

## PLUG AND ABANDONMENT PROCEDURE

## HSR-Harmon 12-36 | API: 05-123-15276

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 and pressure bomb services. Pull bumper spring, tag bottom and run pressure bomb survey to obtain pressure gradient survey from 7293' to surface making gradient stops every 1000'. Forward pressure bomb survey to Evans Engineering. RDMO slickline and pressure bomb 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 water with biocide 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 (360' inside 4-1/2" casing).
  - 7.2 SX Suicide Squeeze: 230 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 47.11 bbl of slurry (670' in inside 4 1/2" casing, no excess and 500' in 9" borehole diameter annular section with 20% excess).
  - 7.3 Balanced Plug: 450 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 106.60 bbl of slurry (100' inside 4-1/2" csg, 717' inside 10-1/2" OH + 20% excess, and 203' inside 8-5/8" surface casing).
8. Unland, TOOH and SB with 2 3/8" tbg.
9. MIRU WL, run gauge ring and junk basket for 4-1/2", 11.6# casing to 7,000'.
10. RIH CIBP on WL. Set at +/- 6930' to isolate NB/CD perfs (collars located at 6901' and 6944'). RDMO WL.
11. Pressure test CIBP to 1000 psi. Note: no recent pressure test.
12. MIRU hydrotester. TIH with 2-3/8" tbg while hydrotesting to 3000 psi until tag on CIBP.
13. 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 6930' to 6550'.
14. PUH to 6000'. Circulate until clear with biocide water. TOOH with tbg, SB 4100' and LD the rest on trailer.
15. MIRU Wireline. PU two 3-1/8" perf guns with 3 spf, 120 degree phasing and .59" EHD. Shoot 1' of perfs at 4500' and 4000'. RDMO WL.
16. PU CICR and RIH on 2-3/8" tbg, set at 4030'. Establish circulation with fresh water and biocide and circulate until clean.
17. MIRU Cementers. Precede cement with 20 bbl of SMS and a 10 bbl fresh water spacer immediately preceding cement.

18. Pump 47.11 bbl slurry of 230 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 (650' in inside 4-1/2" casing, no excess and 500' in 9" borehole diameter annular section with 20% excess). Under displace by 3 bbls and dump onto top of CICR.
19. PUH to 3500' and circulate clean. TOO H tbg and SB 1300', LD remaining tbg on trailer.
20. ND BOP, ND TH.
21. 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.
22. MIRU WL. Shoot off casing at or below 1150'. RDMO WL. Circulate water containing biocide down casing and up annulus to remove any gas. Be sure to circulate until there is no pressure, gas, or condensate remaining.
23. TOO H with 4-1/2" casing, LD.
24. Install 2-3/8" pipe rams in BOP and RIH with 2-3/8" tubing to 1250'.
25. MIRU Cementers. Pump 10 bbl SAPP with a minimum of 20 bbl fresh water spacer. Pump Balanced Plug: 106.6 bbl slurry of 450 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' inside 4-1/2" csg, 717' inside 10-1/2" OH + 20% excess, and 203' inside 8-5/8" surface casing). See calculations for details as necessary.
26. PUH to 100'. Circulate with water containing biocide to clean tubing until clear.
27. TOO H. WOC 4 hrs. Tag Cement with tbg. If cement top is at or above 330' proceed to next step, otherwise, call Evans engineering. TOO H and LD all tbg on trailer.
28. MIRU WL. RIH 8-5/8" CIBP to 80'. Set, PT to 1000 psi for 15 min. If tests, RDMO WL and WO rig.
29. 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.
30. Supervisor submit paper copies of all invoices, logs, and reports to Joleen Kramer.
31. Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
32. Excavate hole around surface casing enough to allow welder to cut 8 5/8" casing minimum 5' below ground level.
33. Welder cut 8 5/8" casing minimum 5' below ground level.
34. MIRU ready cement mixer. Use 4500 psi compressive strength cement, (NO gravel) fill stubout.
35. Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
36. Obtain GPS location data as per COGCC Rule 215 and send to rscDJVendors@anadarko.com.
37. Properly abandon flowlines per Rule 1103.
38. Back fill hole with fill. Clean location, level.
39. Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed. File electronic Form 42 once abandonment complete.