

Fault-associated hydrothermally-dolomitized reservoirs (HTD) in Devonian strata of northeastern British Columbia – A large-scale geological exploration concept.

Achour J. Madi*, and Allula Damte
Petrel Robertson Consulting Ltd.
106 Sierra Nevada Way SW, Calgary, AB, T3H 3P2
jmadi@petrelrob.com

and

Mark Hayes
B.C. Ministry of Energy & Mines.

ABSTRACT

Recent exploration for deep Devonian gas in NW Alberta and NE British Columbia has triggered a renewed search for suitable geological models to explain the occurrence of hydrocarbon pools hosted in hydrothermal dolomites (HTD) of the Slave Point and Keg River formations.

Pervasive dolomitization has occurred along the edge of the Slave Point and Keg river platform margins, and along the edges of Hotchkiss Embayment, where stromatoporoid-coral grainstone and rudstone were deposited in high-energy environments. In contrast, the internal lagoonal limestones exhibit porosity development only where extensional faults crosscut facies that contained primary porosity and permeability (generally found in coarse bioclastic facies around the limits of the parasequences).

In addition to the major -Hay River and Liard- shear zones, that bound the study area, numerous smaller, en echelon arrays of faults have been interpreted, based on dolomitized and leached limestone trends. These faults are situated along carbonate bank edges, and may have influenced both the location of the edges of the carbonate Platforms, and later served as conduits for hydrothermal fluid migration. Syn-depositional reactivation of the Hay River Fault Zone may have influenced the formation of the Hotchkiss Embayment, which in turn controlled the deposition of high-energy bioconstructed facies on its northern and southern edges.

Three main factors generating hydrothermal dolomite reservoirs are: (i) facies – presence of primary porosity; (ii) extensional tectonic setting – deep-seated high-angle faults and fractures which allow fluid flow; and (iii) elevated geothermal gradient, providing a source for the hydrothermal fluids.

This paper documents the regional lithostratigraphic framework of Devonian units, maps dolomitization trends in the Slave Point, Sulphur Point and Keg River

reservoirs, and proposes a play concept that can be used as an exploration tool for new Devonian pools in northeastern British Columbia.