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Laura L. Wray¹, Neal DeShazo², David E. Eby³ (1) Colorado Geological Survey, Denver, CO (2) PetroCorp, Tulsa, OK (3) Eby Petrography & Consulting, Inc, Littleton, CO

Heterogeneous Carbonate Buildups in the Colorado Portion of the Blanding Sub-Basin of the Paradox Basin, Colorado and Utah: Possible Targets for Increased Oil Production Using Horizontal Drilling Techniques

Reservoir heterogeneity of shallow-shelf carbonates in the Pennsylvanian (Desmoinesian) Paradox Formation (primarily the Ismay and Desert Creek zones) in the Blanding sub-basin of the Paradox basin, Colorado and Utah, contributes to inefficient hydrocarbon recoveries. Though overall production exceeds 50 million barrels of oil, carbonate facies architecture and multiple stages of dissolution and cementation have created complex heterogeneity within these two zones. The Ismay reservoir interval is composed of stacked limestone phylloid-algal buildups with locally variable shallow shelf and evaporitic subfacies along the basin margins. The Desert Creek producing interval is composed of dolomitic phylloid-algal buildups deposited in deeper and more saline waters as aligned, linear facies tracts. Complex facies relationships, extensive diagenesis, and compaction-induced fractures have created heterogeneous reservoirs, small in aerial extent, that may not be produced efficiently with vertical wells.

One Ismay field area was chosen as a candidate for reservoir characterization. The Sleeping Ute/Little Ute field in southwestern Colorado has an average porosity and permeability respectively of 8 percent and 4.5 millidarcies. These averages are for all the cored intervals and are not representative of the actual reservoir intervals. Reservoir enhancements including fractures and vugs are so heterogeneous that reservoir storage capacity and permeability analyses, derived from core plugs, may be skewed by this sampling methodology.

Careful examination of the rock fabric is critical to understanding the reservoir pore geometries. Core to log correlations allow the extrapolation of reservoir distribution. The application of horizontal (possibly multi-lateral) drilling may allow more efficient recoveries in these heterogeneous reservoirs.