

Stimulation Results and Completion Implications from the Consortium Multi-well Project in the North Dakota Bakken Shale

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After a great deal of success with Bakken open-hole horizontal completions in Richland County, Montana, between 2002 and 2005, operators began to move to the more laterally extensive North Dakota side of the Bakken play in the Williston Basin. The early results in the North Dakota Bakken were, however, much more variable than the Richland County Bakken wells. With the huge resource at stake in North Dakota, it was realized that better understanding of the nature of the formation's transmissibility and the completion and stimulation efficiency could shorten the learning curve on the economic exploitation of this important oil resource. A consortium was therefore formed with seven operators, a major service company, the state of North Dakota and the DOE to drill and complete three science wells. In these wells, we collected extensive vertical and horizontal log and core data. At this time, two wells were completed and one well was utilized as a monitoring well. During the stimulation, several seismic arrays were deployed to map out the microseismic events, including the largest seismic array ever deployed in a horizontal well. In addition multiple isotope RA tagging and fluid chemical tagging were employed.

This paper presents some of the results of this project and of the completion analysis that was done with these data and other released data in the basin. In addition, we draw some conclusions on the nature of fracture initiation along the wellbore, and attempt to provide some insight to the completion optimization.

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Tom Olsen's experience includes 28 years with Schlumberger and 15 years working in the Rockies. He has also worked in Houston, Alaska, Canada, North Sea, and Europe, has written some 30 technical publications including 4 Patents, and has given more than 70 technical presentations. Tom has worked for the past five years on unconventional completions and stimulation, and he has been the primary completion resource for SLB on the ongoing Bakken consortium initiative.