

Oil shales of the Stellarton Basin, Nova Scotia, Canada: stratigraphy, composition, depositional environment and potential uses

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The fault-bounded Stellarton Basin of northern Nova Scotia contains the Province's largest oil shale resources (825 x 10⁶ bbls of shale oil *in situ*). The oil shales belong to the 2600 m thick coal-

bearing Stellarton Formation of Westphalian B-D age. A total of 60 oil shale beds, which are separated by sandstone, siltstone, claystone, and/or coal, occur within the formation. Individual

beds thicken and thin laterally, average 5 m thick (one bed is up to 35 m thick), and are laterally continuous over 3-5 km. Near basin margins some of the oil shale beds are vertically and laterally transitional to coal.

Three lithologies, all silicate-rich (principally illite, quartz), comprise the oil shale beds, namely, fissile shale, cannel shale (massive oil shale), and boghead shale (stellarite). Cannel shales accumulated at or near lake margins while fissile shale and boghead shale formed under open lacustrine conditions.

Average hydrocarbon yields of 25 litres per tonne (l/t) or less, 40 l/t and 110 l/t are obtained from fissile shale, cannel shale and boghead shale, respectively. Total organic carbon (TOC) contents of fissile shale average 5 wt.% and comprise algal debris and minor vitrinite and inertinite. Cannel shales are transitional to coal and contain up to 40 wt.% TOC rich in vitrinite and

inertinite. Boghead shales average 19 wt.% TOC mostly as telalginite. Combustion testing of cannel shale from one bed shows them to be comparable to some currently produced Western Canadian coal generating 7800 BTUs/lb. Testing of boghead shale from 4 different beds gave values of only 150-4500 BTUs/lb.

Hydrocarbon yields of the oil shales show them to have yields too low for direct utilization when compared to higher yielding, but undeveloped, oil shale elsewhere (e.g., Green River, Rundle, and Albert deposits). However, the ability to recognize distinct oil shale beds within sections separated by 3-5 km makes them useful for section correlation. The association of some oil shale beds with coal show them to be a useful guide for coal exploration as well.