

## PLUG AND ABANDONMENT PROCEDURE

RADEMACHER 11-30A

- | 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 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    | Check and report surface casing pressure. If surface casing is not accessible at ground level, re-plumb so valve is at ground level.   |
| 4    | Prepare location for base beam equipped rig. Install perimeter fence as needed.  |
| 5    | MIRU, kill as necessary using clean fresh water with biocide. ND WH. NU BOP. Unseat landing jt, LD.  |
| 6    | TOOH and stand back 6850' 2 3/8" production tubing (232 jts landed @7264'). LD remaining 2 3/8" tbg and 10 jts 1.66" tbg (315').   |
| 7    | MIRU WL. RIH gauge ring for 4 1/2" 11.6# csg to Liner Top @ 7272'. RIH 4 1/2" CIBP and set at 7270' to abandon J sand perfs. PU dump bailer and spot 2 sx cement on CIBP.  |
| 8    | RIH 4 1/2" CIBP and set @ 6850' to abandon Cd/Nb perfs. Pressure test CIBP and casing to 1000 psi for 15 minutes. RDWL.  |
| 9    | TIH w 2 3/8" tbg open ended to CIBP at 6850'. Hydro -test tbg to 3000 psi.   |
| 10   | RU cementers and equalize a balanced plug above CIBP from 6850' to 6450' as follows: 25 sx "G" w/20% silica flour, 0.4% CD-32, 0.4% ASA-301 and R-3 to achieve 2:30 pump time, mixed at 15.8 ppg and 1.38 cuft/sk. (35 cuft of slurry).  |
| 11   | POH 20 stands and circulate tbg clean using fresh water treated with biocide. POH standing back 3930' of tbg.  |
| 12   | RUWL. PU 2 - 1' 3-1/8" perf guns with 3 spf, 0.5" dia 120° phasing. Shoot 1' of squeeze holes at 4320' and 3900'. RDWL.  |
| 13   | PU CICR on 2 3/8" tbg. RIH and set CICR at 3930'.  |
| 14   | RU Cementers. Pump 5 bbl water w/ biocide, 20 bbl Sodium Metasilicate, and another 5 bbl spacer immediately preceding cement.  |
| 15   | Pump Sussex Suicide: 270 sx class "G", w/0.25 pps cello flake, 0.4% CD-32, 0.4% ASA-301 mixed at 15.8 ppg and 1.15 cuft/sk (310 cuft of slurry) to place cement between perfs. Underdisplace and sting out of CICR to leave 3 bbls cement on top of retainer. Cement volume based on 10" hole with 40% excess. |
| 16   | POH 15 stands. Circulate water containing biocide to clear tubing. POH standing back ~1040' of tbg.  |
| 17   | 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.  |
| 18   | RU WL. Crack coupling or cut casing at 940'. RDMO WL. Circulate bottoms up and continue circulating to remove any gas from wellbore.   |
| 19   | TOOH and LD 940' of 4 1/2" casing.   |
| 20   | RIH with 2 3/8" tubing open-ended to 1040' (100' inside 4 1/2" stub).  |

- 21 RU cementers. Pump 10 bbl SAPP (Sodium Acid Pyrophosphate) followed by 20 bbl (min.) fresh water spacer immediately preceding cement.
- 22 Pump balanced Stub Plug: 250 sx Type III w/0 .25#/sk cello flake and CaCl<sub>2</sub> as deemed necessary mixed at 14.8 ppg and 1.33 cf/sx (333 cuft of slurry). Cement volume based on 100' in 4 1/2" csg, 200' in 8 5/8" csg, and 324' in 10" OH + 40% excess.
- 23 TOOH. WOC per cementing company recommendation. Tag Cement. TOC should be at or above 516'. If not, consult Evans Engineering.
- 24 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.
- 25 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.
- 26 Supervisor submit paper copies of all invoices, logs, and reports to Joleen Kramer.
- 27 Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
- 28 Excavate hole around surface casing enough to allow welder to cut 8 5/8" casing minimum 5' below ground level.
- 29 Welder cut 8 5/8" casing minimum 5' below ground level.
- 30 Fill casing to surface using 4500 psi compressive strength cement, (NO gravel).
- 31 Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
- 32 Obtain GPS location data as per COGCC Rule 215 and send to rscDJVendors@anadarko.com.
- 33 Properly abandon flowlines per Rule 1103. File electronic Form 42 once abandonment complete.
- 34 Back fill hole with fill. Clean location, level.
- 35 Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.

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