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Geologic Modeling Of The T1B Reservoir, Medusa Field, Mississippi Canyon Blocks 538 and 582, A Pliocene, Deepwater, Amalgamated Channel Reservoir

Medusa Field is a deepwater Gulf of Mexico Field operated by Murphy Oil and planned for first oil production in November 2002. The T1B reservoir, a Pliocene deepwater deposit, is one of the main reservoirs in the field. Appraisal data including four well penetrations (two of which were completely cored), pressure and fluids data and 3D seismic data were used to characterize this reservoir. Core data revealed a series of discrete sands separated by muds and muddy sands. Intraclast conglomerates overlain by muddy sands were interpreted as the bases of channel complexes that were first partially filled with debris-flow deposits before being completely filled by high and low-density turbidity current deposits. Pressure data suggests poor vertical and lateral communication between sands, which was interpreted as an indication of poor amalgamation between channels.

Mapping of seismic amplitudes allowed a deterministic model of channel complexes to be built. Sub-seismic heterogeneity was captured using object-based modeling conditioned by well data. Net-to gross variation away from the appraisal wells was a major uncertainty that was captured by building multiple models with varying target amounts of net sand. These models were populated with rock properties and taken into reservoir simulator to determine the affects of reservoir heterogeneity on reserves and to optimize the field development plan.