Salt Evacuation History and Depositional Corridors in the Annapolis and Crimson Region - Do These Wells Really Provide an Accurate Test of Sand Presence in Nova Scotia's Deepwater?

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Annapolis G-24, drilled in 2002, was the first deepwater well in offshore Nova Scotia to encounter hydrocarbon charged reservoir quality sands. The well encountered 27 m of net gas pay in fine to medium grained turbidite sandstones with good porosity and permeability. Crimson F-81 was drilled two years later, and pursued a similar salt withdrawal related play along the same depositional fairway. The well encountered minor reservoir quality sand, but no significant hydrocarbon bearing zones. This result demonstrates that the depositional systems for transporting reservoir sands from the shelf to the slope are not well understood.

Although the highly complex structural geology makes correlation of seismic markers in the study area challenging, the construction of salt contact maps has helped to improve the understanding of allocthonous salt evolution. This allows us to make educated and geologically plausible correlations through areas of detachment, counter-regional growth, and across salt welds and salt bodies. Combined with time-thickness maps, our results demonstrate that salt tectonics played an important role in controlling the distribution of Jurassic and Cretaceous sediment near these wells. Specifically, salt tectonics created paleo-bathymetric highs and lows on the slope that caused deepwater strata to thin and thicken, respectively.

Jurassic and Cretaceous time-structure maps indicate that paleobathymetric highs were oriented perpendicular to the present-day shelf-edge. The highs influenced the trajectory of sediment gravity flows, with isochron maps indicating that both wells were drilled on stratigraphic thins relative to nearby salt withdrawal depocenters. Stratigraphic thinning appears to be directly linked to paleo-bathymetry, specifically with both wells targeting the thinned flanks of an intra-slope minibasin. The fact that these wells still encountered reservoir quality sand while penetrating stratigraphic thins is promising, and suggests that more sand may be present in the isochron thicks to the east. Identification of canyons up-slope from these isochron thicks provides a link between the sand-prone Missisauga and Logan Canyon formations on the shelf and intra-slope minibasins located seaward. Recognition of these canyons support the idea that significant quantities of reservoir grade clastics were transported into deepwater, but drilling efforts to date have not yet adequately tested the thickest stratigraphic intervals.