

PLUG AND ABANDONMENT PROCEDURE

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LEONARD L 17-18

| Step | Description of Work |
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| 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 IOC (970-506-5980) at least 24 hr prior to rig move. Request they isolate production equipment and remove any automation prior to rig MIRU. |
| 2 | Check and report surface casing pressure. If surface casing is not accessible at ground level, re-plumb so valve is at ground level. |
| 3 | Prepare location for base beam equipped rig. Install perimeter fence as needed. |
| 4 | Arrange for delivery of 2 3/8" tbg work string to location: 7200' min. |
| 5 | MIRU, check and bleed off any pressure on casing (all perms are below a bridge plug). ND WH. NU BOP. |
| 6 | PU and RIH 2 3/8" WS open-ended, hydro-testing to 3000 PSI, to tag PBTD: Composite BP set @ 7040' with 2 sx cement on top. Calculated TOC 7015' KB. NOTE: Composite BP in hole since 11/07/2013 - may not be an effective barrier due to temperature degradation. |
| 7 | RU cementers and equalize a balanced plug above BP from 7015' to 6590' as follows: 25 sx "Thermal 35" + 0.5% CFR-2 + 0.25% FMC, mixed at 15.6 ppg and 1.51 cuft/sk. (38 cuft of slurry). |
| 8 | POH 10 stands and circulate tbg clean using fresh water treated with biocide. POH and LD WS to place EOT to 4600'. |
| 9 | RU cementers and equalize a balanced plug from 4600' to 4100' as follows: 40 sx class "G", w/0.4% CD-32, 0.4% ASA-301, and CaCl ₂ as deemed appropriate mixed at 15.8 ppg and 1.15 cuft/sk (46 cuft of slurry). |
| 10 | POH to ~3000. Circulate water containing biocide to clear tubing and casing. WOC per cementing company recommendation. |
| 11 | Tag cement @ 4100'. POH and stand back 1230' of tbg. |
| 12 | RU WL. Crack coupling or cut casing at 1130'. RDMO WL. Circulate bottoms up and continue circulating to remove any gas from wellbore. |
| 13 | ND BOP and wellhead. Install BOP on surface 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. |
| 14 | TOOH and LD 4 1/2" casing. |
| 15 | RIH with 2 3/8" tubing open-ended to 1230' (100' inside 4 1/2" stub). Establish circulation with biocide-treated water. Continue circulating to bring bottoms up and remove gas from wellbore. |

- 16 RU cementers. Pump 10 bbl SAPP (Sodium Acid Pyrophosphate) followed by 20 bbl (min.) fresh water spacer immediately preceding cement.
- 17 Pump balanced Stub Plug: 260 sx Type III w/0.25#/sk Polyflake +0.5% CaCl₂ + 0.3% CFL-3 + 0.3% CFR-2 mixed at 14.8 ppg and 1.33 cf/sx (346 cuft of slurry). Cement volume based on 100' in 4 1/2" csg, 205' in 8 5/8" csg, and 485' in 9" OH + 20% excess. Caliper log on file.
- 18 TOOH. WOC per cementing company recommendation. Tag Cement. TOC should be at or above 545'. If not, consult Evans Engineering.
- 19 MIRU WL. RIH 8 5/8" CIBP to 80'. Set and PT to 1000 psi for 15 min. If tests, RDMO WL and WO rig.
- 20 Instruct cementing and wireline contractors to e-mail copies of all job logs/job summaries to rscDJVendors@anadarko.com within 24 hrs of completion of the job.
- 21 Supervisor submit paper copies of all invoices, logs, and reports to Evans Engineering Specialist.
- 22 Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
- 23 Excavate hole around surface casing enough to allow welder to cut 8 5/8" casing minimum 5' below ground level.
- 24 Welder cut 8 5/8" casing minimum 5' below ground level.
- 25 Fill casing to surface using 4500 psi compressive strength cement, (NO gravel).
- 26 Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
- 27 Obtain GPS location data as per COGCC Rule 215 and send to rscDJVendors@anadarko.com.
- 28 Properly abandon flowlines per Rule 1103. File electronic Form 42 once abandonment complete.
- 29 Back fill hole with fill. Clean location, level.
- 30 Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.