



## A Re-examination of Beaufort Sea-Mackenzie Delta Basin Gas Hydrate Resource Potential Using a Petroleum Play Approach

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### Abstract

An environment favoring gas hydrate (GH) stability and a timely petroleum flux into suitable reservoirs are necessary conditions for GH accumulation. We re-examine the Beaufort Sea-Mackenzie Delta Basin (BMB) GH resource using a petroleum play approach. Geological factors, such as reservoir distribution and conduits/faults connecting gas sources to the GH stability zone control accumulation characteristics that may affect recovery technology and production potential. It is desirable to classify the resource as a function of its characteristics and geological setting. We used both a deterministic spatial model and a reservoir parameter probabilistic model to characterize the GH resource as a function of reservoir parameters that are potential proxies for technological and economic supply controls. Reservoir quality and a spatial association with structure, probably indicative of the gas pathway from deeper levels, are key factors controlling resource volumes and accumulation characteristics.

The deterministic total estimate =  $8.82 \times 10^{12}$  m<sup>3</sup> GIP is illustrated by gas hydrate saturation ( $6.40 \times 10^{12}$  m<sup>3</sup> and  $4.59 \times 10^{12}$  m<sup>3</sup> GIP if average gas saturation is >30% and >50%, respectively). A comparable expected total =  $10.23 \times 10^{12}$  m<sup>3</sup> GIP, (expected  $6.93 \times 10^{12}$  m<sup>3</sup> and  $4.20 \times 10^{12}$  m<sup>3</sup> GIP if gas saturation is >30% and >50%, respectively) is obtained using the probabilistic analysis. Estimates of regionally sequestered methane in GH constrain long-term regional methane flux rates. The flux rate is estimated <0.09-4.20 mg/m<sup>2</sup>/d, which is lower than the tens to hundreds of mg/m<sup>2</sup>/d suggested recently. Understanding methane flux may also characterize seals and trap fill fractions in deeper conventional plays.