

Combining Surface Geochemical Surveys and Downhole Geochemical Logging for Mapping Hydrocarbons in the Utica Shale

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Abstract

Shale plays represent a difficult arena in which to explore since each shale play is unique in terms of organic content and rock property. While general lessons can be translated from play to play there are important differences which control exploration and development decisions. Due to the heterogeneity of resource plays they can even differ within a single field. This means that effectual development of shale plays requires extensive evaluation and coordination of various data sources such as geology, geophysics, geomechanics, petrophysics, and engineering. However, while these conventional disciplines bring a wealth of important data to the discussion, one important data set is often lacking – hydrocarbon data.

Given the heterogeneity of shale plays, it is important to identify hydrocarbon variability in a 3-dimensional sense (i.e. both vertically and horizontally). This is particularly true in the Utica shale. The Utica shale play is a complex area in which to explore due to numerous hydrocarbon sources and charged zones.

This case history will demonstrate how surface hydrocarbon mapping was used to:

- differentiate between economic and noneconomic gas areas in the play
- differentiate and map light and heavy hydrocarbon signatures throughout the area
- image hydrocarbon anomalies aligned with surface lineaments indicating hydrocarbon filled fractures

Additionally, the downhole geochemical logging will demonstrate how vertically detected hydrocarbons were correlated with surface expressions to provide an understanding of:

- from which zone the economic and noneconomic gas may have originated
- why were there surface expressions of heavier hydrocarbons
- from which formations liquid hydrocarbons may have originated