Integration of Geomechanics along with Application of New Fracturing Technique Results in Production Increment above Expectations

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Abstract

Hydraulic fracturing is one of the most effective methods of improving the deliverability of low permeability wells. Hydraulic fracturing in a rich gas condensate field has earned cost benefits by reducing number of infill wells, producing condensate drop out from reservoirs and increasing overall productivity of oil and gas.

The target development well was drilled and completed in September 2013 and post completion testing rates as well as pressure build up analysis indicated severe formation damage issues and requirement for hydraulic fracturing. In the same field hydraulic fracturing was carried out earlier in other wells but yielded mixed results. In some of the wells 2-3 times increase in productivity was observed while in some wells, the results were below expectations, despite placing ~100,000 lbs of proppant. In one of the well, formation break down did not occur. Utilizing prior frac experience it was decided to optimize the upcoming frac job but at the same time not to compromise on the frac quality.

Extensive pre-job evaluation and planning which included review of available logs and previous frac data, development of 1D Mechanical Earth Model (MEM), frac modeling, implementation of Channel fracturing technique, optimization of fracturing chemical and proppant volumes was done to get maximum benefit of this major well stimulation job. As a result of these efforts frac jobs of the target sandstone reservoirs was completed successfully and the well was put on production in minimum clean-up and post frac testing time.

As a result of above effort in planning and optimization of frac job at the target well, significant increase in production was observed which exceeded the operator expectations and raised the confidence level in 1D MEM application for hydraulic frac design (i.e. geomechanics) and the new frac technique by the service company. Based on post frac results, these techniques are being utilized in the upcoming wells in the target field.