

Magnetic Resonance Data Identification
Of Production in Difficult Carbonate Reservoirs
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ABSTRACT

Middle Pennsylvanian Atoka age carbonate wash along the Wichita Mountain Front, Anadarko Basin, western Oklahoma, poses one of the most difficult log interpretation puzzles in the continental United States. Deposited as a series of overlapping, submarine fans where the clastic source material is Cambro-Ordovician Arbuckle Limestone, the formation is complex and inconsistent from well to well. Traditional open hole logs and log interpretation techniques have not provided reliable parameters to determine potential pay.

Magnetic Resonance Image Logs (MRIL) were run in an attempt to add another piece of information. Initially, MRIL results proved inconclusive, but when combined with production test data for several wells, conclusions were formed. The MRIL provides direct measurements of bin size distribution, as well as calculated permeabilities and water saturations.

This case study includes four Atoka age carbonate wash wells where the MRIL was used as the primary log to determine net pay and, in turn, perforations. Log data from standard triple combo logs as well as mud logs were used along with the MRIL bin description data. Examples show that the MRIL identified pay that would have been overlooked using conventional open hole log analysis. Production results show how effective the MRIL has been in this formation, both in showing where to perforate and where not to perforate.

As development drilling in the carbonate wash field has continued, the MRIL has proven to be an effective tool in determining net pay in this complex clastic carbonate system.

OUTLINE

- Geologic Setting
- Depositional Environment
- The play and use of the Magnetic Resonance Image Log (MRIL)
- Log Examples
- Conclusions