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CRACKING THE CRETACEOUS CODE

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Paleoenvironmental reconstruction of fluvial systems: insights from the Dinosaur Park Formation for reservoir analogs

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ABSTRACT

Interpretation of fluvial systems preserved in the sedimentary record has advanced beyond simple vertical facies succession models to three-dimensional, quantitative approaches that provide unprecedented insight into stratigraphic architecture and internal heterogeneity. Recent studies of the meandering fluvial system preserved in the Dinosaur Park Formation (DPFm) at Dinosaur Provincial Park (DPP) have contributed to these developments by establishing key recognition criteria and methods for planform reconstruction. These approaches can be applied to delineate analogous subsurface deposits that host petroleum accumulations.

The DPFm is characterized by sandstone-dominated, meandering fluvial channel-belt deposits and mudstone-dominated floodplain deposits, recording large rivers that flowed from the Cordillera in the west to the intracontinental seaway in the east during the Late Cretaceous (Campanian; 76.7–74.3 Ma). Fieldwork at DPP over the past decade has produced hundreds of meters of measured section, thousands of paleoflow and lateral accretion measurements, samples for geochemical analysis, and remotely piloted aircraft system surveys used to generate digital outcrop models. These datasets enable detailed reconstructions of depositional environments, paleohydraulics, backwater limits, and a novel tephrostratigraphic framework, refining the spatiotemporal evolution of DPFm paleoenvironments.

Of particular importance for subsurface reservoir analogs are the recognition criteria and spatial distribution of counter point-bar deposits, the distribution and continuity of point-bar inclined heterolithic stratification (IHS), paleohydraulic and backwater-length estimates, and the architecture of stacked meander-belt deposits. Well-constrained, outcrop-based examples are compared with examples from subsurface reservoirs to demonstrate how to improve reservoir delineation and characterization. The paleoenvironmental reconstructions presented here are applicable to fluvial channel-belt deposits across the Alberta Foreland Basin, improving efficiency in their identification, delineation, and characterization.