

## **Prospectivity and Hydrocarbon Potential of the Mackenzie Delta/Beaufort Sea Petroleum Province: a Northern Gulf of Mexico Waiting for it's Time**

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The Mackenzie River is second only to the mighty Mississippi River in North America in terms of drainage area and sediment discharge. Like the Mississippi, the Mackenzie River has formed a very thick deltaic sequence that extends far into the Beaufort Sea at a scale that rivals that of the Mississippi Delta extending out into the Gulf of Mexico. From a prospectivity and hydrocarbon potential perspective, the Mackenzie Delta/Beaufort Sea has had the same fundamental geologic processes operating in its favour as have occurred in the Mississippi Delta/Gulf of Mexico hydrocarbon province. These processes include the abundant supply of organic detritus, deposition of thick sand/shale sequences and the resultant formation of large growth faults that set up structural traps (e.g., Taglu and Amauligak fields).

There are important geologic differences between the two deltas. The Mississippi delta has an underlying salt layer that has migrated up-section and outboard over time, creating large salt canopies and offsetting deep hydrocarbon kitchens. There is no evidence for the presence of salt in the Beaufort-Mackenzie Basin (BMB) and the evidence for mobile shale is equivocal. However, large Larimide-age folds of the Beaufort Fold Belt occur in the western portion of the Mackenzie Delta, setting up additional large structural traps with offsetting deep hydrocarbon kitchens (e.g., Adlartok field). Also, in proximal parts of the Mackenzie Delta thinned by erosion, the underlying rifted margin sequence provides additional North Sea style prospectivity (e.g., Parsons Lake and Tuk fields).

Because the BMB is relatively undrilled and new technologies have not been applied, the upside potential of the BMB has yet to be realized. Only one offshore 3D has been shot to date, very large turbidite plays remain untested, deep and ultra-deep wells have not been drilled, electromagnetic resolution of hydrocarbons can be used in deeper water parts of the basin and innovations in arctic drilling and field development can be applied.

Resolution of the current gas pipeline impasse is critical to further exploration and development of the BMB. However, an important consideration is that a lot of oil has been discovered to date in the BMB and much of the upside potential of the BMB is further offshore in areas that are more oil prone. An oil pipeline to Norman Wells could utilize the line there in the short term and perhaps its right-of-way could be utilized for a larger line in the long term. Alternatively, oil could be taken out by very large tankers like those now being built for transporting oil in the Russian Arctic. When tankers or pipe finally arrive, the huge upside potential of the BMB will demand its transformation to a northern energy hub. An Arctic Gulf of Mexico waits for its time.