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Quaternary Fault and Fold Database of the United States

As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the interactive fault map.

Grant Butte fault (Class A) No. 878

Last Review Date: 2002-05-24

citation for this record: **Personius, S.F., compiler, 2002, Fault number 878, Grant Butte fault, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 03:14 PM.**

Synopsis	The northeast-striking Grant Butte fault forms the southern margin of the Portlan basin; this basin may be a right-lateral pull-apart basin in the forearc of the Casca subduction zone or a piggyback synclinal basin formed between antiformal uplift the Portland fold belt. The fault is mapped on the basis of subsurface data that inc down-to-the-north displacement of Plio-Pleistocene Springwater Formation and I Lava, and the trace of the fault is based on the presence of a an embayed, 50- to 7 high escarpment in these rocks. K-Ar analyses on three samples of Boring Lava i area yield ages of about 0.5, 1.3, and 1.6 Ma, and new Ar/Ar analyses in the Portl basin have yield much younger ages of 100–125 ka, so the fault has been active i middle and late Quaternary. No fault scarps on Quaternary surficial deposits have described, and the fault is everywhere shown as buried by latest Pleistocene Miss flood deposits.
Name comments	The Grant Butte fault was not shown on early geologic maps of the region (Piper #4064; Trimble, 1963 #4062; Swanson and others, 1993 #4032). The fault was fi shown on maps of Madin (1990 #4067; 1994 #4046), and was named after nearb

	Grant Butte, which lies to the north of the fault trace (Geomatrix Consultants Inc. 1995 #3593). **Fault ID:** This structure is part of fault number 24 of Geomatrix Consultants, Inc (1995 #3593).
County(s) and State(s)	MULTNOMAH COUNTY, OREGON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:50,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to Madin (2004 #7877).
Geologic setting	The northeast-striking Grant Butte fault forms the southern margin of the Portlan basin; this basin may be a right-lateral pull-apart basin in the forearc of the Casca subduction zone (Beeson and others, 1985 #4022; Beeson and others, 1989 #402 Yelin and Patton, 1991 #4020; Blakely and others, 1995 #4021; Blakely and othe 2000 #4333), or a piggyback synclinal basin formed between antiformal uplifts o Portland fold belt (Unruh and others, 1994 #3597; Unruh and others, 1994 #4007 fault is mapped on the basis of subsurface data that indicates down-to-the-north displacement of Plio-Pleistocene Springwater Formation and Boring Lava (Madi 1990 #4067; 1994 #4046). The fault forms two splays that wrap around Powell B at the west end of the fault.
Length (km)	10 km.
Average strike	N°E
Sense of movement	Normal *Comments:* Madin (1994 #4046) shows the Grant Butte fault as a very high angle normal fault.Dip direction from Madin (1994 #4046).
Dip Direction	N *Comments:* Madin (1994 #4046) shows the Grant Butte fault as a very high angle normal fault.
Paleoseismology	

studies	
Geomorphic expression	The trace of the Grant Butte fault is based on the presence of a an embayed, 50- t m-high escarpment in Plio-Pleistocene rocks of the Springwater Formation and B Lava. No fault scarps on Quaternary surficial deposits have been described, but th trace of the fault was aggressively scoured and buried by gravel from the Missoul floods (I.P. Madin, pers. commun., 2001).
Age of faulted surficial deposits	The fault is mapped on the basis of subsurface data that indicates down-to-the-no displacement of Plio-Pleistocene Springwater Formation and Boring Lava (Madi 1990 #4067; 1994 #4046). K-Ar analyses on three samples of Boring Lava in this yield ages of about 0.5, 1.3, and 1.6 Ma (Madin, 1994 #4046; Conrey and others, #4025). However, preliminary results of Ar/Ar dating of Boring Lava in the Portl basin have yield much younger ages of 100–125 ka (Fleck and others, 2002 #514 these rocks may be younger than previously believed. No fault scarps on Quatern surficial deposits have been described. The fault is everywhere shown as buried b latest Pleistocene Missoula flood deposits (Madin, 1990 #4067; 1994 #4046; Bur others, 1997 #4079).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* If the Grant Butte fault displaces 0.5–1.6 Ma rocks of the Boring Lav (Madin, 1990 #4067; 1994 #4046; Conrey and others, 1996 #4025), then the faul been active in the middle and late Quaternary. Pezzopane (1993 #3544) does not this fault on his map of Quaternary faults; Geomatrix Consultants, Inc. (1995 #35 and Madin and Mabey (1996 #3575) mapped the fault as active in the middle and Quaternary (<780 ka). Unruh and others (1994 #3597) concluded that the fault is potentially active, Wong and others (1999 #4073; 2000 #5137) mapped the fault a probable seismogenic fault, and Madin and others (2001 #5051) infer late Quater offset. The fault is everywhere shown as buried by Missoula flood deposits (Mad 1990 #4067; 1994 #4046), so the youngest event must predate the latest Pleistoce age of these deposits.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Unruh and others (1994 #3597) measured about 120 m of offset of Bo Lava from the mapping of Madin (1990 #4067). The cross section across the faul the Damascus quadrangle (Madin, 1994 #4046) appears to indicate less displacen and this measurement is probably a maximum, because the Boring Lava was dep on a sloping surface (Geomatrix Consultants Inc., 1995 #3593). Geomatrix

	Consultants, Inc. (1995 #3593) and Wong and others (1999 #4073; 2000 #5137) calculated preferred slip rates of 0.01–0.1 mm/yr in their analyses of the earthqua hazards associated with the combined Grant Butte-Damascus Creek-Tickle Creek faults.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
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