

Optimization of pXRF Sampling Methods in Analyzing Hydrocarbon-Rich Zones in the Eagle Ford Shale

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ABSTRACT

Analysis of rock and core-drillings for lithochemical study and stratigraphic correlation using portable x-ray fluorescence spectrometry (pXRF) is an expanding and important study field for both geologic research and industrial exploration. However, as noted by Piercey and Devine (2014), some methods of pXRF experimentation exhibit in their results a poor correlation between the quantities of certain elements in a sample and the quantities of those same elements when determined by other methods. We hypothesize that sample preparation and instrument use may affect results when analyzing some sedimentary rock samples for chemical composition. In our study, we analyzed shale samples from the Eagle Ford Group (South Texas) used previously in the study of Dabney et al. (2015). The Eagle Ford shale is the foremost ‘liquids-rich’ shale play in North America, producing dry gas, wet gas, natural gas, condensate, and oil. In our work, we will analyze samples from three wells for three elements correlated with potential hydrocarbon reserves: vanadium, chromium, and molybdenum. We will analyze approximately 50 samples using two methods—an analysis of whole samples that are approximately sand-sized to pebble-sized chips, and identical pulverized samples—to test the chemical heterogeneity of the shale. The testing of the pXRF results from our two methods of sample preparation will help to answer two questions: First, when contrasted, do the methods of preparation affect the resulting data from heterogeneous samples? Second, what is the optimum method of preparation for lithochemical analysis of Eagle Ford shales?