geoconvention
Calgary • Canada • May 15-19 2017

Lithic Mannville: Significant New Oil and Gas Opportunities- Part 2: Defining, Evaluating, High Grading and Developing Prospect Potential

Leonard Stevens, Richard Wierzbicki, Frank Palmai (1), Fred Hyland (2), Gregg Milne (3)
(1) PrairieSky Royalty Ltd., (2) Hyland Alliance Inc. (3) J. G. Milne Exploration Consultants

A case study of the Parflesh Prospect in the “Wheatland Area” of Southern Alberta will present a proposed “Prospecting Tool Kit”. This “Tool Kit” integrates petrophysics, seismic mapping, as well as drill-cutting, core and petrography data. DST data is also utilized in the interpretation. These data can subsequently be utilized as inputs for the prediction of reservoir quality and ranking the reservoir potential of prospects. Recent Glauconitic Lithic Channel Industry activity and production performance will be shown to illustrate results.

An extensive Lithic Channel Fairway (~340 miles long, ~100miles wide) exists in the WCSB from the Alberta/Montana border to north west of Edmonton, Alberta. Within this Fairway, prospects need to be further defined, evaluated and high graded. The “Lithic Mannville” and “Lithic Glauconitic” in the WCSB are plays with very large resource potential.

Historically, Glauconitic and Post Glauconitic Upper Mannville Group lithic channels have been successfully developed for gas production in specific areas with fracture stimulated vertical wells. Traditionally, the conventional higher quality Glauconitic Formation quartzose channels have been the favored oil exploration and development targets. The more extensive lower permeability Glauconitic and Post Glauconitic lithic channels are largely under evaluated and undeveloped. Recent Industry technical and economic success has been achieved throughout the large Lithic Channel Fairway in these widespread low permeability sandstone reservoirs using multi-stage hydraulic fracture stimulated horizontal wells. Even in today’s challenging price environment, these “shallow depth” lithic channels are economic to drill at current oil prices.

The Upper Mannville Group consists of channel and “regional” sandstones. Extensive channel systems exist in both the Glauconitic Formation as well as in the Post Glauconitic Upper Mannville Group. Fluvial channel sandstones in the Upper Mannville time period records a progressive provenance change manifested by an increase in feldspar content and a decrease in mineralogical maturity. Compositional changes coupled with burial diagenesis results in notably reduced reservoir quality in lithic vs quartzose sandstones. The focus of this presentation will be on the lithic channels, however lithic “regional” sequences also have extensive potential.

The case study of the Parflesh Prospect will illustrate how to integrate the entire “Prospecting Tool Kit”, with a focus on the additional important role that Petrophysics can play in evaluating, comparing, understanding and ranking reservoir potential and prospects.

These feldspathic clay-rich Lithic Channels present several petrophysical challenges. Firstly, the historical opinion that these strata are not of reservoir quality, lead to a scarcity of quantitative core data. Operators often choose not to perform a complete suite of laboratory analysis on Lithic Channel core. Often, Lithic Channel core porosity was not routinely performed throughout the entire core at the time of capture, but there is often sufficient core porosity analysis to test the porosity component of a petrophysical model. Alternatively, water saturation, electrical properties and quantitative mineralogy data are sparse to none existent, as these analysis were likely deemed an unnecessary expense. This data gap leaves water saturation and clay volumes unrestrained in petrophysical models. The authors employed various deterministic methods in an attempt to constrain these values, for the purpose of determining which might best predict reservoir quality.

Recent Glauconitic Lithic Channel activity and production performance will also be shown to illustrate results in this emerging play. Targeted Lithic channel OOIP (per section/per channel) can range from 12-20 MMbbls. Stimulated horizontal wells have demonstrated IPs of 100-400 bopd and EUR’s of 80-160 Mbbls oil (not including gas or liquids). Gas opportunities also exist with OGIP potential of 8-14 BCF/section. Additionally in many areas, lithic channel stacking can dramatically increase potential oil and gas reserves.