Comparison of Results from Infrared Spectral Imaging of Immature Eagle Ford Shale Cuttings with Bulk Geochemical Characterization

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Abstract

The ability to obtain submillimeter-scale mineralogy data over an entire core surface or trays of cuttings makes spectral imaging useful for examining highly variable geologic materials like mudrocks. However, core is often not collected at drill sites due to the expense and logistical constraints. In contrast, well cuttings are commonly available from oil and gas wells. When imaging or other laboratory methods are applied to cuttings samples instead of core or core samples there is clearly potential for loss of spatial resolution, but in lieu of core, cuttings may be the best way to get important geochemical and mineralogical information. While core scanning using spectral imaging has become increasingly common in the mining and petroleum industries, applying this technology to cuttings has not been as widely publicized even if it has been utilized in many studies over the last 10+ years. One unrecognized advantage of spectral imaging over bulk geochemical analyses is that, despite the averaging of material over a large depth interval, spectral imaging methods provide information on the variability of minerals present. Information on the degree of mineral heterogeneity for material collected from a particular depth interval is of benefit to stratigraphic and other characterization studies of mudstones. In this study, cuttings collected from a corehole drilled near Dallas, TX (within the outcrop belt of the Cenomanian-Turonian Eagle Ford Shale) were examined by two spectral imaging systems, the Corescan HSI-3 and the HyLogger 4. The cuttings, sampled over ~10 foot intervals, were extensively analyzed using geochemical and mineralogical methods

prior to the spectral imaging work. These data were compared to the spectral imaging results and geochemical analyses of core material systematically sampled for bulk geochemical analyses every 2 ft. Excellent agreement was observed between the geochemical datasets for the core and cuttings. The spectral imaging results for the cuttings are generally consistent with the laboratory-generated data and confirm a general correlation between the percentage of low reflectance pixels and hydrocarbon generating potential in the lower Eagle Ford strata observed in previous work using core. However, the shortwave infrared results from the cuttings identify more variability in the distribution of clay mineral species within the Turonian strata that bulk analyses did not.