

## Utilizing Borehole Image Logs to Evaluate Depositional Trends in the Uinta Basin, Utah

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### Abstract

The Eocene Wasatch/Colton Formation (WCF) is comprised of a mixed assemblage of carbonates, sandstones, and shales that record the episodic encroachment of transient fluvial/deltaic sands and silts into the deep lacustrine basin of Lake Uinta. Within the Uinta Basin, the WCF encompasses multiple depositional systems with independent provenances. Predominantly, the WCF in the Uinta Basin was deposited as part of a major fluvial/deltaic system that entered the basin from the south where a major paleo-river system entered the basin. Provenance studies of detrital zircons within the Uinta Basin indicate that the Wasatch Formation contains detritus sourced from as far away the Mojave region of California. A secondary fluvial/alluvial depositional system was sourced from the Uinta Mountain uplift and is broadly restricted to the northern portions of the Uinta Basin. Both units are generally considered to interfinger with the Green River Formation in the center of the basin, but few studies have detailed the subsurface relationships between these formations in the deepest portions of the Uinta Basin. Over the past decade, the Uinta Basin of Utah has seen more than 100 horizontal wells drilled into the WCF with highly variable production results. At their best, WCF horizontal wells are prolific producers with Estimated Ultimate Recovery (EUR) in excess of 1.5 million barrels of oil (MMBO). Unfortunately, there are also numerous WCF laterals with EURs less than 0.3 MMBO that will never be able to payout the capital expenditure of the well. This dramatic range in well performance is understandable when one considers the frequent cyclicity and rapid facies changes that occur within fluvial/deltaic depositional systems, which can lead to inconsistent distributions of reservoir fluids along the wellbore. The purpose of this study was to conduct a detailed study of a stratigraphic bench of within the WCF utilizing geologic descriptions from core and cuttings in concert with stratigraphic dips from wireline borehole image (BHI) logs to better delineate depositional trends and play fairways for horizontal oil well targeting. BHI logs obtained in the Altamont/Bluebell Complex were evaluated for depositional trends by rotating the interpreted bedding dips to remove structural dip. These de-rotated stratigraphic dips were then compared to formation dips observed in core to understand the geologic context of these stratigraphic features. By comparing lithofacies maps to stratigraphic trends we are able to identify multiple depositional patterns within a key development bench of the WCF and further delineate multiple tiers of well results to aid in planning future development wells in the WCF.