Effective Fracture Treatment Determination in Unconventional Reservoirs

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Many unknowns are still involved in the production techniques and completion procedures for many unconventional reservoirs. The single issue that seems to be the determining factor in production is surface area created by fracture treatment technique. The data and analysis techniques used in the horizontal well need to be focused to provide the best design parameters for this fracture treatment.

Typical unconventional reservoirs have internal complexities that are not apparent in other reservoirs. As in other rock conditions, contrasts occur at bed boundaries, but other contrasts occur within the rock itself. These contrasts are commonly observed as minor fracture sets and minute horizontal bedding contrasts. Either or both of these conditions can have a significant impact on the effectiveness of the fracture treatment and may even impede the progression of the designed treatment. A technique is needed that will adequately describe these contrasts and predict their affect on the fracture treatment design.

Recent work with dipole sonic logs has demonstrated the ability of the log to resolve rock mechanical properties in the traditional vertical direction along with these same properties in the horizontal dimension. This vertical and horizontal resolution is acquired in a pilot hole and used for landing horizon definition. The same data is used to establish expectations of fracture treatment behavior from the initiation in a horizontal wellbore. The dipole sonic can also establish rock mechanical properties throughout the length of the horizontal section. This combined information allows the most efficient completion for the well.

This paper demonstrates the application of these techniques to establish the best landing point for the horizontal well and design the fracture treatment to overcome potential problems. There are specific examples of how this technique was applied. The ability of the fracture to maintain its shape and size is maximized through this process, thus maximizing the reservoir surface area exposed by the treatment.