

## LUDWIG 22-1

## PLUG AND ABANDON PROCEDURE

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 IOC (970-506-5980) 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. MIRU VES and run GYRO from 7,398' (SN) to surface. RDMO VES and 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.
5. MIRU WO rig. Kill well as necessary w/ water containing biocide. ND WH, NU BOP.
6. Unseat and LD landing joint by PU w/ 2-3/8" tbg (4.7#, J-55, 8rd EUE) to break any sand bridges. Do not exceed the safety tensile load of 57,384 lbs (80% of upset yield strength).
7. TOOH and SB 2-3/8" tbg.
8. MIRU Wireline. PU gauge ring for 4.5" (11.6#, I-80, LTC) csg on wireline. RIH to 7,100'. POOH and LD gauge ring.
9. PU CIBP for 4.5" csg (11.6#, I-80, LTC). RIH and set CIBP at 7,090' (Note: Collars are at 7,100' & 7,056'). POOH and LD the setting tool. Pressure test CIBP to 1000 psi for 15 min. RDMO Wireline.
10. TIH 2-3/8" tbg and tag the CIBP (at +/- 7,090') while hydrotesting each stand to +/- 3000 psi. Pick up 5' from the tag.
11. MIRU Cementing Services. Spot 30 sx (+/- 41 cuft) of cmt (Class G w/ 20% silica flour, 0.4% CD-32, 0.4% ASA-301, and R-3 to achieve 2:30 pump time) mixed at 15.8 ppg and 1.38 cuft/sk from 7,090' to 6,730' on top of CIBP.
12. PUH w/ 2-3/8" tbg to +/- 6,000' (+/- 22 jts) and circulate tbg clean. PUH to +/- 4,730' while LD tbg.
13. Spot a balanced plug from 4,730' to 4,330' in the 4-1/2" csg (11.6#, I-80, LTC) with 30 sx (+/- 35 cuft) of cmt (Class G, 0.4% CD-32, 0.4% ASA-301) mixed at 15.8 ppg and 1.15 cuft/sk. RDMO Cementing Services.
14. PUH to +/- 3,700 (+/- 34 jts) and circulate to clean tbg. WOC for 4 hrs.
15. TIH w/ 2-3/8" tbg to tag TOC at +/- 4,330'. If TOC is deeper than 4,330' contact the Engineer for possible further cement work.
16. TOOH and SB +/- 1,300' of tbg and LD remainder.
17. MIRU wireline. PU a jet cutter on wireline and RIH to +/- 1,180' to cut 4-1/2" csg. Cut csg and circulate bottoms up. Continue to circulate to remove any gas from the wellbore. RDMO wireline.
18. ND BOP and tubing head. NU BOP on surface csg head w/ 4-1/2" pipe rams. Install 3,000 psi ball valves on both csg head outlets. Install choke or choke manifold on one outlet.
19. TOOH and LD 4-1/2" csg. If unable to pull csg, contact the Engineer and notify the COGCC.
20. Remove the 4-1/2" pipe rams and install 2-3/8" pipe rams on the BOP.
21. TIH w/ 2-3/8" tbg to +/- 1,280'.
22. MIRU Cementing Services. Pump 10 bbls of SAPP (Sodium Acid Pyrophosphate) followed by 20 bbls of fresh water containing biocide. Spot 270 sx (+/- 360 cuft) of cmt (Type III w/ cello flake and CaCl<sub>2</sub> as deemed necessary) mixed at 14.8 ppg at 1.33 cuft/sk. Planned cement is from 1,280' to 1,180' stub

- plug in 4-1/2", 11.6# csg stub, 1,180' to 631' in 9.5" OH (plus 20% excess), and from 631' to 430' inside 8-5/8", 24# surface csg. PUH to 250' and circulate tbq clean. RDMO Cementing Services. WOC for 4 hrs.
23. TIH w/ 2-3/8" tbq and tag TOC and if TOC is deeper than 430' contact engineer for possible further cement work. TOO and LD 2-3/8" tbq.
  24. MIRU wireline. PU CIBP on wireline for 8-5/8" (24#) csg and TIH to +/- 80'. Set CIBP and test to 1000 psi for 15 min. POOH and LD wireline. RDMO wireline.
  25. RDMO WO rig.
  26. NOTE: Instruct cementing & wireline contractors to email copies of all job logs/job summaries & invoices to [rscDJVendors@anadarko.com](mailto:rscDJVendors@anadarko.com) within 24 hours of the completion of the job.
  27. Wellsite supervisor should turn all paper copies of cementing reports/invoices and logs into Joleen Kramer.
  28. Have excavation contractor notify One-Call to clear for digging around wellhead and flowline removal.
  29. Excavate hole around surface casing enough to allow welder to cut 8-5/8" casing minimum 5' below ground level.
  30. Welder cut 8-5/8" casing minimum 5' below ground level.
  31. MIRU ready cement mixer. Fill the last 80' inside the 8-5/8" prod. casing until 10' below surface. Use 4,500 psi compressive strength redi-mix cement (Sand and Cement only, no gravel) to finish filling surface casing to top of cut off.
  32. Have welder spot weld on steel marker plate. (Note: marker shall be labeled with well name and number, legal location (¼ ¼ description) and API number.
  33. Properly abandon flowlines as per rule 1103.
  34. Have excavation contractor back fill hole with native material. Clean up location and have leveled to plant any vegetation required.
  35. Submit Form 6 to COGCC. Provide "As Plugged" wellbore diagram identifying the specific plugging completed.

Michael Sax – Production Engineer I  
970-339-1449 – Office      310-613-1637 – Cell  
Michael.sax@anadarko.com