

## PLUG AND ABANDONMENT PROCEDURE

### FREUND L 7-4

#### Steps

1. 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 isolate production equipment and remove any automation prior to rig MIRU.
2. Prepare location for base beam equipped rig. Install perimeter fence as needed.
3. MIRU, kill as necessary using clean fresh water with biocide. NDWH NUBOP. Unseat landing jt, LD. Note: Plunger stuck at 7060' per daily operation report on 10/16/14.
4. Check and record Bradenhead pressure. If Bradenhead valve is not accessible, re-plumb so that valve is above GL.
5. TOOH 220 joints of 1.66" OD production tubing landed at 7270'. Stand back tubing.
6. MIRU slickline services and VES. Tag bottom and run gyro down 2 7/8" csg stopping every 100' from tagged depth to surface. Forward survey results to Sabrina Frantz. RDMO slickline services and VES.
7. Notify cementers to be on call. Provide volumes listed below:
  - 7.1 Niobrara Plug: 20 sx (28 cu-ft) "G" w/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 cuft/sk. Cement volume based on 630' in 2 7/8" casing, no excess.
  - 7.2 Sussex plug: 210 sx (242 cu-ft) "G" w/0.25 lbs/sack cello flake, 0.4% CD-32, 0.4% ASA-301, mixed at 15.8 ppg and 1.15 cuft/sk. Cement volume based on 410' in 2 7/8" casing, and 410' in 9 1/2" OH with 20% excess. Caliper on file.
  - 7.3 Stub Plug: 450 sx (599 cu-ft) Type III w/cello flake and CaCl<sub>2</sub> as necessary, mixed at 14.8 ppg and 1.33 cuft/sk. Cement volume based on 760' in a 9 1/2" OH with 40% excess, and 200' in 8 5/8" casing with no excess. Nearest caliper measurement at 4100'.
8. MIRU WL. RIH gauge ring for 2 7/8" 6.5# casing to 7260'. POOH.
9. PU 2 7/8" 6.5# CIBP, RIH and set at +/- 7230'. Pressure test at 3000 psi.
10. RIH with 1.66" OD production tubing to tag CIBP at +/- 7230' and PUH just above. Hydrotest tubing to 3000 psi while RIH.
11. RU Cementers. Pump Niobrara plug: 20 sx (28 cu-ft) "G" w/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 cuft/sk. Plug to cover 7230' to 6380'. RD cementers.
12. PUH to 6300' and circulate with water and biocide to displace cement and clear tubing. TOOH 1.66 OD" tubing, stand back ~4000'.
13. MIRU WL. PU 1 11/16" perf gun loaded with 6 spf, .37" and 120 degree phasing EHD. Shoot squeeze holes at 4380'. RDMO WL.
14. Establish circulation down 2 7/8" production casing and out 8 5/8" surface casing. If unable to circulate freely, notify engineering and make plans to cut and pull 2-7/8" casing.

15. RU cementers. Precede cement with 5 bbl of water; 20 bbl of sodium metasilicate; 5 bbl water.
16. Pump Sussex plug: 210 sx (242 cu-ft) "G" w/0.25 lbs/sack cello flake, 0.4% CD-32, 0.4% ASA-301, mixed at 15.8 ppg and 1.15 cuft/sk to place cement inside and outside 2 7/8" casing from 4380' to 3970'. Follow w/wiper plug and displace to 3970'. WOC per Cement Company's recommendation.
17. RIH with 1.66" OD tubing. Tag top of plug at or above 3970'. If not, consult with Evans Engineering. TOOH and LD tubing.
18. RU WL. Shoot off casing at 1070'. RD WL.
19. Use 2 7/8" casing as work string. Circulate with water and biocide to remove any gas. Note: If PT to 3000 psi passed in step 9, proceed. If PT failed, TOOH and hydrotest while RIH to 1070'.
20. NDBOP, NDTH.
21. NUBOP on casing head with 2 7/8" pipe rams.
22. RU cementers. Precede cement with 10 bbl SAPP and a 20 bbl (min) freshwater spacer.
23. Pump Stub Plug: 450 sx (599 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 1070' to 310' in a 9 1/2" OH with 40% excess, and from 310 to 110' in 8 5/8" casing.
24. PUH to 100' and circulate with water and biocide to displace cement and clear tubing.
25. TOOH. WOC per company recommendation. Tag cement at 210' or shallower. If not, consult with Evans Engineering.
26. MIRU WL. RIH 8 5/8" 24# CIBP to 80'. Set and PT to 1000 psi for 15 minutes. If tests, RDMO WL and WO rig.
27. Instruct cementing and wireline contractors to e-mail copies of all job logs/job summaries to [rscDJVendors@anadarko.com](mailto:rscDJVendors@anadarko.com) within 24 hrs of completion of the job.
28. Supervisor submit paper copies of all invoices, logs, and reports to Evans Engineering Specialist.
29. Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
30. Excavate hole around surface casing enough to allow welder to cut casing minimum 5' below ground level.
31. Welder cut casing minimum 5' below ground level.
32. Fill casing to surface using 4500 psi compressive strength cement, (NO gravel).
33. Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
34. Obtain GPS location data as per COGCC Rule 215 and send to [rscDJVendors@anadarko.com](mailto:rscDJVendors@anadarko.com).
35. Properly abandon flowlines per Rule 1103. File electronic Form 42 once abandonment complete.
36. Back fill hole with fill. Clean location, level.