AAPG Datapages/Search and Discovery Article #90242 © 2015 AAPG Education Directorate, Geoscience Technology Workshop, Revitalizing Reservoirs-Rocky Mountains, MidContinent, Canada, International Focus, Golden, Colorado, August 11-12, 2015

Completions Evaluation in the Eagle Ford Shale

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Microseismic

Abstract

Microseismic data obtained during hydraulic stimulation of a two well pad in the Eagle Ford shale completed as a zipper-frac was used to optimize wellbore spacing, treatment schedule and optimize the completion design of future wells. A discrete fracture network (DFN) was modeled from the microseismic event lo-cations and the associated source mechanisms. The geometry of the individual fractures (length, height, and aperture) was computed using the event magnitude and source mechanism and calibrated to the rock properties of the treated reservoir and the injected fluid volume. A proprietary proppant filling model was applied to further distinguish and identify parts of the DFN that potentially contain proppant. Distinguishing between the total stimulated rock volume (SRV) where microseismic activity was observed and the part of the SRV that contains proppant filled fractures and will therefore be productive in the long term then allowed for sophisticated wellbore spacing determination. Distance-based material balance proppant filling on a stage-by-stage basis determined an average propped half-length of just under 270 ft. showing that the chosen wellbore spacing is likely sufficient. Integration of pump data and the treatment schedule supports that conclusion and showed that stage length and spacing may be decreased slightly to enhance complexity and connectivity of the created fracture network resulting in more uniform drainage of the reservoir along the wellbore. Furthermore, a large geohazard was mapped from the microseismic data that was continuously activated during 10 stages; resulting in 10% reduction of the SRV. Treatment options were evaluated for future wells, where through real-time monitoring activation of this fault could be avoided without sacrificing the production.