**SULFATE-FILLED SEPARATIONS IN REDBEDS CAN BE SYNDEPOSITIONAL.** D. W. Powers[1] and R. M. Holt[1], [1]Department of Geology and Geological Engineering, University of Mississippi, University, MS 38677 (dwpowers@evaporites.com).

**Introduction:** Sulfate-filled separations or fractures on Mars have been interpreted as forming either as late diagenetic[1,2] or early diagenetic[3] features. Earth analogues for the Martian sulfate-filled fractures have been interpreted as late[4] or early[3] diagenetic features. We will show core samples that display intraclasts (i.e., indicating early diagenesis) of sulfate fracture fillings from the Permotriassic(?) Dewey Lake Formation in southeastern New Mexico.

**Digital Formats:** The Dewey Lake (aka Quartermaster Formation) in southeastern New Mexico (Fig. 1) is a generally fine-grained (mudstone) redbed deposit. Significant characteristics include small ripples and cross-bedding, laminar bedding, desiccation cracks, and mudstone intraclasts. Bioturbation is rare or equivocal. Macroscopic fossils are unknown. Diagenetic features include mm-cm scale gray or greenish gray "reduction" spots and irregular zones ~parallel to bedding. There is a distinct change in mineral cements from gypsum to some carbonate in the upper part of the formation. Fractures or separations are abundant, and they are filled with gypsum that generally is fibrous and perpendicular to the surface of the separation. Suture lines and relics of the "wall rock" are common. These gypsum-filled separations range from horizontal (parallel to bedding) to near-vertical. Some show strain along the suture lines.

The relevant observation is that we have found intraclasts of gypsum (Fig. 2) that are similar to the separation fillings. This is evidence of early formation. In addition, outcrop observations and geophysical log interpretations do not indicate significant channel depths in the Dewey Lake. The clasts are not the result of much deeper erosion.

The Dewey Lake has not yet been investigated in southeastern New Mexico in detail. Prior studies include a petrographic study[5]. Unpublished work shows the presence of roscoelite (a potassium mica that includes vanadium) at the center of many "reduction" spots. The formation may well range across the Permotriassic boundary, but direct evidence is lacking in southeastern New Mexico. Volcanic ash found in the Quartermaster in Texas has not been found near the Waste Isolation Pilot Plant, but an as yet undated ash may be present in another location (see resource for CP-975). The formation does appear to be relatively continuous in deposition, and could be amenable to further paleomagnetic analysis.

A new, large-diameter (~9 m) shaft to be constructed at the location of the corehole may offer research opportunities that can be discussed.

**Resources:** Unpublished resources include the following: corehole geology report: C3977Geology; air intake shaft mapping with color photos of Dewey Lake veins: AISmapping; geology of NP-1, source of some core displayed: NP-1Geology; geology of CP-975, source of probably Dewey Lake volcanic ash: CP-975Geology. If the urls do not work, each report can be found in the ResearchGate page for Dennis W. Powers: https://www.researchgate.net/profile/Dennis_Powers2.

Figure 1 Stratigraphy

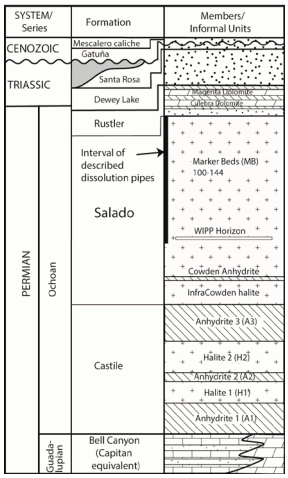
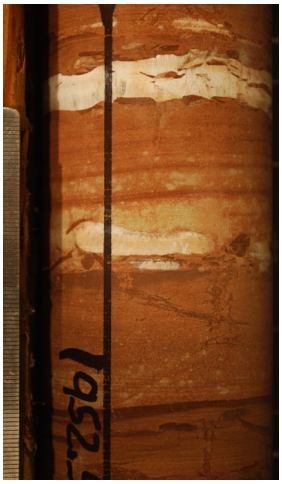



Figure 2 Gypsum Clast



**References:** [1] Grotzinger J. P. et al. (2014) *Science 343*, 338 [2] Nachon, M. et al. (2014) *JGR: Planets 119*, 1991-2016 [3] Schwenzer S. P. et al. (2016) *Meteoritics & Plan. Sci. 51*, 2175-2202. [4] Young B. W. and Chan M. A. (2017) *JGR: Planets, 122*, 150-171. [5] Miller D. N., Jr. (1966) *Am. Assoc. Pet. Geol. Bull. 50*, 283-307.