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Quaternary Fault and Fold Database of the United States

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unnamed fault north of Service Anticline (Class B) No. 569

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Synopsis	This unnamed fault aligns with the axis of the Service Anticline, which is a north-trending anticline that is present directly south of the Columbia River. The Service Anticline and this unnamed fault are located in the southwestern part of the Yakima fold belt, however, the north trend of the Service anticline differs noticeably from the mostly easterly trends of other anticlines and synclines in the Yakima fold belt (Piety and others, 1990 #3733). The unnamed fault at the north end of the anticline is poorly exposed, but mapped as a down-to-the west high-angle fault (Schuster, 1994 #4654; Schuster and others, 1997 #3760). Locally exposed, sub-horizontal slickenlines combined with the north-south orientation of principle stress direction in this region, has suggested to some authors that offset along the fault is mostly left-lateral (Foundation Sciences Inc., 1980 #5722; Piety and others, 1990 #3733). Foundation Sciences Inc. (1980 #5722)

	examined and discussed relationships exposed in an borrow pit cut in Silusi Butte, a small butte directly east of the mapped trace of the fault and about 1 km north of the Columbia River. Based on exposures in this borrow pit, Foundation Sciences Inc. (1980 #5722) reported that glaciofluvial deposits contained large basalt boulders that were cracked and split open and that the cracks were filled with clastic dikes. They interpreted the deposits to be Pleistocene glacial flood deposits and the cracks to be tectonic in origin and the result of a reidel shear, presumably related to the north-striking unnamed fault. Foundation Sciences Inc. (1980 #5722) did not report any other evidence for Quaternary deformation along or near the unnamed fault. Piety and others (1990 #3733) later reported that they were unable to conclusively locate the borrow pit discussed by Foundation Sciences Inc. (1980 #5722), they noted that they found no evidence of Late Quaternary deformation, and they did not mention any evidence for older Quaternary deformation. Based on the information reported by Foundation Sciences Inc. (1980 #5722), this fault is identified as a known or suspected Quaternary fault in other reports and on structure maps of this area (U.S. Department of Energy, 1988 #5820; Tolan and Reidel, 1989 #3765; Reidel and others, 1994 #3539; Rogers and others, 1996 #4191). Because no unequivocal evidence of Quaternary activity along this unnamed fault has been reported, however, it is classified herein as a Class B structure until further studies are conducted.
Name comments	Refers to an unnamed north-striking fault present directly north of the axis of the Service anticline and the Columbia River. This unnamed fault is shown on a 1:100,000-scale geologic map by Schuster (1994 #4654) and on a 1:250,000-scale geologic map by Schuster and others (1997 #3760). The fault extends from the Columbia River, about 2km southwest of Plymouth, Washington, northward about 5-6 km where it intersects the Columbia Hills.
County(s) and State(s)	BENTON COUNTY, WASHINGTON
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Fault trace is from the 1:250,000-scale geologic map by Schuster and others (1997 #3760); the trace was transferred

	directly onto a registered mylar overlay and digitized at 1:250,000 scale. This part of this 1:250,000-scale geologic map was compiled from the 1:100,000 scale geologic map by Schuster (1994 #4654).
Geologic setting	This unnamed fault north of the Service anticline lies in the southeastern part of the Yakima fold belt, a structural-tectonic subprovince of the Columbia Plateaus Province (Reidel and others, 1989 #5553; 1994 #3539). The Yakima fold belt consists of a series of generally east-trending narrow asymmetrical anticlinal ridges and broad synclinal valleys formed by folding of Miocene Columbia River basalt flows and sediments. Anticlinal ridges of the Yakima fold belt began to grow in Miocene time (about 16-17 Ma), concurrent with eruptions of Columbia River basalt flows, and continued during Pliocene time and may have continued to the present (Reidel and others, 1989 #5553; 1994 #3539). This unnamed fault aligns with the axis of the Service Anticline, which is a north-trending anticline that is present directly south of the Columbia River. The north trend of the Service anticline differs noticeably from the mostly easterly trends of other anticlines and synclines in the Yakima fold belt. Relations of this unnamed north-striking fault and the north-striking Service anticline to the mostlly east-striking folds and faults of the Yakima fold belt are poorly known (Foundation Sciences Inc., 1980 #5722; Piety and others, 1990 #3733).
Length (km)	7 km.
Average strike	N0°E
Sense of movement	Normal, Left lateral *Comments:* Fault is shown as a down-to-the-west normal fault on geologic maps by Schuster (1994 #4654) and Schuster and others (1997 #3760). Based on some exposures of sub-horizontal slickenlines, the apparent down-to-the-west throw, and interpretation of regional stress orientations, Foundation Sciences Inc. (1980 #5722) suggest that the fault is principally a left-lateral strike-slip fault.
Dip Direction	W *Comments:* Not reported, the linear trace of the fault as shown on geologic maps by Schuster (1994 #4654) and Schuster and others

	(1997 #3760) may indicate that the fault dips steeply.
Paleoseismology studies	
Geomorphic expression	Geomorphic expression of this unnamed fault apparently is poor to absent (Foundation Sciences Inc., 1980 #5722; Piety and others, 1990 #3733). Foundation Sciences Inc. (1980 #5722) discussed evidence for faulting and folding of Miocene volcanic rocks of the Columbia River Basalt Group, but did not report any obvious geomorphic expression of the unnamed fault, other than the aligned north trend of low Buttes directly east of the fault. Based on examination of 1:58,000-scale color-infrared aerial photographs and on low-sun-angle aerial reconnaissance, Piety and others (1990 #3733) reported that sparse, visible scarps appear to have an erosional origin.
Age of faulted surficial deposits	Foundation Sciences Inc. (1980 #5722) discussed several localities along and near the unnamed fault where faulting is evident in Miocene volcanic rocks of the Columbia River Basalt Group. Foundation Sciences Inc. (1980 #5722) examined and discussed relationships exposed in an borrow pit cut in Silusi Butte, a small butte directly east of the mapped trace of the fault and about 1 km north of the Columbia River. Based on exposures in this borrow pit, Foundation Sciences Inc. (1980 #5722) reported that glaciofluvial deposits contained large basalt boulders that were cracked and split open and that the cracks were filled with clastic dikes. They interpreted the deposits to be Pleistocene glacial flood deposits and the cracks to be tectonic in origin and the result of a reidel shear, presumably related to the north-striking unnamed fault. Foundation Sciences Inc. (1980 #5722) did not report any evidence for shearing or mesoscopic-scale structures associated with the sand-filled cracks and reported no other evidence for Quaternary deformation along or near the unnamed fault. Piety and others (1990 #3733) later reported that they were unable to conclusively locate the borrow pit discussed by Foundation Sciences Inc. (1980 #5722), they noted that they found no evidence of Late Quaternary deformation, and they did not mention any evidence for older Quaternary deformation.
Historic earthquake	
Most recent prehistoric	undifferentiated Quaternary (<1.6 Ma)

deformation	*Comments:* Foundation Sciences Inc. (1980 #5722) discussed sand-filled cracks in basalt boulders of glacial flood deposits at Silusi Butte along or near the mapped trace of the unnamed fault. They interpreted the sand-filled cracks to be clastic dikes that filled cracks related to tectonic deformation and activity along the unnamed fault and other subsidiary faults. These glacial flood deposits are of unknown age, but glacial flood deposits of this region range in age from middle to late Pleistocene (Rigby and Othberg, 1979 #3738). Consequently, if the relations reported in the borrow pit by Foundation Sciences Inc. (1980 #5722) are the result of tectonic deformation and activity along the unnamed fault, the age of that deformation would be middle Quaternary or younger in age. Foundation Sciences Inc. (1980 #5722), however, did not report offsets or other mesoscopic scale structures associated with the sand-filled fractures and they did not report any other evidence for Quaternary deformation along or near the unnamed fault. Piety and others (1990 #3733) reported that they found no evidence of Late Quaternary deformation along or near the unnamed fault and they did not mention any evidence for older Quaternary deformation. Because no unequivocal evidence of Quaternary activity along this unnamed fault has been reported, it is classified herein as a Class B structure until further studies are conducted.
Recurrence interval	*Comments:* No definitive evidence for Quaternary activity along this unnamed fault has been reported. If the fault has been active in the Quaternary, studies by Foundation Sciences Inc. (1980 #5722) suggest that the last event is middle Pleistocene or younger in age. The lack of scarps associated with this unnamed fault (Piety and others, 1990 #3733) probably suggests a relatively long recurrence interval, for possible Quaternary events.
Slip-rate category	Less than 0.2 mm/yr *Comments:* No definitive evidence for Quaternary activity along this unnamed fault has been reported, and the lack of scarps (Piety and others, 1990 #3733) suggests low rates for possible Quaternary slip.
Date and Compiler(s)	2003 David J. Lidke, U.S. Geological Survey

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