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Pointed Mountain, Northwest Territories: Mississippian Flett-Prophet Gas Prospect

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ABSTRACT

The Mississippian Flett and Prophet Formations are present in the subsurface of the Pointed Mountain structure. The north-south, 24 km long and 8 km wide, Pointed Mountain doubly plunging anticline has an axial trace that parallels the Flett-Prophet carbonate bank edge development defined from outcrop and well control. The Flett contains bryozoan-pelmatozoan limestone with subordinate dolostone, spicule-rich rocks and fine-grained silicoclastics. In contrast, the Prophet is chiefly spiculite, spicule-rich limestone, and shale. Chert occurs in both formations but is more abundant in the Prophet.

The South Pointed Mountain L-68 well encountered numerous natural gas kicks and flared gas while drilling through the Flett-Prophet section. Petrography and scanning electron microscopy shows the presence of chert replacement textures that have developed intergranular and moldic microporosity. Flett-Prophet gas kicks were also encountered in other Pointed Mountain wells that were drilled for the deeper Middle Devonian Nahanni dolomite reservoir. The asymmetric geometry, with a steeper east limb, of the Pointed Mountain anticline means that the wells that had productive Nahanni gas were drilled on the west flank of the structure, west of the structural high point in the overlying Flett-Prophet. The exception is the L-68 well that missed the leading edge thrust at the Nahanni level, but penetrated the Flett-Prophet closer to the shallower Flett culmination of the structure.

Natural gas rights on the Pointed Mountain structure were recently acquired by Canadian Forest Oil Ltd. and ADK Petroleum Limited Partnership. The Flett-Prophet has never been tested on this very large structure. The evidence of a thick gas-charged water-free Flett-Prophet section, an unconventional low permeability chert-replacement microporosity, tectonic fractures associated with folding, and pipeline proximity warrants a re-entry of L-28. The drilling of new Flett-Prophet test holes on the structure, using the latest in drilling technology to optimise gas flow rates, may prove up large economic gas reserves. The Flett and Profit are equivalent to the gas productive Debolt Formation of northeastern British Columbia. The low permeability, unconventional carbonate bank-edge, gas-charged water-free Upper Devonian Jean Marie play is a possible analogy.