Sequence stratigraphic interpretation of regional Upper Cretaceous limestone units, offshore eastern Canada

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Regionally widespread, Upper Cretaceous limestone units are recognized beneath the Scotian Shelf and Grand Banks, both as lithostratigraphic units and as important seismic markers. The Late Turonian-Coniacian Petrel Member of the Dawson Canyon Formation and the Late Santonian-Maastrichtian Wyandot Formation are typically composed of intensely bioturbated, fine-grained, coccolith-dominated limestone (chalk) with minor amounts of sandstone, calcareous mudstone, wackestone, and packstone. These units range from a few metres up to 400 metres in thickness, but are thin or absent along the southernmost portion of the Scotian Shelf and beneath much of the southern Grand Banks. The hydrocarbon reservoir potential of these units should not be overlooked given the significance of similarly aged chalk reservoirs worldwide (e.g., Gulf of Mexico and North Sea) and the gas discoveries at the Primrose and Eagle structures in the Wyandot Formation. Heavy oil was also encountered in the Petrel Member at Heron H-73.

Information about the Petrel Member and Wyandot Formation comes primarily from drill cuttings and from interpretation of seismic and wireline data. Cores are available only from four wells drilled on the Scotian Shelf (Wyandot Formation) and one well drilled on the southern Grand Banks (Petrel Member). Despite the level of exploration activity in recent years, no cores are available in the Jeanne d'Arc Basin. From this limited dataset, these limestone units appear to have been deposited in a deep shelf environment below storm wave-base. Trace fossil assemblages are dominated by *Zoophycos*, *Thalassinoides*, and *Chondrites* of the *Cruziana* ichnofacies. Inoceramid bivalves are also present.

Like many Upper Cretaceous chalk-rich units around the world, the Petrel Member and Wyandot Formation are interpreted as the product of pelagic carbonate sedimentation during stages of maximum transgression and minimal siliciclastic input to a shelf environment. While much of our data are consistent with this interpretation, lateral variations in thickness and lithofacies from well and seismic interpretation suggest the development of significant unconformities during and immediately after deposition of the limestone units. Depending upon location within the basins, mappable seismic horizons may correspond either to the maximum flooding surface, the erosional surface developed during relative sea-level lowstands, or the amalgamation of both when the thickness falls below the limit of seismic resolution. This situation greatly complicates the use of the Upper Cretaceous limestone units for regional correlation.