Depositional Conditions Associated with Bank-Attached Bars in Submarine Channels of the Upper Brushy Canyon Formation, west Texas

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The Brushy Canyon Formation, a predominantly fine-grained siliciclastic system, was deposited on the slope and basin floor of the late Paleozoic Delaware Basin. Our project focuses on resolving intra-channel sediment sorting within upper-slope channel deposits, in comparison to channel fills on the proximal basin floor.

The depositional facies on the upper slope fall into two broad classes: A) open-channel facies associated with bypass of sediment to deeper water; and B) channel-filling facies associated with bed aggradation and significant loss of channel relief. Deposits associated with bypass are: (i) Steeply inclined, planar-stratified, trough cross-stratified or sub- to super-critically climbing rippled deposits, with abundant mud drapes (D_{50}=110µm). These are interpreted to have accumulated as eddy bars or separation bars in bank-attached zones of flow separation. The channel-filling deposits form: (i) Thick-bedded, sometimes gravel-rich, sandstone bodies with stratification associated with migrating dunes and intra-channel barforms(D_{50}=156µm). On the proximal basin floor, the channel-filling sandstones (D_{50}=110µm) are dominated by stratification associated with trains of dunes climbing at sub- to super-critical angles, indicating high rates of deposition from suspension.

Grain-size analyses show that particles in the 200-400µm range are common in the channel-filling deposits of upper-slope channels, but are poorly represented in the upper-slope eddy bars and channel fills on the proximal basin floor. The eddy bars and basin-floor channel fills primarily consist of particles finer than 200µm, which we interpret as the size

fraction that was fully-suspended on the upper slope. This size fraction dominates the eddy-bar deposits because only fully suspended particles can be advected into the bank-attached zones of flow separation in significant volumes. We will synthesize depositional styles and grain-size data in order to: 1) describe a comprehensive facies model for thick bank-attached bar deposits, built by sediment sourced from suspension in separation zones associated with planform irregularity in submarine channels, 2) estimate flow velocities and current thicknesses, and 3) assess sediment sorting and storage between channels on the upper slope and proximal basin floor.