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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.

Pinto fault (Class B) No. 559

Last Review Date: 2016-08-18

citation for this record: **Lidke, D.J., and Haller, K.M., compilers, 2016, Fault number 559, Pinto 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 03:03 PM.**

Synopsis	The Pinto fault, as discussed by Geomatrix Consultants Inc. (1990 #5550), consists of three fault strands that may connect beneath areas of Quaternary sediments. If connected, the three strands form a generally east-striking fault that has a concave-to-the-south map pattern (Gulick, 1990 #5561; Gulick and Korosec, 1990 #5668; Stoffel and others, 1991 #5667). The faults are only known to deform Miocene rocks of the Columbia River Basalt Group (Gulick, 1990 #5561; Gulick and Korosec, 1990 #5668; Stoffel and others, 1991 #5667); however, the faults have not been studied in detail. Geomatrix Consultants Inc. (1990 #5550) analyzed aerial photographs and reported that the Pinto fault has poor geomorphic expression and does not appear to be expressed in late Quaternary deposits with an inferred age of about 13 ka. Geomatrix Consultants Inc. (1990 #5550) did not mention evidence for or against Quaternary faulting prior to about 13 ka. Later reports directly and indirectly cite Geomatrix Consultants Inc. (1990 #5550) as the data source for evidence suggestive of possible Quaternary displacement along the Pinto fault (Reidel and

	others, 1994 #3539; Rogers and others, 1996 #4191). On the 1:100,000-scale geologic map by Gulick and Korosec (1990 #5668), Quaternary alluvium is shown along the north side of the central fault strand, however, it is not known if this relation implies faulting of the alluvium or deposition of alluvium along the fault. Because no specific or definitive evidence of Quaternary activity along the Pinto fault has been reported, the Pinto fault is classified herein as a Class B structure until furthers studies are conducted.
Name comments	Easterly striking fault strands discussed herein as the Pinto fault occur about 6 km northwest of Pinto Dam (Geomatrix Consultants Inc., 1990 #5550). These fault strands are shown on 1:100,000-scale geologic maps by Gulick (1990 #5561) and Gulick and Korosec (1990 #5668) and on a 1:250,000-scale geologic map by Stoffel and others (1991 #5667). Geomatrix Consultants Inc. (1990 #5550) referred to these three fault strands as the Pinto fault, as did Reidel and others (1994 #3539). The central strand is labeled the Dry Coulee fault on the 1:100,000-scale geologic map by Gulick (1990 #5561). The Pinto fault name appears to be the name most accepted in the literature and is also used herein. The three strands, if connected, form an easterly striking fault about 15 km long that extends from the southern margin of Billy Clapp Lake, westward to about 1 km west of Dry Coulee.
County(s) and State(s)	GRANT COUNTY, WASHINGTON
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Location of fault from GER_Seismogenic_WGS84 (http://www.dnr.wa.gov/publications/ger_portal_seismogenic_features.zip, downloaded 05/23/2016) attributed to 1:100,000 scale geologic maps by Gulick (1990 #5561).
Geologic setting	The easterly striking Pinto fault occurs in the northern part of the Palouse structural-tectonic subprovince of the Columbia Plateaus province, near the southern boundary of this subprovince with the Yakima fold belt 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 Yakima fold belt, directly to the south and southwest, is characterized by a series of mostly easterly striking anticlinal ridges and broad synclinal valleys that are mostly expressed in Miocene-Pliocene volcanic rocks and sediments (Reidel and others, 1994 #3539). The folds of the Yakima fold belt are commonly associated with easterly striking thrust and reverse faults that locally deform Quaternary sediments (Campbell and Bentley, 1981 #3513; Reidel, 1984 #5545; Reidel and others, 1994 #3539; West and others, 1996 #3514). Other east- and northeast-striking faults and folds are shown on geologic maps in Mioccene volcanic rocks of the region surrounding the Pinto fault (Gulick, 1990 #5561; Gulick and Korosec, 1990 #5668; Stoffel and others, 1991 #5667). In general, however, faults and folds are relatively sparse in this area and their tectonic significance is not well known (Geomatrix Consultants Inc., 1990 #5550).
Length (km)	10 km.
Average strike	N60°E
Sense of movement	Normal *Comments:* The sense of movement along the fault strands of the Pinto fault is not definitively known. Geomatrix Consultants Inc. (1990 #5550) state that the Pinto fault is a relatively short normal fault. On 1:100,000-scale geologic maps by Gulick (1990 #5561) and Gulick and Korosec (1990 #5668) the eastern and central strands are shown as down-to-the-north faults, whereas the western strand is shown as a down-to-the-south fault.
Dip Direction	N; S *Comments:* Dip measurements are not reported for the Pinto fault. On 1:100,000-scale geologic maps by Gulick (1990 #5561) and Gulick and Korosec (1990 #5668), the eastern and central strands are shown as down-to-the-north faults, whereas the western strand is shown as a down-to-the-south fault. These map relations and the relatively straight map traces of the fault strands may indicate that the eastern and central strands dip steeply north and the western strand dips steeply south.
Paleoseismology studies	
Geomorphic expression	Little has been reported on the geomorphic expression of the Pinto fault. Much of the fault appears to be confined to Miocene volcanic rocks in areas where Quaternary deposits are lacking (Gulick, 1990 #5561; Gulick

	and Korosec, 1990 #5668; Stoffel and others, 1991 #5667). Based on analysis of aerial photographs, Geomatrix Consultants Inc. (1990 #5550) report that the fault has poor geomorphic expression and does not appear to be expressed in flood deposits inferred to be about 13 ka in age, which locally overlie the fault.
Age of faulted surficial deposits	No definitive evidence for faulting of Quaternary deposits along the Pinto fault has been reported, however, geologic maps suggest that Quaternary deposits are absent along much of the fault trace (Gulick, 1990 #5561; Gulick and Korosec, 1990 #5668; Stoffel and others, 1991 #5667). Based on reconnaissance field studies and analysis of aerial photographs Geomatrix Consultants (1990 #5550) report that early Holocene (about 13 ka) deposits locally overlie the fault and are not faulted. On the 1:100,000-scale geologic map by Gulick and Korosec (1990 #5668), Quaternary alluvium is shown along the north side of the central fault strand; however, it is not known if this relation implies faulting of the alluvium or deposition of alluvium along the fault. The conclusions of Geomatrix Consultants Inc. (1990 #5550) suggest that they identified no evidence of deformation in Quaternary alluvium mapped along the fault by Gulick and Korosec (1990 #5668).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* No definitive evidence for Quaternary activity along the Pinto fault has been reported, and studies by Geomatrix Consultants Inc. (1990 #5550) suggest that the fault has not been active in about the last 13 k.y. Rogers and others (1996 #4191) show the Pinto fault on a map showing known and suspected faults with Quaternary displacement in the Pacific Northwest and they cite Reidel and others (1994 #3539) as the information source. Reidel and others (1994 #3539) similarly list the Pinto fault as one of several faults in the Columbia basin with suspected Pleistocene-Holocene activity and cite Geomatrix Consultants (1990 #5550) as the source of information. Based mostly on studies of aerial photographs, Geomatrix Consultants Inc. (1990 #5550) reported that the Pinto fault has poor geomorphic expression and does not appear to be expressed in late Quaternary deposits with an inferred age of about 13 ka. Geomatrix Consultants Inc. (1990 #5550) did not mention evidence for or against Quaternary faulting prior to about 13 ka. Quaternary alluvium is shown along and north of the central strand of the fault on a 1:100,000-scale geologic map by Gulick and Korosec (1990 #5668), however, it is not known if that relation implies that the alluvium is faulted or deposited along the fault.

Recurrence interval	*Comments:* No definitive evidence for Quaternary activity along the Pinto fault has been reported. If the fault has been active in the Quaternary, studies by Geomatrix Consultants Inc. (1990 #5550) suggest that the last event was prior to about 13 ka, which may indicate that the recurrence interval is also greater than about 13 k.y.
Slip-rate category	Less than 0.2 mm/yr *Comments:* No definitive evidence for Quaternary activity along the Pinto fault has been reported, but the lack of scarps in deposits estimated to be about 13 ka (Geomatrix Consultants Inc., 1990 #5550) may indicate relatively low rates for possible Quaternary slip.
Date and Compiler(s)	2016 David J. Lidke, U.S. Geological Survey Kathleen M. Haller, U.S. Geological Survey
References	#3513 Campbell, N.P., and Bentley, R.D., 1981, Late Quaternary deformation of the Toppenish Ridge uplift in south-central Washington: Geology, v. 9, p. 519–524. #5550 Geomatrix Consultants, Inc., 1990, Seismotectonic evaluation of the Walla Walla section of the Columbia Plateau geomorphic province for Grand Coulee, North, Dry Falls, Pinto, and O'Sullivan Dams; Soda Lake, north Scooteney, and south Scooteney dikes: Technical report to U.S. Department of the Interior, Bureau of Reclamation, Denver, Colorado, under Contract 6-CS-81-07310, April 1990, 129 p. #5561 Gulick, C.W., 1990, Geologic map of the Moses Lake 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open File Report 90-1, 9 p. pamphlet, 1 sheet, scale 1:100,000. #5668 Gulick, C.W., and Korosec, M.A., 1990, Geologic map of the Banks Lake 1:100,000 quadrangle, Washington: Washington Division of Geology and Earth Resources Open-File Report 90-6, 20 p. pamphlet, 1 sheet, scale 1:100,000. #5545 Reidel, S.P., 1984, The Saddle Mountains—The evolution of an anticline in the Yakima fold belt: American Journal of Science, v. 284, p. 942-978. #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. #5667 Stoffel, K.L., Joseph, N.L., Waggoner, S.Z., Gulick, C.W., Korosec, M.A., and Bunning, B.B., 1991, Geologic map of Washington-northeast quadrant: Washington Division of Geology and Earth Resources Geologic Map GM-39, 36 p. pamphlet, 2 sheets, scale 1:250,000. #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. #3514 West, M.W., Ashland, F.X., Busacca, A.J., Berger, G.W., and Shaffer, M.E., 1996, Late Quaternary deformation, Saddle Mountains anticline, south-central Washington: Geology, v. 24, no. 12, p. 1123-1126.