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Quaternary Fault and Fold Database of the United States

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Central Ferry fault (Class B) No. 577

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Synopsis	The north-striking Central Ferry fault is mapped as a down-to-the-east, north-striking fault that is exposed in Miocene volcanic rocks south of the Columbia River and Central Ferry, Washington (Gulick, 1994 #5564). The fault is inferred to continue at least a short distance north of the river beneath Pleistocene gravels and Pleistocene-Holocene loess deposits (Foundation Sciences Inc., 1980 #5722; Gulick, 1994 #5564). The southern part of the fault, where it is inferred in the Patah River valley, also appears to be covered by loess (Foundation Sciences Inc., 1980 #5722; Gulick, 1994 #5564). Possible evidence of Quaternary activity along the Central Ferry fault was reported Foundation Sciences Inc. (1980 #5722); they reported identification of a linear, north-striking mound that is present in a plowed field underlain by loess deposits. Foundation Sciences Inc. (1980 #5722) reported that a tectonic origin for this feature was not demonstrated. However, if this linear mound is related to movement along the Central Ferry fault, it suggests late Quaternary activity along the fault. Foundation Sciences Inc. (1980 #5722) reported no other

	evidence suggestive of Quaternary activity along the Central Ferry fault and other evidence for Quaternary activity is not known to have been reported. Consequently, because no unequivocal evidence of Quaternary activity along the Central Ferry fault has been reported, it is classified herein as a Class B structure until further studies are conducted.
Name comments	The Central Ferry fault is a north-striking fault that extends from directly north of Central Ferry, Washington along the Columbia River, southward to about 3 km southeast of Dodge, Washington in the Pataha River valley (Foundation Sciences Inc., 1980 #5722). The fault is shown on the 1:100,000-scale geologic map by Gulick (1994 #5564) and on the 1:250,000-scale geologic map by Schuster and others (1997 #3760). The fault is named for its exposures near Central Ferry and it is referred to as the Central Ferry fault by Foundation Sciences Inc. (1980 #5722) and labeled as such on the geologic map by Gulick (1994 #5564). Later reports by the U.S. Department of Energy (1988 #5820) and Reidel and others (1994 #3539) also refer to this fault as the Central Ferry fault. The Central Ferry fault is shown on structure maps of this region as a known or suspected Quaternary fault (Tolan and Reidel, 1989 #3765; Rogers and others, 1996 #4191).
County(s) and State(s)	WHITMAN COUNTY, WASHINGTON GARFIELD 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 that 1:250,000-scale geologic map was compiled from the 1:100,000 scale geologic map by Gulick (1994 #5564).
Geologic setting	The north-striking Central Ferry fault occurs in the south-central part of the Palouse subprovince of the Columbia Plateaus province, near the southern boundary of this subprovince with the Blue Mountains subprovince to the southeast. This part of the Palouse subprovince is also called the Palouse slope. The region of the Palouse slope is characterized by sparse faults and low-

	amplitude, long wavelength folds that deform Miocene basalts of the Columbia River Basalt Group, which otherwise dip very gently westward above a similarly dipping paleoslope (Swanson and others, 1980 #3574; Reidel and others, 1994 #3539). The Blue Mountains subprovince directly to the southeast, is a 250-km-long anticlinorium that forms the southern margin of the Columbia basin and the Columbia Plateaus province (Reidel and others, 1994 #3539). A few other north- and northwest-striking faults and folds are shown on geologic maps in Miocene volcanic rocks of the region surrounding the Central Ferry fault (Schuster, 1994 #4655; Schuster and others, 1997 #3760). In general, however, faults and folds are relatively sparse in this area and their tectonic significance is not well known (Foundation Sciences Inc., 1980 #5722).
Length (km)	10 km.
Average strike	N9°W
Sense of movement	Left lateral, Reverse *Comments:* Fault is shown as a down-to-the-east fault on geologic maps by Gulick (1994 #5564) and Schuster and others (1997 #3760). Foundation Sciences Inc. (1980 #5722) also report that the fault shows a down-to-the east throw and report 80?-90? west dips for breccia zones associated with the fault, which may indicate a reverse component of movement along the fault. Based on some exposures of sub-horizontal slickenlines, the down-to-the-east 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	80°-90° *Comments:* Foundation Sciences Inc. (1980 #5722) report gouge and breccia zones along the fault that strike N10?W an N16?W and dip 85?W and 86?W, respectively.
Paleoseismology studies	
Geomorphic expression	The Central Ferry fault is expressed principally to entirely in Miocene volcanic rocks and geomorphically expressed mostly as a linear topographic depression and as notches in ridges and drainages (Foundation Sciences Inc., 1980 #5722). According to

	Foundation Sciences Inc. (1980 #5722), the fault is exposed in road cuts in lower Deadman Creek, along State Highway 127, and in a rock quarry near Dodge, Washington. At these exposures, the fault is in Miocene volcanic rocks and is expressed as gouge and shear zones that vary in width and degree of brecciation (Foundation Sciences Inc., 1980 #5722). Along the south end of the inferred mapped trace of the fault, Foundation Sciences Inc. (1980 #5722) identified a linear, north-trending mound in a tilled field underlain by Pleistocene-Holocene loess deposits, about 1.6 km northeast of Housner, Washington. They reported that the mound obliquely cuts this cultivated slope on the south side of Pataha Valley, is clearly visible during low sun-angle conditions, and is about 180 m long and 1.0-1.5 m in height (Foundation Sciences Inc., 1980 #5722). They also reported that the mound might be a reverse scarp and indicate offset of the loess deposits, or might be an erosional feature that follows a buried basalt surface; they noted they were unable to determine which of these origins was most likely.
Age of faulted surficial deposits	Foundation Sciences Inc. (1980 #5722) discussed several localities along and near the Central Ferry fault where faulting is evident in Miocene volcanic rocks of the Columbia River Basalt Group. Foundation Sciences Inc. (1980 #5722) identified a linear, north-trending mound in a tilled field underlain by Pleistocene-Holocene loess deposits, about 1.6 km northeast of Housner, Washington and they suggested that the mound might be a reverse scarp and indicate offset of the loess deposits. They were unable to verify a tectonic origin for this linear feature and they did not report any other evidence suggestive of possible Quaternary offset along the Central Ferry fault (Foundation Sciences Inc., 1980 #5722).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Foundation Sciences Inc. (1980 #5722) discussed a linear mound they identified in a tilled field underlain by Pleistocene-Holocene loess deposits, about 1.6 km northeast of Housner, Washington and they suggested that the mound might be a reverse scarp and indicate offset of the loess deposits. The precise age of the loess is not known, but it is shown as Pleistocene-Holocene in age on the geologic map of this area by Gulick (1994 #5564). Foundation Sciences Inc. (1980 #5722)

	reported that they were unable to verify a tectonic origin for this linear feature and they did not report any other evidence suggestive of possible Quaternary offset along the Central Ferry fault. Because no unequivocal evidence of Quaternary activity along the Central Ferry 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 the Central Ferry 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 Pleistocene or younger in age.
Slip-rate category	Less than 0.2 mm/yr *Comments:* No definitive evidence for Quaternary activity along this unnamed fault has been reported. Foundation Sciences Inc. (1980 #5722) reported a 1.0-1.5 m linear mound in Pleistocene-Holocene loess deposits along the southern part of the fault, which might be a reverse slope scarp. They were unable to determine a tectonic origin for this feature. However, if the assumption is made that the mound is a tectonic feature that is as young as early Holocene in age (about 10 ka), then a scarp height and offset of 1.0-1.5 m would yield a vertical slip rate of about 0.1-0.15 mm/yr.
Date and Compiler(s)	2003 David J. Lidke, U.S. Geological Survey
References	#5722 Foundation Sciences Inc., 1980, Geologic reconnaissance of parts of the Walla Walla and Pullman, Washington, and Pendleton Oregon 1° x 2° AMS quadrangles: Technical report to U.S. Army Corps of Engineers, Seattle, Washington, 83 p., 3 pls. #5564 Gulick, C.W., 1994, Geologic map of the Pullman 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 94-6, 22 p. pamphlet, 1 sheet, scale 1:100,000. #3539 Reidel, S.P., Campbell, N.P., Fecht, K.R., and Lindsey, K.A., 1994, Late Cenozoic structure and stratigraphy of south-central Washington, *in* Lasmanis, R., and Cheney, E.S., eds., Regional geology of Washington State: Washington Division of

Geology and Earth Resources, p. 159-180.

#4191 Rogers, A.M., Walsh, T.J., Kockelman, W.J., and Priest, G.R., 1996, Assessing earthquake hazards and reducing risk in the Pacific Northwest—Volume 1:U.S. Geological Survey Professional Paper 1560, 306 p.

#3760 Schuster, E.J., Gulick, C.W., Reidel, S.P., Fecht, K.R., and Zurenko, S., 1997, Geologic map of Washington-southeast quadrant: Washington Division of Geology and Earth Resources Geologic Map GM-45, 20 p. pamphlet, 2 sheets, scale 1:250,000.

#4655 Schuster, J.E., 1994, Geologic map of the Walla Walla 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open-File Report 94-3, 18 p., scale 1:100,000.

#3574 Swanson, D.A., Wright, T.L., Camp, V.E., Gardner, J.N., Helz, R.T., Price, S.M., Reidel, S.P., and Ross, M.E., 1980, Reconnaissance geologic map of the Columbia River Basalt Group, Pullman and Walla Walla quadrangles, southeast Washington and adjacent Idaho: U.S. Geological Survey Miscellaneous Investigations Map I-1139, 2 sheets, scale 1:250,000.

#3765 Tolan, T.L., and Reidel, S.P., 1989, Structure map of a portion of the Columbia River flood-basalt Province, *in* Reidel, S.P., and Hooper, P.R., eds., Volcanism and tectonism in the Columbia River Flood-Basalt Province: Geological Society of America Special Paper 239, 1 sheet, scale 1:500,000.

#5820 U.S. Department of Energy, 1988, Site characterization plan—Reference repository location, Hanford site, Washington [consultation draft]: Washington, D.C., Office of Civilian Radioactive Waste Management Report DOE/RW-0164, v. 1, p. 1.3.14-1.3.40.

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