

Yukon Oil and Gas – Past and Future

Lee Pigage

Yukon Geological Survey, Whitehorse, Yukon

lee.pigage@gov.yk.ca

Yukon is an underexplored jurisdiction with eight sedimentary basins identified as having high conventional oil and gas resource potential. Six of these basins occur in north Yukon, and two occur in south Yukon. Discovered reserves have been delineated from two basins: Eagle Plain in north Yukon and Liard Basin in southeast Yukon. Historical production consists of natural gas from Liard Basin. To date there has been no oil production.

Basin potential resource studies have recently been completed for each of the eight basins by the National Energy Board and/or the Geological Survey of Canada (Calgary, Alberta). Mean estimated total petroleum initially-in-place for eight basins is 17 Tcf natural gas and 771 MMbbls oil. Completed wells in Eagle Plain and Liard Basin have discovered resources of 501 Bcf natural gas and 11 MMbbls oil. Cumulative production from Kotaneelee field in Yukon from 1979 to March 2007 is 223 Bcf natural gas.

Surface exploration in Yukon began in the 1950's and has continued intermittently to the present. Most exploration activity ceased in mid to late 1970's. Greater than 14,000 line-km of 2-D seismic has been completed with most of the seismic studies occurring in the Beaufort-Mackenzie and Eagle Plain areas. A total of 73 wells have been completed to date in the entire Yukon, with the first spudded in 1958, and the most recent in 2005.

Hydrocarbon plays within Yukon are largely conceptual. Host rocks range in age from Lower Paleozoic to Tertiary. Lower Paleozoic plays are stratigraphic and structural traps in a facies transition from Mackenzie carbonate platform in the east to carbonaceous deep water basinal shales in the west. Late Paleozoic plays are stratigraphic and structural traps in carbonate and siliciclastic sedimentary rocks associated with deposition in marine foreland basins associated with the developing Ellesmerian orogeny to the North. Mesozoic and Tertiary plays are structural and stratigraphic traps in sandstone and conglomerate horizons developing in foreland marine and nonmarine basins associated with ongoing Cordilleran orogeny caused by amalgamation of ancient North America with various suspect terranes.

Historically Liard Basin production consists of natural gas from three fields: Beaver River, Kotaneelee, and La Biche. These fields are hosted in fractured, hydrothermal dolomite of the Manetoe facies within Middle Devonian carbonate rocks. Gas is trapped in closures formed by anticlines, normal faults, and reverse faults. Commonly gas is trapped on top of water. Only 13 wells have been completed in Liard Basin in Yukon.

The Yukon *Oil and Gas* Act and regulations were developed in partnership with Yukon First Nations following the transfer of oil and gas management responsibilities from the federal government in 1998. To date Yukon has enacted regulations governing the transfer of federal

disposition to Yukon control, disposition of rights, license administration, geoscience exploration, and drilling and production. Royalty regulations are expected to be passed by the end of 2007. Land claims settlements have been finalized for 11 of the 14 First Nations within Yukon. Yukon has intervened with Mackenzie Gas Project hearings to ensure northern Yukon resources are not stranded and to ensure that employment, procurement and training opportunities are available to Yukon residents while highways, transportation and social issues are mitigated. Yukon is also closely following developments with the Alaska Highway pipeline.