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Quaternary Fault and Fold Database of the United States

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Arlington-Shutler Butte fault (Class A) No. 847

Last Review Date: 2016-04-12

citation for this record: **Personius, S.F., and Lidke, D.J., compilers, 2003, Fault number 847, Arlington-Shutler 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 03:16 PM.**

Synopsis	The Arlington-Shutler Butte fault is a northwest-striking fault zone marked by right-lateral strike slip and normal faults, and is coincident with anticlines of similar trend. The fault zone offsets Miocene and Pliocene volcanic and sedimentary rocks. No scarps on Quaternary deposits have been described, but geomorphic evidence suggests that the fault has undergone middle and late Quaternary displacement.
Name comments	Lineaments and fault and fold traces of various orientations have been mapped as the Arlington-Shutler Butte (or Buttes) fault, Arlington-Shutler Butte lineament, and Shutler lineament (Bela, 1982 #3584; U.S. Army Corps of Engineers, 1983 #3480; Pezzopane, 1993 #3544; Geomatrix Consultants Inc., 1995 #3593). Herein we retain the name Arlington-Shutler Butte fault. The Arlington-Shutler Butte fault extends southeastward from the Simcoe Mountains in Washington, across the Columbia River,

	and into Oregon about 15 km. **Fault ID:** This structure is part of fault number 10 of Pezzopane (1993 #3544) and fault number 81 of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	KLICKITAT COUNTY, WASHINGTON GILLIAM COUNTY, OREGON
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault trace is from 1:100,000-scale compilations of Walsh (1986 #5189), Philips (1987 #4660), and Schuster (1994 #4654) in Washington, and from 1:100,000-scale mapping of Weldon and others (2002 #5648), based on 1:250,000-scale compilations of Swanson and others (1981 #3496) and Bela (1982 #3584), and 1:500,000-scale mapping of Pezzopane (1993 #3544) in Oregon.
Geologic setting	The Arlington-Shutler Butte fault is a northwest-striking structure formed in Miocene Columbia River basalts and Miocene and Pliocene sedimentary rocks, in the southern part of the Yakima fold belt (Swanson and others, 1981 #3496; Bela, 1982 #3584; Walsh and others, 1987 #3579; Walker and MacLeod, 1991 #3646; Schuster and others, 1997 #3760). The Yakima fold belt, a structural-tectonic sub province of the western Columbia Plateaus Province, 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 (Reidel and others, 1989 #5553; 1994 #3539). 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). The northwest-striking Arlington-Shutler Butte fault is one of several northwest-striking faults, which appear to cut east-trending folds and faults of the Columbia Hills structures [568]. Several studies have reported that these northwest-striking faults are at least in part younger features that cut and offset easterly trending, Yakima fold belt structures such as those of the Columbia Hills (Myers and others, 1979 #5175;

	Bentley and others, 1980 #4667; Geomatrix Consultants Inc., 1995 #3593).
Length (km)	52 km.
Average strike	N42°W
Sense of movement	Right lateral, Normal *Comments:* The Arlington-Shutler Butte fault is almost everywhere coincident with and parallel to a northwest-striking anticline; in places it is mapped as a down-to-the-northeast normal fault, and in other places is mapped as a right-lateral strike-slip fault (Swanson and others, 1981 #3496; Bela, 1982 #3584; Walsh and others, 1987 #3579; Tolan and Reidel, 1989 #3765; Pezzopane, 1993 #3544; Schuster and others, 1997 #3760; Weldon and others, 2002 #5648). About 8 km of right-lateral displacement of east-northeast trending thrust faults parallel to the Columbia Hills anticline [568] is apparent just north of the Columbia River, but other fold axes in the area are mapped across the fault without apparent displacement.
Dip Direction	V; NE *Comments:* No actual dip measurements are available, but Geomatrix Consultants, Inc. (1995 #3593) modeled the Arlington-Shutler Butte fault as a vertical strike-slip fault in their analysis of paleo-earthquake magnitudes.
Paleoseismology studies	
Geomorphic expression	The Arlington-Shutler Butte fault is coincident with lineaments and short uplifts (anticlines) along most of its length (Swanson and others, 1981 #3496; Bela, 1982 #3584; U.S. Army Corps of Engineers, 1983 #3480; Tolan and Reidel, 1989 #3765). S.K. Pezzopane (pers. commun., 1993, in Geomatrix Consultants Inc., 1995 #3593) used airphoto analysis to observe "good geomorphic expression" of faulting along the Arlington-Shutler Butte fault.
Age of faulted surficial deposits	The Arlington-Shutler Butte fault offsets Miocene and Pliocene volcanic and sedimentary rocks (Swanson and others, 1981 #3496; Bela, 1982 #3584; Walsh and others, 1987 #3579; Schuster and others, 1997 #3760); no evidence of faults in Quaternary deposits have been documented, but such deposits are

	rare in this part of the Columbia Plateau.
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* The timing of the most recent prehistoric faulting event along this fault is not tightly constrained. U.S. Army Corps of Engineers (1983 #3480) used regional structural relationships to suggest that youngest movement on the fault occurred more than 1 Ma, but airphoto analysis by S.K. Pezzopane (1993 #3544) and (pers. commun., 1993, in Geomatrix Consultants Inc., 1995 #3593), and Geomatrix Consultants, Inc. (1995 #3593) suggest that the Arlington-Shutler Butte fault has "good geomorphic expression" of faulting and may have been active in the middle or late Quaternary (<700–780 ka). The fault also is mapped as active in the middle or late Quaternary (<780 ka) by Weldon and others (2002 #5648).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* No slip data are available for the Arlington-Shutler Butte fault, but the lack of scarps on Quaternary deposits suggests low rates of Quaternary slip. Geomatrix Consultants, Inc. (1995 #3593) used estimated slip rates of 0.01–0.1 mm/yr in their analysis of earthquake hazards associated with the Arlington-Shutler Butte fault.
Date and Compiler(s)	2003 Stephen F. Personius, U.S. Geological Survey David J. Lidke, U.S. Geological Survey
References	#3584 Bela, J.L., 1982, Geologic and neotectonic evaluation of north-central Oregon—The Dallas 1 x 2 quadrangle: State of Oregon, Department of Geology and Mineral Industries Geologic Map Series GMS-27, 2 sheets, scale 1:250,000. #4667 Bentley, R.D., Powell, J., Anderson, J.L., and Farooqui, S.M., 1980, Geometry and tectonic evolution of the Columbia Hills anticline, Washington-Oregon: Geological Society of America Abstracts with Programs, v. 12, no. 3, p. 97. #3593 Geomatrix Consultants, Inc., 1995, Seismic design

mapping, State of Oregon: Technical report to Oregon Department of Transportation, Salem, Oregon, under Contract 11688, January 1995, unpaginated, 5 pls., scale 1:1,250,000.

#5175 Myers, C.W., Price, S.M., Caggiano, J.A., Cochran, M.P., Czimer, W.J., Davidson, N.J., Edwards, R.C., Fecht, K.R., Holmes, G.E., Jones, M.G., Kunk, J.R., Landon, R.D., Ledgerwood, R.K., Lillie, J.T., Long, P.E., Mitchell, T.H., Price, E.H., Reidel, S.P., and Tallman, A.M., 1979, Geologic studies of the Columbia Plateau—A status report: Technical report to U.S. Department of Energy, under Contract DE-AC06-77RL01030, October 1979, variously paginated, 36 pls.

#3544 Pezzopane, S.K., 1993, Active faults and earthquake ground motions in Oregon: Eugene, Oregon, University of Oregon, unpublished Ph.D. dissertation, 208 p.

#4660 Phillips, W.M. and Walsh, T.J., 1987, Geologic map of the northwest part of the Goldendale quadrangle, Washington: Washington Division of Geology and Earth Resources, Open File Report 87-13, 9 p., 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.

#5553 Reidel, S.P., Fecht, K.R., Hagood, M.C., and Tolan, T.L., 1989, The geologic evolution of the central Columbia Plateau, *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, p. 247-264.

#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.

#4654 Schuster, J.E., 1994, Geologic maps of the east half of the Washington portion of the Goldendale 1:100,000 quadrangle and the Washington portion of the Hermiston 1:100,000 quadrangle: Washington Division of Geology and Earth Resources Open-File Report 94-9, 17 p., scale 1:100,000.

#3496 Swanson, D.A., Anderson, J.L., Camp, V.E., Hooper, P.R., Taubeneck, W.H., and Wright, T.L., 1981, Reconnaissance geologic map of the Columbia River Basalt Group, northern Oregon and western Idaho: U.S. Geological Survey Open-File Report 81-797, 35 p., 5 pls., 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.

#3480 U.S. Army Corps of Engineers, 1983, The Dalles and John Day Lakes earthquake and fault study—Design memorandum 26: U.S. Army Corps of Engineers, Portland District, 66 p., 19 pls.

#3646 Walker, G.W., and MacLeod, N.S., 1991, Geologic map of Oregon: U.S. Geological Survey, Special Geologic Map, 2 sheets, scale 1:500,000.

#5189 Walsh, T.J., compiler, 1986, Geologic map of the west half of the Toppenish quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 86-3, 8 p., 1 pl., scale 1:100,000.

#3579 Walsh, T.J., Korosec, M.A., Phillips, W.M., Logan, R.L., and Schasse, H.W., 1987, Geologic map of Washington-southwest quadrant: Washington Division of Geology and Earth Resources Geologic Map GM-34, 28 p. pamphlet, 2 sheets, scale 1:250,000.

#5648 Weldon, R.J., Fletcher, D.K., Weldon, E.M., Scharer, K.M., and McCrory, P.A., 2002, An update of Quaternary faults of central and eastern Oregon: U.S. Geological Survey Open-File Report 02-301 (CD-ROM), 26 sheets, scale 1:100,000.