

## **2455, JOES VALLEY FAULT ZONE EAST FAULT**

**Structure number:** 2455.

Comments: Hecker's (1993) fault number 13-7.

**Structure name:** Joes Valley fault zone east fault.

Comments:

**Synopsis:** Normal fault bounding the east side of the northern Joes Valley graben. Both east and west (2453) faults show evidence for Holocene movement.

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**Compiler and affiliation:** Bill D. Black and Greg N. McDonald (Utah Geological Survey), and Suzanne Hecker (U.S. Geological Survey).

**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 fault bounding the east side of the northern Joes Valley graben. Bedrock displacement along the fault is greatest at its center and diminishes toward the north and south. Joes Valley is 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:** W.

**Geomorphic expression:** Foley and others (1986) divide the fault (based on relative age and displacement) into the Miller Flat, Straight Canyon, and Ferron sections (from north to south). Section lengths are 8, 42, and 5 kilometers, respectively. The Miller Flat section is marked by a zone of parallel and branching faults with up to 100 meters of total stratigraphic throw in bedrock. The Ferron section also has about 100 meters of total throw, and is marked by a low, deeply incised scarp in colluvial veneer and bedrock. Data are from the Straight Canyon section, which is marked by a steep linear escarpment in bedrock and unconsolidated deposits with up to 900 meters of total throw. Only the Straight Canyon section has significant inferred late Quaternary (<150 ka) displacement. The youngest measured displacement (2.5 meters) is apparently due to monoclinical folding and may be the result of several small events. The estimated maximum credible earthquake on the East 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 southeast side of Scad Valley at the north end of the Straight Canyon section (site 2455-1), approximately 18 kilometers north of the area studied for the west fault (2453) and intragaben faults (2454). Stratigraphic and structural relations indicate at least four

surface-faulting events since 150-300 ka, which is the interpreted age (based on amino acid racemization of snail shells) of the oldest unit exposed in the trench. The four events appear to have involved both brittle rupture and monoclinal folding. Two bulk-soil samples and one charcoal sample from the modern (unfaulted) soil profile yielded radiocarbon age estimates that place a minimum limiting age on the most recent event.

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

Comments: Age data (radiocarbon-age estimates and soil development) for the Straight Canyon section indicate the most recent event occurred between 1.5 ka and 14-30 ka. Four or more events are thought to have occurred since 150-300 ka; two of these events predate a soil interpreted to date from >130 ka.

**Recurrence interval:** <60 ky (<150-300 ka).

Comments:

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

Comments: 0.1-0.3 millimeters/year since 150-300 ka.

**Length:** End to end (km): 57

Cumulative trace (km): 61

**Average strike** (azimuth): N2°E

## ***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.