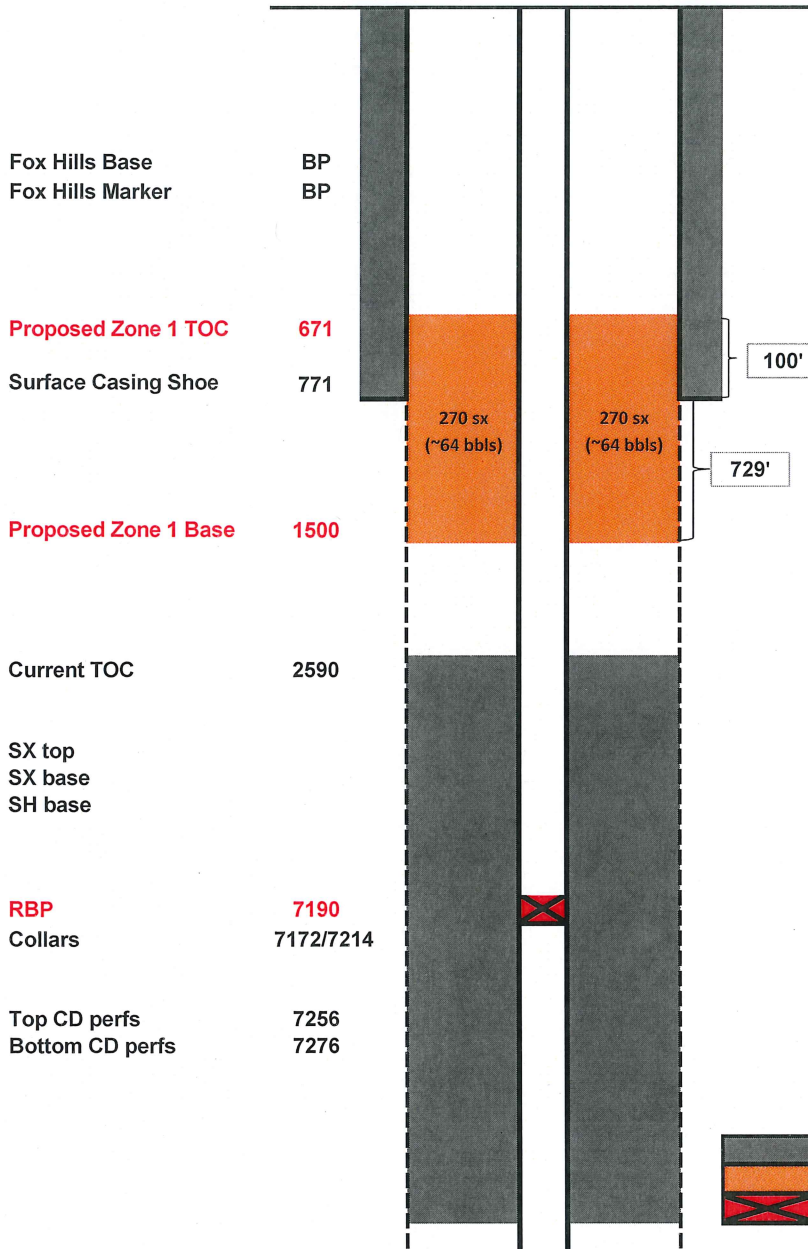


Frank 14-31 Bradenhead Procedure

- 1 No GYRO needed.
- 2 Call Foreman or Lead Operator at least 24 hrs prior to rig move. If not already completed, request that they catch and remove plunger, isolate production equipment and remove any automation equipment prior to the rig showing up. Install perimeter fence as needed.
- 3 MIRU slickline. Fish plunger from lubricator. RIH and pull the bumper spring and standing valve if necessary. RBIH with sinker bars and tag bottom. Report findings. PBSD should be at 7404'. RDMO slickline.
- 4 Prepare location for base beam rig.
- 5 Spot a minimum of 25 jts of 2-3/8", 4.7#, J-55, EUE tbgs for replacement and 60 jts 1-1/4", 2-33#/ft, J-55, 10rd IJ for annular cement job.
- 6 MIRU WO rig and auxiliary equipment. Check pressures. Rig up 2" line from the casing head annulus to work tank. Kill well with fresh water. ND tree and adapter flange, NU BOP's.
- 7 PU 8-10' landing joint. TIW valve on top and screw into the tbgs hanger. Back out the lock down pins and pull up on tbgs string to break any possible sand bridges, unseat landing joint and lay down. Do not exceed 80% of tubing tensile strength, or **57,380-lb**. Clean out as necessary to 7404'.
- 8 MIRU EMI equipment. TOOH with 2-3/8" tbgs. EMI tbgs while TOOH. Lay down joints with wall loss or penetrations >35%. Replace joints as necessary. Note joint number and depth of tubing leak(s) on production equipment failure report in Open Wells. Clearly mark all junk (red band) tubing sent to yard.
- 9 TIH with 2-3/8" tbgs and 4.5" RBP. Set RBP @ +/-7190', (collars are at 7172' and 7214'). Pressure test RBP to 5000 psi. Spot 2sx of sand on top of RBP and TOOH.
- 10 Bleed off pressure. ND BOP's, ND wellhead, Un-land 4 1/2" casing, NU dual entry flange, NU BOP.
- 11 PU 1-1/4" 2.3#/ft J-55 10rd IJ tubing, and TIH outside 4-1/2" casing in open hole to ~1900'. Circulate with the rig pump while TIH to clean up the annulus. Use sweeps as necessary until clean returns are seen. Make sure no pressure is present on bradenhead before moving on to the next step. If gas is detected, contact engineering to discuss plan moving forward.
- 12 Contact Imperial mud (min of 24hrs. in advance) to bring out 40bbls of 10.0ppg mud. Pump 40bbls of mud at 1900'. Leave 1-1/4" tbgs full of mud to avoid wet trip and PUH to 1500' to displace cement.
- 13 MIRU cement services. Circulate 10 bbls water, 20 bbls mud flush and 10 bbls water. Prepare to cement.
- 14 Mix and pump **270sx (~64bbls)** of 14.8 ppg (1.33 cuft/sk) Type III w/ 1/4 lb/sk cello-flake. The cement is to be retarded for 80 °F and 3 hour pump time. Design is for coverage from ~1500' to ~671'.
- 15 TOOH ~35 joints to ~400' and reverse circulate 2 times the tubing volume of water or until clean returns are seen. TOOH with 1-1/4" tubing.
- 16 RDMO cementing company.
- 17 ND BOP. ND dual entry flange and crossover. Pick up and land 4-1/2" casing in slips. NU new 4-1/2" 5000 psi tubing head with 2-5000 psi valves (use new style flanged well head equipment if

available). NU BOP's to tubing head.

- 18 Leave well shut in for ~36hrs.
- 19 MIRU wireline and run CCL-GR-CBL-VDL from 2700' to surface. If top of cement is below 671' notify Engineering. In addition to normal handling of logs/job summaries, email copies of all cement job logs/job summaries and invoices to rscDJVendors@anadarko.com within 24 hours of the completion of the job.
- 20 RDMO wireline.
- 21 PU and TIH with 2-3/8" tbg and retrieving head. Circulate sand off RBP at @ +/-7190'. TOOH with RBP and SB tbg.
- 22 TIH with 2-3/8" NC, 2-3/8" XN SN and 2-3/8" 4.7# J55 EUE tbg, circulate out fill if necessary to 7404'. Land tbg @ +/- 7246' (1 jt above bottom Codell perf).
- 23 Broach tubing to seating nipple. ND BOP's, NU master valve and tubing head adaptor. Hydrotest tubing head to 5000 psi for 15 minutes.
- 24 RDMO WO rig.
- 25 Clean location and swab well back to production. Notify Field Foreman/Field Coordinator of finished work and turn well back over to production team.



Between 8-5/8" Casing 24# and 4.5" casing	0.24715	ft ³ /ft
Between 8-5/8" Casing 24# and 4.5" casing	0.04402	bbl/ft
7 7/8" Open hole and 4.5" casing	0.2278	ft ³ /ft
7 7/8" Open hole and 4.5" casing	0.0406	bbl/ft
8" Open hole and 4.5" casing	0.2386	ft ³ /ft
8" Open hole and 4.5" casing	0.0425	bbl/ft
8.5" Open hole and 4.5" casing	0.2836	ft ³ /ft
8.5" Open hole and 4.5" casing	0.05051	bbl/ft
9" Open hole and 4.5" casing	0.3313	ft ³ /ft
9" Open hole and 4.5" casing	0.059	bbl/ft
9.5" Open hole and 4.5" casing	0.3818	ft ³ /ft
9.5" Open hole and 4.5" casing	0.068	bbl/ft
10" Open hole and 4.5" casing	0.435	ft ³ /ft
10" Open hole and 4.5" casing	0.0775	bbl/ft
11" Open hole and 4.5" casing	0.5495	ft ³ /ft
11" Open hole and 4.5" casing	0.0979	bbl/ft
11.5" Open hole and 4.5" casing	0.6108	ft ³ /ft
11.5" Open hole and 4.5" casing	0.1088	bbl/ft
12.5" Open hole and 4.5" casing	0.7417	ft ³ /ft
12.5" Open hole and 4.5" casing	0.1321	bbl/ft
Class Cement yield (SX/SH) 15.8ppg	1.15	ft ³ /sk
Class Cement yield (Fox Hills) 14.8ppg	1.33	ft ³ /sk

*Caliper shows ~9-1/2" near SH/SX

0.2 excess

Zone 1 (Fox Hills)

$$(0.3818 \times (1500 - 771)) / 1.33 \times 1.2 = 251.1 \text{ sx}$$

$$(0.24715 \times (771 - 671)) / 1.33 = 18.6 \text{ sx}$$

$$\text{Total } 269.7 \text{ sx} \sim 270 \text{ sx}$$

$$(0.068 \times (1500 - 771)) \times 1.2 = 59.5 \text{ bbls}$$

$$(0.04402 \times (771 - 671)) = 4.4 \text{ bbls}$$

$$\text{Total } 63.9 \text{ bbls} \sim 64 \text{ bbls}$$

Existing Cement
Proposed Cement
RBP