

THE SEDIMENTOLOGY, ICHNOLOGY, SEQUENCE STRATIGRAPHY, AND RESERVOIR ARCHITECTURE IN MCMURRAY FORMATION, ALBERTA

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ABSTRACT

The Lower Cretaceous McMurray Formation of Alberta comprises one of the largest bitumen and heavy oil reserves in the world. Despite decades of research several aspects of the McMurray remain poorly resolved. Due to the lateral and vertical complexity of stratal architecture, mapping of significant, regional stratigraphic surfaces is highly difficult. In addition, there is a discrepancy between large-scale geomorphological observations on 3D seismic (extensive meandering scroll bars of apparent fluvial origin), and small-scale facies level observations (indicating brackish-water chemistry and tidal modulation). Thus, this research will attempt to add resolution to these observations by combining several lines of investigation, including: sedimentology, ichnology, sequence stratigraphy, geochronology, and palaeoecology. Data collected will include logging of approximately 120 core, outcrop mapping, wireline log and seismic analysis, geochemical, and geochronology data from an area of approximately 2800 km². Findings of this research will ideally lead to the development of a robust, regional sequence stratigraphic model, resolution of the discrepancy between geomorphology and facies, and add to the knowledge of basin-scale sediment sourcing. In a broader sense, the findings of this research will contribute to the fields of sedimentology, ichnology, and palaeoecology beyond specifics of the McMurray Formation. For example, observations of animal-sediment interactions, and the interpreted palaeoecologic conditions that they represent are applicable to ancient strata spanning significant periods of geologic time. From a sedimentological perspective, this research will contribute to our understanding of the sedimentological distinctions between tidal and fluvial processes and the resulting architectural elements of rivers versus estuaries.

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