

OCCIDENTAL PETROLEUM CORPORATION

Please contact your area engineer with any questions concerning this procedure.

1/26/2022

PLUG and ABANDONMENT PROCEDURE

LUDWIG 17-1

API: 05-123-22656

**Step Description**

1	Review Previous Open Wells Reports/Well History. If you have questions or concerns, contact Foreman/Engineer.
2	COA: Provide 48 hour notice to COGCC prior to rig up per request on approved Form 6 (e.g. call field coordinator, submit Form 42, etc.).
3	Notify Automation Removal Group at least 24 hours prior to rig move. Request they catch and remove plunger, isolate production equipment, and remove any automation prior to rig MIRU.
4	MIRU Slickline. Pull production equipment and tag bottom. Record tag depth, casing/tubing pressures and fluid level in Open Wells. Gyro was run on 02/26/14. RDMO Slickline.
5	Prepare location for base beam equipped rig. Install perimeter fence as needed.
6	COA: Verify Form 17 (State Bradenhead Test) has been run within 60 days of RU.
7	Refer to the Rockies Well Services Guidelines document whenever rigging up BOP and WL, or whenever tripping in or out of the well. Consult with Foreman/Engineer before deviating from these guidelines. All cement jobs (excluding injections squeezes) must be pumped at 4-6 BPM. All cement plugs pumped through tubing must use the Diverter tool. Final top-out can be pumped between 2-4 BPM.
8	Upon RU, check and record bradenhead pressure. If bradenhead valve is not accessible, re-plumb so that valve is above GL. Blow down bradenhead and leave open during working hours. Re-check pressure each day and input value in the "Casing press." box in Open Wells.
9	MIRU WO rig. Verify BOP and wellhead rating, inspect for appropriate API standards, pressure test BOP. Kill well as necessary using biocide treated fresh water. ND WH. NU BOP. Unland tbg. **Barrier Management** Fluid will be the only barrier while NU BOP. Stop and review JSA.
10	TOOH and SB 4290' of 2-3/8" tbg. LD remaining 2-3/8" tbg.
11	MIRU WL. PU and RIH with (4-1/2", 11.6#) gauge ring to 7740'. POOH.
12	PU and RIH with (4-1/2", 11.6#) CIBP and set at +/- 7730' (no CCL coverage here). POOH. RIH and dump 2 sx cement on CIBP. POOH.
13	PU and RIH with (4-1/2", 11.6#) CIBP and set at +/- 7375' (no CCL coverage here). POOH. RIH and dump 2 sx cement on CIBP. POOH.
14	PU and RIH with (4-1/2", 11.6#) CIBP and set at +/- 7025' (no CCL coverage here). POOH. Slowly top fill well to clear out all gas. Pressure test CIBP to 1000 psi. RIH and dump 2 sx cement on CIBP. POOH.
15	PU and RIH with one 4', 3-1/8" deep penetrating perf gun with 4 spf. Shoot squeeze holes at 4320'. POOH. RDMO WL.
16	PU and TIH with (4-1/2", 11.6#) packer on 2-3/8" tbg. Set packer at 4290'.
17	Establish an injection rate with treated water. Record rate and pressure results and report them to the Foreman/Engineer. Plugging orders may change based on results. When 1 bpm is achieved, record pressure and successful test has been completed.
18	Release packer. TOOH, SB 2-3/8" tbg. LD packer.
19	If gas is present, consider swabbing and venting before pumping injection squeeze.
20	PU and TIH with (4-1/2", 11.6#) CICR on 2-3/8" tbg. Set CICR at 4290'.
21	MIRU cementers. Pump Sussex Squeeze: 100 sx (21.2 bbl or 119 cf) of the Sussex AGM: Class G with 0.4% B547 Gas Block (Latex) and 2% D053 Expansion (Gyp) and 0.25% D255 FLA (Fluid Loss) 0.3% D065 (Dispersant). Underdisplace by 1 bbls. Volume is based on 30' in the casing below the CICR, cement squeezed into formation, and 60' on top of the CICR. Collect wet and dry samples of cement to be left on rig. RDMO Cementers.
22	Sting out and leave remaining 1 bbl on top of CICR. Move up to 4000' and reverse clean with 2X hole volumes. TOOH and SB 2160' of 2-3/8" tbg. LD stinger, and remaining tbg.
23	COA: Confirm and document static conditions in the well before placing the next plug. If there is evidence of pressure or fluid migration at any time after placing the Sussex plug, contact Engineering.

24	MIRU WL. PU and RIH with two 4', 3-1/8" perf guns with 4 spf. Shoot 16 squeeze holes at 2800' and 16 squeeze holes at 2100'. RDMO WL.
25	PU and TIH with (4-1/2", 11.6#) packer on 2-3/8" tbg. Set packer at 2160'.
26	Initiate circulation at low rate monitoring returns for fluid. Add mud thinner to hydrate/clean mud. Slowly increase circulation rate to 4-6 BPM using mud thinner and gel polymer sweeps as needed.
27	Pump 47 bbls of 160F HSF (0.5 gals/bbl or 1.5 lbs/bbl) and let soak for ~2 hours.
28	Continue circulating at 4-6 BPM if possible. If returns show hydrocarbons or a 1 hr build-up shows pressure, swab and vent well and clean open tank. Circulate clean fluid before pumping cement.
29	Release packer. TOOH, SB 2-3/8" tbg. LD packer.
30	PU and TIH with (4-1/2", 11.6#) CICR on 2-3/8" tbg. Set CICR at 2160'.
31	MIRU cementers. Pump 10 bbls (min) of pre-flush, followed by 5 bbls fresh water spacer. Pump Squeeze: 215 sx (46.4 bbl or 261 cf) of the Lower AGM blend: Class G with 0.4% MCGC-1 PVA FL (Latex) and 0.5% MCA-1 CC (Calcium Chloride) and 4% MCA-4 Post Set Exp (Gyp). Underdisplace by 2.5 bbls. Volume is based on 640' in the casing below the CICR, 700' in the casing-hole annulus with 15% excess, and 160' on top of the CICR. Collect wet and dry samples of cement to be left on rig. RDMO Cementers.
32	Sting out of CICR and leave remaining 1 bbl on top of CICR. Pull out of cement. TOOH to 1900'. Reverse clean with 2X hole vol.
33	TOOH and SB 650' of 2-3/8" tbg. LD stinger, and remaining tbg.
35	MIRU WL. PU and RIH with one 4', 3-1/8" perf gun with 4 spf. Shoot 16 squeeze holes at 1800'. RDMO WL.
36	Initiate circulation at low rate monitoring returns for fluid. Add mud thinner to hydrate/clean mud. Slowly increase circulation rate to 4-6 BPM using mud thinner and gel polymer sweeps as needed.
37	Pump 48 bbls of 160F HSF (0.5 gals/bbl or 1.5 lbs/bbl) and let soak for ~2 hours.
38	Continue circulating at 4-6 BPM if possible. If returns show hydrocarbons or a 1 hr build-up shows pressure, swab and vent well and clean open tank. Circulate clean fluid before pumping cement.
39	MIRU cementers. Pump Squeeze: 250 sx of the Upper AGM blend: Class G with 0.4% B547 Gas Block (Latex) and 1.5% S001 CC (Calcium Chloride) and 4% D053 Expansion (Gyp) down the casing. Displace cement with Water to 900'. Collect wet and dry samples of cement to be left on rig. RDMO Cementers.
40	Leave valves open to balance plug between the production and surface casing.
41	PU and TIH with mechanical cutter on 2-3/8" tbg. Cut 4-1/2", 11.6# casing at 650'. TOOH and LD cutter.
42	Attempt to establish circulation with biocide treated fresh water.
43	ND BOP. ND TH. Un-land casing. Rig max pull shall be 100,000#. Max pull over string weight shall be 50,000#. If unable to unland, contact Foreman/Engineer. **Barrier Management** Fluid will be the only barrier while unlanding casing. Stop and review JSA.
44	Install BOP on casing head with 4-1/2", 11.6# pipe rams. **Barrier Management** Fluid will be the only barrier while NU BOP. Stop and review JSA.
45	TOOH and LD all 4-1/2", 11.6# casing. Remove 4-1/2", 11.6# pipe rams and install 2-3/8" pipe rams.
46	TIH with diverter tool on 2-3/8" tubing to 650'. Establish circulation to surface with biocide treated fresh water.
47	Initiate circulation at low rate monitoring returns for fluid. Add mud thinner to hydrate/clean mud. Slowly increase circulation rate to 4-6 BPM using mud thinner and gel polymer sweeps as needed.
48	Pump 26 bbls of 160F HSF (0.5 gals/bbl or 1.5 lbs/bbl) and let soak for ~2 hours.
49	Continue circulating at 4-6 BPM if possible. If returns show hydrocarbons or a 1 hr build-up shows pressure, swab and vent well and clean open tank. Circulate clean fluid before pumping cement.
50	COA: Verify and document that all pressure and fluid migration has been eliminated prior to placing the SC shoe plug at 650'. If there is evidence of pressure or fluid migration, contact Engineering.
51	MIRU cementers. Pump 10 bbls (min) of pre-flush, followed by 5 bbls fresh water spacer. Pump Surface Casing Shoe Plug: Pump 120 sx (25.9 bbl or 146 cf) of the Upper AGM blend: Class G with 0.4% B547 Gas Block (Latex) and 1.5% S001 CC (Calcium Chloride) and 4% D053 Expansion (Gyp). Volume is based on 104' in 7.875" bit size open hole with 100% excess factor. 201' in the 8-5/8", 24# surface casing with no excess. The plug is designed to cover 650'-345'. Collect wet and dry samples of cement to be left on rig. RDMO Cementers. Notify engineering if circulation is ever lost during job.
52	COA: If cement was not circulated to surface, then WOC 4 hours. Tag TOC. TOC must be 496' or shallower. If tag is too deep or there is evidence of pressure or fluid migration, contact Engineering.

53	Pull out of cement. TOO H to 260'. Forward circulate clean with 2x hole vol. TOO H & SB 260' of tubing. WOC 4 hours.
54	Note: Plug can be tagged after a 4 hour WOC, but must have a 6 hour WOC prior to pressure testing.
55	ND 7-1/16" BOP. NU 9" or 11" BOP. RIH with bit and scraper. Clean csg and tag TOC. Circulate Clean. POOH. PT casing to 500 psi. Contact engineering if test fails.
56	MIRU WL. PU and RIH with (8-5/8", 24#) CIBP and set at 260'. POOH. RDMO WL.
57	TIH with diverter tool on 2-3/8" tubing to 260' and pump 18 bbls of 160F HSF (0.125 gals/bbl or 0.5 lbs/bbl) to fill Csg & Flush Csg Valves. Let soak for 1 hour. Either swab well down or use rig air to remove water from well. (Note: Do not exceed 175 psi if using rig air). If either methods cannot be performed, contact engineering to discuss excess cement volume for top out plug.
58	DO NOT PUMP WATER AHEAD OF CEMENT. MIRU Cementers. Pump Surface Plug: Pump 80 sx (17.3 bbl or 97 cf) of the Surface AGM blend: Class G with 0.4% B547 Gas Block (Latex) and 2% S001 CC (Calcium Chloride) and 4% D053 Expansion (Gyp). Volume based on 260' inside 8-5/8", 24# surface casing with no excess. Cement will be from 260' to surface. Verify and document cement to surface. Collect wet and dry samples of cement to be left on rig.
59	TOOH and remove diverter tool. Insert ~5' of 2-3/8" Tbg. Circulate FW to clean Csg & Csg Valves. LD final joint of 2-3/8" Tbg. RDMO cementers. ND BOP. Install night cap. RDMO WO rig.
60	Instruct cementing and wireline contractors to e-mail copies of all job logs/job summaries to rscDJVendors@anadarko.com within 24 hours of completion of the job.
61	Supervisor submit paper copies of all invoices, logs, and reports to VWP Engineering Specialist.
62	Excavation crew to notify One Call to clear excavation area around wellhead and for flow lines.
63	Excavate hole around surface casing enough to allow welder to cut casing a minimum 5' below ground level.
64	Welder cut casing minimum 5' below ground level.
65	Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
66	Obtain GPS location data as per COGCC Rule 215 and send to rscDJVendors@anadarko.com.
67	Properly abandon flow lines per Rule 1103. File electronic Form 42 once abandonment is complete.
68	Back fill hole with fill. Clean location, and level.
69	Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.

Deepest WW 1 mile: Not Found'; FHM: 1043*'; Sussex Top: 4300'; Sussex Base: 4610'; Shannon Base: Absent; Niobrara Top: 7075'
WELL HAS GYRO. Gyro was run on 02/26/14.

No known casing integrity issues.

SUSSEX PRODUCTIVE WITHIN 1 MILE

Well was drilled by KMG.

Vertical Well.