about 40 km to the south (Dohrenwend, 1991 #286; Barnhard, 1985 #428). **Fault ID:** Refers to fault EK11B (Independence Valley fault zone) of dePolo (1998 #2845).
County(s) and State(s)	ELKO COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Compiled at 1:250,000 scale by Barnhard (1985 #428) and Dohrenwend and others (1991 #286). Because they were based, in part, on field studies, the fault locations of Barnhard (1985 #428) are followed here. That map was produced by analysis of 1:60,000-scale photography transferred by photoreduction to 1:250,000-scale topographic map.
Geologic setting	This zone of subparallel normal faults includes intermontane faults within the northern Pequop Mountains, relatively continuous range-front faults along west front of the range from east of Holborn south to Brush Creek, and piedmont faults in eastern Independence Valley. Where it is located at the base of the range, it is apparently a major range-front fault separating the Pequops from the basin beneath Independence Valley;

	topographic relief is as much as 1 km (Wesnousky and others, 2006 #7559). Geology of part of the Pequop Mountains of the southern section mapped at 1:24,000 scale by Fraser and others (1983 #4323), but they showed only two faults cutting Quaternary sediments. Most of the Pequop Range consists of Paleozoic sedimentary rocks, but the north part has Tertiary rocks down faulted to the west along the west base of the range.
Length (km)	This section is 40 km of a total fault length of 61 km.
Average strike	N1°W (for section) versus N5°W (for whole fault)
Sense of movement	Normal *Comments:* As shown on geologic maps (Dohrenwend and others, 1991 #290).
Dip Direction	W
Paleoseismology studies	Site 1582-1 Pequops trench (Wesnousky and others, 2006 #7559) crossed a 3-m-high fault scarp Diffusion modeling of the fault scarp suggests that the earthquake occurred about 42 ka; however, in Table 2, the timing of the event is reported as 28 ka.
Geomorphic expression	The southern section of the Independence Valley fault zone trends south from near lat 41° N. to the vicinity of the Hogan rail siding (Union Pacific) where it bends sharply southwest. These two main trends mark the west margin of two main high part s of the Pequop Range that are separated by a conspicuously low part in the vicinity of the Hogan rail siding. West of the low area, and in the northernmost 5 km of the southern section, the trace is located in the piedmont a few kilometers west of the main part of the range. Elsewhere, the trace is near, but not directly along, the piedmont/bedrock break in slope. The bedrock escarpment is, in many places, quite irregular, possibly suggesting relatively slow young (Quaternary) displacement rate. The fault trace is expressed almost entirely by west-facing scarps on surficial deposits or erosion surfaces at the west base of the Pequop Range near the bedrock/alluvium contact (Dohrenwend, 1991 #286). Eleven fault-scarp profiles were measured, with scarp heights ranging from 3 to 14.9 m and scarp-slope angles of almost 20° (Barnhard, 1985 #428). dePolo (1998 #2845) reports a maximum preferred basal fault facet height of 219 m (195–244 m).
Age of faulted	Barnhard (1985 #428) noted that "Quaternary deposits offset

surficial deposits	down to the west along the length of the zone," but that late Pleistocene lake deposits are not offset. Locally, oversteepening of the fault scarp by wave action shows that the fault scarps predate the lake shoreline. Dohrenwend and others (1991 #286) interpreted that the sediments cut by the scarps are as young as late Pleistocene.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* An age of late Pleistocene is indicated from quantitative data from profiles of scarps on sediment (Barnhard, 1985 #428; Dohrenwend and others, 1991 #286).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.419 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, the height of the scarps on late Quaternary deposits 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)	2006 Thomas L. Sawyer, Piedmont Geosciences, Inc. John A. Oswald, Piedmont Geosciences, Inc. Peter C. Rowley, U.S. Geological Survey, Retired R. Ernest Anderson, U.S. Geological Survey, Emeritus Kathleen M. Haller, U.S. Geological Survey
References	#428 Barnhard, T.P., 1985, Map of fault scarps formed in unconsolidated sediments, Elko 1° x 2° quadrangle, Nevada and Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1791, 1 sheet, scale 1:250,000. #2861 Coats, R.R., 1987, Geology of Elko County, Nevada: Nevada Bureau of Mines and Geology Bulletin 101, 112 p., scale 1:250,000.

#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.

#290 Dohrenwend, J.C., McKittrick, M.A., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Wells 1° by 2° quadrangle, Nevada, Utah, and Idaho: U.S. Geological Survey Miscellaneous Field Studies Map MF-2184, 1 sheet, scale 1:250,000.

#286 Dohrenwend, J.C., Schell, B.A., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Elko 1° by 2° quadrangle, Nevada and Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-2179, 1 sheet, scale 1:250,000.

#4323 Fraser, G.D., Ketner, K.B., and Smith, M.C., 1983, Preliminary geologic map of the Spruce Mountain 4 quadrangle, Elko County, Nevada: U.S. Geological Survey Open-File Report 83-301, scale 1:24,000.

#7559 Wesnousky, S.G., Barron, A.D., Briggs, R.W., Caskey, S.J., Kumar, Senthil, and Owen, L., 2005, Paleoseismic transect across the northern Great Basin: Journal of Geophysical Research, v. 110, B05408, 25 p.