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Porosity in Rocks Containing Clay: Effective or Total?

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ABSTRACT

This paper clarifies the definition, determination, and use of porosity, clay and shale in formation evaluation. The issues involved, supported by core analysis, are described, summarized and resolved.

In the literature porosity is defined many different ways. For formation evaluation purposes the primary terms are total and effective porosity. Petrophysicists define effective porosity differently than engineers and geologists. One of the reasons is there are four definitions of effective porosity in common use. These definitions for effective porosity will be defined and explained consistent with the API Recommended Practices No. 40 published in 1998.

The measurement of porosity, shale and clay from core will be described. Core data to support and clarify the concepts, definitions, measurements, and proper determination from well logs is presented. The core measurements cover sand and shale and include conventional and humidity dried measurement of porosity, capillary pressure, X-ray diffraction and thin section point count.

The proper use and integration with well logs to obtain results consistent with core analysis will be covered along with the proper log analysis results to use for reservoir engineering and geophysical purposes. The method for consistently moving between the total and effective porosity system and retaining the proper bulk volume hydrocarbon will be given.