

OCCIDENTAL PETROLEUM CORPORATION

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

12/28/2021

PLUG and ABANDONMENT PROCEDURE

LUDWIG 31-1

API: 05-123-23847



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 and Core Tech. Pull production equipment and tag bottom. Record tag depth, casing/tubing pressures and fluid level in Open Wells. RUN GYRO to 7390', making stops every 100'. RDMO Slickline and Core Tech.
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 4333' 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 7084'. POOH.
12	PU and RIH with (4-1/2", 11.6#) CIBP and set at +/- 7074' (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.
13	PU and RIH with one 4', 3-1/8" deep penetrating perf gun with 4 spf. Shoot squeeze holes at 4363'. POOH. RDMO WL.
14	PU and TIH with (4-1/2", 11.6#) packer on 2-3/8" tbg. Set packer at 4333'.
15	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.
16	Release packer. TOOH, SB 2-3/8" tbg. LD packer.
17	If gas is present, consider swabbing and venting before pumping injection squeeze.
18	PU and TIH with (4-1/2", 11.6#) CICR on 2-3/8" tbg. Set CICR at 4333'.
19	Note: Do not exceed 40 bbls of cement on injection squeezes.
20	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. Sting out of CICR and dump remaining bbl of cement on top of CICR. Volume is based on 30' in the casing below the CICR, cement squeezed into formation, and 63' on top of the CICR. Collect wet and dry samples of cement to be left on rig. RDMO Cementers.
21	Move up hole to 4100' and reverse clean with 2X hole volume. TOOH and SB 2160' of 2-3/8" tbg. LD stinger, and remaining tbg.
22	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.
23	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.
24	PU and TIH with (4-1/2", 11.6#) packer on 2-3/8" tbg. Set packer at 2160'.

25	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.
26	Pump 49 bbls of 160F HSF (0.5 gals/bbl or 1.5 lbs/bbl) and let soak for ~2 hours.
27	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.
28	Release packer. TOO, SB 2-3/8" tbg. LD packer.
29	PU and TIH with (4-1/2", 11.6#) CICR on 2-3/8" tbg. Set CICR at 2160'.
30	MIRU cementers. Pump 10 bbls (min) of pre-flush, followed by 5 bbls fresh water spacer. Pump Squeeze: 225 sx (48.5 bbl or 273 cf) of the Lower AGM blend: Class G with 0.4% B547 Gas Block (Latex) and 1% S001 CC (Calcium Chloride) and 4% D053 Expansion (Gyp). Underdisplace by 2.5 bbls. Sting out of CICR and displace remaining cement out to 2000'. Volume is based on 640' in the casing below the CICR, 700' in the casing-hole annulus with 25% excess, and 160' on top of the CICR. Collect wet and dry samples of cement to be left on rig. RDMO Cementers.
31	Pull out of cement. TOO to 1900'. Reverse clean with 2X hole volumes.
32	TOOH and SB 1160' of 2-3/8" tbg. LD stinger, and remaining tbg.
33	MIRU WL. PU and RIH with two 4', 3-1/8" perf guns with 4 spf. Shoot 16 squeeze holes at 1800' and 16 squeeze holes at 1100'. RDMO WL.
34	PU and TIH with (4-1/2", 11.6#) packer on 2-3/8" tbg. Set packer at 1160'.
35	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.
36	Pump 49 bbls of 160F HSF (0.5 gals/bbl or 1.5 lbs/bbl) and let soak for ~2 hours.
37	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.
38	Release packer. TOO, SB 2-3/8" tbg. LD packer.
39	PU and TIH with (4-1/2", 11.6#) CICR on 2-3/8" tbg. Set CICR at 1160'.
40	MIRU cementers. Pump 10 bbls (min) of pre-flush, followed by 5 bbls fresh water spacer. Pump Squeeze: 225 sx (48.5 bbl or 273 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). Underdisplace by 2.5 bbls. Sting out of CICR and displace remaining cement out to 2000'. Volume is based on 640' in the casing below the CICR, 700' in the casing-hole annulus with 25% excess, and 160' on top of the CICR. Collect wet and dry samples of cement to be left on rig. RDMO Cementers.
41	Pull out of cement. TOO to 900'. Reverse clean with 2X hole volumes.
42	TOOH and SB 730' of 2-3/8" tbg. LD stinger, and remaining tbg.
43	PU and TIH with mechanical cutter on 2-3/8" tbg. Cut 4-1/2", 11.6# casing at 730'. TOO and LD cutter.
44	Attempt to establish circulation with biocide treated fresh water.
45	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.
46	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.
47	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.
48	TIH with diverter tool on 2-3/8" tubing to 730'. Establish circulation to surface with biocide treated fresh water.
49	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.
50	Pump 25 bbls of 160F HSF (0.5 gals/bbl or 1.5 lbs/bbl) and let soak for ~2 hours.
51	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.
52	COA: Verify and document that all pressure and fluid migration has been eliminated prior to placing the SC shoe plug at 730'. If there is evidence of pressure or fluid migration, contact Engineering.

53	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 100' in 7.875" bit size open hole with 100% excess factor. 200' in the 8-5/8", 24# surface casing with no excess. The plug is designed to cover 730'-430'. Collect wet and dry samples of cement to be left on rig. RDMO Cementers. Notify engineering if circulation is ever lost during job.
54	COA: If cement was not circulated to surface, then WOC 4 hours. Tag TOC. TOC must be 580' or shallower. If tag is too deep or there is evidence of pressure or fluid migration, contact Engineering.
55	Pull out of cement. TOOH to 260'. Forward circulate tbg clean with 2X hole volume. TOOH & SB 260' of tubing. WOC 4 hours.
56	Note: Plug can be tagged after a 4 hour WOC, but must have a 6 hour WOC prior to pressure testing.
57	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.
58	MIRU WL. PU and RIH with (8-5/8", 24#) CIBP and set at 260'. POOH. RDMO WL.
59	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.
60	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.
61	TOOH and remove perf sub. 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.
62	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.
63	Supervisor submit paper copies of all invoices, logs, and reports to VWP Engineering Specialist.
64	Excavation crew to notify One Call to clear excavation area around wellhead and for flow lines.
65	Excavate hole around surface casing enough to allow welder to cut casing a minimum 5' below ground level.
66	Welder cut casing minimum 5' below ground level.
67	Spot weld on steel marker plate. Marker should contain Well name, Well number, legal location (1/4 1/4 descriptor) and API number.
68	Obtain GPS location data as per COGCC Rule 215 and send to rscDJVendors@anadarko.com.
69	Properly abandon flow lines per Rule 1103. File electronic Form 42 once abandonment is complete.
70	Back fill hole with fill. Clean location, and level.
71	Submit Form 6 to COGCC ensuring to provide 'As performed' WBD identifying operations completed.

Deepest WW 1 mile: 430'; FHM: 1038'; Sussex Top: 4343'; Sussex Base: 4660'; Shannon Base: Absent; Niobrara Top: 7124'

GYRO IS NEEDED

No known casing integrity issues.

SUSSEX PRODUCTIVE WITHIN 1 MILE

Well was drilled by KMG.

Vertical Well.