Overview of the Geology and the Petroleum Systems Associated with the Jurassic Aged Carbonate Bank, Scotian Basin, Offshore Nova Scotia

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The Cohasset and Panuke oil-condensate fields are located on the western margin of the Sable Subbasin on the Scotian shelf. The Cohasset-Panuke Project began production in 1992 and reached its economic limit and production terminated on December 17, 1999. The project produced a total of 44.5 million barrels over its seven-year life.

The condensate in both fields has accumulated in elongated anticlines trapped both stratigraphically and structurally as the result of sands draped over the underlying high formed by the thick carbonate section of the Abenaki Formation deposited neat the Shelf edge.

The Cohasset field discovered in 1973 consists of up to fifteen stacked sandstone reservoirs located within the Lower Logan Canyon Formation through the Naskapi Formation and the Upper Missisauga Formation. The Panuke Field discovered in 1986 consists of a series of five stacked reservoirs sandstones located entirely within the upper part of the Missisauga Formation.

The whole sequence seems regressive with a proximal lagoonal-estuary system overlying the various pulses of proximal to distal estuarine mouth bar sheets. Each fluvial pulse was dominated and eventually overwhelmed by marine influences after the sand packages were deposited over both fields at which time the shorelines moved seaward.

Geochemical fingerprinting suggests that the Abenaki Formation limestone and Misaine shale within the La Have Platform and Abenaki Subbasin did not have enough hydrocarbon potential to generate low GOR Mississauga and Logan Canyon Formation light oil and condensates in the Cohasset and Panuke fields. Discrete aromatic biomarkers (thiophenes or dibenzothiophenes) and stable carbon isotopes of saturate and aromatic fractions of these oil and condensates, and one dimensional petroleum system modeling indicate that these oils have low maturity, high saturate fractions and are mostly derived from the lacustrine Type I or 1-II source rocks from the Early Jurassic source rocks (possibly from the Mohican Group) similar to the Newark Basin in East Coast USA. The hydrocarbons have been migrated just after the reservoir formation through both vertical and lateral migration from that candidate source rock and not from the distal marine late Jurassic Verrill Canyon source rock. The reservoir geochemistry of both Mississauga and Logan Canyon oils suggests distinct compartmentalization of various reservoirs and possibly changed due to multi-phase migration and fractionation of heavier hydrocarbons.