

## PLUG AND ABANDONMENT PROCEDURE

### Gerhardt Marie Gas Unit 1

- | 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 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 Slick line. Pull bumper spring and tag TD.  |
| 3    | Prepare location for base beam equipped rig.   |
| 4    | MIRU workover rig. Circulate well with water w/ biocide to kill the well. ND wellhead. NU BOPs. Unseat landing jt.   |
| 5    | POOH 2-3/8" tbg and stand back.  |
| 6    | PU csg scraper for 4-1/2" 10.5# and RIH to 7950'. POOH and LD scraper.   |
| 7    | MIRU Wireline. RIH with 4-1/2" CIBP to 7900'. Dump bail 2 sks cmt on top.  |
| 8    | RIH with 4-1/2" CIBP to 7425'. PT csg to 1000 psi for 15 minutes. Dump bail 2 sks cmt on top.  |
| 9    | RIH with 2- 1' 3-1/8" perf guns with 3 spf, 0.5" dia 120 phasing. Shoot 1' of squeeze holes at 7340' and 6830'. RDMO WL.   |
| 10   | Notify Cementers to be on call.  |
| 11   | PU CICR and RIH on 2-3/8" tbg while hydrotesting to 3000 psi. Set at 6850'.  |
| 12   | "RU Cementers. Establish injection and pump Niobrara suicide squeeze: 360 cu-ft (210 sks) 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 cuft/ sk yield with 20% excess and 9.5" hole size. Underdisplace by 3 bbls and sting out of CICR leaving 17 cu-ft (10 sks) on top of the CICR. Need to leave at least 100' on top above squeeze perfs." |
| 13   | PUH to leave end of 2-3/8" tbg at 4950 while circulating hole clean.   |
| 14   | RU Cementers. Spot Sussex balanced plug: 92cu-ft (80 sks) "G" w/0.25pps cello flake, 0.4% CD-32, 0.4% ASA-301 with CaCl <sub>2</sub> as necessary. Mixed at 15.8 ppg, 1.15 cuft/sack. Calculated top of plug 4025' based in the 4-1/2" csg. POH to ~3500' and circulate hole clean. WOC per cement company recommendation.   |
| 15   | Tag top of plug at 4025'. POOH, standing back 1360' and laying down the rest.  |
| 16   | ND BOP and wellhead. Install a 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.  |
| 17   | MIRU Wireline. Free point and cut off 4-1/2" csg at 1260' per CCL. RDMO WL. Circulate bottoms up using water and biocide to remove any gas from wellbore.  |

- 18 POOH and LD 4-1/2" csg. Remove the 4-1/2" pipe rams and Install 2-3/8" pipe rams.
- 19 RIH w/ 2-3/8" tbg open ended 100' past the 4-1/2" csg stub to 1360'.
- 20 MIRU Cementers. Equalize Fox Hills plug: 758 cu-ft (570 sx) Type III w/cello flake and CaCl<sub>2</sub> as deemed necessary, mixed at 1.33 cf per sack, 14.8 ppg. POH and WOC per cementing company recommendation. Plug size is based on 12.5" hole with 20% excess covering 1360' to shoe of surface casing at 646' plus capacity of surface casing to 300'. TOH and WOC per cement company recommendation.
- 21 RIH and tag top of plug. Plug needs to be tagged at 440' or shallower. POOH and LD 2-3/8" tbg.
- 22 RU wireline. Run and set CIBP in the 8 5/8", 24# surface casing at 80'. PT CIBP and surface casing to 1000 psi for 15 minutes. Assuming successful test, RD wireline.
- 23 RDMO workover rig.
- 24 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.
- 25 Supervisor submit paper copies of all invoices, logs, and reports to Joleen Kramer.
- 26 Excavate hole around surface casing of sufficient size to allow welder to cut off 8 5/8" casing at least 5' Below ground level (depending on land owner requirements).
- 27 Fill surface casing with cement (4500 psi compressive strength, no gravel).
- 28 Spot weld steel marker plate on top of sfc casing stub. Marker shall be labeled with well name, well number, legal location (1/4 1/4 descriptor) and API number.
- 29 Back fill hole with native material. Reclaim location to landowner specifications
- 30 Submit Form 6 to COGCC. Provide "As plugged" wellbore diagram identifying the specific plugging completed.

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