Depositional Models for Deep Lacustrine Sequences within the Wasatch Formation, Uinta Basin, Utah: An Example of Lacustrine Supply Generated Sequences

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Abstract

Recent advances in cube-style development within the Uinta Basin have resulted in the development of numerous intervals throughout the Lower Green River and Wasatch Formation. Multiple intervals within the Upper and Middle Wasatch Formation are routinely targeted for horizontal development. These Wasatch benches have been targeted by ~34% of all horizontals drilled in the basin, making them a critical component of many operators' development plans. Subsurface cores collected from the Wasatch Formation in the Altamont/Bluebell Complex and Central Basin subregions of the Uinta Basin routinely contain black, organic-rich shales and fossiliferous limestones that serve as the precursors to the prolific oil-bearing lacustrine carbonates and shales of the Green River Formation. In contrast with units such as the Uteland Butte member of the Lower Green River Formation, the lacustrine strata of the Wasatch Formation are routinely interbedded with white to gray fluvial-deltaic and hyperpycnal sandstones. These observations are consistent with interpretations that the Uteland Butte marks the initial transgression of a prominent stable Lake Uinta during a stable climatic regime, but also demonstrate that the climate during deposition of the Wasatch Formation was quite the opposite. Outcrop, log, and core data provide evidence for a diverse fluvial/lacustrine system resulting from large amounts of sediment transportation into the Uinta Basin. Many authors have published on Wasatch deposition due to fluvial input from the south; however, this study will focus on Wasatch deposition in terms of a large avulsing delta system from the north, alluvial input from the Uinta Mountains, and how precipitation of Wasatch carbonates is influenced by tectonic control resulting from the Sevier Orogeny and Uinta Uplift. Furthermore, this study attempts to establish a framework of supply generated sequences based on mapping of consistent carbonate benches within the Wasatch Formation with a focus on the implications of these surfaces to hydrocarbon exploration and cube development within the Uinta Basin.