Quaternary Geological Studies in Northeast British Columbia, Canada: Quaternary Gas Potential and Aggregate Inventory

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ABSTRACT

Quaternary geology studies in northeast British Columbia have two main applications for oil and gas activities. The first is the provision of a stratigraphic framework for Quaternary gas exploration plays in the region. The second is in the identification of aggregate resources for oil and gas development roads in areas of rapidly expanding exploration activity. This paper will discuss recent results of Quaternary studies in northeast BC in relation to these two applications.

Interest in Quaternary gas was highlighted in the region by development of the Sousa Quaternary gas field near High Level, Alberta which has successfully been producing gas since 1998 from paleochannel sediments underlying late Quaternary glacial deposits. The paleochannel sediments are sands and gravels believed to be of early Quaternary age although a Tertiary age is also possible. The cap for the gas is thick clay-rich glacial tills and glaciolacustrine sediments. Northeastern British Columbia has similar geology, and a similar glacial history, to the High Level area and as such has similar potential to host Quaternary gas. Bedrock topography and inferred paleochannel mapping are currently being undertaken as a first step to evaluate the potential of the area to host such gas reserves. To date, 825 wireline-geophysical logs have been used to map the surface of Upper Cretaceous, Dunvegan Formation conglomerates, sandstones and shales and Lower Cretaceous Fort St. John Group shales and sandstones in NTS map sheets 94I and 94P. Where possible, lithologic and sedimentologic descriptions in neighbouring conductor pipe and water well logs have been used to verify bedrock picks. Drift thickness in these maps sheets varies from a few metres to as much as 280 m. Areas with bedrock lows, and areas with granular material overlying bedrock, have been identified suggesting the presence of Late Tertiary to Pleistocene paleochannels. Features such as these could be suitable targets for shallow or Quaternary gas exploration.

A key component of the BC Oil and Gas Development Strategy (OGDS) is a comprehensive road infrastructure plan, aimed at promoting better access to resources through improved infrastructure. At the forefront of this vision is British Columbia, Canada. The completion of road infrastructure improvements, such as the upgrade of the Sierra-Yoyo-Desan Road and construction of the Clarke Lake By-Pass Road in the Fort Nelson area, is expected to promote longer drilling seasons, accelerate exploration and production programs, and increase

industry and Provincial revenues. It has been estimated that 2 000 000 m^3 of aggregate material are needed for this initial road infrastructure improvement program. A study completed by Thurber (2000) indicated that existing aggregate resources in northeast British Columbia were largely depleted. To meet this need a program was initiated to systematically explore for new, local aggregate sources in northeast British Columbia.

Subdued topography, extensive muskeg, and a general scarcity of glaciofluvial landforms make the use of traditional mapping techniques such as aerial photograph interpretation relatively ineffective for locating new deposits. Additionally, 1 to 2 m of glaciolacustrine silt and clay or other glacial sediments commonly blanket much of the area. The use of data sources such as wireline-geophysical, waterwell, seismic shot-hole, and rathole logs, and airborne aeromagnetic, high resolution electromagnetics and other remote sensing techniques have been successfully employed in exploring for buried or blind gravels. To date, four main aggregate resources have been identified within the SYD Road corridor, with a total resource of approximately 5 000 000 m^3 of granular material.