2398, OQUIRRH FAULT ZONE

Structure number: 2398.
Comments: Hecker's (1993) fault number 7-15.
Structure name: Oquirrh fault zone.
Comments:
Synopsis: Holocene range-front normal fault along the western base of the Oquirrh Mountains in eastern Tooele Valley.
Date of compilation: 10/99.
Compiler and affiliation: Bill D. Black and Greg N. McDonald (Utah Geological Survey), and Suzanne Hecker (U.S. Geological Survey).
State: Utah.
County: Tooele.
1° x 2° sheet: Tooele.
Province: Basin and Range.
Reliability of location: Good.
Comments: Mapped or discussed by Everitt and Kaliser (1980), Barnhard and Dodge (1988), Olig and others (1996), and Solomon (1996). Mapping from Solomon (1996).
Geologic setting: Generally north-trending normal fault along the western base of the Oquirrh Mountains. The Oquirrh Mountains are the easternmost and highest of three distinctive north-south mountain ranges in the Basin and Range west of the high central part of the Wasatch Range. Surficial geology in Tooele Valley to the west is dominated by lake deposits and alluvium. Several buried faults that do not cut surficial deposits are postulated in the vicinity of the Oquirrh fault zone which may be older and not related to the fault zone. One such fault, the Occidental fault, may have been reactivated by Oquirrh fault zone activity (Solomon, 1996).
Sense of movement: N.
Comments:
Dip: 66-85° W (Olig and others, 1996).
Comments: 66-77° W measured in Pole Canyon trench in Bonneville lacustrine and pre-Bonneville fluvial deposits: 85° W measured in Big Canyon trench in pre-Bonneville deposits juxtaposed against Bonneville lacustrine deposits.
Dip direction: W
Geomorphic expression: Scarps in lake deposits and alluvium. Everitt and Kaliser (1980) and Barnhard and Dodge (1988) divide the fault into two sections: a northern section expressed as Quaternary fault scarps on basin-fill sediments, and a southern section expressed as a prominent break in slope at the base of the range front. Profiles of scarp heights at Big Canyon in the northern fault section yield scarp heights ranging from 12 to 18 meters, maximum slope angles of 24 to 32 degrees, and surface offsets of 4.0 to 6.8 meters (Olig and others, 1996). Net vertical displacement at Big Canyon from the most recent event on the fault was an estimated 2.2 meters (Olig and others, 1996). Large displacements documented on the northern section of the fault zone imply a rupture length greater than 12 kilometers (the length of the northern trace), suggesting both sections of the fault probably form a single rupture segment extending from Stockton to Great Salt Lake (Olig and others, 1996).

Age of faulted deposits: Holocene.
Paleoseismology studies: Olig and others (1996) excavated trenches at two sites where the trace of the fault crosses Lake Bonneville deposits overlain by modern alluvium/colluvium. Three trenches were excavated at the Big Canyon site (2398-1), about 2 kilometers southeast of Lake Point and 0.3 kilometers west of the mouth of Big Canyon. Radiocarbon age estimates on bulk-soil samples from debris-flow deposits directly overlain by colluvial-wedge material, and from unfaulted fluvial deposits that bury the fault scarp, constrain timing of the most recent faulting event. A single (76-meter-long) trench was excavated at the Pole Canyon site (2398-2), 2.7 kilometers southwest of the Big Canyon site and 1.7 kilometers northwest of the mouth of Pole Canyon. A lack of diagnostic stratigraphy and dateable organic material precluded resolving the timing of the most recent surface-faulting event beyond a post-Bonneville age. Radiocarbon age estimates from charcoal contained in an unfaulted marsh deposit and a faulted fluvial deposit constrain timing of the penultimate event. A radiocarbon age estimate from charcoal contained in fluvial sediments that bury the eroded free face of the antepenultimate event provides a minimum limiting age for this event.
Timing of most recent paleoevent: (2) Latest Quaternary (<15 ka).
Comments: Scarp morphology is more similar to the Bonneville shoreline scarps than to the Drum Mountains fault scarps (2432), which have been dated at about 9 ka. This suggests an age close to, but not greater than, the Provo shoreline (which is offset across the fault). Trenching studies at Big and Pole Canyons indicate the most recent event occurred between 4.3 and 6.9 ka, with two prior events, one between 20.3 and 26.4 ka and another sometime before 32.8 ka (Olig and others, 1996). Earthquakes on the central segments of the Wasatch fault zone (2351) during the late Holocene do not appear to have influenced activity on the Oquirrh fault zone (Olig and others, 1996). Displacement on the East Great Salt Lake fault zone (2369) may transfer to the Oquirrh fault zone (Dinter and Pechmann, 1999).
Recurrence interval: 13.3-22.1 ky.
Comments:
Slip rate: (D) <0.2 mm/yr.
Comments: 0.1 to 0.2 millimeters/year since ~33 ka, based on data from the Big and Pole Canyon trench sites (Olig and others, 1996).
Length: End to end (km): 21
Cumulative trace (km): 22
Average strike (azimuth): N1°E

REFERENCES

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