AN UPDATED RESERVOIR MODEL AND OPTIMIZATION OF THE JOHNSON 'B' POOL, COUNTESS-ALDERSON TREND, S. ALBERTA

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The Johnson Glauconitic 'B' Pool discovered in 1982 with the drilling of 8-23-16-15W4 extends from 23-16-15W4 to 31-16-14W4 along the Countess-Alderson trend. This study was initiated to better understand the geological control influencing the current production, to identify further infill locations, and to optimize production from existing wells with integrated geological, petrological, geophysical, and reservoir engineering data.

The Johnson 'B' Pool discovery well tested 26° API oil out of an 8.3m thick Glauconite sand. After further delineation, the reservoir sands were interpreted to consist of four main fluvial-dominated deltaic channels connected by sheet sands. The pool presently has 30 producing wells and 4 water injectors. The pool produced 740,864 m³ oil and 53.8 E⁶ m³ gas with a 68% watercut to the end of December 1994. The estimated OOIP and total recoverable oil are 2,632,095 m³ and 1,326,375 m³ respectively.

As a result of this study, three depositional sequences are recognized within the Johnson 'B' Pool. The oldest sequence is a coarse-grained, chert and kaolinite rich sand, interpreted as a braided fluvial Basal Quartz sand. The later Lower Glauconitic incision event removed most of the underlying strata and preserved isolated remnants of the Basal Quartz sand. This second sequence forms part of a Bay Head Delta complex within an upper estuarine setting. It is comprised of distributary channel, interdistributary bay, and delta front sandstones. The third, youngest Middle Glauconitic incision event truncates the previous sequence and is composed of a prograding Bay Head Delta interbedded with sandstone and shale of Central Basin deposits.

The Johnson 'B' reservoir produces from both the older Basal Quartz channel and the younger Glauconitic estuarine distributary channel deposits. The Basal Quartz channel has an average porosity of 18% and a permeability range of 110 - 2250 md. In contrast, the younger estuarine channel has better reservoir quality. Porosities can reach 28% with a permeability range of 1660-3700 md. The shaly Middle Glauconitic sequence seals the reservoir. The improved understanding of the reservoir unit will be used as a predictive tool in optimizing the hydrocarbon production from the pool.