Application of predictive modeling to the Early Cretaceous sedimentary sequences of the Central Scotian Basin, offshore Canada

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The distribution and quality of the reservoir sandstone units of the Nova Scotia offshore is poorly understood in the Early Cretaceous, particularly in the deep basin, where few wells have been drilled. Exploration is further complicated by the widespread salt tectonism and the strong influence of diagenesis on reservoir quality. This project uses *DionisosFlow*™, a forward stratigraphic modeling software, and *CougarFlow*™, statistical analysis software, to produce stratigraphic models of the Central Scotian Basin, and test the sensitivity of produced models. These models will test proposed provenance pathways, determine if sands in the Scotian Basin are trapped on the slope or bypass to the deep ocean floor, and attempt to predict the quality and distribution of reservoir sandstone intervals by simulating the distribution of sand and feldspar within the basin.

An integrated multi-disciplinary approach to stratigraphic modeling has been used, in which model inputs are drawn from research conducted in the Central Scotian Basin. Model results are calibrated against well logs, facies, and seismic interpretations of the study area to produce predictive stratigraphic models.

Model results indicate that the style of sand and feldspar deposition changed through time. In the Upper Missisauga Formation, sand was trapped dominantly on the shelf, with lesser deposition in minibasins along the slope and basin and transported into the deep basin along salt corridors. Feldspar concentrations show a similar trend; however, low concentrations are observed in the central shelf and elevated feldspar concentrations in the eastern and western shelf. In the Naskapi Member, the system became shale dominated, with sands trapped dominantly on the shelf and very limited transport into the basin. Feldspar shows increased overall concentrations with a more evenly distribution on the shelf, and more feldspar being pushed into the deep basin. In the Cree Member sand and feldspar deposition returned to a similar style as the Upper Missisauga Formation, however, the central shelf shows a more even distribution of feldspar.

Sensitivity analysis of the reference case models show that sand and feldspar distribution are most uncertain in the deep basin, and in association with salt bodies. Preliminary results also suggest that subsidence and supply control sand distribution, and the proportion of feldspar in the sources supplying the system controls feldspar distribution. Future work will combine statistical results

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and model predictions with fault and temperature mapping, to produce risk maps of reservoir quality for the Central Scotian Basin.

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