GSA DR Item **2013139** accompanies Koning, D.J., Grauch, V.J.S., Connell, S.D., Ferguson, J., McIntosh, W., Slate, J.L., Wan, E., and Baldridge, W.S., 2013, Structure and tectonic evolution of the eastern Española Basin, Rio Grande rift, north-central New Mexico, *in* Hudson, M.R., and Grauch, V.J.S., eds., New Perspectives on Rio Grande Rift Basins: From Tectonics to Groundwater: Geological Society of America Special Paper 494, p. 185–219, https://doi.org/10.1130/2013.2494(08).

APPENDIX D. EXPLANATION OF FOUR KEY ASH CORRELATIONS BETWEEN STRATIGRAPHIC SECTIONS SOUTH OF THE SANTA CRUZ RIVER AND WEST OF THE SANTA CLARA FAULT

In the following, we justify correlations of four key tephra beds between the Arroyo Seco stratigraphic sections in the eastern Española Basin and the Rio del Oso stratigraphic sections on the immediate footwall of the Santa Clara fault. These tephra correlations are based largely on tephrochronology and relative stratigraphic positions of the tephras. The correlations allow thickness comparisons of tephra-bounded stratums between the footwall and hanging wall of the Santa Clara and North Pajarito fault, which is used in the our interpretation of the tectonic history of this structure (via the hanging wall-normalized thickening index).

The stratigraphically lowest correlated ash, the No. 2 white ash of the Skull Ridge Member (Galusha and Blick, 1971), is represented by sample EB-ASH-2(3) in the West Arroyo Seco hanging wall section (Figure D-1). Here, two to three gray, fine ashes are found within 10 m above the No. 2 white ash bed (see also Appendix E and Galusha and Blick, 1971, fig. 17) and are associated with early Barstovian faunal remains (Tedford and Barghoorn, 1993). In the Rio del Oso area to the west, a fine, white ash bed (samples OC-186-011004-djk and OC-168-280904-djk in Figure D-1) is overlain by a fine, gray ash (3 m stratigraphic distance) and is probably also associated with early Barstovian fauna (based on Tedford and Barghoorn, 1993, fig. 2). This led us to hypothesize that this set of white and gray ashes is correlative between the two areas, an inference that is consistent with the similar overall composition of these samples (Slate et al., 2013, tables 4 and 5).

In both the Arroyo Seco and Rio del Oso sections, a fine, white ash lies 17–18 m above the No. 2 white ash bed and its interpreted western equivalent. This ash was sampled in the Arroyo Seco area (sample EB-ASF-WA3) and in the basal Rio del Oso section (sample OC-187-011004-djk; Figure D-1). Correlation of this particular ash bed is supported by similarities in overall composition between these samples (Slate et al., 2013, tables 4 and 5) as well as their similar stratigraphic position above the No. 2 white ash bed. In the Arroyo Seco area, this ash is referred to as the No. 3 white ash bed of the Skull Ridge Member (Galusha and Blick, 1971).

One fine, gray ash seems to correlate between the West Arroyo Seco hanging-wall section (EB-ASH-26) and the lower Rio del Oso section (RDO-091106f). These two samples are both polymodal, and their compositions appear to encompass the same range of composition (Slate et al., 2013, tables 4 and 5). A roughly similar stratigraphic position relative to the No. 2 and No. 4 white ashes (the latter discussed below) is consistent with this interpretation.

The No. 4 white ash bed of the Skull Ridge Member (Galusha and Blick, 1971) is found at the top of the Arroyo Seco hanging-wall section (sample EB-ASH-WA4). This sample is interpreted to correlate to a sample near the top of the lower Rio del Oso section (RDO-091106a). These two samples are similar in overall chemical composition, though EB-ASH-WA4 contains somewhat more Fe_2O_3 than RDO-091106a (Slate et al., 2013, tables 4 and 5). The alkalis are also somewhat different in the two samples, but these can differ in the same tephra layer owing to differential leaching of these elements in the volcanic glass.

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Galusha, T., and Blick, J.C., 1971, Stratigraphy of the Santa Fe Group, New Mexico: Bulletin of the American Museum of Natural History, v. 144, 127 p.

Slate, J.L., Sarna-Wojcicki, A.M., Koning, D.J., Wan, E., Wahl, D.B., Connell, S.D., and Perkins, M.E., 2013, Upper Neogene tephrochronologic correlations of the Española Basin and Jemez Mountains volcanic field, northern Rio Grande rift, north-central New Mexico, in Hudson, M.R., and Grauch, V.J.S., eds., New Perspectives on Rio Grande Rift Basins: From Tectonics to Groundwater: Geological Society of America Special Paper 494, p. 303–322, doi:10.1130/2012.2494(12).

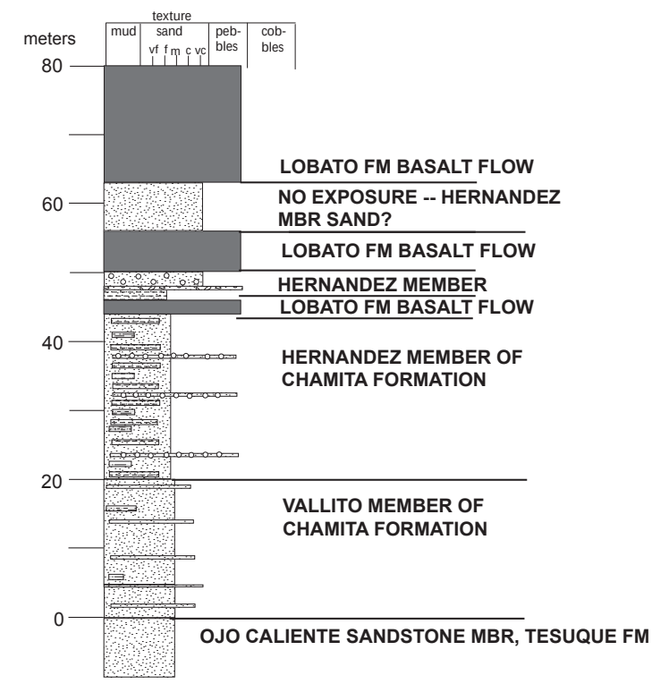
Tedford, R.H., and Barghoorn, S.F., 1993, Neogene stratigraphy and mammalian biochronology of the Española Basin, northern New Mexico: Vertebrate paleontology in New Mexico, New Mexico Museum of Natural History and Science, Bulletin 2, p. 159-168.

Stratigraphic fence diagrams for sections south of Santa Cruz River and west of Santa Clara fault (10-16 Ma strata)

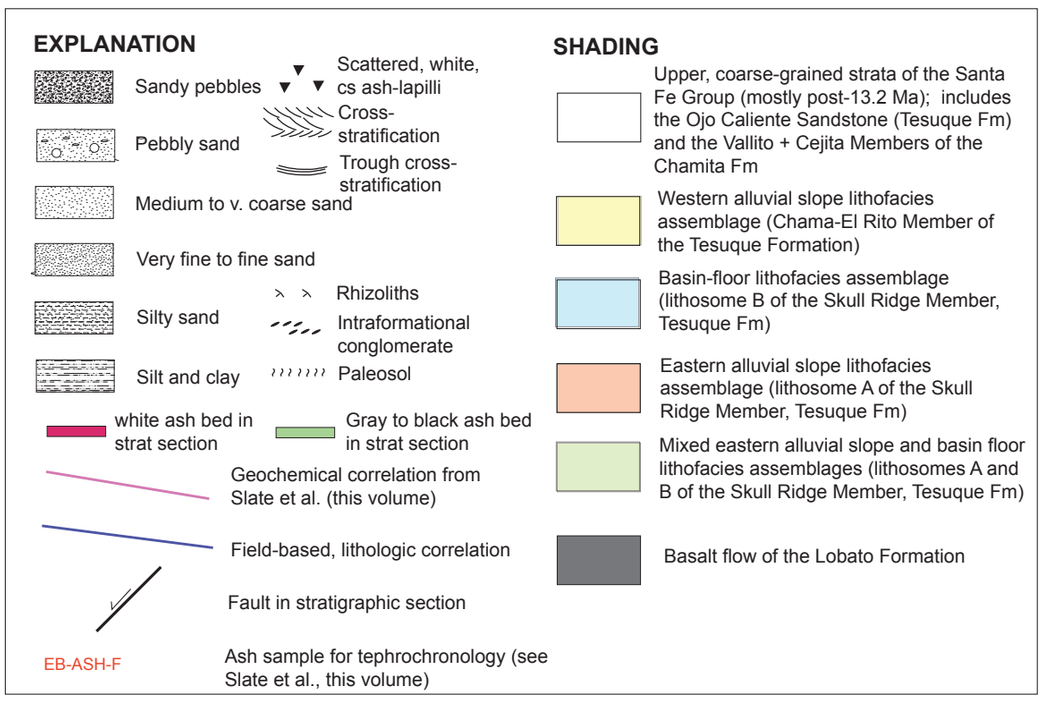
East

West

RIO DEL OSO HANGING WALL SECTION



Note: Thickness of Ojo Caliente Sandstone between the West Chili and RDO-HW section is 170-220 m (using geologic map relations and attitudes of Koning et al., 2005)



Notes:

Locations of sections shown on Figure 8 and Plate 1. Detailed descriptions are presented in Appendix E.

Abbreviations: Fm = Formation; Mbr = Member.

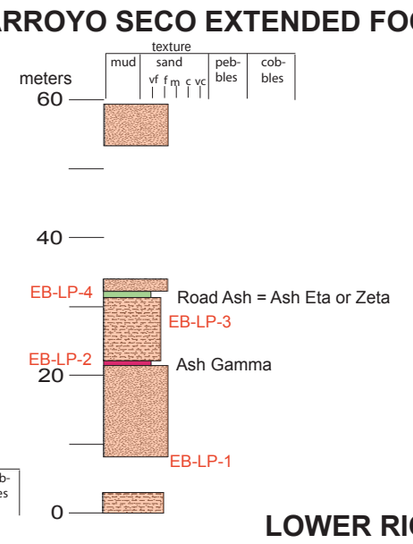
Tephra nomenclature for the West Arroyo Seco fault stratigraphic sections follows that of Galusha and Blick (1971).

References:

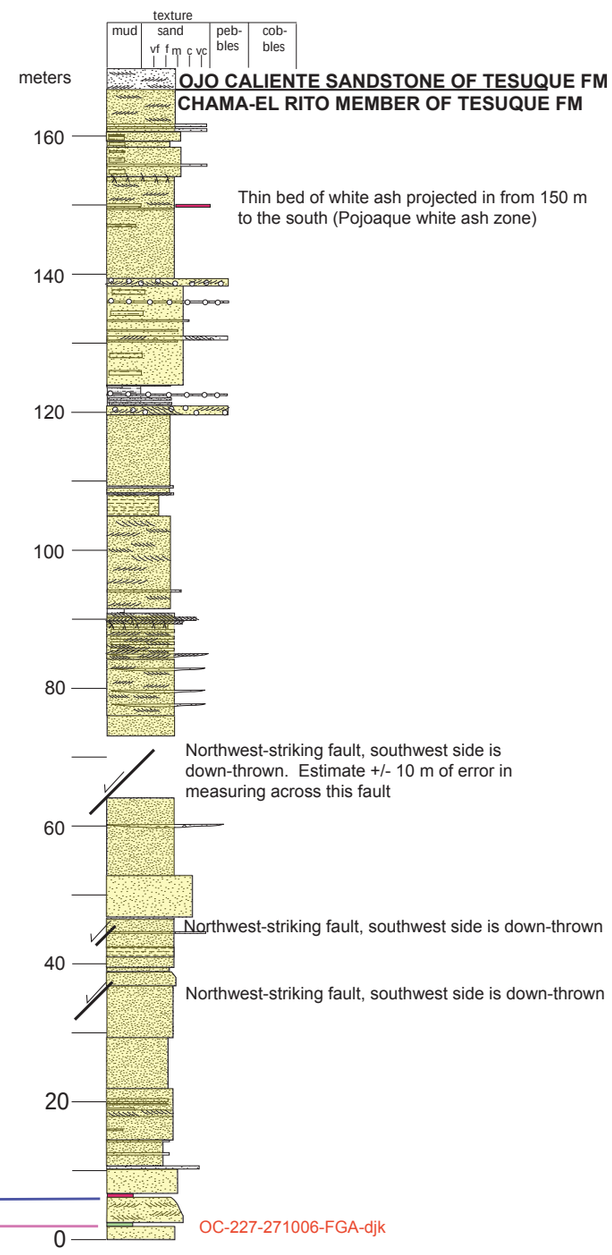
Galusha, T., and Blick, J.C., 1971, Stratigraphy of the Santa Fe Group, New Mexico: Bulletin of the American Museum of Natural History, v. 144, 127 p.

Koning, D.J., Skotnicki, S., Moore, J., and Kelley, S., 2005, Geologic map of the Chili 7.5-minute quadrangle, Rio Arriba county, New Mexico: New Mexico Bureau of Geology and Mineral Resources, Open-file Geologic Map OF-GM-81, scale 1:24,000.

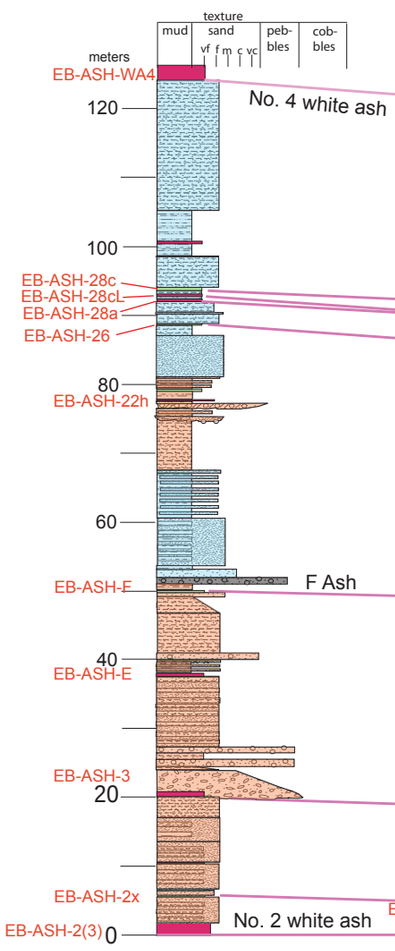
WEST ARROYO SECO EXTENDED FOOTWALL SECTION



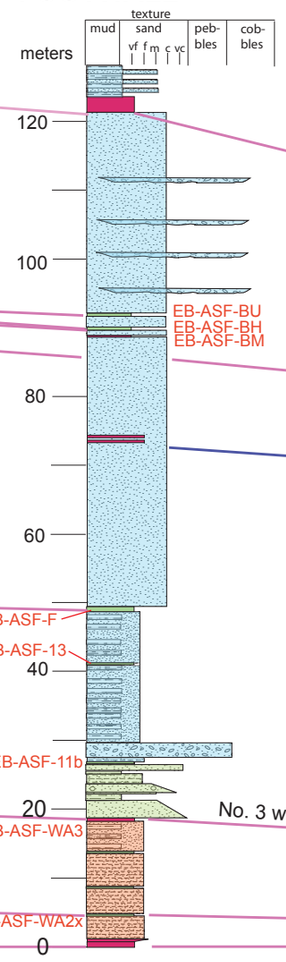
UPPER RIO DEL OSO SECTION



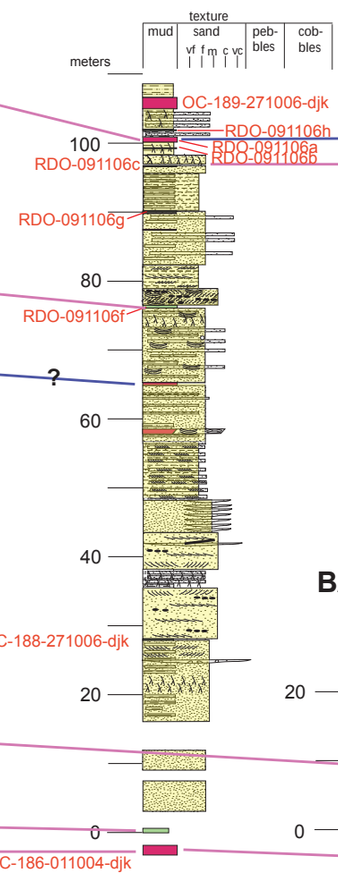
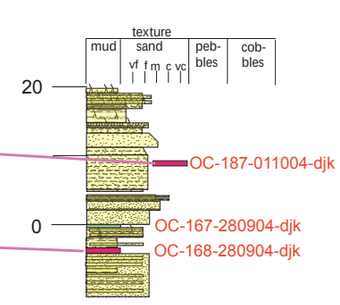
WEST ARROYO SECO HANGING WALL



WEST ARROYO SECO FOOTWALL



LOWER RIO DEL OSO SECTION



BASAL RIO DEL OSO SECTION