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Schwartz, Daniel E. (Shell International Exploration and Production, Inc, Houston, TX)

CHANNELIZED DEEP MARINE RESERVOIRS IN THE DEEPWATER – MODELING AND RECOVERY

To produce maximum oil, in the shortest time period, with the smallest capital investment over the life of the asset, high rate/high ultimate wells must be placed in deepwater reservoirs to optimize oil recovery. Many deepwater reservoirs in new development areas have distinct channel character. The expectation is that recovery efficiency in these reservoirs can be lower than those from sheet sands or well-amalgamated channel sands in mature areas.

Factors influencing recovery from poorly or non-amalgamated channel reservoirs are attributed to depositional and structural architecture. These features are often not resolved on seismic. In the early stages of exploration and appraisal, 3D seismic and limited well data are available. Seismic reveals architectural features (sinuous units, gorge geometries) while well data reveals stacking patterns and bed geometries (via dip meter or image logs). These features are augmented with analog information (sea floor images, modern fan systems, and outcrops) to build a geological model. Static reservoir models constructed from seismic and well data reflect a range of possible geometric and fluid saturation scenarios. These models aid in future well placement, better constrain in-place volumes, and assess features that impact sweep efficiency and total recovery. Developing multiple geologic realizations allows for risking reservoir uncertainties.

Coarse-scale static models are used to build dynamic reservoir models. A connectivity or complexity factor is applied to recovery results to reflect the impact of sub-seismic features. Comparing recovery efficiency estimates for fields before start-up and after extended production indicates the connectivity factor reduction is realistic. As local data becomes available, sufficient geological detail is built into models and complexity factors are phased out.