# Source Rock Analysis Using Machine-Learning Derived Parameters from Petrophysical Logs in the Unconventional Cane Creek formation, Utah

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## Abstract

The Cane Creek formation, Paradox Basin, Utah, is a prolific yet challenging reservoir given the complex stratigraphic layout in the area. The scope of this analysis is to determine the source rock properties and identification of producible plays in the basin. The standard method to determine hydrocarbon production potential in an unconventional reservoir is with source rock analysis from anhydrous pyrolysis tests on drilling cuttings. Due to operational restrictions, the pyrolysis tests are completed at discrete intervals, leading to data gaps where no samples are available. The method consists of predicting continuous pyrolysis parameters TOC, S1, S2, S3, and Tmax derived from petrophysical logs, by implementing machine learning algorithms including a thorough log quality control, statistical pre-processing, and lithology controls. The source rock analysis with Van-Krevelen diagrams indicates if the in-situ generated fluids match the fluids identified by gas chromatography analysis, thus segregating in-situ sourced fluids from migrated. The ML predictive model is also extrapolated to other wells in the area with no source rock analysis, followed by log upscaling, propagation of petrophysical values into a three-dimensional model using seismic attributes, as a novel prediction model to identify high productivity hot-spots, optimizing drilling and hydraulic fracking programs.