

William R Morris¹(1) ConocoPhillips Alaska, Anchorage, AK

Controls of Sequence Stratigraphy and Turbidite Elements on the Distribution of Reservoir Properties in the Tarn Field

The Cenomanian-aged Tarn reservoir consist of two slope-apron turbidite deposits at the base of slope within the Brooks Range foreland basin, North Slope Alaska.

HST to early LST consist of broad sheets of muddy sediment-gravity flows and slumps that increase in sandy turbidites upward.

During LST, the southern slope apron system developed within a shallow silled basin and consists of 7 packages that were fed from three gullies. The oldest two packages consist of lobes with channels limited to the gully mouth. As the basin filled, leveed channels extend further into the basin, breaching the sill. During late LST deposition consists largely of lobes that appear to have a much lower sand content.

The northern slope apron deposits during LST are unconfined and consist of 4 packages fed by a single conduit. The basal package consists of lobes. The overlying two packages contain significant offstacked leveed channels. The final package, (late LST) consists of unconfined muddy lobes.

TST to HST deposits cap the Tarn reservoir, consisting of hemipelagic muds and muddy turbidites which occur as a wedge at the base of slope and grade up into basinwide condensed interval.

Reservoir properties (porosity, permeability, SW and N/G ratios) vary significantly between the different system tracts, turbidite packages and turbidite elements. Best reservoir properties occur at maximum LST decreasing during early LST and late LST and non-existent at TST or HST. The best reservoir properties occur in channel fill and decrease progressively to amalgamated lobe, layered lobe crevasse splay and levee, respectively. In addition, different turbidite packages, within the same systems tracts, show significant variation in reservoir properties due to sediment input parameters and turbidite element types.