

Engineer: Samantha Tran
Cell: 832-540-0209

PLUG and ABANDONMENT PROCEDURE

LUDWIG 2-5 2

Step	Description of Work
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| 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 bumper spring and tag bottom. Record tag depth in Open Wells. Well has GYRO from 01/22/2014. RDMO slickline. |
| 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. Blow down bradenhead and re-check pressure the next day. Repeat until pressure stays at 0 psi. |
| 5. | MIRU WO rig. Spot a min of 25 jts of 2-3/8" 4.7# J-55, EUE tbgs. Kill well as necessary using clean fresh water with biocide. ND WH. NU BOP. Unland tbgs using unlanding joint and LD. |
| 6. | TOOH and SB all 2-3/8" tbgs. |
| 7. | PU and RIH with (4.5", 11.6#) Bit and Scraper on 2-3/8" tbgs to 7730'. TOOH and SB 7030' 2-3/8" tbgs, LD remaining. |
| 8. | MIRU WL. PU and RIH with (4.5", 11.6#) CIBP and set at +/- 7720' to abandon the J Sand perfs. POOH. RD WL. |
| 9. | TIH to 2500' with 2-3/8" tbgs and circulate gas out of well with biocide treated fresh water. TOOH. |
| 10. | RU WL. Well does not have CBL. PU and RIH with CCL-GR-CBL-VDL. Run log from 7720' to surface and send results to Engineering (assumed TOC at 6525'). |
| 11. | RIH to dump 2 sx cement on CIBP. POOH |
| 12. | PU and RIH with (4.5", 11.6#) CIBP and set at +/- 7030' to cover the Niobrara formation. POOH. RDMO WL. |
| 13. | TIH with 2-3/8" tbgs while hydrotesting to 3000 psi to 7030'. Load hole with biocide fresh water and circulate all gas from well. PT CIBP to 1000 psi for 15 minutes. |
| 14. | <u>MIRU cements</u> . Niobrara/Codell Balance Plug: Pump 25 sxs (39 cf) 15.8 ppg & 1.55 cf/sk. Volume based on 410' inside 4-1/2" production casing. Cement will be from 7030' – 6620'. RD cements. |
| 15. | Slowly pull out of the cement and PUH to 6120'. Reverse circulate tubing clean to ensure no cement is left in the tubing. |
| 16. | TOOH and SB 4170' of 2-3/8" tbgs, LD remaining tbgs. |
| 17. | MIRU WL. 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 4690' and 4' of squeeze holes at 4140'. POOH. RDMO WL. |
| 18. | PU and RIH with (4.5" 11.6#) CIBP on 2-3/8" tbgs. Set CIBP at 4170'. |
| 19. | Establish circulation to surface with biocide treated fresh water, and pump 200 bbls to clean up hole. |
| 20. | <u>RU Cements</u> . Pump Sussex Squeeze: Pump 10 bbls sodium silicate and 5 bbls fresh water followed 420 sx (496 cf) with 0.25 lb/sk polyflake 15.8 ppg & 1.18 cf/sk. Underdisplace by 3 bbls. Volume is based on 520' below the CIBP inside 4-1/2" production casing with no excess, 550' in the 4-1/2" annulus assuming 11.5" OH from the log with 20% excess and 193' on top of the CIBP to cover top perfs. RD cements. |
| 21. | Slowly pull out of the cement and PUH to 3450'. Reverse circulate to ensure no cement is left in the tbgs. |
| 22. | TOOH and SB 1350' 2-3/8" tbgs, LD remaining tbgs and CIBP stinger. |
| 23. | MIRU WL. RIH and cut 4-1/2" casing at 1250'. POOH, RDMO WL. |
| 24. | Circulate with fresh water containing biocide to remove any gas. |
| 25. | ND BOP. ND TH. Un-land casing using a casing spear, not a lifting sub. Max pull shall be 100,000#. If unable to unland, contact Engineering. |

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26. Install BOP on casing head with 4-1/2" pipe rams.
27. TOOH and LD all 4-1/2" casing. Remove 4-1/2" pipe rams and install 2-3/8" pipe rams.
28. RIH with 2-3/8" tubing to 1350'.
29. Establish circulation with biocide treated fresh water and pump one hole volume (105 bbls). Pump 10 bbls (min) SAPP, followed by 5 bbls fresh water spacer.
30. RU Cementers. Pump GAS BLOCK Stub Plug: 395 sxs (459 cf) with 0.25 lb/sk Polyflake, 15.8 ppg & 1.16 cf/sk (100' in 4-1/2" production casing with no excess, 690' in 7.88" bit size OH with 60% excess factor, and 200' in 8-5/8" surface casing with no excess). The plug will cover 1350' – 360' RDMO cementers.
31. Slowly pull out of the cement and PUH to 100'. Reverse Circulate using biocide treated fresh water, to ensure the tubing is clean.
32. WOC per cement company recommendation. TIH and tag cement. Cement top needs to be at or above 510' (50' above the surface casing shoe at 560'). Call Engineering if tag is lower than 510'. PU and TOOH.
33. MIRU WL. RIH (8-5/8", 24#) CIBP to 80'. RDMO WL and WO rig.
34. Instruct cementing and wireline contractors to e-mail copies of all job logs/job summaries to rscDJVendors@anadarko.com within 24 hours of completion of the job.
35. Supervisor submit paper copies of all invoices, logs, and reports to Platteville Engineering Specialist.
36. Excavation crew to notify One Call to clear excavation area around wellhead and for flow lines.
37. Capping crew will set and secure night cap on 8 5/8" casing head, restrain the casing head, pressure test CIBP to 500 psi with hydrotest pump, then remove night cap and casing head restraints.
38. Excavate hole around surface casing enough to allow welder to cut casing a minimum 5' below ground level.
39. Welder cut casing minimum 5' below ground level.
40. Fill casing to surface using 4500 psi compressive strength cement (NO gravel).
41. Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
42. Obtain GPS location data as per COGCC Rule 215 and send to rscDJVendors@anadarko.com.
43. Properly abandon flow lines per Rule 1103. File electronic Form 42 once abandonment is complete.
44. Back fill hole with fill. Clean location, and level.
45. Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.