

# Methodology to Obtain an Accurate TOC Output from Spectroscopy Logs in Oil Base Mud Systems

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## Abstract

The Litho Scanner\* pulsed-neutron spectroscopy tool combines the advantages of inelastic and capture gamma-ray spectroscopy, thus enabling the stand-alone evaluation of Total Organic Carbon (TOC). Use of oil-based mud presents a new challenge in which the carbon in the borehole must be accurately resolved from the organic carbon of the reservoir to get an accurate formation TOC value. A previous publication demonstrated the accuracy of TOC in wells with both water and oil based mud systems. In these cases, the boreholes were in good condition and a constant borehole carbon correction produced good results. However, the borehole carbon signal is sensitive to variations in borehole size, borehole shape, and other environmental effects, which must be taken into account to get an accurate TOC.

Monte Carlo modeling is a valuable technique for understanding the measurement sensitivity to elements in the borehole over a wide range of environmental conditions. It is possible to derive a borehole correction purely from modeling, but unfortunately, an accurate mud composition is rarely available in practice. A better solution is to combine modeling information with in-situ empirical data in order to customize an accurate borehole correction for each well. The method is fully automated in software to provide a robust and repeatable correction. The most pressing application is to correct the TOC measurement when hydrocarbons are present in the borehole, but the method is theoretically applicable to any mineral element in the borehole as well.

Multiple examples of field data illustrate the variable impact of borehole carbon on raw TOC measurements and the efficacy of the new automatic borehole correction in producing accurate TOC.

## Reference Cited

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