

Woodford Completion Efficiency Improvement through Applied Geology

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Abstract

Production results from the Woodford formation are difficult to predict and evaluate. Horizontal wells in this play can produce extremely well, but are sometimes surrounded by poor producers. One of the most frustrating aspects of these wells from the perspective of the completion is the inconsistency of fracture treatments to be effectively placed. In specific wells, some treatments pumped as designed, but many others could not even initiate breakdown. Some understanding of the geology of the reservoir could contribute to understanding these failures. There is still significant discussion about the best source of geologic knowledge for completion in these unconventional reservoirs, but the development of an efficient completion design is still the desired objective. Different logging technologies to assist in this design have been attempted with varying degrees of success.

A decision was made to establish a control case with an evaluation of conventional practices. The well was drilled and completed following the accepted methods and treatment designs for other Woodford wells in the area. A comparison well would acquire geologic information through elemental capture, dipole sonic, and nuclear magnetic resonance with the objective of determining rock composition, vertical- and horizontal-rock mechanical properties, effective porosity, and permeability. These factors would be used to target completion areas in the horizontal well and design fracture treatments that would create effective flow geometry from the reservoir to the wellbore.

This paper details some of the completion data in the control well and in a subsequent, geologically-focused well. The results were extremely positive. Fracture treatment placement in the control well was inconsistent. Better knowledge into the geology of the reservoir resulted in improved placement within the well. Statistical improvement from 25% to 100% fracture treatment placement efficiency was achieved. Log results and pumping treating records are presented and compared for these situations.