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*Reservoir Characterization for Energy Security*

## Utilizing machine learning to replace traditional Petrophysical equations in the McMurray

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### ABSTRACT

A deterministic workflow including some derivation of the Archie saturation equation has been the staple of many petrophysicists in their interpretation of the McMurray Formation. Although there is ample Dean Stark core analysis with weight percent bitumen, weight percent water, and porosity, very little has been done on water sampling and electrical properties work to assist in the interpretation. The Archie electrical parameters of a, m, n and the formation water resistivity (Rw) have been the manipulated variables for most interpreters to get saturations to match core. These properties are rarely based on measured values.

This presentation proposes a workflow that utilizes standard petrophysical logs and a version of machine learning, K Nearest Neighbours (KNN). The KNN methodology is hosted within Emerson's Geolog petrophysical software. The proposed methodology bypasses individual Archie variable manipulation while increasing a direct match to core. This workflow provides a very consistent, robust interpretation that allows direct comparison between fields.