

Unraveling the Mysteries of the Hogback Ridge Field, Crawford Thrust Plate, Utah

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While hydrocarbons have been extracted from the Wyoming-Utah-Idaho thrust belt for over 100 years, the bulk of the success has been on the Absaroka Thrust Plate. A distinct enigma that has implications to future exploration activity in Utah and Idaho has been the Hogback Ridge Field, located on the Crawford Thrust Plate. This field produced nearly 6 billion cubic feet of dry gas from a single well (i.e., Hogback Ridge 20-1) over a 3 year period. The offset wells were completed as dry holes.

The primary investigative tool used is fluid inclusion stratigraphy (FIS), which analyzes via mass spectrometer the hydrocarbons that are released from sealed cavities upon mechanical crushing. The results indicate that the uppermost commercial reservoir is the Triassic Dinwoody, and that the “original” fairly continuous dry gas paleocolumn exceeded 3000ft (i.e., extended at least down into Mississippian Brazer in Red Knoll 33-B). This dry gas is confirmed to be highly mature thermogenic using gas phase fluid inclusion extraction to measure a carbon average of -35.2‰ on methane. The minor amount of hydrogen sulfide is documented to be restricted to discrete intervals in the Permian Phosphoria and the lower part of the Pennsylvanian Wells. Vertical seal analysis indicates the Triassic Woodside generally provides an excellent seal, whereas the top seal for the Phosphoria, Wells, Amsden, and Brazer are better described as baffles (i.e., weak vertical seals). The Woodside top seal exception is documented in the Hogback Ridge 28-1, where the interpreted back-thrust accommodation appears to have breached the Woodside top seal allowing the dry gas to migrate vertically into the Triassic Thaynes, which significantly reduced the available commercial gas production (i.e., dry hole analysis). While gas shows were reported in the drilling of the Hogback Ridge 20-1 Thaynes, the FIS documents at least 1000ft of wet gas column (i.e., paleo-column?). The Thaynes reservoir is usually silty carbonate, contains internal vertical baffles, and is a fairly good top seal (i.e., Triassic Ankareh). The Jurassic Nugget is mostly barren, whereas the Twin Creek has intermittent oil signal. Collectively, this analysis of the Hogback Ridge Field provides novel insights that are applicable to future exploration activity on the Crawford Thrust Plate.