

Woodford Shale, Oklahoma: Managed Pressure Drilling (MPD) system by @balance Services enables completion of well with narrow operating window

“With the support of @balance Services and their MPD system, we reached total depth on a well that we once thought we could not finish. We had high pressure gas directly under our casing shoe and losses at the top of our producing formation below it. The only way we were able to get to TD was with the @balance Services MPD system. From the first day we rigged up, our rig hands caught on to the concept immediately, with the help of @balance Services field technicians, and we were back to drilling the same day. We TD’d the well in a timely fashion and opened a lot of eyes to some options that could benefit us in the future.”

Colby Wilson, Senior Drilling Engineer, Newfield Exploration Co.

Well Information

Location	Stephens County, Oklahoma
Operator	Newfield Exploration
Well Type	Horizontal
Formation	Woodford Shale
Interval drilled	6½” Lateral section from 16,043 ft MD/15,756 ft TVD to 20,852 ft MD/15,756 ft TVD
Spud date	Dec. 17, 2013
Initial mud weight	13.2 ppg

The Situation

The operator was unable to complete the well due to a narrow operating window. High pressure gas from just below the casing shoe entered the well while experiencing losses from the producing formation at the same time.

The Solution

M-I SWACO pressure control equipment, including a HOLD RCD⁺ and an AUTOCHOKER⁺, was installed. The mud weight was reduced from 13.2 ppg to 12.5 ppg (below pore pressure) to reduce the Equivalent Circulating Density (ECD) while drilling to avoid losses. VIRTUAL HYDRAULICS⁺ was used to model the well, and the applied annular pressure was calculated in order to hold a constant bottomhole pressure for all stages of the operations.

To prevent gas influx, up to 900 psi of annular pressure was applied during connections, while 1,000 psi was held when stripping out to compensate swabbing.

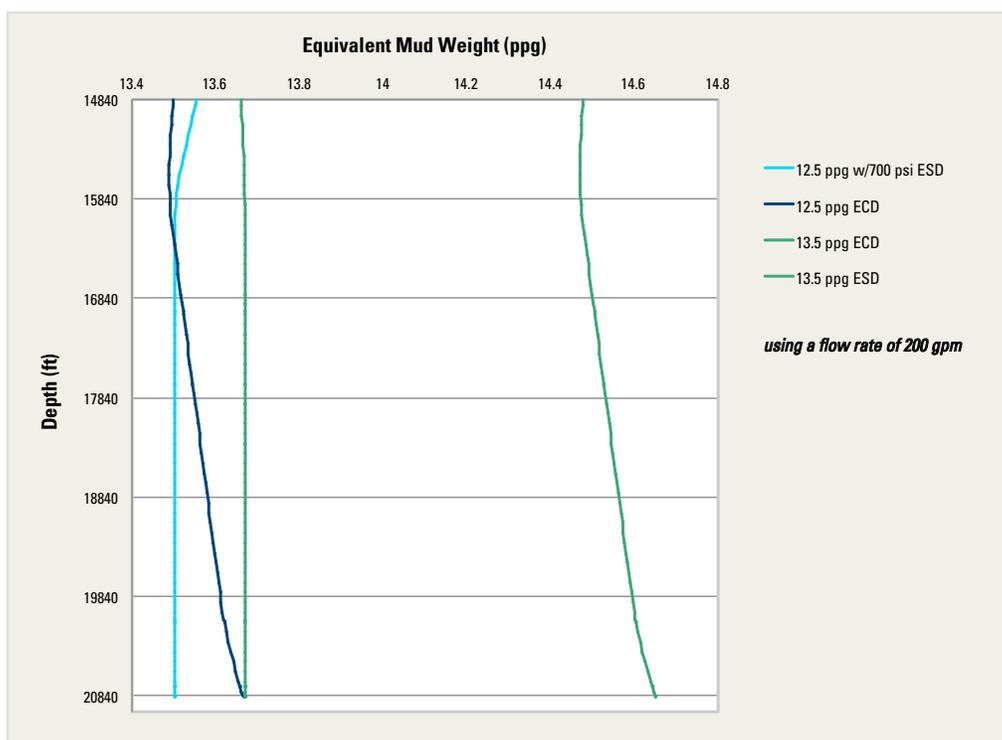
The Results

The well was successfully drilled and completed without non-productive time (NPT) from losses or influxes. Thorough modeling and execution ensured the drilling, rollovers, tripping and cementing were successfully completed using MPD techniques by @balance Services.

The Details

Prior to using MPD, the operator had fought losses and influxes for a long period without being able to drill to the desired well TD. The difference between static and circulating conditions was too great for the operating window for this particular well. By using MPD, the pressure in the well stayed within the operating window by holding a near-constant bottomhole pressure.

The graph below illustrates the difference. The green lines indicate when drilling conventionally and the blue lines show drilling with MPD. With conventional drilling, the difference is approximately 1 ppg Equivalent Mud Weight (EMW) whereas MPD kept the pressure difference within 0.1 ppg EMW.



Summary

Rather than being forced to abandon the well, MPD techniques by @balance Services made it possible to successfully complete it.



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