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Quaternary Fault and Fold Database of the United States

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West Valley fault zone, Taylorsville fault (Class A) No. 2386a

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Compiled in cooperation with the Utah Geological Survey

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Synopsis	**General:** Intrabasin graben-bounding fault west of the Salt Lake City section of the Wasatch fault zone [2351f] in Salt Lake Valley. The fault zone shows evidence for Holocene surface faulting, but exposures are poor and often lack clear evidence or datable material. Hecker (1993 #642) indicates a composite slip rate of 0.5–0.6 mm/yr, recurrence interval of 1.8–2.2 k.y., and displacement per event of 1.2–1.5 m for the fault zone as a whole. The slip-rate estimates for the West Valley fault zone reflect the consensus values of the Utah Quaternary Fault Parameters

	Working Group (Lund, 2004 #6733). Preferred values of Lund (2004 #6733) approximate mean values based on available paleoseismic-trenching data, and the minimum and maximum values approximate two-sigma (5th and 95th percentile) confidence limits. Confidence limits incorporate both epistemic (*e.g.*, data limitation) and aleatory (*e.g.*, process variability) uncertainty (Lund, 200 #6733). **Sections:** This fault has 2 sections. The southern portion of the WVFZ consists of two subparallel east-dipping faults, each of which are considered as sections herein: the Taylorsville fault [2386a] to the east, and Granger fault [2386b] to the west. The northern part of the WVFZ is broader and characterized by many smaller, east- and west-dipping faults. Seismic-reflection data from an area on-trend with the fault zone at the south end of Great Salt Lake (north of the fault zone) indicate a buried, east-dipping fault that cuts the inferred base of the Quaternary section (Wilson and others, 1986 #185). Movement on the WVFZ may be independent or directly tied to movement on the Salt Lake City section [2351f] of the WFZ. The age of the most recent events on the Taylorsville [2386a] and Granger [2386b] faults are similar to those for the last two events on the Salt Lake City section of the Wasatch fault zone.
Name comments	**General:** **Section:** Hecker's (1993 #642) Taylorsville fault (?). **Fault ID:** Refers to fault number 12-8 of Hecker (1993 #642).
County(s) and State(s)	SALT LAKE COUNTY, UTAH
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:50,000 scale. *Comments:* Fault traces from 1:50,000 scale geologic mapping of Personius and Scott (1992 #4632).
Geologic setting	North- to northwest-trending, approximately 15-km-long, 7-km-wide zone of generally east-dipping faults, which form the western boundary of a fault-bounded basin in the center of the Salt Lake Valley. The Salt Lake Valley is bounded on the east by

	the Wasatch Range and on the west by the Oquirrh Mountains. The Salt Lake City section of the Wasatch fault zone [2351f] traverses the eastern half of the valley, and recent events on the West Valley fault zone appear to be similar in age to known Salt Lake City section surface-faulting earthquakes.
Length (km)	This section is 15 km of a total fault length of 16 km.
Average strike	N17°W
Sense of movement	Normal
Dip Direction	E; W *Comments:* Fault exposed in trenches is related to a monoclinal flexure.
Paleoseismology studies	Four trenches were excavated in the mid-1980s at two locations along the southern part of the Taylorsville fault trace (Keaton and others, 1987 #237). Two trenches were at a northern site (2386-1) in Pioneer Industrial Park about 0.8 km north of 2100 South Street, and two trenches were at a southern site (2386-2) about 3 km south-southeast of Decker Lake on the northwest corner of 4100 South Street and Redwood Road. None of the trenches showed evidence for a discrete fault trace, but minor discontinuous fault traces were observed at the northern site. Both sites exposed a monoclinal fold in the near-surface sediments at appropriate locations to represent the surface expression of the fault, and subsurface offsets of strata were consistent with the amount of topographic relief across the scarp ((Keaton and others, 1987 #237). The timing of individual earthquakes could not be determined. Subsequent excavation of seven trenches at the Pioneer Industrial Park site (Keaton and Currey, 1989 #4650) provided additional constraints on the location of the fault trace, but no information on earthquake timing. Solomon (1998 #4374) described an exposure of the Taylorsville fault in a consultant's trench near the northern end of the fault trace, between I-215 and the Salt Lake City International Airport (site 2386-8). Two radiocarbon age estimates on bulk-soil samples from organic crack-fill material and pre-fault-event sag-pond sediments provide a maximum limiting age for the most recent surface-faulting event.

Geomorphic expression	Near-surface expressions of parts of the Taylorsville fault are characterized by monoclinal flexuring and minor step-faulting. The style of deformation suggests earthquakes near the threshold magnitude for surface faulting (M~6.5). Geomorphic evidence suggests that a minimum of two events occurred on the Taylorsville fault in post-Gilbert shoreline time (<12 ka) (Keaton and others, 1987 #237). Solomon (1998 #4374) reported that 0.5 m of most-recent-event displacement in lacustrine silt, sand, and clay was exposed in a consultants trench, just below the Holocene highstand of Great Salt Lake.
Age of faulted surficial deposits	Holocene
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Most exposures lacked material suitable for radiocarbon dating. However, the trench on the northeasternmost fault strand yielded two radiocarbon age estimates that indicate the most recent event on the Taylorsville fault occurred slightly after 2.0–2.4 ka (Solomon, 1998 #4374). Mean timing for the penultimate event (2.5 ka) on the Salt Lake City section of the Wasatch fault zone [2351f] appears similar.
Recurrence interval	6–12 k.y. (<12 ka) *Comments:* Keaton and others (1987 #237) report a mean recurrence of 6 k.y., based on two earthquakes in the past 12 ka; however, the timing of the earthquakes, and thus the inter-event times, are unknown. However, based on a review of available paleoseismic data for the Taylorsville section of the West Valley fault zone, Lund (2004 #6733) considers the data insufficient to make a recurrence-interval estimate.
Slip-rate category	Less than 0.2 mm/yr *Comments:* Lund (2004 #6733) indicates a geologic vertical displacement rate for the entire West Valley fault zone of 0.4 mm/yr (preferred), and a consensus minimum-maximum range of 0.1–0.6 mm/yr, based on available fault-trench, scarp-profile, and drill-hole data. A geologic vertical displacement rate estimate of

	0.1–0.25 mm/yr for the Taylorsville fault is based on single-event displacements of 1.2–1.5 m and one or two post-12 ka events. The reported rates are poorly constrained estimates, and may not reflect the actual fault slip rate due to the lack of closed seismic cycles.
Date and Compiler(s)	2004 Bill D. Black, Utah Geological Survey Christopher B. DuRoss, Utah Geological Survey Michael D. Hylland, Utah Geological Survey Suzanne Hecker, U.S. Geological Survey
References	#642 Hecker, S., 1993, Quaternary tectonics of Utah with emphasis on earthquake-hazard characterization: Utah Geological Survey Bulletin 127, 157 p., 6 pls., scale 1:500,000. #8532 Hylland, M.D., uRoss, C.B., and McDonald, G.N., 2012, Evaluating the seismic relation between the West Valley fault zone and Salt Lake City segment of the Wasatch fault zone, Salt Lake Valley, Utah: Utah Geological Survey, Survey Notes, v. 44, no. 2, p. 1–3 and 7. #4650 Keaton, J.R., and Currey, D.R., 1989, Earthquake hazard evaluation of the West Valley fault zone in the Salt Lake City urban area, Utah: Technical report to U.S. Geological Survey, Salt Lake City, under Contract 14-08-001-G1397, 69 p. #237 Keaton, J.R., Currey, D.R., and Olig, S.J., 1987, Paleoseismicity and earthquake hazards evaluation of the West Valley fault zone, Salt Lake urban area: Technical report to U.S. Geological Survey, under Contract 14-08-0001-22048, April 1986 (Draft), 18 p. #6733 Lund, W.R., 2005, Consensus preferred recurrence interval and vertical slip rate estimates—Review of Utah paleoseismic-trenching data by the Utah Quaternary Fault Parameters Working Group: Utah Geological Survey Bulletin 134, compact disk. #4632 Personius, S.F., and Scott, W.E., 1992, Surficial geologic map of the Salt Lake City segment and parts of adjacent segments of the Wasatch fault zone, Davis, Salt Lake, and Utah Counties, Utah: U.S. Geological Survey Miscellaneous Investigations Map I-2106, scale 1:50,000. #4374 Solomon, B.J., 1998, New evidence for the age of faulting

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