

2453, JOES VALLEY FAULT ZONE WEST FAULT

Structure number: 2453.

Comments: Hecker's (1993) fault number 13-6.

Structure name: Joes Valley fault zone west fault.

Comments:

Synopsis: Normal fault bounding the west side of the northern Joes Valley graben. Both the east (2455) and west faults show evidence for Holocene movement.

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State: Utah

County: Sanpete.

1° x 2° sheet: Price.

Province: Colorado Plateaus.

Reliability of location: Good.

Comments: Mapping from Foley and others (1986).

Geologic setting: North-trending normal fault bounding the west side of the Joes Valley graben. Bedrock displacement along the fault is greatest at its center and diminishes toward the north and south, similar to the parallel east fault. Joes Valley is a long, straight, north-trending graben that splits the Wasatch Plateau, which is capped mainly by Tertiary Flagstaff Limestone.

Sense of movement: N.

Comments:

Dip: No data.

Comments:

Dip direction: E.

Geomorphic expression: Foley and others (1986) divide the fault (based on relative age and displacement) into the Huntington, Seely, and Dugway Hollow sections (from north to south). Section lengths are 4, 42, and 7.5 kilometers respectively. The Dugway Hollow section is marked by a low, deeply incised scarp in colluvial veneer and bedrock with about 150 meters of throw. The Huntington section has up to 500 m of throw and is marked by an eroded bedrock scarp partially buried by Pinedale (11-14 ka) terminal moraines. Data are from the Seely section, which consists of two en-echelon faults in Quaternary deposits (total throw is uncertain). Scarps 8-12 meters high are in latest Pleistocene-age (<30 ka) deposits along the longer en-echelon fault; a 9-meter-high, single-event(?) scarp is at one location. The shorter en-echelon fault has 12-14-meter-high scarps in latest Pinedale (11-14 ka) deposits. The estimated maximum credible earthquake on the West Joes Valley fault is 7.5 (M_s). However, this estimate assumes the existence of a rupture pathway (presently unidentified) to the base of the seismogenic crust.

Age of faulted deposits: Holocene.

Paleoseismology studies: Foley and others (1986) excavated a trench on the Seely section of the fault, about 270 meters north of Little Creek near the north end of a 450-meter-long scarp crossing the highest of three alluvial terraces (site 2453-1).

Stratigraphic relations indicate a minimum of two surface-faulting events. Radiocarbon

age estimates from a bulk-soil sample and charcoal derived from unfaulted colluvium provide a minimum age of the most recent event. Geomorphic relations and soils data provide additional broad constraints on earthquake timing.

Timing of most recent paleoevent: (2) Latest Quaternary (<15 ka).

Comments: Age data (radiocarbon-age estimates and relative ages of displaced deposits) from the longer en-echelon fault indicate two post-30 ka events: a most recent event prior to 6.5 ka and possibly between 11 and 14 ka, and an earlier event between 23 and 30 ka.

Recurrence interval: 10-20 ky (<30 ka).

Comments:

Slip rate: (C) 0.2-1 mm/yr.

Comments: Fault scarps at five localities along the Seely section show about 12 meters of displacement in deposits ranging in age from 11-30 ka, suggesting a long-term slip rate of 0.4-1.1 millimeters/year. The northern part of the section appears to have the largest Holocene displacement, where 12-14-meter-high scarps are in Pinedale (11-14 ka) moraines.

Length: End to end (km): 57

Cumulative trace (km): 87

Average strike (azimuth): N0°W

REFERENCES

Foley, L.L., Martin, R.A., Jr., and Sullivan, J.T., 1986, Seismotectonic study for Joes Valley, Scofield and Huntington North Dams, Emery County and Scofield Projects, Utah: Denver, U.S. Bureau of Reclamation Seismotectonic Report No. 86-7, 132 p., scale 1:60,000 and 1:155,000.

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.