

A Comparison of Hydrocarbon Mobility Understanding, Approaches and Applied Workflows

Stephanie E. Perry
GeoMark Research Ltd.

Summary

The innovation and advancement of open hole wireline tools as well as laboratory methodology has led the petrophysical discipline to techniques and approaches that can access the mobile versus immobile fractions of both the water and hydrocarbon filled pore volume. Techniques and approaches to the quantify vary from applied nuclear magnetic resonance cut-off methodology to programmed pyrolysis understanding and hydrocarbon light versus heavy fraction corrections.

Theory / Method / Workflow

Here, we review the various tools, approaches and work flows that can be applied to a single well case study. We highlight the important technical differences in tool quantification and fluid partitioning results from applying the mathematical logic of the techniques. We also introduce a new quantification approach that includes integrating geochemistry with petrophysics based on laboratory results from a closed retort fluid quantification. All results and quantification will also be compared to wireline based petrophysical evaluations to link the geologic context to petrophysical results.

Results, Observations, Conclusions

We investigate the applied methodology via cross-plot associations and links to measured data sets. This then allows a translation of the applied correlations to wireline-based interpretation. The five overall approaches investigated are as follows:

1. Nuclear Magnetic Resonance based 'Heavy' (Often Bitumen) Correction
2. Total Porosity-Bitumen Correction Approach via Programmed Pyrolysis
3. Thermal Maturity, Temperature Maximum and Thermal Stress Methodology
4. Closed Retort and Programmed Pyrolysis Methodology
5. Thermal Extraction of Organic Matter (Applied on Oils) Combined with Closed Retort Approach

Novel/Additive Information

Results will empower geoscientists with quantitative results and differences observed. Results will then guide the recommendation, accuracy and appropriate use of the above workflows/tools to a single well or basin scale study.