Jump to Navigation

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West Grande Ronde Valley fault zone, Mount Emily section (Class A) No. 802a

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Synopsis	**General:** The West Grande Ronde Valley fault forms the western margin of a larg graben system that confines the Grande Ronde Valley in northeastern Oregon. Th graben is formed in Miocene and Pliocene volcanic rocks, and is floored by a thic sequence of Neogene and Quaternary alluvial sediments. The Grande Ronde Vall may be a pull apart basin related to displacement along a regional scale right-late strike-slip fault system. The West Grande Ronde Valley fault zone is divided into sections herein; from north to south, these are the Mount Emily, La Grande, and C Mountain sections. All of these sections form steep, en echelon range fronts, whi intermittently marked by tonal contrasts, linear depressions, range front facets, sp and scarps. Most fault studies in the region infer late Pleistocene and perhaps Hol displacement on the Mount Emily and La Grande sections, and somewhat older l Quaternary displacement on the Craig Mountain section.

	Sections: This fault has 3 sections. The West Grande Ronde Valley fault zone is divided into three sections herein, slightly modified from the divisions of Simpso others (1993 #3596); from north to south, these are the Mount Emily section, the Grande section, and the Craig Mountain section.
Name comments	**General:** The fault zone along the western margin of the Grande Ronde Valley w originally mapped by Hampton and Brown (1964 #3491), and later summarized b Walker (1979 #3576). Parts of the fault zone north of La Grande were named the Ruckel Ridge and Indian Rock faults (Kienle and others, 1979 #3728); faults nea Grande were named the Mount Emily, La Grande, Foothill Road, and Hot Lake fa (Barrash and others, 1980 #3570), and the La Grande fault (Geomatrix Consultan Inc., 1989 #1310). The fault traces included herein were informally grouped as th West Grande Ronde Valley fault by Simpson and others (1993 #3596). Faults alo west side of the Grande Ronde Valley have been included in numerous reconnais Quaternary fault investigations and compilations (Kienle and others, 1979 #3728 Army Corps of Engineers, 1983 #3480; Geomatrix Consultants Inc., 1989 #1310 and others, 1990 #3733; Pezzopane and Weldon, 1993 #149; Pezzopane, 1993 #3 Simpson and others, 1993 #3596; 1995 #3593; Madin and Mabey, 1996 #3575; Personius, 1998 #3508; Wood, 1999 #4042). **Section:** This section includes the Thimbleberry and Mount Emily segments of th West Grande Ronde Valley fault zone of Simpson and others (1993 #3596). Previ named faults in this section include the Ruckel Ridge and Indian Rock faults of K and others (1979 #3728) the Mount Emily fault of Barrash and others (1980 #357 and the Owlsey Canyon fault of Ferns and Madin (1999 #5160). **Fault ID:** This structure is part of fault number 13 of Pezzopane (1993 #3544) an fault number 68a of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	UNION COUNTY, OREGON
Physiographic province(s)	COLUMBIA PLATEAU
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Location of fault from ORActiveFaults (http://www.oregongeology.org/arcgis/rest/services/Public/ORActiveFaults/MapS downloaded 06/02/2016) attributed to 1:100,000-scale compilation of Ferns and c (2001 #5135).
Geologic setting	The West Grande Ronde Valley fault zone forms the western margin of a large gr system that forms the Grande Ronde Valley. The graben is formed in volcanic roc the Miocene Columbia River Group and the Mio-Pliocene Powder River volcanic

	and is floored by a thick sequence of Neogene and Quaternary alluvial sediments (Hampton and Brown, 1964 #3491; Walker, 1979 #3576; Barrash and others, 198 #3570; Ferns and Madin, 1999 #5160, Ferns, 2001 #5135; Van Tassell and others 2000 #5166). Numerous northwest-trending faults are present throughout the regi some workers attribute graben formation to a pull apart basin related to displacem along a regional scale right-lateral strike-slip fault system (Gehrels and others, 19 #3774). However, no evidence of significant lateral displacement in the Quaterna been found along the West Grande Ronde Valley fault zone (Ferns and Madin, 19 #5160).
Length (km)	This section is 29 km of a total fault length of 48 km.
Average strike	N2°W (for section) versus N19°W (for whole fault)
Sense of movement	Normal, Right lateral *Comments:* Faults in this section are mapped as a normal or high-angle faults (Hampton and Brown, 1964 #3491; Walker, 1979 #3576; Barrash and others, 198 #3570; Walker and MacLeod, 1991 #3646; Pezzopane, 1993 #3544; Simpson and others, 1993 #3596; Ferns and Madin, 1999 #5160; Ferns and others, 2001 #5135 Some workers attribute formation of the Grande Ronde graben to a pull apart bas related to displacement along a regional scale right-lateral strike-slip fault system horizontal striations have been observed on some faults in the area (Gehrels and 1980 #3774). However, no evidence of significant lateral displacement in the Quaternary has been found along the West Grande Ronde Valley fault zone (Fern Madin, 1999 #5160).
Dip Direction	E *Comments:* No dip measurements have been published, but Ferns and Madin (19 #5160) used mapped outcrop patterns to estimate dips of 60–70° on the Mount Er section. Simpson and others (1993 #3596) and Geomatrix Consultants, Inc. (1995 #3593) modeled the West Grande Ronde Valley fault as a 70° dipping normal fau their analyses of paleo-earthquake magnitudes. These values are substantiated by of 68–70° that can be estimated from the interception depth of the Hot Lake fault geothermal test well (Barrash and others, 1980 #3570) along the Craig Mountain section [#802c].
Paleoseismology studies	
Geomorphic expression	The Mount Emily section forms a steep, en echelon range front, from the vicinity Thimbleberry Mountain on the north to the mouth of the Grande Ronde River car north of La Grande. Simpson and others (1993 #3596) described the fault as intermittently marked by tonal contrasts, linear depressions, range front facets, ar

	scarps, and a geomorphic expression that suggested a lower rate of activity than t Grande section. However, Ferns and Madin (1999 #5160) and Ferns and others (2 #5135) describe much of the fault section as marked by pronounced scarps where little colluvial material has been deposited, and abrupt topographic inflections at t fault zone.
Age of faulted surficial deposits	Faults in the Mount Emily section offset volcanic rocks of the Miocene Columbia River Group and Mio-Pliocene Powder River volcanic field, and also offset Quat surficial deposits (Ferns and Madin, 1999 #5160; Ferns and others, 2001 #5135). Simpson and others (1993 #3596) could not clearly demonstrate offsets in Quater surficial deposits (Simpson and others, 1993 #3596), but Ferns and Madin (1999 #5160) and Ferns and others (2001 #5135) map faults in Quaternary deposits and describe geomorphic evidence of Holocene displacement.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Simpson and others (1993 #3596) did not find evidence of repeated la Quaternary displacement on the Mount Emily section. Pezzopane (1993 #3544) a Geomatrix Consultants, Inc. (1995 #3593) infer middle and late Quaternary displacement on this part of the West Grande Ronde Valley fault zone. Recent det mapping by Ferns and Madin (1999 #5160) revealed geomorphic evidence of Holocene displacement on the southern half of the section; Weldon and others (20 #5648) also infer latest Quaternary displacement on this part of the section.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Several vertical displacement estimates across the fault zone suggest rates of long-term slip. Such estimates include vertical offset of Miocene Columb River basalts of about 1000 m near Mount Emily (Hampton and Brown, 1964 #3 Simpson and others, 1993 #3596), and more than 1000 m of vertical displacemen the 13.4 Ma dacite of Mount Emily (Ferns and Madin, 1999 #5160). Geomatrix Consultants, Inc. (1995 #3593) use offset data from Simpson and others (1993 #3 to estimate displacement rates of 0.01–0.05 mm/yr for all of the West Grande Ron Valley fault zone. Rates may be higher than those estimated by Geomatrix Consu Inc. (1995 #3593) because Van Tassell and others (2000 #5161) used regional ma and well data to calculate a subsidence rate of 0.2 mm/yr for the last 9 Ma for the southwestern part of the La Grande basin.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey

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References	#3570 Barrash, W., Bond, J.G., Kauffman, J.D., and Venkatakrishnan, R., 1980, Geology of the La Grande Area, Oregon: State of Oregon, Department of Geolog Mineral Industries Special Paper 6, 47 p., 5 pls., scale 1:24,000. #5160 Ferns, M.L., and Madin, I.P., 1999, Geologic map of the Summerville quadrangle, Union County, Oregon: State of Oregon, Department of Geology and Mineral Industries Geologic Map Series GMS-111, 23 p. pamphlet, 1 sheet, scale 1:24,000. #5135 Ferns, M.L., Madin, I.P., and Taubeneck, W.H., 2001, Reconnaissance geo map of the La Grande 30' x 60' quadrangle, Baker, Grant, Umatilla, and Union Counties, Oregon: State of Oregon, Department of Geology and Mineral Industri Reconnaissance Map Series RMS-1, 1 pl., scale 1:100,000. #3774 Gehrels, G.E., White, R.R., and David, G.A., 1980, The La Grande pull-ap basin, northeastern Oregon: Geological Society of America Abstracts with Progra v. 12, no. 3, p. 107. #1310 Geomatrix Consultants, Inc., 1989, Final report seismotectonic evaluation Mann Creek Dam site and Mason Dam site: Technical report to U.S. Department Interior, Bureau of Reclamation, Denver, Colorado, under Contract 6-CS-81-073 October 1989, 118 p., 2 pls. #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. #3491 Hampton, E.R., and Brown, S.G., 1964, Geology and ground-water resour the Upper Grande Ronde River Basin Union County, Oregon: U.S. Geological Su Water-Supply Paper 1597, 99 p., 6 pls. #3728 Kienle, C.F., Jr., Hamill, M.L., and Clayton, D.N., 1979, Geologic reconnaissance of the Wallula Gap, Washington-Blue Mountains-LaGrande, Oreg region: Technical report to Shannon & Wilson, Inc., Portland, Oregon, under Con 44013, December 1979, 58 p., 1 pl., scale 1:125,000. #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. #3508 Personius, S.F., 1998, Surficial geology and neotectonics of selected areas western Idaho and northeastern Oregon: U.S. Geological Survey Open-File Repo 771, 25 p.

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

#149 Pezzopane, S.K., and Weldon, R.J., II, 1993, Tectonic role of active faulting
central Oregon: Tectonics, v. 12, p. 1140-1169.

#3733 Piety, L.A., LaForge, R.C., and Foley, L.L., 1990, Seismic sources and
maximum credible earthquakes for Cold Springs and McKay Dams, Umatilla Pro
north-central Oregon: U.S. Bureau of Reclamation Seismotectonic Report 90-1, 6
1 pl.

#3596 Simpson, G.D., Hemphill-Haley, M.A., Wong, I.G., Bott, J.D.J., Silva, W.J
Lettis, W.R., 1993, Seismotectonic evaluation, Burnt River Project Unity Dam, B
Project Thief Valley Dam, northeastern Oregon: Final Report prepared for U.S.
Department of the Interior, Bureau of Reclamation, 167 p., 2 pls.

#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 Engir
Portland District, 66 p., 19 pls.

#5161 Van Tassell, J., Ferns, M.L., and McConnell, V.S., 2000, Neogene sedimer
accumulation and subsidence rates, La Grande basin, northeast Oregon: Geologic
Society of America Abstracts with Programs, v. 32, no. 6, p. A-73-A-74.

#5166 Van Tassell, J., Ferns, M., McConnell, V., and Smith, G.R., 2001, The mid
Pliocene Imbler fish fossils, Grande Ronde Valley, Union County, Oregon, and th
connection between Lake Idaho and the Columbia River: Oregon Geology, v. 63,
p. 77-96.

#3576 Walker, G.W., 1979, Reconnaissance geologic map of the Oregon part of t
Grangeville quadrangle, Baker, Union, Umatilla, and Wallowa Counties, Oregon:
Geological Survey Miscellaneous Investigations Map I-1116, 1 sheet, scale 1:250

#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.

#4042 Wood, S.H., 1999, Quaternary faulting in southwest Idaho and adjacent Or
in Quaternary geology of the northern Quinn River and Alvord Valleys, southeast
Oregon: Friends of the Pleistocene field trip guide, September 24-26, 1999, Appe

	9, p. 1-5.