Reservoir Architecture of Fluvially Dominated Channel Fills Within Deltaic to Marginal-Marine Deposits, Grand Rapids Formation, East-Central Alberta

Adam B. Coderre[1], Hugo Pouderoux[1], and Per Kent Pedersen[1]

[1]Centre for Applied Basin Studies, Department of Geoscience, University of Calgary, Calgary, AB, Canada (abcoderr@ucalgary.ca)

Abstract

The complex internal architecture of fluvial to marine-influenced channel bodies often makes it difficult to delineate the spatial extent of reservoir quality sandstones. Internal heterogeneities from bed to channel body scale result in highly variable reservoir geometries that significantly affect production or enhanced recovery from such reservoirs. Dense well spacing within the Grand Rapids Formation in east-central Alberta allows for high-resolution stratigraphic and sedimentological reconstruction of the internal reservoir architecture of fluvially dominated multilateral, multistory, and single-story channel bodies cut into deltaic to marginal marine deposits. Highly detailed facies distribution maps are created through the integration of well data, core descriptions, published seismic slices, and a series of modern and ancient analogues to constrain the interpreted distribution of sedimentary and reservoir facies within channel bodies. Multiple facies distribution maps are created at regular depth intervals below a datum to predict the spatial and temporal distribution of stories within complex channel bodies. Coupled with detailed porosity and permeability data determined for each facies, these maps provide a detailed prediction of potential flow pathways in 3D within a well-defined channel body. This methodology and 3D depositional models are suited to other areas with poor well coverage.