

## Comparing Two Different NMR Based Porosity Measurements of Drill Cuttings

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**Abstract.** Drill cuttings are ubiquitous in well drilling operations, but beyond mud logging, cuttings are often discarded without analysis. Recently, there has been an increased interest in employing cuttings to unlock more information about wells. Specifically, there has been interest in applying nuclear magnetic resonance (NMR) core analysis techniques to cuttings. Deriving porosity of drill cuttings via NMR  $T_2$ -pore size distribution can be significantly influenced by surface fluid on the cuttings, acquired either during saturation of the cuttings in the lab or from cutting fluid at the well site, which can easily be misinterpreted as pore volume. Over the past several years, Green Imaging Technologies (GIT) and Aramco Americas have developed two different methods for distinguishing fluid in the pores from fluid on the surface of the cuttings.

The Aramco method relies on applying a cutoff to the  $T_2$  pore size distributions, where the NMR signal below the cutoff originates from fluid in the pores of the sample while the signal above the cutoff is from fluid on the surface of the pores. These two NMR measurements are then used in combination with mass measurements of the cutting samples to determine the porosity of the cuttings sample. In contrast, the GIT method actually seeks to directly measure the pore volume of the cuttings by eliminating any signal from fluid on the surface of the cuttings. The elimination is completed through a combination of centrifugation and rinsing of the cuttings in  $D_2O$ . The porosity of the cuttings is then determined with this pore volume and the bulk volume determined through two other NMR  $T_2$  measurements.

In this paper, we will compare each of these methods by applying them each to the same set of cuttings samples. This comparison will be done independently and the derived porosities of the cuttings samples will be evaluated.