

Hydrocarbon Potential Of The Bonnet Plume Basin: A Frontier Basin in Yukon, Canada

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Summary

The Bonnet Plume Basin is a physiographic and structural depression near the eastern margin of the Frontal Belt of the Cordilleran Orogen in northern Yukon, Canada. It formed in early Late Cretaceous time by down-dropping Paleozoic strata along regional faults, and contains up to 7,500 m of clastic and carbonate sediments ranging from Precambrian to Tertiary in age. The oldest strata are Precambrian metasediments of the Wernecke Supergroup. This is overlain unconformably by a thick Paleozoic succession of marine limestone and mudstone (i.e., Illtyd, Slatts Creek, Taiga, Rabbit Kettle, Bouvette, Canol and Imperial formations, and the Road River Group). The youngest strata are Cretaceous and Tertiary clastics of the Bonnet Plume Formation that unconformably overlie the Paleozoic sediments.

The Bonnet Plume Formation is informally subdivided into the Lower Bonnet Plume formation and the Upper Bonnet Plume formation. The Lower Bonnet Plume formation (Albian) consists of interbedded conglomerate, sandstone, mudstone and bituminous coal deposited in a fluvial environment, and the Upper Bonnet Plume formation (Paleocene) consists of fluvial sandstone, mudstone and lignite. Based on regional geology and sediment type and thickness, the Bonnet Plume Basin is thought to have gas potential, but insignificant oil potential. Lower Paleozoic clastic and carbonate strata are potential source rocks, as are Cretaceous clastic strata. The median estimate for the total gas potential in the Bonnet Plume Basin is 896 Bcf of in-place gas. In addition, extensive coal deposits in the Bonnet Plume Formation indicate that it has significant coalbed methane potential. Although no seismic surveys have been undertaken and no oil and gas wells have been drilled, the proposed Mackenzie Valley Pipeline would make this basin a viable hydrocarbon exploration target.