

Helium and Low-Hydrocarbon Reservoir in San Juan County, Utah: Unconventional Methods to Detect Reservoir Zonations and Gas-Water Contacts

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1) *Advanced Hydrocarbon Stratigraphy*

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Summary

Methods for detecting reservoir fluid-zonations and water contacts often rely upon well-accepted hydrocarbon-relationships and their respective solubilities in water (e.g. ratios of heavy to light hydrocarbons, BTEX, etc.), and employ standard wellsite gas detection methods (e.g. gas chromatograph or hotwire). These methods are not reliable in a recent helium-well targeting the Mississippian Leadville in San Juan County, Utah due to its low hydrocarbon concentrations (0.9 - 1% He, 70.4 - 70.9% CO₂, 22.2 - 22.3% N₂, 5.8% C₁ and trace C₁₊) and the fact that hotwire and gas chromatography methods are rarely capable of reliably detecting helium, CO₂ and N₂. In this presentation we discuss methods to detect reservoir zonation and gas water contacts based on volatile compounds entrained in sealed at well site and unsealed lab loaded cuttings samples:

- AHS's Rock Volatiles Stratigraphy (RVS) method was used to gently extract modern volatiles from cuttings samples; thus reflecting the current volatile contents of the reservoir.
- RVS is used here to assess seal-quality, relative porosity / permeability and to define modern differences in oxidative potential and fluid-zonations. RVS strengthens the relationship to the proposed gas-water contact detected using other methodologies.