

# 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](#).

## Red Hills fault, southern section (Class A) No. 2087b

Last Review Date: 2016-01-26

## Compiled in cooperation with the New Mexico Bureau of Geology & Mineral Resources

*citation for this record:* Machette, M.N., and Jochems, A.P., compilers, 2016, Fault number 2087b, Red Hills fault, southern section, 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 02:22 PM.

### Synopsis

**General:** This normal fault bounds Precambrian, Paleozoic, and Tertiary rocks that are uplifted in a north-trending horst, southwest of the Caballo Mountains block. The fault forms part of the eastern margin of the Palomas Basin, an eastward-tilted, sediment-filled half-graben. The Red Hills fault joins the Caballo fault [2088] on the north and appears to abut or project to the Derry fault [2086] on the south. These three faults form the western, tectonically active margin of the Caballo uplift (Caballo Mountains, Red Hills, Derry Hills, Round Mountain, and Red House Mountain). Quaternary deposits of the Camp Rice

	<p>Formation and middle to late Pleistocene piedmont-slope deposits are offset along almost the entire length of the Red Hills fault. However, no detailed studies have addressed the fault's Quaternary history.</p> <p><b>Sections:</b> This fault has 2 sections. These sections are based on the aforementioned character of the fault. Section boundary placed in southwest corner of Sec. 4, T. 17 S., R. 4 W. (Garfield 7.5-minute quadrangle).</p>
<p><b>Name comments</b></p>	<p><b>General:</b> Named by Kelley and Silver (1952 #1072) for the Red Hills, a horst block southeast of Caballo Dam and southwest of the Caballo Mountains. The fault extends from Caballo Creek (about 3 km east of Caballo Dam) where it joins the Caballo fault [2088], southwest and south to a point about 4 km east of Derry, New Mexico, where it projects to or abuts the Derry fault [2086].</p> <p><b>Section:</b> The section extends from the southwest corner of Sec. 4, T. 17 S., R. 4 W. (Garfield 7.5-minute quadrangle), at a point about 2.5 km north of the mouth of Green Canyon, south to a point about 4 km east of Derry, New Mexico, where it projects to or abuts the Derry fault [2086]. Seager and Mack (1998 #1258) label the southernmost part of the fault as the Nakaye fault; the southern splay is considered part of the Red Hills fault by Seager and Mack (2003 #7347). The northern boundary of the section is based on the geology of hanging-wall deposits and footwall structure. Seager and others (1982 #626) and Seager and Mack (1991 #1263; 1998 #1258) showed primarily older sediment of the Camp Rice Formation against bedrock along this section.</p> <p><b>Fault ID:</b> Referred to as fault 10 in Machette (1987 #960).</p>
<p><b>County(s) and State(s)</b></p>	<p>SIERRA COUNTY, NEW MEXICO</p>
<p><b>Physiographic province(s)</b></p>	<p>BASIN AND RANGE</p>
<p><b>Reliability of location</b></p>	<p>Good Compiled at 1:24,000 scale.</p> <p><i>Comments:</i> The location of the fault is from 1:24,000-scale maps of Seager and Mack (1991 #1263; 1998 #1258) combined with accurate placement using photogrammetric methods. The geologic map of Kelley and Silver (1952 #1072) shows the Red Hills fault extending south to a termination against the Woolfer</p>

	fault [now referred to as the Derry fault, 2087].
<b>Geologic setting</b>	This down-to-the-west normal fault bounds Precambrian, Paleozoic, and Tertiary rocks that are uplifted in a north-trending horst southeast of the Caballo Mountains block. The fault forms part of the eastern margin of the Palomas Basin, an eastward-tilted, sediment-filled half-graben. The fault was probably initiated in the Miocene; it cuts Tertiary and Quaternary deposits of the Santa Fe Group, sediment of the Palomas Formation (largely equivalent to the Pliocene to Pleistocene Camp Rice Formation to the south), and locally derived piedmont-slope deposits of middle to late Quaternary age. The fault changes character at its approximate mid-point: to the north, it places piedmont-slope deposits against bedrock and to the south the hanging wall is comprised mainly of sediment of the Palomas Formation. Also, this point marks a prominent southward bifurcation in the fault, with some strands trending southeast into Paleozoic bedrock. The point at which this change in character occurs may reflect long-term differences in slip rate, and may prove to be a fault segment boundary. However, no detailed studies have been made of the fault's scarp morphology or its Quaternary history to warrant such a segmentation model.
<b>Length (km)</b>	This section is 5 km of a total fault length of 14 km.
<b>Average strike</b>	N20°W (for section) versus N7°W (for whole fault)
<b>Sense of movement</b>	Normal  <i>Comments:</i> Kelley and Silver (1952 #1072) considered the fault to be normal dip slip.
<b>Dip Direction</b>	W  <i>Comments:</i> Kelley and Silver (1952 #1072) show the fault as having a high-angle dip on their cross sections E and F.
<b>Paleoseismology studies</b>	
<b>Geomorphic expression</b>	The Red Hills fault forms a prominent west-facing topographic escarpment, most of which is a fault-line scarp on Paleozoic rocks exposed in the hanging-wall block. Along this section, the fault trends south and has several splays that extend into bedrock of the footwall block. Only the most basinward (main) trace is known to

	<p>be Quaternary. The fault places sediment of the Camp Rice Formation against Paleozoic bedrock, but further south it is entirely within bedrock. No detailed studies have been made of the fault's scarp morphology or Quaternary history.</p>
<b>Age of faulted surficial deposits</b>	<p>Most facies of the Camp Rice Formation (Pliocene to early or middle (?) Pleistocene) are faulted against bedrock. Detailed mapping by Seager and Mack (1991 #1263; 1998 #1258) indicates that their unit Qvo (late Pleistocene piedmont-slope deposits) is not displaced by the fault along this section.</p>
<b>Historic earthquake</b>	
<b>Most recent prehistoric deformation</b>	<p>middle and late Quaternary (&lt;750 ka)</p> <p><i>Comments:</i> Timing based on offset of sediment of the Camp Rice Formation and no observed offset of unit Qvo of Seager and others (1982 #626).</p>
<b>Recurrence interval</b>	
<b>Slip-rate category</b>	<p>Less than 0.2 mm/yr</p> <p><i>Comments:</i> The amount of offset in sediment of the Camp Rice Formation cannot be determined because these deposits are only present on the hanging-wall block of the fault. However, based on comparisons with the Caballo fault [2088] and other associated faults in the region, this section of the Red Hills fault probably has a low slip rate (&lt;0.2 mm/yr).</p>
<b>Date and Compiler(s)</b>	<p>2016</p> <p>Michael N. Machette, U.S. Geological Survey, Retired Andrew P. Jochems, New Mexico Bureau of Geology &amp; Mineral Resources</p>
<b>References</b>	<p>#1072 Kelley, V.C., and Silver, C., 1952, Geology of the Caballo Mountains: University of New Mexico Publications in Geology 4, 286 p., 9 pls.</p> <p>#960 Machette, M.N., 1987, Preliminary assessment of Quaternary faulting near Truth or Consequences, New Mexico: U.S. Geological Survey Open-File Report 87-652, 40 p.</p> <p>#1263 Seager, W.R., and Mack, G.H., 1991, Geology of Garfield</p>

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#1258 Seager, W.R., and Mack, G.H., 1998, Geology of McLeod Tank quadrangle, Sierra and Doña Ana Counties, New Mexico: New Mexico Bureau of Mines and Mineral Resources Geologic Map 77, 2 sheets, scale 1:24,000.

#7347 Seager, W.R., and Mack, G.H., 2003, Geology of the Caballo Mountains, New Mexico: New Mexico Bureau of Geology and Mineral Resources Memoir 49, 136 p.

#626 Seager, W.R., Clemons, R.E., Hawley, J.W., and Kelley, R.E., 1982, Geology of northwest part of Las Cruces 1° x 2° sheet, New Mexico: New Mexico Bureau of Mines and Mineral Resources Geologic Map 53, 3 sheets, scale 1:125,000.

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