# Seismic and lithological characterization and source rock potential of the Aptian Naskapi Shale Member, Logan Canyon Formation, offshore Nova Scotia, Canada

ANNE C. HARGREAVES, F. W. RICHARDS, RICARDO L. SILVA, AND GRANT D. WACH

*Basin and Reservoir Lab, Department of Earth Sciences, Dalhousie University, Life Sciences Centre, Halifax, Nova Scotia B3H 4R2, Canada*

The Early Cretaceous fluvial-deltaic successions of the Logan Canyon and Missisauga formations, offshore Nova Scotia, have produced hydrocarbons in the Sable sub-basin. Distal deposits of the Jurassic–Cretaceous Verrill Canyon (Bajocian – Barremian) and the Logan Canyon (Aptian – Albian) contain transgressive shale sequences, several of which correspond to worldwide oceanic anoxic events (OAEs). A significant one is the Aptian Naskapi Shale Member, the basal unit of the Logan Canyon Formation, and the focus of this study.

The Jurassic shale section has been viewed as a relatively lean source rock; however, it is disputed if there are sufficient total organic carbon (TOC) or vitrinite reflectance (VR) values to generate hydrocarbons or form a fluid phase sufficient to facilitate migration. The Naskapi Shale Member does not appear to exhibit significant levels of organic matter, nor share characteristics from contemporaneous oceanic anoxic events seen elsewhere in the world. Our study suggests this was due to: (1) a high delta-derived sediment load focused in the Sable Sub-basin during the Cretaceous that resulted in high dilution rates; and (2) the ocean current regime during that time was not optimal for high production and deposition of organic matter.

Examination of datasets from 95 wells on the Scotian Shelf incorporating heat flow, total organic carbon, X-ray fluorescence, wireline log data from gamma ray, sonic, density and neutron logs, lithological descriptions from cuttings and core, biostratigraphy, sedimentation rates, paleo-ocean currents, and seismic interpretations of the Naskapi Member permit creation of an extensive suite of isochore maps and 3D models. These maps portray and define the stratigraphy, sedimentology, and diagenesis associated with the Naskapi succession.

Comparison of the Scotian Margin with time equivalent Cretaceous deposits elsewhere on the Atlantic Margin suggests that the low levels of effective Cretaceous source rocks here are due to paleo-ocean currents and high volumes of sediments shed from the adjacent Appalachian Mountains.

Atlantic Geology, 2018, Volume 54
Conjugate Margins Conference 2018, August 19-22, 2018
doi: 10.4138/atlgeol.2018.014