Prospects for conventional and unconventional hydrocarbon plays for the Winterhouse Formation, Port Au Port Peninsula, Newfoundland

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Winterhouse Formation, the Newfoundland equivalent to the Utica shale of New York, Ontario and Quebec, lies in a region of western Newfoundland that is thought to contain an active petroleum system. Outcrop studies in 2009 explored sedimentology, paleontology, structural geology, and petroleum prospects for these rocks. Some key findings on source reservoir and seal and relevant to exploration are reported here.

Winterhouse is thought to be well over 800 m of grey calcareous siltstone, punctuated with grey and white sandstone beds, and conglomerates. The base is a flooding event covering the underlying Lourdes Limestone. The top is a conformable succession of redbeds of the Misty Point Formation. In detail, the lower 130 m of Winterhouse strata are darker in colour and presumably a little more organic rich. Throughout this part of the section, acritarch concentrations are normally thousands of grains per gram and *Gloeocapsomorpha*, a key indicator species for source rock, are common. In contrast, the upper part of the formation is lighter grey in colour, he acritarch flora is markedly different in composition, and *Gloeocapsomorpha* are rare.

In total, Winterhouse strata are considered to be storm deposits punctuated by chaotic beds of conglomeratic debris covered with rafted and imbricated clasts. Some sandstone and conglomerate beds are darker in colour and smell of hydrocarbons when cracked. In other places, small joints and fractures are lined with pyrobitumen. The distribution of possible petroliferous beds is not uniform. Coastal outcrops are gently to steeply dipping and overturned. In addition, small faults, parasitic folds, and perhaps also drape folds appear to influence hydrocarbon migration. These aspects are addressed as threats and opportunities for conventional oil and gas and unconventional shale exploration.

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