

Upper Ordovician Shale Gas and Oil in Quebec: Sedimentological, Geochemical and Thermal Frameworks

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Abstract

In eastern USA, significant industry interest has recently focused on Upper Ordovician black shales in Ohio that is the liquid-rich Utica Shale. As in Ohio and New York, the Upper Ordovician black shales in Quebec (Utica and Macasty) form a thick marine clastic succession that overlies the predominantly shallow marine carbonate facies of the Cambrian-Ordovician St. Lawrence Platform. Over the years, the hydrocarbon exploration targets in southern Quebec consisted primarily of the dolomitized facies of the carbonate platform (e.g., Beekmantown, Trenton-Black River), a small field (St. Flavien) was exploited and some sub-economic discoveries made.

When drilling for the deep targets, gas kicks and/or oil shows, sometimes very significant, were almost invariably reported when intercepting the Utica and Macasty shales. Geochemical analyses of the typical dark shales of both units led to the recognition of their significant hydrocarbon source rock potential as well as preliminary mapping of thermal maturation.

For the Utica Shale, extensive testing of its potential to release natural gas through high pressure hydraulic fracturing started a few years ago. It has been shown that the calcareous shales of the Utica have the capacity to release significant volume of natural gas, whereas a liquid-rich window has been identified near Quebec City; a situation in line with our current understanding of regional thermal maturation in southern Quebec. On Anticosti Island, preliminary data from the industry indicate that the Macasty shales are, at least locally, oil-rich. However, the potential of these shales to release economic volume of oil is still unknown.