2395, STANSBURY FAULT ZONE

Structure number: 2395.
Comments: Hecker's (1993) fault number 7-10.
Structure name: Stansbury fault zone.
Comments:
Synopsis: Moderately to poorly understood Quaternary fault zone along the western side of the Stansbury Mountains.
Date of compilation: 10/01.
Compiler and affiliation: Bill D. Black (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), Sack (1993), Helm (1994), and Geomatrix Consultants, Inc. (1999). Mapping from Barhard and Dodge (1988) and Sack (1993).
Geologic setting: Generally north-trending normal fault zone bounding the western side of the Stansbury Mountains. The Stansbury Mountains expose mainly Paleozoic rock, and are the centermost of three prominent north-south mountain ranges (including the Oquirrh Mountains to the east and Cedar Mountains to the west) west of the high central part of the Wasatch Range. Surficial geology in the valleys between the ranges is dominated by lake deposits and alluvium.
Sense of movement: N.
Comments:
Dip: No data.
Comments:
Dip direction: W.
Geomorphic expression: The surface trace of the Stansbury fault is simple in the southern half of the fault (south of Pass Canyon) but complex to the north, suggesting the fault may consist of two independent sections. A down-to-the-south cross-fault at Pass Canyon forms the boundary between the sections (Helm, 1994). In the south, a single fault strand consisting of a main fault and a subsidiary antithetic fault cuts Quaternary alluvial fans and forms a narrow (about 20-meter-wide) graben along most of the fault trace (Helm, 1994). North of Pass Canyon, the trace is a complex fault zone consisting of multiple synthetic and antithetic fault traces showing evidence of Quaternary movement. Based on scarp morphology and observation of stream knickpoints a short distance from the fault trace, Everitt and Kaliser (1980) concluded that the most recent movement was during the Holocene. Helm (1994) reports maximum scarp angle vs. scarp height plots suggest the Stansbury fault is generally older than the highstand of Lake Bonneville. However, Geomatrix Consultants, Inc. (1999) states that the southern section of the fault is inferred to have moved in a single event during the early to middle Holocene. From scarp-profile data collected by Geomatrix Consultants, Inc. (1999), the Stansbury scarps of the southern section

appear younger than the Sheeprock (2405), Topliff Hill (2407) and Mercur (2399) fault scarps. Measured scarp heights are from 3.9 to 49.5 meters, though net tectonic displacement may be less.
Age of faulted deposits: Early to middle Holocene and Late Pleistocene.
Paleoseismology studies: None.
Timing of most recent paleoevent: (2) Latest Quaternary (<15 ka).
Comments: Helm (1994) reports scarps in the north section are modified by shoreline processes, indicating a pre-Bonneville age (>16.8 ka). However, Sack (1993) indicates air-photo evidence for displaced intermediate and Bonneville shorelines, and maps faults in Lake Bonneville and younger deposits in the northern section. Helm (1994) observed no evidence to indicate an age for the southern section, which may be younger. Geomatrix Consultants, Inc. (1999) reports that the geomorphic position of a displaced stream terrace and relatively subdued character of the fault scarp suggests early to middle Holocene (6-10 ka) displacement along the southern section.
Recurrence interval: No data.
Comments:
Slip rate: (C) 0.2-1 mm/yr (<35 ka).
Comments: Helm (1994) estimated an average slip rate of 0.26 millimeters/year based on diffusion modeling of the scarps, but notes this rate is tentative and possibly high. Geomatrix Consultants, Inc. (1999) estimated a slip rate of 0.39 millimeters/year, summing slip rates on individual traces across the fault zone in post-35 ka alluvial-fan and post-18 ka lacustrine deposits west of Indian Hickman Canyon. Slip rates on individual traces range from 0.11-0.15 millimeters/year.
Length: End to end (km): 50
Cumulative trace (km): 59
Average strike (azimuth): N17°W

REFERENCES

Barnhard, T.P., and Dodge, R.L., 1988, Map of fault scarps formed on unconsolidated sediments, Tooele 1° x 2° quadrangle, northwestern Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1990, scale 1:250,000.

Everitt, B.L., and Kaliser, B.N., 1980, Geology for assessment of seismic risk in the Tooele and Rush Valleys, Tooele County, Utah: Utah Geological and Mineral Survey Special Studies 51, 33 p.

Geomatrix Consultants, Inc., 1999 [revised 2001], Fault evaluation study and seismic hazard assessment, Private Fuel Storage Facility, Skull Valley, Utah: San Francisco, California, prepared for Stone and Webster Engineering Corporation, Project No. 4790, 118 p.

Hecker, Suzanne, 1993, Quaternary tectonics of Utah with emphasis on earthquake-hazard characterization: Utah Geological Survey Bulletin 127, 2 plates, scale 1:500,000, 257 p.

Helm, J.M., 1994, Structure and tectonic geomorphology of the Stansbury fault zone, Tooele County, Utah, and the effect of crustal structure on Cenozoic faulting patterns: Salt Lake City, University of Utah, M.S. Thesis, 128 p.

Sack, Dorothy, 1993, Quaternary geologic map of Skull Valley, Tooele County, Utah: Utah Geological Survey Map 150, 16 p. pamphlet, scale 1:100,000.