

Engineer: Heath Pottmeyer

Cell: 740-525-3445

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## PLUG AND ABANDONMENT PROCEDURE

### HSR-DENYS 14-15, API 05-123-15545

#### Steps

1. Provide 48 hour 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 hours prior to rig move. Request they catch and remove plunger, isolate production equipment and remove any automation prior to rig MIRU.
2. MIRU slickline services. Pull bumper spring and tag bottom. RDMO slickline services.
3. Prepare location for base beam equipped rig. Install perimeter fence as needed.
4. Check and record bradenhead pressure. If bradenhead valve is not accessible, re-plumb so that valve is above GL.
5. MIRU, kill as necessary using clean fresh water with biocide. NDWH. NUBOP. Unseat landing jt, LD.
6. Notify cementers to be on call. Provide volumes listed below:
  - 6.1 Niobrara plug: 25 sx (35 cu-ft) "G" w/ 20% silica flour, 0.4% CD-32, 0.4% ASA-301 and R-3 to achieve 2:30 pump time. Mix at 15.8 ppg and 1.38 cu-ft/sk. Cement volume based on 400' in 4 1/2" casing.
  - 6.2 Sussex suicide: 300 sx (345 cu-ft) "G" w/ 0.25 pps cello flake, 0.4% CD-32, 0.4% ASA-301, mixed at 15.8 ppg and 1.15 cu-ft/sk. Cement volume based on 720' in 4 1/2" casing and 520' in a 10" OH with 20% excess. Caliper on file.
  - 6.3 Foxhills plug: 240 sx (319 cu-ft) Type III w/ cello flake and CaCl<sub>2</sub> as necessary, mixed at 14.8 ppg and 1.33 cu-ft/sk. Cement volume based on 100' in 4 1/2" casing, 350' in a 10" OH with 20% excess, and 200' in 8 5/8" casing. Caliper on file.
7. TOOH 2 3/8" and 1.66" tubing landed at 7480'. Stand back 2 3/8" tubing and lay down 1.66" tubing.
8. MIRU WL. RIH gauge ring for 2 7/8" 6.5# casing to 7500'. POOH.
9. PU 2 7/8" 6.5# CIBP and RIH w/ WL. Set at +/-7440' to abandon J Sand perms. PU dump bailer, dump bail 1 sx class "G" cement on CIBP. POOH.
10. RIH gauge ring for 4 1/2" 11.6# casing to 6800'. POOH.
11. PU 4 1/2" 11.6# CIBP and RIH w/ WL. Set at +/-6770' to abandon Niobrara and Codell perms. PT to 1000 psi for 15 minutes. RDMO WL.
12. RIH with 2 3/8" tubing to +/- 6770', tag CIBP and PUH 5'. Hydrotest tubing to 3000 psi while RIH.
13. RU cementers. Pump Niobrara plug: 25 sx (35 cu-ft) "G" w/ 20% silica flour, 0.4% CD-32, 0.4% ASA-301 and R-3 to achieve 2:30 pump time. Mix at 15.8 ppg and 1.38 cu-ft/sk. Plug to cover 6370' - 6770'.
14. PUH to +/- 6100'. Reverse circulate with biocide treated water to displace cement and clear tubing.
15. POOH. Stand back 3840' of tubing.
16. RU WL. PU 3 1/8" perf guns with 3 spf, 120 degree phasing, 0.50" EHD and RIH w/ WL. Shoot 1' of squeeze holes at 4330' and 2' of squeeze holes at 3810'. RD WL.

17. PU and RIH w/CICR and 2 3/8" tubing, set CICR at +/- 3840'. Establish circulation with rig pump using biocide treated water.
18. RU cementers. Establish circulation with biocide treated water and precede cement with 5 bbl water containing biocide, 20 bbl sodium metasilicate and another 5 bbl water spacer.
19. Pump Sussex suicide: 300 sx (345 cu-ft) "G" w/ 0.25 pps cello flake, 0.4% CD-32, 0.4% ASA-301, mixed at 15.8 ppg and 1.15 cu-ft/sk to place cement between perms from 4330' to 3810'. Under displace and sting out of CICR to leave 3 bbls (~200') on top of retainer. Cement volume based on 10" OH with 20% excess. Caliper readings across entire interval. RD cementers.
20. PUH to +/- 3400'. Reverse circulate with biocide treated water to displace cement and clear tubing.
21. P&SB 1000', LD remainder.
22. RU WL. Shoot off 4 1/2" casing at or below 900'. RD WL. Circulate casing with biocide treated water to remove any gas.
23. NDBOP, NDTH.
24. Install BOP on casing head with 4 1/2" pipe rams.
25. TOOH 4 1/2" casing, LD.
26. RIH with 2 3/8" tubing to 1000' inside 4 1/2" casing.
27. RU cementers. Establish circulation with biocide treated water and precede cement with 10 bbl SAPP and a minimum 20 bbl fresh water spacer. Pump Foxhills plug: 240 sx (319 cu-ft) Type III w/ cello flake and CaCl<sub>2</sub> as necessary, mixed at 14.8 ppg and 1.33 cu-ft/sk. Plug to cover 1000' – 900' in 4 1/2" casing, 900' – 550' in 10" OH with 20% excess, and 550' – 350' in 8 5/8" casing. Caliper readings across entire interval. RD cementers.
28. PUH to 100' and circulate with biocide treated water to displace cement and clear tubing.
29. WOC per cement company recommendation. Tag cement at or above 450'. If not, consult with Evans Engineering.
30. RU WL. RIH 8 5/8" 24# CIBP to 80'. Set and pressure test to 1000 psi for 15 minutes. If tests, RDMO WL and WO rig.
31. Instruct cementing and wireline contractors to email copies of all job logs/jobs summaries to [rsdJVendors@anadarko.com](mailto:rsdJVendors@anadarko.com) within 24 hours of completion of the job.
32. Supervisor is to submit paper copies of all invoices, logs, and reports to Evans Engineering Specialist.
33. Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
34. Excavate hole around surface casing enough to allow welder to cut casing minimum 5' below ground level.
35. Welder cut casing minimum 5' below ground level.
36. Fill casing to surface using 4500 psi compressive strength cement, (NO gravel).
37. Spot weld on steel marker plate. Marker should contain well name, well number, legal location (1/4 1/4 descriptor) and API number.
38. Obtain GPS location data as per COGCC Rule 215 and send to [rsdJVendors@anadarko.com](mailto:rsdJVendors@anadarko.com).
39. Properly abandon flowlines per Rule 1103. File electronic Form 42 once abandonment complete.
40. Back fill hole with fill. Clean location, level.