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Quaternary Fault and Fold Database of the United States

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Chemult graben fault system, Walker Rim section (Class A) No. 839b

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Synopsis	**General:** This north- and northeast-trending normal fault system forms the Chem graben in central Oregon, at the intersection of the northwestern Basin and Range the Cascade Range. The fault system is marked by prominent escarpments (Walk Rim) on upper Miocene to lower Pliocene volcanic rocks; much of the southern p the graben is covered with pyroclastic deposits of Holocene Mount Mazama. Fau the western section form small scarps on middle Pleistocene alluvial deposits alo Little Deschutes River, and perhaps on latest Pleistocene(?) glacial moraines that buried by Mazama pyroclastic debris south of Little Walker Mountain. No scarps Quaternary deposits have been described along faults in the Walker Rim section, forms the eastern margin of the graben. **Sections:** This fault has 2 sections. Following Geomatrix Consultants, Inc. (1995 #3593), the Chemult graben fault system is divided into a western section that co of the mostly east-down faults that bound the western margin of the graben, and t Walker Rim section that consists of the mostly west-down faults that bound the e

	margin of the graben. The primary structures in the latter section are associated w the Walker Rim fault zone.
Name comments	**General:** The Chemult graben fault system is composed of faults that bound the Chemult graben in central Oregon. Numerous authors use the names Chemult gra or fault zone and Walker Rim fault or fault zone for these structures (Higgins, 19 #3764; Sherrod and Pickthorn, 1989 #3599; Goles and Lambert, 1990 #3763; MacLeod and Sherrod, 1992 #3566, 1988; Pezzopane, 1993 #3544); Geomatrix Consultants, Inc. (1995 #3593) used the name Chemult Graben-Walker Rim fault Herein we informally include the primarily east-down faults that bound the weste margin of the graben in a western section, and the primarily west-down faults tha bound the eastern margin of the graben in the Walker Rim section. **Section:** This section includes the Walker Rim fault zone of Higgins (1973 #376 MacLeod and Sherrod (1988 #3770; 1992 #3566), Sherrod and Pickthorn (1989 #3599), and Pezzopane (1993 #3544), parts of the Sellers Creek fault zone of Gol and Lambert (1990 #3763), and the Walker Rim faults (eastern margin of Chemu graben) of Geomatrix Consultants, Inc. (1995 #3593). **Fault ID:** This group of structures consists of fault numbers 28 and 29 of Pezzop (1993 #3544) and fault numbers 51a and 51b of Geomatrix Consultants, Inc. (19 #3593). This section is fault number 51a of Geomatrix Consultants, Inc. (1995 #3
County(s) and State(s)	KLAMATH COUNTY, OREGON
Physiographic province(s)	COLUMBIA PLATEAU BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 and 1:250,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to 1:250,000-scale mapping of MacLeod and Sherrod (1992 #3566) and Sherrod and Pickthorn (1992 #3567), and Weldon and others (2002 #5648).
Geologic setting	This north and northeast trending, normal fault system forms the Chemult graben central Oregon, at the intersection of the northwestern Basin and Range and the Cascade Range. The fault is marked by prominent escarpments (Walker Rim) on Miocene to lower Pliocene volcanic rocks; much of the southern part of the grabe covered with pyroclastic deposits of Holocene Mount Mazama (Sherrod and Smi 1989 #3498; Walker and MacLeod, 1991 #3646; MacLeod and Sherrod, 1992 #3 Sherrod and Smith, 2000 #5165).

Length (km)	This section is 97 km of a total fault length of 97 km.
Average strike	N1°E (for section) versus N7°E (for whole fault)
Sense of movement	Normal *Comments:* Faults in this section are mapped as normal or high-angle faults by W and MacLeod (1991 #3646), MacLeod and Sherrod (1992 #3566), Pezzopane (19 #3544), Bacon and others (1997 #3516), and Sherrod and Smith (2000 #5165).
Dip Direction	W; E *Comments:* No structural data on the dip of these faults have been published, but Sherrod and Pickthorn (1989 #3599) estimated dips of 60° on the Chemult graben faults, and Geomatrix Consultants, Inc. (1995 #3593) used an estimated dip of 70 their modeling of earthquake potential of the Chemult graben fault system.
Paleoseismology studies	
Geomorphic expression	The most prominent structure in this section, the range-bounding Walker Rim fau zone, is coincident with a prominent 300-m-high escarpment (Walker Rim) on up Miocene to lower Pliocene volcanic rocks. Further south, the section bifurcates in predominantly down-west faults bounding lower bedrock escarpments (<100 m h all of the escarpments are partially buried by pyroclastic debris from the Mount Mazama eruptions. No fault scarps on Quaternary deposits have been described a the faults in this section. These faults appear to be less active than faults in the we section (MacLeod and Sherrod, 1992 #3566; Pezzopane, 1993 #3544; Geomatrix Consultants Inc., 1995 #3593; Ake and others, 2001 #5035). Weldon and others (#5648) map lineaments across Quaternary deposits based on interpretation of 1:100,000-scale DEMs of the area.
Age of faulted surficial deposits	Faults in the Walker Rim section offset lava flows as young as 2.33±0.09 Ma (She and Pickthorn, 1989 #3599; Sherrod and others, 2002 #5169). No fault scarps on Quaternary deposits have been described along faults included in this section.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Most faults in this section are classified as active in the Quaternary (< 1.8 Ma) by Pezzopane (1993 #3544) and subsequent compilations (Geomatrix Consultants Inc., 1995 #3593; Madin and Mabey, 1996 #3575). Pezzopane (1993 #3544) used geomorphic and airphoto analysis to infer middle and late Quaternar (<780 ka) movement on a few of the faults in the Walker Rim section. Weldon an

	others (2002 #5648) map most of these faults as active in the middle and late Quaternary (<780 ka) and some as active in the late Quaternary (<120 ka).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low rates of long-term slip are suggested by 300-m-high escarpment 4.5–7 Ma volcanic rocks. Geomatrix Consultants, Inc. (1995 #3593) cited the poo geomorphic expression of faults along the section to infer a range in slip rates of (0.1 mm/yr in their analysis of earthquake hazards along the Walker Rim section. Pezzopane (1993 #3544) inferred an average slip rate of about 0.5–1 mm/yr acros Chemult graben, although this slip must be accommodated on many faults. Ake a others (2001 #5035) used the subdued geomorphic development to conclude that rates across the fault zone are probably <0.1 mm/yr.
Date and Compiler(s)	2016 Stephen F. Personius, U.S. Geological Survey
References	#5035 Ake, J., LaForge, R., and Hawkins, F., 2001, Probabilistic seismic hazard analysis for Wickiup Dam—Deschutes project, central Oregon: U.S. Bureau of Reclamation Seismotectonic Report 2000-04, 71 p. #3516 Bacon, C.R., Mastin, L.G., Scott, K.M., and Nathenson, M., 1997, Volcano earthquake hazards in the Crater Lake region, Oregon: U.S. Geological Survey O File Report 97-487, 30 p., 1 pl., scale 1:100,000. #3593 Geomatrix Consultants, Inc., 1995, Seismic design mapping, State of Oreg Technical report to Oregon Department of Transportation, Salem, Oregon, under Contract 11688, January 1995, unpaginated, 5 pls., scale 1:1,250,000. #3763 Goles, G., and Lambert, R.S.J., 1990, A strontium isotopic study of Newbe volcano, central Oregon—Structural and thermal implications: Journal of Volcano and Geothermal Research, v. 43, p. 159-174. #3764 Higgins, M.W., 1973, Petrology of Newberry Volcano, central Oregon: Geological Society of America Bulletin, v. 84, p. 455-488. #3770 MacLeod, N.S., and Sherrod, D.R., 1988, Geologic evidence for a magma chamber beneath Newberry Volcano, Oregon: Journal of Geophysical Research, v no. B9, p. 10,067-10,079. #3566 MacLeod, N.S., and Sherrod, D.R., 1992, Reconnaissance geologic map o west half of the Crescent 1° by 2° quadrangle, central Oregon: U.S. Geological S

Miscellaneous Investigations Map I-2215, 1 sheet, scale 1:250,000.

#3575 Madin, I.P., and Mabey, M.A., 1996, Earthquake hazard maps for Oregon: of Oregon, Department of Geology and Mineral Industries Geological Map Serie GMS-100, 1 sheet.

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

#3567 Sherrod, D.R., and Pickthorn, L.B.G., 1992, Geologic map of the west hal the Klamath Falls 1° by 2° quadrangle, south-central Oregon: U.S. Geological Su Miscellaneous Investigations Map I-2182, 1 sheet, scale 1:250,000.

#3599 Sherrod, D.R., and Pickthorn, L.G., 1989, Some notes on the Neogene stru evolution of the Cascade Range in Oregon, *in* Muffler, P.L.J., Weaver, C.S., and Blackwell, D.D., eds., Geological, geophysical, and tectonic setting of the Cascac Range: U.S. Geological Survey Open-File Report 89-178, p. 351-368.

#3498 Sherrod, D.R., and Smith, J.G., 1989, Preliminary map of upper Eocene to Holocene volcanic and related rocks of the Cascade Range, Oregon: U.S. Geolog Survey Open-File Report 89-14, 20 p., 1 pl., scale 1:500,000.

#5165 Sherrod, D.R., and Smith, J.G., 2000, Geologic map of upper Eocene to Holocene volcanic and related rocks of the Cascade Range, Oregon: U.S. Geolog Survey Geologic Investigations Map I-2569, 2 sheets, scale 1:500,000.

#5169 Sherrod, D.R., Gannett, M.W., and Lite, K.E., Jr., 2002, Hydrogeology of t upper Deschutes basin, central Oregon—A young basin adjacent to the Cascade volcanic arc, *in* Moore, G.W., ed., Field guide to geologic processes in Cascadia: of Oregon, Department of Geology and Mineral Industries Special Paper 36, p. 1(144.

#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.

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

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