

REMEDIAL CEMENT PROCEDURE

SACK ALBERT UNIT 1

- | Step | Description of work |
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| 1 | Gyro run 3/13/2014 to 8070'. GL and KB unavailable. Possible adjustments may be necessary. Please call on-call engineer if any issues arise. |
| 2 | Contact field foreman or field coordinator before rig up to isolate production equipment. Catch and remove plunger. Enter plunger into PLUNGER DATABASE. Call prior to the rig moving onto location so that any automation equipment can be removed prior to the rig showing up. Install perimeter fence if needed. If surface csg is not accessible at ground level, re-pipe so valve is at ground level. Plug all disconnected valves around wellhead. |
| 3 | MIRU SL. Fish bumper spring and tag PBMD (should be 8136'). Inform engineer of tag depth. |
| 4 | Level location for base beam rig. |
| 5 | Spot 25 jts of 2-3/8" 4.7# J-55 8RD EUE tbg. |
| 6 | MIRU WO rig. Kill well with fresh water and biocide. ND WH, NU BOP. |
| 7 | PU tbg. Unset packer. LD landing jt. |
| 8 | MIRU EMI equipment. TOOH with 2-3/8" tbg. EMI tbg while TOOH. Lay down jts with wall loss or penetrations >35%. Replace jts as necessary. Keep yellow and blue band tbg. Note jt number and depth of tubing leak(s) on production equipment failure report in OpenWells. Clearly mark all junk (red band) tbg sent to yard. SB all 2-3/8" tubing and LD packer. |
| 9 | RU hydrotesters. PU bit and scraper for 4-1/2", 10.5 lb/ft casing and RIH with 2-3/8" tubing to 6795' while hydrotesting tubing to 3000 psi. TOOH. SB all 2-3/8" and LD bit and scraper. RDMO hydrotesters. |
| 10 | RU WL. PU 4-1/2", 10.5 lb/ft CIBP. RIH and set CIBP at +/- 6790' (collars at 6778' and 6811'). POOH. RDWL. |
| 11 | TIH with 2-3/8" tubing to 2500'. Circulate to remove gas. |
| 12 | Pressure test CIBP to 1000 psi for 15 minutes. If pressure test passes, TOOH. SB tbg. |
| 13 | RU WL. Spot 2 sx of cement on top of CIBP at 6790'. POOH. |
| 14 | PU and RIH with two 3-1/8" perf guns with 3 spf, 0.50" EHD, 120° phasing. Shoot 1' of squeeze holes at 4900' and 1' at 4385'. POOH. RD WL. |
| 15 | PU 4-1/2", 10.5 lb/ft CICR and RIH with 2-3/8" tubing. Set CICR at 4415' (collars located at 4394' and 4427'). |
| 14. | <u>RU Cementers.</u> Establish circulation through squeeze holes. Pump 100 bbls of water with biocide, 10 bbls sodium silicate, and another 5 bbls spacer immediately preceding cement.
Pump Sussex Suicide Squeeze: 325 sx (382.5 cu.ft.) with Polyflake assumed at 15.8 ppg & 1.18 ft ³ /sk. Follow with 5 bbls of clean fresh biocide treated water and again followed by 5 sx of cement. Under-displace by 2 bbls and un-sting from CICR spotting a minimum 100' of cement covering the squeeze holes. Goal is to create 200' plug over bottom squeeze hole, about 300' of water, and 60' of cement below the retainer and 100' of cement above the retainer. The annular cement will cover 4900' – 4385'. Volume based on 515' in 11" OH w/ 20% excess (from caliper log) and 360' in 4-1/2" production casing with no excess. RD cementers. |

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15. Slowly pull out of the cement and PUH to 4315'. Reverse circulate tubing clean with fresh water to ensure no cement is left in the tubing.
16. TOOH, SB all 2-3/8" tubing; LD stinger.
17. RU WL. PU and RIH with two 3-1/8" perf guns with 3 spf, 0.50" EHD, 120° phasing. Shoot 1' of squeeze holes at 1545' and 1' at 1000'. RD WL.
18. PU 4-1/2", 10.5 lb/ft CICR and RIH with 2-3/8" tubing. Set CICR at 1035' (collars located at 1025' and 1058').
19. RU Cementers. Establish circulation through squeeze holes. Pump 100 bbls of water with biocide immediately preceding cement. **Pump FHM Suicide Squeeze:** 235 sx (266.7 cu.ft.) with Polyflake assumed at 15.8 ppg & 1.16 ft³/sk. Follow with 5 bbls of clean fresh water and again followed by 5 sx of cement. Under-displace by 2 bbls and un-sting from CICR spotting a minimum 100' of cement covering the squeeze holes. Goal is to create 200' plug over bottom squeeze hole, about 300' of water, and 60' of cement below the retainer and 100' of cement above the retainer. The annular cement will cover 1545' – 1000'. Volume based on 545' in 7.88" OH w/ 60% excess (from caliper log) and 360' in 4-1/2" production casing with no excess. RD cementers.
20. Slowly pull out of the cement and PUH to 930'. Reverse circulate tubing clean with fresh water to ensure no cement is left in the tubing.
21. TOOH, SB all 2-3/8" tubing; LD stinger.
22. WOC per cement company recommendation. PU and TIH with tubing string consisting of a 3-7/8" rock bit, 8-10 drill collars (as needed), and 2-3/8" tubing to surface.
23. TIH to tag top of cement @930'.
24. RU power swivel, establish circulation with fresh biocide treated water. Drill out cement to 1035'. RD power swivel.
25. PT squeeze holes to 500 psi. If holes do not hold pressure, contact on-call engineer for additional remediation.
26. RU power swivel, establish circulation with fresh biocide treated water. Drill out cement to 1645'. RD power swivel.
27. PT squeeze holes to 500 psi. If holes do not hold pressure, contact on-call engineer for additional remediation.
28. TIH to tag top of cement @ 4315'.
29. RU power swivel, establish h circulation with fresh biocide treated water. Drill out cement to 4415'. RD power swivel.
30. PT sqz holes to 500 psi. If holes do not hold pressure, contact on-call engineer for additional remediation.
31. RU power swivel, establish circulation with fresh biocide treated water. Drill out cement to 5000'. RD power swivel.
32. PT sqz holes to 500 psi. If holes do not hold pressure, contact on-call engineer for additional remediation.
33. TOOH and SB all 2-3/8" tubing and LD drill collars and rock bit (if worn).
34. MIRU WL and run CCL-GR-CBL-VDL from 6790' to surface (cement should be from +/- 4900' to 4385' and 1545' – 1000'). If Sussex plug is not above 4487', contact engineering for further instructions. Email logs to engineering and DJVendors@anadarko.com. RDMO WL.
35. PU and TIH with tubing string consisting of a 3-7/8" rock bit and 2-3/8" tubing to surface.
36. TIH to tag top of cement on CIBP @6790'.

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37. RU power swivel, establish circulation with fresh biocide treated water. Drill out CIBP @ 6790' KB. Chase the remains of the CIBP to below 8120'. RD power swivel.
38. TOOH and SB all 2-3/8" tbg. LD rock bit.
39. RU Hydrotester. Hydrotest tubing to 6,000 psi while TIH. TIH with 2-3/8" NC, 2-3/8" XN nipple, 38 jt of 2-3/8" tbg (~1170'), 4-1/2" Arrowset AS-1X packer rated to 10,000 psi (4-1/2", 10.5#) set at +/- 6835' (collar located at 6811' and 6842'), 2-3/8" tbg to surface. Verify XN nipple sizes and enter in Open Wells. Land EOT at 8005'.
40. Fill hole with packer fluid. (Julio Ramirez 970-518-2166 or Cesar Rodriguez 970-590-2682 with Reliable Services). Do not load hole with water out of the work tank. Pressure test to 500 psi for 15 minutes.
41. ND BOP. Make sure the wellhead is a WHI 5,000 psi flanged tubing head complete w/ 5,000 psi rated casing valves. Thread tubing mandrel onto tubing and land in tubing head bowl.
42. Install 7 1/16", 5,000 psi flanged tubing head adaptor w/ new 2 1/16", 5,000 psi flanged master valve (reports indicate that the wellhead is already upgraded).
43. MIRU hydrotester. Install 2 3/8" pup joint above master valve. Hydrotest wellhead to 5,000 psi from below tubing head through master valve for 15 minutes.
44. Secure WH, RMDO WO rig. Return well to production team.