

## PLUG AND ABANDONMENT PROCEDURE

### HSR-Hearst 10-36

1. Note: Production Casing = 4 1/2" OD, 11.6#/ft, I-70; Production Hole Drilled @ 7 7/8."
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 Group 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, kill as necessary using clean fresh biocide water and circulate. ND WH. NU BOP. Unseat landing jnt, LD.
7. Notify cementers to be on call. Provide volumes listed below:
  - 7.1 Niobrara Plug: 25 sks "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 yield for a total of 6.14 bbl of slurry (370' inside 4-1/2" casing).
  - 7.2 Balanced Plug: 20 sks class "G", with 1/4 # per sk cello flake, 0.4% CD-32, 0.4% ASA-301 mixed at 15.8 ppg and 1.15 cuft/sk for a total of 4.1 bbl of slurry (312' in inside 4 1/2" casing, no excess and 40 sks added for squeezing production perms).
  - 7.3 SX Squeeze & Plug: 70 sks class "G", with 1/4 # per sk cello flake, 0.4% CD-32, 0.4% ASA-301 mixed at 15.8 ppg and 1.15 cuft/sk for a total of 14.34 bbl of slurry (312' in inside 4 1/2" casing, no excess and 40 sks added for squeezing production perms).
  - 7.4 Balanced Plug: 380 sks of Type III cement, with 1/4 # per sk cello flake and CaCl<sub>2</sub> as necessary, mixed at 14.8 ppg and 1.33 cuft/sk for a total of 90.02 bbl of slurry (150' inside 4-1/2" csg, 696' inside 9-1/2" OH + 20% excess, and 218' inside 8-5/8" surface casing).
8. PU 91 jnts of 2-3/8" tbg for cement and RBP removal.
9. Unland tbg and tie into tbg string and TIH to RBP at 4206'. Clean off sand and latch onto RBP, release and TOO. LD RBP and SB tbg.
10. TIH with retrieving head and 2-3/8" tbg, clean off sand and latch onto RBP at 6885'. Release and TOO. SB tbg and LD RBP. Return RBPs to shop.
11. MIRU WL, run gauge ring and junk basket for 4-1/2", 11.6# casing to 7,000'.
12. RIH CIBP on WL. Set at +/- 6970' to isolate NB/CD perms (collars located at 6952' and 7002'). RDMO WL.
13. MIRU hydrotester. PU and TIH with packer on 2-3/8" tbg while hydrotesting to 3,000 psi. Set packer at +/- 6940'. Pressure test CIBP to 1000 psi. Note: Last pressure test to 1000 psi was on 3/11/2014. TOO, SB tbg and LD packer.
14. TIH open ended 2-3/8" tbg to CIBP at 6970'.

15. MIRU Cementers. Pump Niobrara Plug: 6.14 bbl slurry of 25 sks "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 yield. Displace with fresh water as necessary to place in production casing from 6970' to 6600'.
16. PUH to 5180' and LD tbg. Circulate tbg clean with biocide water.
17. MIRU Cementers. Pump 5 bbl fresh water spacer immediately preceding cement. Pump 4.1 bbl slurry of 20 sks class "G", with ¼ # per sk cello flake, 0.4% CD-32, 0.4% ASA-301 mixed at 15.8 ppg and 1.15 cuft/sk to place in casing between perfs from 5180' to 4920'. Displace with fresh water as necessary. TOOH and SB 4500', LD remaining tbg.
18. PU and TIH w/ CICR and 2-3/8" tbg. Set CICR at +/- 4450' (collars at 4440' and 4484') and establish injection into SX perfs.
19. MIRU Cementers. Pump 5 bbl fresh water spacer immediately preceding cement. Squeeze into SX : 14.34 bbl slurry of 70 sks class "G", with ¼ # per sk cello flake, 0.4% CD-32, 0.4% ASA-301 mixed at 15.8 ppg and 1.15 cuft/sk to place squeeze between perfs from 4632' to 4554'. Displace with fresh water 4.0 bbl short. Sting out of CICR to leave remaining 4.0 bbl on top of retainer to set a plug onto of CICR.
20. PUH to 3000'. Circulate with biocide water to clean tubing until clear. Then, TOOH and SB 1300' and LD remaining tubing.
21. ND BOP, ND TH.
22. Install BOP on 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.
23. MIRU WL. Shoot off casing at or below 1150'. RDMO WL. Circulate biocide water down casing and up annulus to remove any gas. Be sure to circulate until there is no pressure, gas, or condensate remaining.
24. TOOH with 4-1/2" casing, LD.
25. Install 2-3/8" pipe rams in BOP and TIH with 2-3/8" tubing to 1250'.
26. MIRU Cementers. Pump 10 bbl SAPP with a minimum of 20 bbl fresh water spacer. Pump Balanced Plug: 90.02 bbl slurry of 380 sks of Type III cement, with ¼ # per sk cello flake and CaCl<sub>2</sub> as necessary, mixed at 14.8 ppg and 1.33 cuft/sk. Displace with fresh water as necessary to cover from 1250' to 250' (100' in 4" ID casing, 696' in 9.5" borehole and 218' in 8.1" ID surface casing). See calculations for details as necessary.
27. PUH to 100'. Circulate with biocide water to clean tubing until clear.
28. TOOH. WOC 4 hrs. Tag Cement. If cement top is at or above 370' proceed to next step, otherwise, call Evans engineering.
29. MIRU WL. RIH 8-5/8" CIBP to 80'. Set, PT to 1000 psi for 15 min. If tests, RDMO WL and WO rig.
30. Instruct cementing and wireline contractors to e-mail copies of all job logs/job summaries and invoices to rscDJVendors@anadarko.com within 24 hrs of the completion of the job.
31. Supervisor submit paper copies of all invoices, logs, and reports to Joleen Kramer.
32. Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
33. Excavate hole around surface casing enough to allow welder to cut 8 5/8" casing minimum 5' below ground level.
34. Welder cut 8 5/8" casing minimum 5' below ground level.
35. MIRU ready cement mixer. Use 4500 psi compressive strength cement, (NO gravel) fill stubout.

36. Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
37. Obtain GPS location data as per COGCC Rule 215 and send to [rscDJVendors@anadarko.com](mailto:rscDJVendors@anadarko.com).
38. Properly abandon flowlines per Rule 1103.
39. Back fill hole with fill. Clean location, level.
40. Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed. File electronic Form 42 once abandonment complete.