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## PLUG and ABANDONMENT PROCEDURE

### WARDELL 6-20

#### Description

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.). Notify 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. Pull production equipment and tag bottom. Record tag depth in Open Wells. Gyro was run on 11/26/11. RDMO Slickline.
3. Prepare location for base beam equipped rig. Install perimeter fence as needed.
4. Verify COAs before RU.
5. Upon RU, check and record bradenhead pressure. If bradenhead valve is not accessible, re-plumb so that valve is above GL. Blow down bradenhead and re-check pressure the next day. Repeat until pressure stays at 0 psi.
6. MIRU WO rig. Kill well as necessary using biocide treated fresh water. Verify BOP and wellhead rating, inspect for appropriate API standards, pressure test BOP according to VWP BOP testing guidelines. ND WH. NU BOP. Unland tbg using unlanding joint and LD.
7. TOOH and SB 6930' 2-3/8" tbg. LD any remainder.
8. MIRU WL. PU and RIH with (4-1/2", 11.6#) gauge ring to 6940'. POOH.
9. PU and RIH with (4-1/2", 11.6#) CIBP and set at +/- 6930' (collars at 6908' & 6950'). POOH. RDMO WL.
10. TIH with 2-3/8" tbg to 6930'
11. Load hole with biocide treated fresh water and circulate all gas out of well. PT CIBP to 1000psi for 15 minutes.
12. MIRU Cementers. Pump Niobrara Balance Plug: Pump 25 sx (6.9 bbl or 39 cf), assuming 15.8 ppg & 1.53 cf/sk. Volume based on 400' inside 4-1/2", 11.6# production casing with no excess. Cement will be from 6930'-6530'. Collect wet and dry samples of cement to be left on rig. RD Cementers.
13. Pull out of cement at a rate of 1 jt/min. TOOH, SB 3460' 2-3/8" tbg. LD remaining tbg.
14. MIRU WL. PU and RIH with (4-1/2", 11.6#) CIBP and set at +/- 4100' (collars at 4081' & 4122'). POOH. RIH and dump 2 sx cement on CIBP. POOH.
15. PU and RIH with two 3-1/8" perf guns with 3 spf, min 0.5" EHD, 120° phasing. Shoot 2' of squeeze holes at 3800' and 4' of squeeze holes at 3400'. RDMO WL.
16. PU and TIH with (4-1/2", 11.6#) CICR on 2-3/8" tbg. Set CICR at 3460'.
17. Establish circulation to surface with biocide treated fresh water, and pump 100 bbls to clean up hole. Max pump pressure is 1184 psi with fresh water at 2 bpm. If unable to circulate at that pressure, contact engineer.
18. RU Cementers. Pump 10 bbls (min) of pre-flush, followed by 5 bbls fresh water spacer. Pump Squeeze: 150 sx (41.5 bbl or 233 cf) Class G cement with 0.25 lb/sk polyflake, assuming 14 ppg & 1.55 cf/sk. Max pump pressure is to be 642 psi at 2 bpm with a full column of cement. Underdisplace by 3 bbls. Volume is based on 340' below the CICR inside 4-1/2", 11.6# production casing with no excess, 400' in the 4-

- 1/2", 11.6# annulus assuming 7.88" bit size with 100% excess and 190' on top of the CICR to cover top perms. Collect wet and dry samples of cement to be left on rig. RD Cementers.
19. Pull out of cement at a rate of 1 jt/min. TOO H to 2770'. Reverse circulate to ensure no cement is left in the tbg.
  20. TOO H and SB 1375' of 2-3/8" tbg. LD stinger, and remaining tbg.
  21. Shutdown for a minimum of 8 hours and monitor gas migration. If gas exists, contact engineer.
  22. MIRU WL. PU and RIH and jet cut 4-1/2", 11.6# casing at 1275'. RDMO WL.
  23. Attempt to establish circulation and circulate (100 bbl) with fresh water containing biocide to remove any gas.
  24. ND BOP. ND TH. Un-land casing using a casing spear, not a lifting sub. Rig max pull shall be 100,000#. Max pull over string weight shall be 50,000#. If unable to unland, contact Engineering.
  25. Install BOP on casing head with 4-1/2", 11.6# pipe rams.
  26. TOO H and LD all 4-1/2", 11.6# casing. Remove 4-1/2", 11.6# pipe rams and install 2-3/8" pipe rams.
  27. TIH with mule shoe and 2-3/8" tubing to 1375'.
  28. Establish circulation to surface with biocide treated fresh water and pump at least three hole-volumes (352.5 bbl) to circulate all gas out of the well. Contact engineering if evidence of gas migration persists.
  29. RU Cementers. Pump 10 bbls (min) of pre-flush, followed by 5 bbls fresh water spacer. Pump Stub Plug: 320 sx (88.4 bbl or 496 cf) Class G cement with 0.25 lb/sk Polyflake, assuming 14 ppg & 1.55 cf/sk. Volume is based on 100' in 4-1/2", 11.6# production casing with no excess. 603' in 7.88" bit size open hole with 100% excess factor. 202' in the 8-5/8", 24# surface casing with no excess. The plug is designed to cover 1375'-470'. Collect wet and dry samples of cement to be left on rig. RDMO Cementers. Notify engineering if circulation is ever lost during job.
  30. Pull out of cement at a rate of 1 jt/min. TOO H to 270'. Reverse circulate using biocide treated fresh water to ensure the tubing is clean. TOO H, LD all 2-3/8" tbg.
  31. Tag cement as needed. After tagging top of cement, and verifying appropriate coverage above the surface casing shoe, pressure test surface casing to 500 psi and hold for 15 minutes.
  32. MIRU WL. RIH 8-5/8", 24# CIBP to 80'. RDMO WL and WO rig.
  33. 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 hours of completion of the job.
  34. Supervisor submit paper copies of all invoices, logs, and reports to VWP Engineering Specialist.
  35. Excavation crew to notify One Call to clear excavation area around wellhead and for flow lines.
  36. Capping crew will set and secure night cap on 8-5/8", 24# casing head, restrain the casing head, pressure test CIBP to 500 psi with hydrotest pump, then remove night cap and casing head restraints.
  37. Excavate hole around surface casing enough to allow welder to cut casing a minimum 5' below ground level.
  38. Welder cut casing minimum 5' below ground level.
  39. Fill casing to surface using 4500 psi compressive strength cement (NO gravel).
  40. Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
  41. Obtain GPS location data as per COGCC Rule 215 and send to [rscDJVendors@anadarko.com](mailto:rscDJVendors@anadarko.com).
  42. Properly abandon flow lines per Rule 1103. File electronic Form 42 once abandonment is complete.
  43. Back fill hole with fill. Clean location, and level.
  44. Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.