

Formation Fluid Identification in Carbonate Reservoirs Using Magnetic Resonance Imaging "MRI" Logs

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The reliability of evaluating carbonate formations using standard logs is made more difficult by complex mineralogy, secondary porosity, and other factors. Fluid typing is one of the most important evaluation results required for completing and producing carbonate reservoirs. In many cases, operators may resort to well testing for characterizing formation fluid type in such reservoirs. However, well testing is usually very costly and also requires special efforts to manage environmental issues and the risks inherent in the mechanics of well testing. For these reasons, some operators may be reluctant to proceed with well testing, even if such tests appear to be the best thing to do. Others may unnecessarily test zones that may not need testing.

Magnetic Resonance Imaging ("MRI") technology has made significant contributions in the area of evaluating the need for well testing and in enhancing the effectiveness of any particular well test. The ability of MRI to detect the type of fluid, regardless to the rock matrix type, has had major influence in eliminating zones to be tested. MRI may also help in properly preparing for the testing procedure by pre-identifying the type of hydrocarbon in a zone.

The interplay of formation type, fluid properties, reservoir parameters, and the MRI tool characteristics will affect the shape of the recorded MRI signals. Pre-job planning is critical for acquiring proper MRI log data and the success of evaluating and analyzing the MRI signal. Pre-job planning will lead to proper and reliable fluid typing especially now that MRI logs have gained more general acceptance and are being applied in complex environments.
