

## Douthit 8N-27HZ Remediation Procedure

### Well History:

The Douthit 8N-27HZ was planned as a horizontal sliding sleeve completion of the Niobrara utilizing the Suretech sliding sleeve system. Its well configuration consists of 7" intermediate casing through the curve to 7640 ft, and the 4.5" Suretech system from a liner hanger at 6597 ft to a TD at 12,919 ft. The 7" intermediate casing cement top was located at 210' via CBL.

Prior to completion, a leak was found at the liner hanger by testing against a retrievable bridge plug set in the 4.5" casing below the liner hanger. The remedy was to install a second liner hanger (Packers Plus) above the existing Suretech liner hanger. The two were connected via a latch assembly and 1 joint of 4.5" 11.6ppf HCP-110 casing. After this work, the liner still had a similar leak. A retrievable bridge plug was then set in the single joint of casing between liner hangers, isolating the Suretech liner hanger from the Packers Plus liner hanger. Upon pressure testing, the Packers Plus liner hanger held pressure, showing that the leak was below. The well was readied for completion.

During the frac, no ball seats were seen while attempting to frac the first two stages. Due to previous issues with the Douthit 41C (four stages attempted), the frac was stopped pending further investigation. A retrievable bridge plug was set below the Suretech liner hanger to attempt to determine injection. Injection was established: 5bpm at 3440psi. Assumption is that frac exited 4.5" casing below the liner hanger and entered the Niobrara at the 7" shoe.

### Current Status:

The Douthit 8N-27HZ is currently shut in awaiting further operations.

### Remediation Procedure – Bullhead Squeeze Cement into 4.5" x 7" Annulus

- RIH with RBP and set 2-3 joints below Suretech liner hanger. Test injection. If no injection, discuss tubing punch in 4.5" casing for injection point. Dump sand on RBP.
- RIH with composite cement retainer and set in joint of pipe between liner hangers. RIH with 2-3/8" tubing and sting into cement retainer. Establish injection through leak, down 4.5" x 7" annulus, and into formation. Sting out.
- MIRU cements. Cement to consist of:
  - Lead – 95sks (4.5" x 7" annulus volume) of 15.8ppg Class G plus additives with pump time of 1-1.5 hours.
  - Tail – 50sks of 15.8ppg Class G plus additives including retarder with pump time of 3 hours.
- Spot lead cement to end of tubing. Sting into cement retainer and inject cement. Pump lead out of tubing. Once tail is out of tubing, begin slowing down and hesitating while tail enters 4.5" x 7" annulus in order to build pressure.
- Once all of tail is in 4.5" x 7" annulus or no further injection is possible, sting out of cement retainer, reverse circulate out any remaining cement, trip out of hole with tubing, and wait on cement.
- RIH with mill on tubing. Mill cement retainer and any cement below. Tag sand on RBP. Trip out of hole with tubing.
- Test squeeze to 4000psi. If squeeze tests, slowly bring pressure up to frac test pressure of 7500psi. If squeeze tests to 7500psi, MIRU frac crew and finish well with max frac pressure of 7500psi.
- If squeeze does not test:
  - If injection >2bpm is possible, repeat squeeze attempt.
  - If no injection is possible, shut well in and plan to remediate via drill out and flush joint pipe. Timetable on drill out is fall 2015, after crops are harvested.