

## PLUG AND ABANDONMENT PROCEDURE

### HSR-MOORHEAD 13-5

- | Step | Description of Work   |
|------|---|
| 1    | Well has 2-3/8" tbg with a Thunderbird Tool's Arrowset 1-X 10k packer set at 5955' set on 10/17/2013.   |
| 2    | Provide 48 hr notice to COGCC prior to rig up per request on approved Form 6 (e.g. call field coordinator, submit Form 42, etc.). Call Automation Removal Team at least 24 hr prior to rig move. Request they catch and remove plunger, isolate production equipment and remove any automation prior to rig MIRU.   |
| 3    | MIRU slickline services. Pull bumper spring and tag bottom. RDMO slickline services.  |
| 4    | Prepare location for base beam equipped rig. Install perimeter fence as needed.   |
| 5    | Check and record Bradenhead pressure. If Bradenhead valve is not accessible, re-plumb so that valve is above GL.  |
| 6    | MIRU workover rig. Bullhead down tubing with water w/ biocide to kill the well. ND wellhead. NU BOPs. Unseat landing jt.  |
| 7    | Unseat Arrowset 1-X 10k packer and POOH. Stand back 2-3/8" tbg (229 jts) and lay down packer. Send back to Thunderbird Tools for re-dress.  |
| 8    | MIRU Wireline. PU gauge ring for 4-1/2" 11.6# and RIH to 7000'.   |
| 9    | RIH with 4-1/2" CIBP and set at 6960'. PT csg to 1000 psi for 15 minutes.   |
| 10   | Notify Cementers to be on call.   |
| 11   | RIH on 2-3/8" tbg while hydrotesting to 3000 psi to CIBP at 6960'. Tag plug and pick up 5'.   |
| 12   | RU Cementers. Pump Niobrara plug consisting of 34.5 cu-ft (25 sx)"G" w/ 20% silica flour , 0.4% CD -32, 0.4% ASA -301 and R-3 to achieve 2:30 pump time mixed at 15.8 ppg and 1.38 cuft/sk. Calculated top in the 4-1/2" csg is 6600'.  |
| 13   | PUH to 6000' and circulate hole clean with fresh water w/ biocide. POOH standing back 134 jts.  |
| 14   | MIRU WL. PU and RIH with 2- 1' 3-1/8" perf guns with 3 spf, 0.59" diam, 4.72 penetration, 120° phasing. Shoot 1' of squeeze holes at 4580' and 4175'. RDMO WL.  |
| 15   | PU 4-1/2" CICR and RIH w/2-3/8" tbg and set at 4210' +/- 10' per CCL. Establish circulation with rig pump using fresh water and biocide.  |
| 16   | RU Cementers. Pump 5 bbls fresh water followed by 20 bbls Sodium Metasilicate followed by 5 bbls fresh water spacer. Pump Sussex Suicide plug: 184 cu-ft (160 sks) "G" w/ 0.25 pps cello flake, 0.4% CD-32, 0.4% ASA-301 with CaCl <sub>2</sub> as necessary. Underdisplace by 3 bbls and sting out of CICR. Spot final 3 bbls on top of CICR. Mixed at 15.8 ppg, 1.15 cuft/sack. Volume is based on 8.25" hole plus 20% excess from 4580' to 4175' and 4-1/2" csg up to 4000'. |
| 17   | PUH to ~3800' and circulate hole clean with fresh water w/ biocide. POOH standing back 35 jts 2-3/8" tbg. Lay down stinger and remaining jts.   |

- 18 MIRU Wireline. Crack couplings or jet cut 4-1/2" csg at 1000'. RDMO WL. Circulate bottoms up using water and biocide to remove any gas from wellbore.
- 19 ND BOP and tubing head. Install a BOP on surface casing head with 4 1/2" pipe rams. Install 3000 psi ball valves on both casing head outlets. Install a choke or choke manifold on one outlet.
- 20 POOH and LD 4-1/2" csg. Remove the 4-1/2" pipe rams and Install 2-3/8" pipe rams.
- 21 RIH w/ 2-3/8" tbg 100' into the csg stub to 1100'.
- 22 MIRU Cementers. Fox Hills Suicide Squeeze: Pump mud flush of 10 bbls SAPP and 20 bbl water ahead of 332.5 cu-ft (250 sx) Type III w/cello flake and CaCl<sub>2</sub> as deemed necessary, mixed at 1.33 cf per sack, 14.8 ppg. Plug size is based on 8.25" hole with 20% excess covering 1100' to surface csg shoe at 453' and capacity in the 8-5/8" csg to 250'.
- 23 PUH to 100' and circulate hole clean. POOH and WOC at least 4 hours per cementing company recommendation.
- 24 RIH and tag top of plug. Plug needs to be tagged at 253' or shallower. Contact Reed Boeger in Evans after tag to confirm. POOH and LD 2-3/8" tbg.
- 25 RU wireline. Run and set CIBP in the 8 5/8", 24# surface casing at 80'. PT CIBP and surface casing to 1000 psi for 15 minutes. Assuming successful test, RDMO wireline. RDMO WO Rig.
- 26 Instruct cementing and wireline contractors to e-mail copies of all job logs/job summaries to rscDJVendors@anadarko.com within 24 hrs of completion of the job.
- 27 Supervisor submit paper copies of all invoices, logs, and reports to Joleen Kramer.
- 28 Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
- 29 Excavate hole around surface casing enough to allow welder to cut casing minimum 5' below ground level.
- 30 Welder cut casing minimum 5' below ground level.
- 31 Fill casing to surface using 4500 psi compressive strength cement, (NO gravel).
- 32 Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
- 33 Properly abandon flowlines per Rule 1103. File electronic Form 42 once abandonment complete.
- 34 Back fill hole with fill. Clean location, level.
- 35 Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.

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