LATE ABSTRACT

The Windsor Group: Overlooked Petroleum Potential Onshore Nova Scotia, Canada


Since the middle of the last century, 100 petroleum wells have been drilled onshore Nova Scotia resulting in non-commercial significant shows in about one-third of them while the same results have occurred in at least 68 wells drilled for other purposes. The major focus of past exploration has been in the Carboniferous Horton Group clastic rocks due to their similarity to the rocks of the Stoney Creek discovery in southeast New Brunswick. More attention is warranted for the overlying dominantly marine Windsor Group of rocks. A mere six shows have been reported in these rocks to date thus indicating the paucity of wells to evaluated this unit.

The Windsor Group is a regionally widespread marine unit up to 1000 metres thick. These rocks not only contain a diverse lithology but also display a wide range of structural and stratigraphic components which make it attractive for petroleum potential. A source rock study completed in 1991 concluded that the Windsor Group rocks are richer source rocks than originally thought, and contain greater reservoir potential due to the presence of a greater variety of possible trap combinations than contained in Horton Group rocks.

One area that was identified in the source rock study as having rich Windsor source rock potential is the St. Georges Bay of Nova Scotia. The source rock potential of the Windsor Group around Antigonish and Port Hood suggest that they are kerogen Type II-III, lie within the oil window (0.5 to 1.3%R0) and are mostly depleted in hydrocarbons due to early generation. Therefore, they are mostly considered as oil-prone source rocks. Similarly, the Horton Group has potential source rocks of kerogen Type II or II-III and because of higher maturity have potential for natural gas generation which can be trapped in Windsor reservoir rocks. The geological and geophysical work undertaken in this area over the last 2 years has resulted in the mapping of at least six separate salt-cored structures which have resulted from the flowage of thick Windsor Group evaporate. Reservoir development could occur on the crest and flanks of these structures capped by evaporate. Other structural and stratigraphic traps could occur adjacent to the salt-cored structures. Migration pathways could include north-east striking faults, north-to-northwest striking faults and low angle thrust faults.

Within the Windsor Group, there are other areas of interest when exploring for petroleum including reefal buildups, brecciated and karst features, association with base metal deposits and unconformities which can provide the necessary components of a petroleum play.