

Structural Constraints for Oil and Gas Assessment in the Whitehorse Trough: New Results from Seismic Profiling

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Abstract

The Whitehorse Trough is an elongated, northwest-trending Mesozoic marine sedimentary basin which extends some 650 km from just north of Carmacks, Yukon, to near Dease Lake, British Columbia. It originated as a forearc basin in the Middle to Late Triassic, adjacent to the emerging Lewes River Arc, and had received more than 7,000 metres of clastic deposits by Middle Jurassic time. The Whitehorse Trough has been identified as an immature, gas-prone basin in which potential source rocks, reservoirs and seals occur. Potential for some 7.3 trillion cubic feet of gas, and possibly some oil, is estimated for the basin. Structural traps associated with clastic or carbonate reservoirs (Lewes River and Laberge groups) are proposed as having significant hydrocarbon potential with surface-defined anticlines posing the best primary drilling targets. However, current assessments of hydrocarbon potential in the Whitehorse Trough rely on limited stratigraphic studies and are based on conceptual plays.

In 2004, a regional, multi-channel, multi-component Vibroseis seismic reflection survey was conducted across the northern part of Whitehorse Trough. The survey comprises two seismic profiles totaling 170 km in length acquired along the Robert Campbell and North Klondike highways. Preliminary interpretation of the shallow seismic images depict broad antiformal and synformal structures truncated by relatively steep faults. Interpreted Lewes River and Laberge groups strata attain a maximum thickness of 6000-7000 m toward the west side of the Trough with interpreted Laberge Group accounting for up to ~3000 m of this total. Maximum vertical relief of the structures is ~4000 m.