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Mirela Dumitrescu¹, Richard M. Kettler¹ (1) University of Nebraska, Lincoln, NE

Carbon-Sulfur-Iron Relationships in Condensed Intervals of the Cretaceous Mancos Shale

Although numerous studies have focused on the seismic, well log, or biostratigraphical expression of condensed sections, few detailed geochemical analyses of these strata exist. This study examines C-S-Fe relationships in condensed intervals from the Cretaceous Mancos Shale.

The River Gas Utah #1 well is located in the southern Uinta basin in Carbon County, Utah and penetrated the Tununk Shale (76 ft), Ferron Sandstone (243 ft), and main body of the Mancos Shale (1621 ft). Two intervals (770-820 ft and 1162-1209 ft) of thinly laminated dark gray shale with abundant fossil fragments and high gamma activity (60 API units over baseline) are interpreted to be condensed intervals.

Preliminary results obtained from 50 samples analyzed for C and S demonstrate that the condensed intervals contain more organic carbon than the surrounding rocks. The average total organic carbon (TOC) values for the upper and lower condensed intervals are 2.2% and 1.8%, respectively, whereas the rest of the Mancos Shale main body has an average TOC value of 1.2%. Although the total sulfur (TS) content of the condensed intervals is higher than the surrounding rocks, the TS:TOC ratios are lower in the condensed intervals.

Elevated TOC values observed in condensed sections are typically considered to reflect slow sedimentation rates and limited dilution by clastic detritus. These data suggest that variations in diagenesis or organic matter reactivity also play a significant role in the preservation of greater amounts of organic carbon in condensed intervals.