

## PLUG AND ABANDONMENT PROCEDURE

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### STATE OF COLO "AF" #1

- | Step | Description of Work  |
|------|--|
| 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 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    | 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. Check and blow down daily - record the results in OpenWells. If Bradenhead does not blow down to zero and stay at zero, surface plug may be altered.  |
| 5    | MIRU, kill as necessary using clean fresh water with biocide. ND WH. NU BOP. Unseat landing jt, LD.  |
| 6    | Spot trailer with +- 5500' 2 3/8" tbg work string.   |
| 7    | POOH and stand back 1.66" IJ tbg (244 jts of 1.66" landed at 7921').   |
| 8    | MIRU WL. RIH gauge ring for 2 7/8" 6.5 #/ft casing to 7900'. POOH. Set 2 7/8" CIBP at 7880' to abandon JS perfs (collars at 7868' and 7898'). Pressure test CIBP to 1000 psi for 15 minutes.   |
| 9    | TIH with 1.66" IJ tbg open-ended to CIBP at 7880', hydro-testing to 3000 PSI.  |
| 10   | MIRU Cementers. Place a balanced plug from 7880' to 6720': 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).  |
| 11   | LD 1.66" tbg to +- 6000'. Circulate water treated with biocide to clear tbg. TOH and LD 1.66" tbg string.  |
| 12   | MIRU WL. Cut off 2-7/8" liner @ 5200'. Establish circulation with water containing biocide down 2 7/8" liner, taking returns on 4 1/2" casing. Circulate bottoms up to remove any gas from wellbore. RD WL.  |
| 13   | ND BOP and 2 7/8" tbg head. Install BOP on casing head with 2 7/8" pipe rams. Install 3000 psi ball valves on both casing head outlets. Install a choke or choke manifold on one outlet.   |
| 14   | TOOH with 2-7/8" casing, LD. Circulate bottoms up again @ +- 1000' to ensure hole is full with no trapped gas for CBL.   |
| 15   | RU WL. Run CBL from 4773' (bottom of 4.5") to surface. Find the TOC above the SX and the Bottom and Top of Cement at the DV Tool at 755' and identify any other anomalies. Forward results to evans Engineering. Contact Evans Engineering for possible changes to procedure.                                      |
| 16   | Change pipe rams to 2 3/8".  |
| 17   | PU and TIH 2-3/8" tbg WS open-ended to 5200' while hydrotesting to 3000 psi. Circulate bottoms up with water containing biocide to remove gas.   |
| 18   | MIRU Cementers. Pump 20 bbl sodium metasilicate and a 5 bbl water spacer.  |

- 19 Place SX/SN balanced plug: 90 sx (104 cuft) class "G" w/ .25 pps cello flake, 0.4% CD-32, 0.4% ASA-301 mixed at 15.8 ppg and 1.15 cuft/sx. The plug will cover 5200' - 4200'. Cement volume based on 427' in 4" OH with 40% excess plus 573' in 4 1/2" 10.5# casing. RD cementers.
- 20 TOH to 3000' and circulate tubing and casing clean.
- 21 WOC per cementing company recommendation. Tag cement. TOC should be above 4270'.
- 22 TOOH standing back 810', LD remainder.
- 23 MIRU WL. PU 2- 3-1/8" perf guns w/ 0.6" diam, 120 phasing and shoot 1' of squeeze holes at 1350' and 2" of holes @ 780'. Adjust top perf to be ~ 20' below BOC at the DV Tool per CBL. RDWL
- 24 PU Thunderbird tension-set CICR on 2-3/8" tbg. RIH and set @ 810'.
- 25 RU cementers. Establish circulation with biocide-treated water. Pump 10 bbl SAPP (Sodium Acid Pyrophosphate) followed by 20 bbl (min.) fresh water spacer immediately preceding cement.
- 26 Pump Fox Hills Suicide sqz: 250 sx (333 cuft.) Type III cement w/ 0.25 pps Polyflake, 0.3% CFR-2, 0.3% CFL-3 and 0.5% CaCl<sub>2</sub> mixed at 14.8 ppg and 1.33 cuft/sk. to place cement between perfs. Underdisplace and sting out of CICR to leave 3 bbls cement on top of retainer. Cement volume based on 720' in 4 1/2" csg plus 570' in 9" open hole with 40% excess.
- 27 PUH to 630' and circulate hole clean. TOOH and LD stinger.
- 28 TIH w/ tbg open-ended to 630'.
- 29 RU cementers and place a balanced plug from 630' to 150': 33 sx (44 cuft) Type III cement w/ 0.3% CFR-2, 0.3% CFL-3 and 0.5% CaCl<sub>2</sub> mixed at 14.8 ppg and 1.33 cuft/sk. PUH and circulate clean at 150'. TOOH.
- 30 WOC per cement company recommendation. Tag cement. Cement top needs to be 175' or shallower..
- 31 MIRU WL. RIH 4 1/2" CIBP to 150'. Set and pressure test to 1000 psi for 15 minutes. RDMO WL and WO rig.
- 32 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.
- 33 Supervisor submit paper copies of all invoices, logs, and reports to Evans Engineering Specialist
- 34 Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
- 35 Excavate hole around surface casing enough to allow welder to cut casing minimum 5' below ground level.
- 36 Welder cut casing minimum 5' below ground level.
- 37 Fill casing to surface using 4500 psi compressive strength cement, (NO gravel).
- 38 Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
- 39 Obtain GPS location data as per COGCC Rule 215 and send to rscDJVendors@anadarko.com.
- 40 Properly abandon flowlines per Rule 1103. File electronic Form 42 once abandonment complete.
- 41 Back fill hole with fill. Clean location, level.
- 42 Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.