

Source Rocks and Maturation of the Carboniferous Rocks from Onshore Nova Scotia, Eastern Canada and their Relationship with the Natural Hydrocarbon Seepage and Stains

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The paleogeographic setting of the Carboniferous basins from onshore Nova Scotia is associated with three major structural areas which provides backdrop for studies of the evolving basin fill and its petroleum resources. The Carboniferous sediments contain various active and mature oil and gas-prone source rocks that include:

- ◆ lacustrine (oil-prone) and fluvio-deltaic shales (gas-prone) within the Horton Group (mainly Tournaisian)
- ◆ marine shale (oil-prone) and carbonates (oil & gas prone) of the Windsor Group (Viséan in age)
- ◆ fluviodeltaic shales (gas prone) of the Mabou Group (late Viséan – early Namurian)
- ◆ lacustrine (oil prone) and fluviodeltaic shale, coal (oil & gas prone), and coaly shales of the Cumberland Group (Wesphalian A through C).

The major oil-prone sources in onshore Canada are quite thin and restricted while the gas-prone sources are dominant in most basins.

Maturity profiles of the Carboniferous strata in the Windsor, Mabou, and Cumberland Groups of rocks suggest that these sediments are within the "oil window" in most areas of onshore Nova Scotia. Major fault movement controls the thermal regime within onshore Nova Scotia. Major thermal anomalies were detected in the area south and north of the Cobequid-Chedabucto Fault zone that has affected the Horton Group of rocks.

Numerous oil and gas seeps and the past drilling activities indicate some sixty-eight oil and gas shows/stains in the Carboniferous reservoirs in onshore Nova Scotia. Selected studies on the petroleum systems indicate their source rock affinity and possible migration pathways.