

PLUG AND ABANDONMENT PROCEDURE

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HARKIS USX X 13-4

- | 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 Automation Removal Group at least 24 hr prior to rig move. Request they pull plunger, 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 | MIRU slickline. RIH to retrieve production equipment and tag sand plug. Note tagged depth in OpenWells. RDMO slickline. |
| 4 | Prepare location for base beam equipped rig. Install perimeter fence as needed. |
| 5 | This well as a gyro from 3/24/14 |
| 6 | MI trailer with an additional 25 joints of tubing. |
| 7 | MIRU, kill as necessary using clean fresh water with biocide. ND WH. NU BOP. Unseat landing jt, LD. Tbg is landed @ 7574' KB w/ 235 jts. |
| 8 | TOOH and stand back 2 3/8" tbg. |
| 9 | PU 4 1/2" casing scraper on 2 3/8" tbg and RIH to 7600'. **NOTE: the production casing is an unknown mix of 10.5# and 11.6# 4.5" K55. |
| 10 | Pull and stand back 6475' of tubing, laying down the remainder. RIH 4 1/2" CIBP on 2 3/8" tbg and set at 7490' to abandon J Sand perfs. Circulate to remove gas. |
| 11 | RUWL. RIH with CCL-GR-CBL-VDL. Log from CIBP at 7490' to surface to verify cement coverage. No CBL can be found. TOC is believed to be at +/- 7350'. Contact engineering before proceeding to verify procedure. Remaining steps assume there is NOT adequate cement squeeze coverage over Niobrara. PU dump bailer and spot 2 sxs of cement of CIBP. RDMO wireline services. |
| 12 | Pressure test CIBP at 7490' and casing to 1000 psi for 15 minutes. |
| 13 | RUWL. PU 3' 3-1/8" perf guns with 3 spf, 0.5" dia 120° phasing. Shoot 1' of squeeze holes at 7260' and 2' of squeeze holes at 6445'. RDWL. |
| 14 | PU CICR on 2 3/8" tbg. RIH while hydrotesting to 3000psi and set CICR at 6475'. |
| 15 | RU Cementers. Establish circulation with fresh water treated with biocide. If circulation cannot be established contact Evans engineering before proceeding. |
| 16 | Pump Niobrara suicide squeeze from 7260' to 6445' as follows: 300 sx Thermal 35 + 0.5% CFR - 2 + 0.25% FMC, mixed at 13.5 ppg and 1.66 cuft/sk. (494 cuft of slurry). Cement volume based on 10.0" hole with 20% excess. Caliper log dated 11/27/1979 on file. |
| 17 | POH to ~6250' and circulate tbg clean using fresh water treated with biocide. TOOH standing back 4580' of tbg. |
| 18 | RUWL. PU 3' 3-1/8" perf guns with 3 spf, 0.5" dia 120° phasing. Shoot 1' of squeeze holes at 4580' and 2' of squeeze holes at 4005'. RDWL. |
| 19 | PU CICR on 2 3/8" tbg. RIH and set CICR at 4035'. |

- 20 RU Cementers. Establish circulation with fresh water treated with biocide. If circulation cannot be established contact Evans engineering before proceeding. Pump 5 bbl water w/ biocide, 20 bbl Sodium Metasilicate, and another 5 bbl spacer immediately preceding cement.
- 21 Pump Sussex Suicide: 280 sx class "G" + 0.6% CFL - 2 + 0.5% CFR + 0.6% SMS + 0.2% SPC - 2 + 0.1% LTR mixed at 14.6 ppg and 1.12 cuft/sk (311 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 9.5" hole with 20% excess. Caliper log dated 11/27/1979 on file.
- 22 POH to ~3800. Circulate water containing biocide to clear tubing. POOH standing back 1470' tbg.
- 23 RU WL. Crack coupling or cut casing at 1370'. RDMO WL. Circulate bottoms up and continue circulating to remove any gas from wellbore.
- 24 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.
- 25 TOOH and LD 1370' of 4 1/2" casing.
- 26 RIH with 2 3/8" tubing open-ended to 1470' (100' inside 4 1/2" stub).
- 27 RU cementers. Establish circulation with fresh water treated with biocide. If circulation cannot be established contact Evans engineering before proceeding. Pump 10 bbl SAPP (Sodium Acid Pyrophosphate) followed by 20 bbl (min.) fresh water spacer immediately preceding cement and get bottoms up.
- 28 Pump balanced Stub Plug: 430 sx Type III + 0.3% CFL - 3 + 0.3% CFR - 2 + 0.25 lb/sk Polyflake and CaCl₂ as deemed necessary mixed at 14.8 ppg and 1.33 cf/sx (565 cuft of slurry). Cement volume based on 100' in 4 1/2" csg, 202' in 8 5/8" csg, and 703' in 9.5" OH + 40% excess. (based on caliper log 11/27/1979).
- 29 TOOH. WOC per cementing company recommendation. Tag Cement. TOC should be at or above 565'. If not, consult Evans Engineering.
- 30 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.
- 31 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.
- 32 Supervisor submit paper copies of all invoices, logs, and reports to Evans Engineering Specialist.
- 33 Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
- 34 Excavate hole around surface casing enough to allow welder to cut 8 5/8" casing minimum 5' below ground level.
- 35 Welder cut 8 5/8" casing minimum 5' below ground level.
- 36 Fill casing to surface using 4500 psi compressive strength cement, (NO gravel).
- 37 Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
- 38 Obtain GPS location data as per COGCC Rule 215 and send to rscDJVendors@anadarko.com.
- 39 Properly abandon flowlines per Rule 1103. File electronic Form 42 once abandonment complete.
- 40 Back fill hole with fill. Clean location, level.
- 41 Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.