

Determining Tar Sands Facies using Borehole Image Logs and Feedback from Core Interpretation

Kris Vickerman*
HEF Petrophysical Consulting Inc., Calgary, AB, Canada
kris@hef.com

and

Richard Surtees
HEF Petrophysical Consulting Inc., Calgary, AB, Canada

The Athabasca Oil Sands deposit is stratigraphically extremely complex but there are two excellent tools available to attempt to measure this complexity. The ideal method is careful core study but there are several limitations to using core alone, namely missing core, depth control and issues with core expansion. The other method available for facies determination is using borehole microresistivity image and other petrophysical logs to distinguish the different facies.

Care must be taken when using image logs for lithofacies determination as there are many different facies zones that are commonly used when characterizing the Athabasca Oils Sands deposit. By carefully comparing digital core photos to the image logs, the core photos can be moved on depth and can be variably expanded and contracted so that each mud lamination is correctly positioned next to the same feature in the image log. This solves the core depth control issue and addresses the problem of heterogeneous core expansion.

By examining the lithofacies identified in the core, and looking at the corresponding image log response, analogues can be developed so that facies can be interpreted from the image and openhole logs alone. The image log-determined facies can then be compared against core-determined facies in other wells to further enhance the analogue model. The analogue model can then be used to cover zones where core is missing or where core acquisition is impossible.

Image log facies and other petrophysical curves can then used for net pay and other calculations and modeling as normal.