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CRACKING THE CRETACEOUS CODE

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Driving Geological Insight: A Refined Interpretation of McMurray Fluvial Systems at Pike 1

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ABSTRACT

Canadian Natural's Pike 1 property is a key contributor within the company's development portfolio. The reservoir is hosted within the McMurray Formation and is interpreted as fluvial point-bar deposits situated at the proximal end of the fluvial-to-marine transition zone (Hubbard et al., 2011; Jablonski & Dalrymple, 2016; Durkin et al., 2017; Peng et al., 2024). Incorporation of regional parasequence sets within the unformalized upper McMurray (Hagstrom, 2019; Horner et al., 2019, Peng et al., 2022; Peng et al., 2024) indicates that Pike 1 is predominantly composed of "C"-aged channel-belt deposits, later overprinted by a largely muddy "A2" channel-belt incision.

Through stratigraphic relationships, facies analysis, and dip interpretations, four distinct channel belts have been identified within the "C" interval of the SAGD reservoir. Despite the challenges posed by the area's largely sand-dominated nature, applying core stratigraphic fundamentals, 'anchor wells,' and fluvial first principles yields the most probable interpretation. One such principle is that channel-belt bases should remain relatively flat over short distances. Another axiom is that the underlying Devonian topography exerted primary control on Cretaceous channel-belt evolution, acting as the bedrock on which these rivers developed.

Using established principles for subsurface fluvial morphology interpretation (Hubbard et al., 2011; Durkin et al., 2015; Durkin et al., 2017), the Pike 1 stratigraphic framework can be refined by subdividing each of the four channel belts into discrete lateral-accretion packages. This subdivision is guided by facies proportions, IHS dip orientations, and paleocurrent trends. Although some uncertainty remains around the exact package boundaries, the integrated dataset strongly supports the interpretation that each channel belt consists of a complex assemblage of amalgamated point bars.

By integrating lateral-accretion packages, channel belts, and channel systems, the final interpretation resolves 50 discrete zones within the area of interest. This refinement supports a more representative geomodel that captures the full suite of depositional elements and the dip architecture of each package. A more accurate geomodel has aided in well-performance forecasting and provided clearer expectations for drilling of the SAGD horizontal wells.