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Quaternary Fault and Fold Database of the United States

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Hite fault system, Thorn Hollow section (Class A) No. 845c

Last Review Date: 2003-10-03

citation for this record: **Personius, S.F., and Lidke, D.J., compilers, 2003, Fault number 845c, Hite fault system, Thorn Hollow section, 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 03:15 PM.**

Synopsis	**General:** The Hite fault system is a complex zone of faulting that parallels the northeast-trending western flank of the Blue Mountains uplift in northeastern Ore and southeastern Washington; the fault system may overlie the suture zone betwe accreted terranes in the Blue Mountains and the stable craton. Sense of slip on structures included in this zone has been described as normal, left-lateral, and rig lateral strike slip, but recent work is most consistent with a left-lateral oblique (d to-the-west or northwest) sense of slip. Most structures in the Hite fault system a found exclusively in rocks of the Miocene Columbia River Basalt Group, so determination of Quaternary activity is difficult. **Sections:** This fault has 4 sections. The Hite fault system was originally divided i four sections in this compilation; from northeast to southwest, these were the Hit section, the Kooskooskie section, the Thorn Hollow section, and the Agency sect the Hite section and the Kooskooskie section were combined by DOGAMI in the ORActiveFaults compilation

	(http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS
Name comments	**General:** The Hite fault system is a complex zone of faulting that parallels the northeast-trending western flank of the Blue Mountains uplift. The Hite fault was named after U.S. Soil Conservation Service scientist Thomas Hite (Kuehn, 1995 #3478). Faults included in the system herein include the Hite, Thorn Hollow, and Kooskooskie faults (Kienle and others, 1979 #3728); most faults have been mapp Swanson and others (1981 #3496). **Section:** This section consists of the Thorn Hollow fault zone, one of several nort trending fault strands that extend southwest of the Hite fault. The fault was name a linear stream valley, Thorn Hollow, by Kienle and others (1979 #3728). **Fault ID:** Some of these structures are included in fault number 76 of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	UMATILLA COUNTY, OREGON
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to 1:24,000-scale mapping by Ferns (2006 #7
Geologic setting	The Hite fault system is a complex zone of faulting that parallels the northeast-tre western flank of the Blue Mountains uplift in northeastern Oregon and southeaste Washington; the fault system may overlie the suture zone between accreted terran the Blue Mountains and the stable craton (Reidel and others, 1994 #3539). Sense on structures included in this zone has been described as normal, left-lateral, and lateral strike slip (Newcomb, 1970 #3761; Kienle and others, 1979 #3728; Tolan Reidel, 1989 #3765). Most structures in the Hite fault system are found exclusive rocks of the Miocene Columbia River Basalt Group (Walker, 1973 #3756; Swans others, 1981 #3496; Walker and MacLeod, 1991 #3646; Schuster and others, 199 #3760), so determination of Quaternary activity is difficult.
Length (km)	This section is 44 km of a total fault length of 140 km.
Average strike	N10°E (for section) versus N20°E (for whole fault)
Sense of movement	Left lateral, Normal *Comments:* Sense of slip on faults in the Thorn Hollow section have been describ

	normal, left-lateral, and right-lateral strike slip (Kienle and others, 1979 #3728; Swanson and others, 1981 #3496; Tolan and Reidel, 1989 #3765). However, rece detailed work on faults in the Hite section indicate left-lateral oblique (down-to-tl northwest) slip (Kuehn, 1995 #3478); this sense of slip probably characterizes the Hite fault system (Reidel and others, 1994 #3539).
Dip	80–90° NW *Comments:* Limited dip measurements of 80–90° indicate steeply northwest-dipp fault attitudes (Kienle and others, 1979 #3728).
Paleoseismology studies	
Geomorphic expression	The Thorn Hollow section forms a complex zone of faulting in rocks of the Colu River Basalt Group; it is expressed as an alignment of linear streams, saddles, and notches in ridges north of the Umatilla River, and as a shallow linear depression f with hydrophilic vegetation south of the river (Kienle and others, 1979 #3728).
Age of faulted surficial deposits	Structures in the Thorn Hollow section offset Miocene Columbia River basalts, a one place appear to offset Quaternary surficial deposits (Kienle and others, 1979 #3728). At a site along Highway 11, about 0.3 km south of Dry Creek, caliche-fil fractures associated with a 20-m-wide fault zone in basalt extend through fluvial s sand and gravel into overlying loess to near the ground surface (Kienle and others #3728). Kienle and others (1979 #3728) do not discuss the age of these deposits, than to correlate the loess to the Palouse Formation, which they apparently descri pre-last glacial. Piety and others (1990 #3733) inferred a late Pleistocene (approximately 100 ka) age for the offset loess deposits.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* However, Kienle and others (1979 #3728) use apparent offset of Palo Formation loess to infer "post late Pleistocene" displacement on the Thorn Hollo near Dry Creek. However, elsewhere they caution that given the uncertain age of deposits in the region, offset of loess is not prima facie evidence of very young fa More recent work on the chronology of loess deposits in this region indicates thes sediments may have begun to form as much as 1-2 Ma (Busacca, 1991 #3598). G these uncertainties, Pezzopane (1993 #3544) and subsequent compilations (Geom Consultants Inc., 1995 #3593; Madin and Mabey, 1996 #3575; Weldon and others #5648) show the southern part of the Thorn Hollow section as active in the Quate (<1.6-1.8 Ma), and the northern part of the fault as active in the middle and late (- 780 ka) Quaternary. Piety and others (1990 #3733) also infer late Quaternary (<1

	displacement on the northern part of the Thorn Hollow fault.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* No detailed fault slip data have been documented, but displacement a the Thorn Hollow fault zone in Miocene Columbia River basalts may be 80-450 r near Interstate 84 (Kienle and others, 1979 #3728); such offset yields low rates of term slip.
Date and Compiler(s)	2003 Stephen F. Personius, U.S. Geological Survey David J. Lidke, U.S. Geological Survey
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