

## PLUG AND ABANDONMENT PROCEDURE

### Edward Rademacher UNIT #1

Note: Production Casing = 4.5" OD, 11.6#/ft, K-55; Production Hole Drilled @ 7.875"; MI ~15 additional 2.375" prod tbg jts. Surface Sqz Holes: 570'. SX Sqz Holes: 4802'.

- 1 Provide at least 48 hr notice to COGCC prior to rig up. Call foreman or lead operator at least 24 hr prior to rig move. Request they catch and remove the plunger, isolate production equipment and remove any automation prior to rig showing up. Install perimeter fence as needed.
- 2 MIRU slickline services. Pull bumper spring and tag bottom. Gyro ran 12/10/2013. RDMO slickline services.
- 3 Notify IOC when rig mobilizes to location to generate workorder for flowline removal & one call for line locates.
- 4 Prepare location for base beam equipped rig.
- 5 MIRU, kill as necessary using clean fresh water with biocide and circulate. ND WH. NU BOP. Unseat landing jt, LD.
- 6 Notify cementers to be on call. Provide volumes listed below:
  - 6\_1 Niobrara Suicide: 140 sx 50/50 Poz "G" w/ 20% silica flour, 3% gel, 0.1% sodium metasilicate and 0.4% FL-52 mixed at 13.5 ppg and 1.71 cf/sk (38.5bbls) (9.5"+ 20% Caliper Log in file);
  - 6\_2 SX/SH Suicide: 280 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 cf/sx (52.7bbls) (11.25"+20% Caliper Log in file);
  - 6\_3 Surface Suicide: 240 sx Type III CaCl<sub>2</sub> cement mixed at 14.0 ppg and 1.53 cf/sx (55.1bbls) (347' in 12" OH+20% excess, 317' inside 4.5" production casing, and 8 bbls on top of CICR)
- 7 TOOH 2.375" production tubing. Stand Back.
- 8 MIRU WL. RIH gauge ring for 4.5" 11.6#/ft casing to 7660'. RIH CIBP w/ WL. Set at 7580'. PU dump bailer, dump bail 2 sx class 'G' cement on CIBP. Do not PT (note squeeze holes).
- 9 RIH CIBP w/ WL. Set at 7152'. PU dump bailer, dump bail 2 sx class 'G' cement on CIBP.
- 10 Run CBL from CIBP to Surface.
- 11 PU 2 - 1' 3-1/8" perf guns with 3 spf, 0.5" dia 120° phasing. Shoot 1' of squeeze holes at 6940' and 6540'. Adjust perf heights according to cement location on CBL. Desired bottom perf is 20' above TOC; Desired top perf is 400' above 6971' (Niobrara Top).
- 12 PU CICR. RIH and set at 6570'+/-20' pending collar locator on CBL. RD WL.
- 13 RIH w/ 2.375" tubing while hydrotesting to 3,000 psi.
- 14 RU Cementers. Pump Niobrara Suicide: 140 sx 50/50 Poz "G" w/ 20% silica flour, 3% gel, 0.1% sodium metasilicate and 0.4% FL-52 mixed at 13.5 ppg and 1.71 cf/sk (38.5bbls) (9.5"+ 20%

- Caliper Log in file); to place suicide squeeze between perfs. Underdisplace and sting out of CICR to leave 3 bbls on top of retainer.
- 15 PUH 6 stands. Circulate 90bbls water containing biocide to clear tubing.
  - 16 Place 9.0 ppg mud containing biocide from 6382' to 4290' (~34bbls). TOO H & WOC 4 hrs.
  - 17 RUWL & PU 2 - 1' 3-1/8" perf guns with 3 spf, 0.5" dia 120° phasing. Shoot 1' of squeeze holes at 4290' and 3910'. Adjust perf heights according to cement location on CBL.
  - 18 PU CICR. RIH and set at 3940'+/-20' pending collar locator on CBL. RD WL.
  - 19 RIH w/ 2.375" tubing.
  - 20 RU Cementers. Pump 5 bbl water w/ biocide, 20 bbl Sodium Metasilicate, and another 5 bbl spacer immediately preceding cement.
  - 21 Pump SX/SH Suicide: 280 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 cf/sx (52.7bbls) (11.25"+20% Caliper Log in file); to place suicide squeeze between perfs. Underdisplace and sting out of CICR to leave 3 bbls on top of retainer.
  - 22 PUH 5 stands. Circulate 55bbls water containing biocide to clear tubing. TOO H & WOC 4 hrs.
  - 23 Place 9.0 ppg mud containing biocide from 3750' to 953' (~45bbls). TOO H & WOC 4 hrs.
  - 24 RUWL & PU 2 - 1' 3-1/8" perf guns with 3 spf, 0.5" dia 120° phasing. Shoot 1' of squeeze holes at 953' and 606'.
  - 25 PU CICR. RIH and set at 636'+/-20' pending collar locator on CBL. RD WL.
  - 26 RIH w/ 2.375" tubing.
  - 27 RU Cementers. Pump Surface Suicide: 240 sx Type III CaCl<sub>2</sub> cement mixed at 14.0 ppg and 1.53 cf/sx (55.1bbls) (347' in 12" OH+20% excess, 317' inside 4.5" production casing, and 8 bbls on top of CICR) to place suicide squeeze between perfs. Pump all but 8 bbls. Sting out of CICR and spot 8 bbls on top of retainer.
  - 28 TOO H circulating as necessary to clear tubing. WOC 4 hrs. Tag Cement. Cement top needs to be above 150'; Proceed assuming TOC is above 150'. Otherwise, call production engineer.
  - 29 MIRU WL. RIH 4.5" CIBP to 100'. Set, PT to 1000 psi for 15 min. If tests, RDMO WL and WO rig.
  - 30 Supervisor submit paper copies of all invoices, logs, and reports to Joleen Kramer.
  - 31 Excavation crew to notify One Call to clear excavation area around wellhead and for flowlines.
  - 32 Excavate hole around surface casing enough to allow welder to cut 8 5/8" casing minimum 5' below ground level.

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