

An Evaluation of Log Responses in the Bakken Shale

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ABSTRACT

A wealth of information can be found in the very large electric log database of the Williston Basin. Log curves such as gamma ray, deep resistivity, and the bulk density can be utilized to construct regional maps of certain variables. For example, bulk density mapping is a method that closely approximates the variation in total organic carbon values within both the upper and lower Bakken shale members. Similarly, regional distribution maps of maximum deep resistivity values correlate very well with Bakken shale maturity lines. Other log responses of interest for mapping purposes are 1) isopachs of maximum deep resistivity in the lower Lodgepole, the upper Bakken shale, the middle Bakken, and the lower shale, 2) isopach of the "deep resistivity bulge" beginning at the top of the lower Lodgepole and terminating at the base of the lower Bakken shale, and 3) the maximum deep resistivity in the lower Lodgepole.

Each of these maps make contributions to understanding all members in the Bakken group on a regional basis, but it is also very informative to overlay them. By doing so, it becomes easier to envision the relationship that occurs between each member and see possible exploration applications.

On a more detailed basis, the Bakken group can be evaluated using a technique that has been developed by Canadian/American Hunter and is known internally as a two dimensional "pseudo" core. This computer generated product is based upon an intensive study of a foot by foot correlation between electric logs and real cores. It provides both mineral and fluid identification evaluation.

As a complex source and reservoir rock, the Bakken and adjacent formations must be evaluated on both a detailed regional and local level as described above if the reservoir model is to be accurately defined.