

## **McMurray Formation SAGD Reservoirs in Northeastern Alberta: Comparative Architecture and Performance**

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### **ABSTRACT**

Several commercial and experimental steam-assisted gravity drainage (SAGD) projects, hosted within Lower Cretaceous McMurray Formation sandstones, are now operating in northeastern Alberta. Operators employ a wide range of criteria with which optimal reservoirs are assessed and screened. These geological criteria have subsequently been used in the construction of numerical simulation models which form the basis of predicted reservoir performance. The core display and associated materials will allow a comparison of the geological attributes of different projects and an assessment of reservoir variation influence on production performance to date.

Five commercial SAGD projects are compared: Foster Creek (70-4W4), Christina Lake (76-6W4), Hangingstone (84-11W4), MacKay River (93-12W4), and Firebag (95-6W4); all but Firebag have publicly available performance data.

Select cores from each project exhibit features that are common to McMurray tar sand deposits throughout northeastern Alberta; thick, well-sorted basal sands that pass upward and laterally into interbedded successions of sand and mud and channel fill mudstone that formed within fluvial-estuarine channels. The major differences observed between the projects include the trends of possibly solitary channel fills, stacked channel successions, and the presence of intra-bitumen aquifers. The relation between the geological attributes of different projects and various performance metrics will be discussed. In general, reservoir performance appears related to homogeneity and the presence of easily mapped and systematic trends. These kinds of reservoirs are not necessarily associated with the thickest McMurray sandstones and bitumen columns.

Stringent screening criteria are required to establish the locations of truly optimal SAGD reservoirs. Identifying vertically continuous bitumen columns that contain the fewest number of heterogeneities may result in a smaller resource base amenable to economic SAGD development, but will allow for more accurate predictions of both reservoir performance and risk assessment.