Conveyance Method Aids in Large Rigless Production Enhancement, Saving 5 Days of Intervention Time

SUCCESSFUL UTILIZATION OF E-LINE TRACTOR IN HORIZONTAL, HIGH-PRESSURE, AND HIGH-TEMPERATURE GAS WELLS

SAUDI ARABIA

OVERVIEW

High-pressure, high-temperature (HP/HT) horizontal gas wells have traditionally been challenging for performing tractor operations because of reliability issues. Recent technical improvements have enhanced the operating range of the tractor, enabling more consistent and dependable operations in these environments. Based on the experience of conducting several plug and perforation stimulation jobs in Saudi Arabia, the electric-line (e-line) tractor has proven to be a reliable and consistent well intervention solution. Successful tractor interventions have been performed in wells with more than 3,000 ft of horizontal sections, total depth (TD) of more than 17,000 ft, temperatures greater than 325°F, and pressures greater than 10,000 psi.

CHALLENGES

First attempt to fracture a high-temperature gas well encountered tractor deployment complications
Lack of fluid injectivity eliminated the possibility of performing pumpdown plug and perforation operations

SOLUTIONS

Extend the cluster length and stimulate the well in one combined stage of 60 ft
Redesign of job to include a multifinger caliper log to obtain well integrity information, a run of blank guns, and three runs with 20-ft fracture guns
Convey the e-line tools with 3.125-in. DC-powered tractor
Limit tool length to 60 ft as a precautionary measure to avoid well integrity issues

RESULTS

Successfully stimulated the well after the extended-tractor well intervention
Saved 5 days of rig time or approximately 40% less time
RESULTS

The multifinger caliper tool string for casing inspection was centralized using a combination of strong, optimally placed spring-loaded roller and stiff arm centralizers. The logging string was decoupled from the tractor section using a flex joint to enable consistent tool position and centralization in the well, resulting in the acquisition of good-quality casing profile data using the multifinger caliper.

Five tractor-conveyed runs were sequentially conducted in the well with a maximum bottomhole temperature of 322°F to evaluate the integrity of the tubing and to establish connectivity with a longer reservoir section. The tubing was found to be undamaged, and a decision was made to continue with the stimulation operation.

The well was successfully stimulated after the extended-tractor well intervention. Tractor deployment enabled a much more efficient well intervention solution to evaluate and establish well integrity, as compared to an equivalent e-coil intervention. The total wireline operating time of 675 hours for five runs was approximately 40% less than the estimated time for a similar e-coil intervention (approximately five days). The resources and processes of multiple service companies were integrated in this operation and implemented under the operator’s supervision. Multilevel managerial engagement was crucial to the achievement of this goal.

More information about this case study can be found in the 2015 SPE Kuwait Oil & Gas Conference paper, Successful Utilization of E-Line Tractor in Horizontal, High-Pressure and High-Temperature Gas Wells.