Title: “Advanced Petrophysical Evaluation of a Low-Resistivity Laminated Shaly Sand Formation Showed Significant Increase in Reserves Calculations”

Abstract

Reserve estimation of low-resistivity, low-contrast, laminated shaly sand formations from conventional logging tools often yield inaccurate results of the true potential of the reservoir. A productive zone with horizontal resistivity of 1 Ohm-m can easily be interpreted as wet and therefore overlooked. The resistivity suppression is caused by a lack of conventional tool resolution and the presence of conductive shale lamina. This paper will describe advanced techniques for effective evaluation of the low-resistivity laminated shaly sand sequences.

To accurately identify and quantify these thinly laminated sands, we will detail a method to acquire the necessary data for proper reserve calculation with examples from a well in the Gulf of Mexico. The study well has a deep-water distal turbidite depositional environment, and contains significant intervals of thinly-bedded sands and shales. The sedimentary facies appeared to be different to offset wells because of separation by a large fault. This geological setting caused an expected zone of interest to have a very low apparent resistivity and brought a lot of uncertainty about hydrocarbon potential of the formation. To provide a thorough appraisal, a suite of most beneficial for such environment advanced wireline measurements were acquired, which were combined with core analysis and conventional logs for an accurate evaluation of thin sand layers.

This integrated approach improved net pay calculations by 80% when compared to the conventional petrophysical analysis, allowing the operator to make some key adjustments in the completion program. The proof of the laminated formation having hydrocarbon potential from the integrated petrophysical analysis was confirmed by the production data. Multiple 24-hour flow tests confirmed oil and gas production with an inconsequential amount of water.

Short Bio:

Alisa Kukharchuk is a petrophysicist at Baker Hughes based in Houston, Texas. She interprets data from multiple wireline and LWD services with a purpose of formation evaluation of conventional and unconventional reservoirs. She joined Baker Hughes in 2013 and for several years her main specialization was evaluation laminated shaly sand reservoirs using triaxial resistivity measurements. Throughout the years she expanded her expertise working with multiple resistivity services (induction, propagation and dielectric measurements), as well as mineralogy services. Alisa covers very diverse types of reservoirs, including challenging deep water projects and unconventional shale plays. She holds a MS in Mining Engineering with a specialization in petrophysics from Russian State Geological Prospecting University from Moscow, Russia.