

New Hydrocarbon Play Opportunities in Cenomanian Strata of Eagle Plain Basin, Northern Yukon Territory

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Eagle Plain Basin is a relatively unexplored sedimentary basin with recognized hydrocarbon potential located in northern Yukon Territory. The Cretaceous succession contains estimated resources of 108 MMbbls of crude oil and 350 Bcf of natural gas (Osadetz et al., 2005); with the cretaceous section commonly considered a secondary target to Upper Palaeozoic strata. Of 35 wells drilled in the basin, 32 were drilled prior to 1978; these are mainly concentrated in south-east Eagle Plain where access is easiest and the most significant hydrocarbon shows have been targeted in Laramide-related anticline and fault traps.

The Cenomanian Parkin Formation consists of a basal transgressive pebbly sandstone member with high-quality reservoir characteristics and an overlying shale member. The Parkin shale member is overlain by cycles of deltaic sandstones of the Fishing Branch Formation which have tested significant volumes of gas, with rates up to 3,300 mcf/day. Recent field work discovered large outcrops within the western part of the Eagle Plain Basin of large scale convoluted interbedded sandstone and shales, with deformation involving an up to 100m section of strata of the Parkin shale member. These are interpreted as mass-transport deposits, and indicate the presence of a shelf-slope break in the Cenomanian basin with relief of at least 100m. This adds a new degree of complexity to previous interpretation of low-angle ramp style basin morphology (Dixon, 1992).

Recognition of a shelf-slope break with sand-rich slump deposits could have profound implications for hydrocarbon potential of the Parkin and Fishing Branch sandstones, opening the door for a variety of new large play opportunities, e.g., shelf-margin delta and turbidite fan sandstones. Such plays are host to very large gas accumulation within world-class basins. The gas-charged Chinkeh sandstone of the Liard Basin in British Columbia could also provide an analogue for the basal Parkin sandstone. Thick units of known and potential source rock are identified in Eagle Plain Basin and the presence of migration pathways is evident from previous exploration; thus, timing is the key for hydrocarbon accumulation. Petroleum systems in the basin are the subject of an ongoing study incorporating outcrop, well logs, and core, supplemented by reprocessed seismic data optimized for shallower intervals of the basin.