Squeezing the Bakken: Successful Scale Squeeze Programs Lead to Shift in Bakken Scale Control

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Abstract

The Bakken shale formations in North Dakota, Montana and Alberta have presented unique operational challenges during the unconventional play boom. Despite the ability to control scale formation with conventional scale inhibitors under Bakken conditions, scale formation (primarily calcium carbonate) can still remain an operational challenge due to well design and sub-optimal scale inhibitor deployment.

Due to limited experience in the industry in scale squeezing fractured horizontal wells, scale squeezes have not been frequently applied in the Bakken. As a result of sub-optimal scale control despite application of suitable scale inhibitors, an in-depth evaluation of scale squeeze chemistries, application methods and scale squeeze modeling has been ongoing in the Bakken. These successful applications are being studied to improve current scale squeeze modeling approaches for horizontal, fracked wells in addition to understanding the factors that impact Bakken scale squeezes. The lessons learned in modeling, application and monitoring of the scale squeezes will be discussed in this paper. Squeeze9 and Place-iT™ field history matching indicate the primary impact to squeeze life is the amount of scale inhibitor used while overflush volumes have a minimal impact. This varies from traditional scale squeezes that combine scale inhibitor and overflush volumes to achieve the desired scale squeeze lifetime. Examples of successful Bakken squeezes lasting more than 1 year will be highlighted.

The successful applications of scale squeezes in the Bakken are bringing a new method of efficient, cost effective, long term scale control to unconventional plays. The lessons learned in the Bakken, and the resulting advancement of unconventional scale squeeze models and theories, have implications for the global industry as unconventional plays across the world are identified, explored and produced.

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