

## **Spectral Gamma Ray Investigation of the West Springs Creek Formation (Ordovician), Upper Arbuckle Group, Southern Oklahoma**

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The West Springs Creek Formation, Ordovician Arbuckle Group, consists of a series of shallow subtidal to intertidal carbonates that cycle upward into upper intertidal silty and dolomitic carbonates. Spectral gamma-ray measurements taken across the West Spring Creek Formation outcrop along I-35 near Davis, Oklahoma reveal interesting relationships between gamma-ray log signature, radionuclide concentrations and lithofacies. Over 700 measurements were collected at 2 foot intervals across the 1466 feet thick outcrop.

These natural gamma-ray values were interpreted to identify cycle thickness, characteristics of clay- and silt-rich intervals and the effects of sea level fluctuation on lithofacies. Several patterns emerge from the data. Thicker carbonate cycles lack red beds and contain shaly intervals with U/Th ratios indicative of marine deposition. These thicker cycles are interpreted as representing periods of higher accommodation. In contrast, intervals of higher frequency, thinner cycles contain thin red beds and are interpreted as representing periods of low accommodation with increased opportunity for exposure to subaerial oxidizing conditions during sea-level lowstands. U/Th ratios are low for silt- and clay-rich units in thinner cycles, which is consistent with increased terrigenous sediment input. Parasequence patterns established for the West Spring Creek Formation outcrop are expected to reflect regional changes in accommodation and provide a tool for correlating outcrop stratigraphy to the subsurface. Accommodation and cycle thickness can impact porosity enhancing processes and may provide an explanation for the distribution of dissolution porosity and reservoirs within the Arbuckle Group.