

Madsen, B.M., and Raup, O.B. 1988. Characteristics of the Boundary between the Castile and Salado Formations near the Western Edge of the Delaware Basin, Southeastern New Mexico. *New Mexico Geology*, Vol. 10, No. 1.

ABSTRACT, p 1, col. 1;

" The contact between the Upper Permian Castile and Salado Formations throughout the Delaware Basin, southeast New Mexico and west Texas, has been difficult to define because of facies changes from the basin center to the western edge. Petrographic studies of core from a Phillips Petroleum Company well, drilled in the western Delaware Basin, indicate that there are major mineralogical and textural differences between the Castile and Salado Formations. The Castile is primarily laminated anhydrite with calcite and dolomite. The Salado Formation is also primarily anhydrite at the location of this core hole, but with abundant layers of magnesite. This magnesite indicates an increase in magnesium enrichment in the basin brines, which later resulted in the deposition of magnesium-rich potash deposits within the Salado Formation elsewhere in the basin. A breccia zone at the top of the Castile Formation shows evidence of massive recrystallization, which indicates a break in sedimentation and possible subaerial erosion. This breccia zone probably represents an unconformity along the western edge of the basin between the Castile and Salado Formations, which has been recognized by other workers."

Summary and conclusions, p 4, col 3, para 4;

" The Castile and Salado Formations in the Delaware Basin represent sediments that were deposited in an evaporite environment of steadily increasing salinity. The boundary between the two formations, in general, represents a change from sulfate, carbonate, and some chloride deposition in the Castile, to deposition of chlorides and magnesium-rich potash minerals in the Salado Formation.

Adams (1944) recognized an unconformity between the Castile and Salado Formations in the northern part of the Delaware Basin. Correlations of acoustical logs and facies studies by Anderson (1978, 1981) support Adams' interpretation. Anderson (1978, p. 17) said that 'there was an episode of non-deposition, angular unconformity, and even salt dissolution in the northern part of the basin following the deposition of the Halite III unit (upper halite) of the Castile Formation.'

The Phillips core hole, on which this study is based, was drilled at the western edge of the Delaware Basin where both the Castile and Salado Formations are now primarily anhydrite with some layers of carbonate. The major difference between the Castile Formation in this core, as compared to core from farther into the basin, is the absence of halite that has been removed by dissolution. The Salado Formation in the core can be distinguished from the underlying Castile Formation on the basis of anhydrite characterized by major inclusions of magnesite. The magnesite in this basin-edge facies indicates an enrichment of magnesium in the basin brines that later resulted in the deposition of magnesium-rich potash deposits within the Salado Formation elsewhere in the basin.

The top of the breccia zone in the Phillips core probably represents the unconformity,



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and perhaps the period of subaerial erosion at the top of the Castile that was described by Adams (1944) and Anderson (1978, 1981). This breccia zone in the core represents dissolution of halite that resulted in brecciation and massive recrystallization of the anhydrite at the top of the Castile before deposition of the overlying magnesian anhydrite of the Salado Formation along the western edge of the basin. Contortion of the magnesite layers, as described from this core hole, probably resulted from slumping and differential compaction of soft sediments that were deposited over the irregular breccia surface at the top of the Castile Formation."

