



## Project Memo

**Operator:** Devon **Job Number:** 2013-119  
**Well Name:** Lava Tube #27 State 1H  
**Date:** April 2, 2013  
**To:** Kenny Allen **From:** Dicky Robichaux / Terry A. Strickland / Aaron Scheet  
**CC:** Dan Eby / Fred Ng / Kerry Girlinghouse / Larry Nixon  
**Subject:** Detailed Well Control Procedures

### PROJECT MEMO 5

#### Background

While drilling 8<sup>3</sup>/<sub>4</sub>" pilot hole; a kick was taken at 12,200' with 9.2 ppg mud, strong flow was observed at surface. WWCI was dispatched and observed 2,400 psi on the casing upon arrival on location. The surface casing in this well is 9<sup>5</sup>/<sub>8</sub>" 40 ppf J-55 set at 4,110'. A Formation Integrity Test (FIT) was performed with 8.6 ppg fluid giving a 9.2 ppg equivalent (129 psi surface pressure). As of March 30, lubricate and Bleed operations have been performed in an attempt to reduce surface casing pressure from 2,550 psi. Current casing pressure is 500 psi and has held steady for over 18+ hours. Noise / Temperature log and stuck pipe log have been run and identified a possible loss zone at 6,600' and 7,040'. Surface casing pressures have been kept below 2,750 psi, 70% burst of casing.

Additional logs have been ran that indicate the flow is from bottom to top based on the temperature logs, also we note an additional location for a thief zone where the temperature spikes at 7,040'. The sonic log has indicated there is a possible bridge located between 5,694' to 5,712'.

#### Objective

The primary objective of this memo is to summarize forward plan Kill operation of the Lava Tube #27 well. One 3bbl cement test plug and two 25bbl cement plugs have been pumped and displaced just past the drillpipe and BHA. This has shown results of a restricted flow and allowed for positive pressure to be observed while pumping down the drillpipe. The below procedure will step out a forward plan to pump a final cement plug, under displacing the cement to leave the TOC calculated to be 100' into the heavy weight drillpipe.



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### Detailed Procedures to place cement inside BHA and into the Wolfcamp Formation then Kill well

1. Service all equipment; ensure full mud volume at surface and record annulus pressures.
  - a. Pump 60 bbls 9.3 ppg WBM into drillpipe to determine injectivity; If established
  - b. Pump 4 bbls fresh water lead
  - c. Mix and pump 25 bbls 14.2 ppg Thixotropic cement on the fly at 3 BPM
  - d. Pump 2 bbls fresh water chaser
  - e. Displace with 190.5 bbls 9.3 ppg WBM at 3 BPM, slow down at 188.5 bbls of displacement to 1 BPM
    - i. This will put the top of cement at 11,481.8', that equates to covering the lower 119' into the heavy weight drillpipe.
    - ii. Worst Case Scenario – cement locks up at bit - Top of Cement at 10,146.5 feet MD
2. Wait 5 hours for cement to set up, time starts when the cement is blended in the mixer.
3. R/D Cement pump lines from drillpipe

### Set Magna Range Plug inside 5" HWDP ID 2.08"

1. Rig up electric line truck
2. Install 2 $\frac{1}{2}$ " Gauge Ring
  - a. Install lubricator
  - b. Pressure test to 250 psi low 2,500 psi High
  - c. Run in hole with 2 $\frac{1}{2}$ " gauge ring to locate top of cement
  - d. POOH with gauge ring
3. Pick up 2.08" Magna Range plug
  - a. Install lubricator
  - b. Pressure test to 250 psi low 2,500 psi High
  - c. Run in hole with 2.08" Magna Range Plug
  - d. Set plug at @ 10 feet above top of cement, depending on CCL recordings @ 11,500'
  - e. POOH with wireline, secure drill string
  - f. Remove Lubricator
4. Test Plug
  - a. Rig up cement pump to drillpipe
  - b. Pressure test plug to 1,000 psi
  - c. Bleed off pressure and rig down cement pump and rig up wireline.
5. Pick up wireline dump bailer
  - a. Mix cement and fill dump bailer
  - b. Install lubricator
  - c. Pressure test to 250 low 1,500 High
  - d. Run in hole with dump bailer



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- e. Dump bail 10 feet cement on top of plug
- f. POOH

### Severe HWDP to gain access to annulus for pumping operation

1. Pick up severing charge and CCL
  - a. Install lubricator
  - b. Pressure test to 250 psi low 2,500 psi High
  - c. Run in hole to 30 feet above top of cement, depending on CCL recording @ 11,450'
  - d. Pressure up drillpipe to 500 psi and monitor for annulus communication
  - e. Fire severing charge
  - f. POOH with wireline
  - g. Lay down wireline and rig down same

### Establish circulation in preparation for kill

2. Install Top Drive or BJ
  - a. Check pressure on drillpipe to determine BHP. Procedure assumes 9.3 ppg is KWM.
  - b. Begin pumping 9.3 ppg WBM down the drillpipe into the annulus
  - c. Attempt to establish circulation
  - d. If circulation can be established, circulate the well with 9.3 ppg WBM with heavy concentration of LCM.
  - e. If circulation cannot be established inject full volume of 9.3 ppg WBM with heavy concentration of LCM up to the Delaware and Lube and Bleed on annulus to zero above bridge.
  - f. Work Bridge free and move back to step d in this procedure.

### Pump cement to isolate Lower well bore once well is killed

1. Pick up drillpipe 50' above severed heavy weight
  - a. Rig up high pressure pump lines to drillpipe
  - b. Establish pump rate
  - c. Pump cement (Volume to be discussed, leaving a 50' balanced plug above BHA)
  - d. Wait on cement
  - e. Rig down cement pump lines
  - f. POOH above TOC and reverse circulate drillpipe volume
  - g. Once cement has set tag top of same and POOH



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### Calculations

Item	Length (ft)	Ann bpf	Annular Volume	ID ( in)	Volume (BPF)	DP Volume (bbls)	Description
1	1			0.01	0.0000	0.0000	bit
2	30.28	0.030	0.9119	1	0.0010	0.0294	motor
3	2.34	0.033	0.0780	2.312	0.0052	0.0122	XO
4	6.38	0.036	0.2277	2.312	0.0052	0.0331	stabilizer
5	29.23	0.033	0.9743	2.5	0.0061	0.1775	DC
6	5.17	0.033	0.1723	2.312	0.0052	0.0268	stabilizer
7	14.96	0.034	0.5105	2.312	0.0052	0.0777	Survey tool - Teledrift
8	351.27	0.033	11.7087	2.5	0.0061	2.1327	DC
9	2.83	0.033	0.0943	2.5	0.0061	0.0172	XO
10	748.69	0.050	37.5018	3.0625	0.0091	6.8213	HWDP
11	6742	0.050	337.7058		0.0172	115.8950	DP X 8.75" OH
12	4110	0.052	211.8372	4.276	0.0172	70.6509	DP X 9 5/8"
Totals	12044.15		601.7225		Total	195.8738	



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### Additional Equipment

#### Pumping Operation

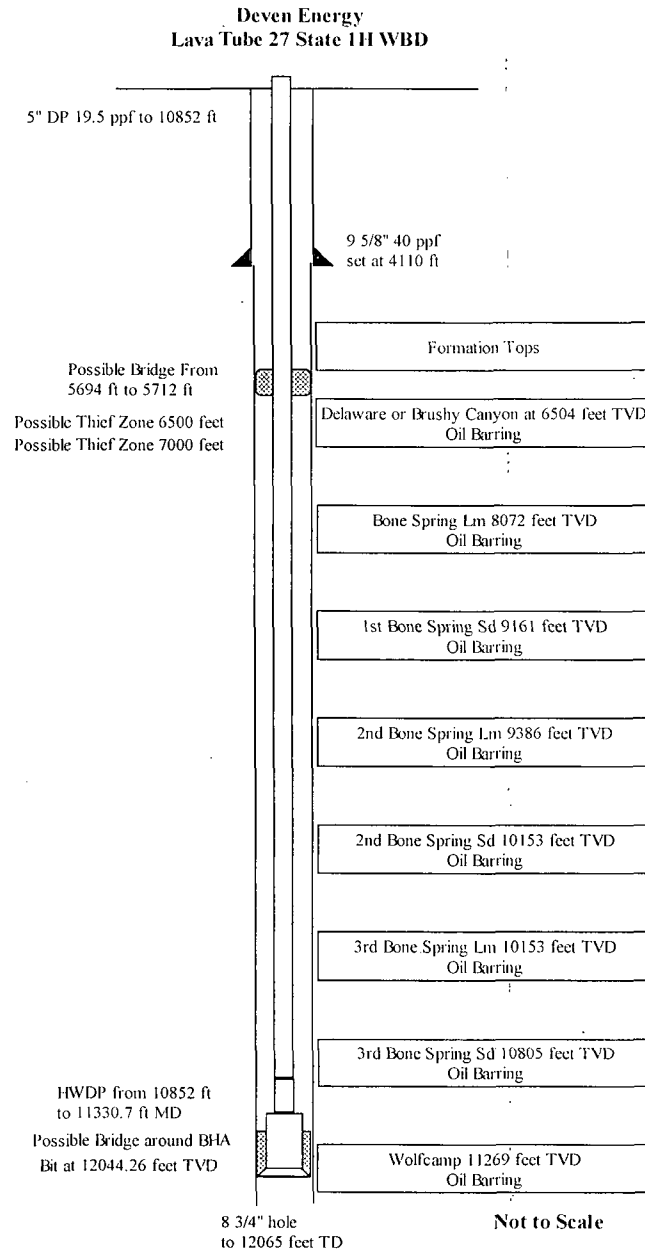
- Second/Back up pump
- Blender
- Thixotropic cement – Volume and density to be determined
- Class H cement – Volume and density to be determined

#### Wireline Operation

- 2.08" Magna Range plugs (1) for HWDP
- Setting Tool 2 1/8" OD Multi Stage
- 1.9" Magna Range Plug (2) for Drillpipe
- Setting Tool 2 1/8" OD Multi Stage
- Severing tools



## Wellbore Diagram



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# Daily Operations Report

**WWCI Job Number- 2013-119**

## Customer Information

<b>Customer</b>	Devon Energy Corporation	<b>Well Name</b>	Lava Tube #27
<b>Representatives</b>	Kenny Allen		
<b>Start Date</b>	3/22/2013	<b>Report Date</b>	04/05/2013
<b>WWCI Personnel</b>	Dicky Robichaux / Terry Strickland		

## Summary

[illegible]

# Daily Operations Report

[illegible]

## WWCI Personnel

*This document does not reflect billing days on location. An itemized invoice will be issued.*

Name	Start	Days	End
D. Robichaux	3/22/13	15	
T. Strickland	3/22/13	15	
A. Scheet	3/28/13	1	3/28/13
A. Scheet	3/30/13	5	4/3/13
Chris Stover	4/4/13	2	
Kirk Johnson	4/4/13	2	
Ben Chorney	4/4/13	2	
Jason McNew	4/4/13	2	
By Dicky Robichaux/TA Strickland	Customer	Devon Energy Corporation	





# Daily Operations Report

WWCI Job Number- 2013-119			
Customer Information			
Customer	Devon Energy Corporation	Well Name	Lava Tube #27
Representatives	Kenny Allen		
Start Date	3/22/2013	Report Date	04/03/2013
WWCI Personnel	Dicky Robichaux / Terry Strickland		

Summary
<p>Performed wireline operations and set a magna range plug at 11243 feet, the plug was set inside a tool joint in the HWDP. Dump bailed cement on top of the plug. Performed a pressure test of 1000 psi and had a good test. Picked up the severing tool and ran in and tagged up on top of the cement at 11231 feet, picked up to tool joint with ccl, opened up to the well to pressure up to 500 psi, and noted there was 715 psi on the well already. Bled pressure down to 500 psi, no change after 20 minutes, bled to 200 psi and observed immediate increase to 300 psi. Repeated the 200 psi bleed with the same result. Discussed situation with Deven on-site CM's. Also, performed Lube and Bleed during the day reduced the pressure from 750 psi to 250 psi.</p>

Time	Details
0000-0500	Waited on cement to set up. Casing pressure at 0000 = 400psi; 0500 =
0500-0530	Broke out the pump line and opened the low torque valve, a vacuum was observed that lasted for between 7 to 10 seconds and died off.
0530-0630	Rigged up the wireline with the 2.5" gauge ring.
0630-0700	Pressure tested 250 psi low and 2500 psi high. Began in the hole and noted the ccl was not working.
0700-0800	POOH with the wireline to replace the ccl. Note: Tool string wet with mud, DP full. Note: Casing pressure 460psi. Rig up wireline.
0800-0815	Pressure tested 250psi low and 2,500psi high.
0815-0915	RIH with CCL and 2.32"OD gauge ring. Tagged soft at 10890' @ 50' into the heavy weight.
0915-1030	Work tool string down from 10890' to 11,290' tagged hard and picked up drag. Casing pressure = 550psi
1030-1130	Run CCL strip up and locate tool joints, identified plug setting depth at 11,243' and severing depth at 11,212'. Work gauge ring up and down 6 times to insure clear and free.
1130-1200	POOH with gauge ring and CCL, R/D W/L. Casing pressure at 550psi.
1200-1230	Make up 2.28" Magna Range plug and R/U W/L. Test Lubricator to 250psi low and 2,500psi high. Note: Distance from CCL to element = 10' 3".



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Time	Details
1230-1315	RIH with plug while lubing 16bbls of brine into annuls, casing pressure build from 550psi to 750psi. Total Pumped = 1,248bbls
1315-1345	Continue RIH with plug while allowing for fluid swap with gas.
1345-1400	Locate tool joint at 11,243' flag wire and pick up 10' set plug. Pick up and tag plug twice, confirmed plug set.
1400-1445	POOH with wireline tool string, Casing pressure 750psi. Note: Held H2S drill, Muster to station.
1445-1515	R/D W/L and make up dump bailer, while bleeding well from 750psi to 400psi. Note: 15' flair. Fill bailer with cement and R/U W/L, test lubricator to 250psi low and 1,500psi high.
1515-1600	RIH with dump bailer while pumping 16bbls 9.2ppg brine in annulus 400psi to 700psi. Total pumped = 1,264bbls
1600-1700	Continue to RIH with bailer. Tagged at 10,800' work tool down to 11,243' and fire shot / dump cement. Note: Casing pressure 680psi
1700-1730	POOH to 10,750' and test plug to 1,000psi for 5min. Test Good.
1730-1800	Bleed well form 640psi to 250psi, Note: 15' flair, while POOH with dump bailer.
1800-1900	R/D W/L and re-head tool string, Make up 2" severing tool. Note: center of severing charge is 5' to CCL.
1900-1950	Test lubricator 250 low and 2,500psi high. Blew chicksan line off of lubricator. Change connection and re-test.
1950-2000	Ran in hole with severing tool, set down at 11231 feet, top of cement, pulled ccl to tool joint.
2000-2030	Held JSA stand down for safety, discussed forward plans, procedures and job assignments. 9.3 ppg wbm with LCM was not quite ready, decided to wait until ready to pump before severing HWDP.
2030-2200	Continued to add LCM to wbm.
2200-2300	9.3 ppg wbm was loaded with 50 ppb lcm. Took positions, on rig floor, high pressure pump and inside the electric line unit, check communications, all ready. Opened low torque valve from drillpipe to high pressure pump, and noted 715 psi already on the drillpipe. Discussed the mystery with the Deven CM's, decided to bleed the pressure to 500 psi, bled to 485 psi and pressure held steady for 20 minutes, bled to 200 psi and the pressure immediately climbed to 300 psi, repeated the 200 psi bleed, same result, pressure immediately increased to 300 psi. Stopped to discuss problem.
2300-2330	Discussed possible scenarios and how to proceed. Decided to POOH with the severing tool.
2330-2400	POOH with wireline.



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Summary
Laid down the lubricator and secured the severing charge. Held a conference call with the OKC staff to discuss having pressure on the drillpipe that was not there previously. Decided to get a spinner log to determine at what depth the leak in the string was located. Ordered out equipment. Went to the pump truck and attempted to pressure up to 600 psi, the pressure kept bleeding to 277 psi. Waited on the equipment to arrive. During the day, the drill string parted at an unknown depth, a sling shot affect pushed the drillpipe up and out of the slips allowing it to then fall into the BOP stack where it was hung up. The pump line was severed and a low torque valve that had been open while monitoring pressures, some how closed as it was pulled down into the rotating head. Called in to WWCI office and discussed the situation. Deven authorized mobilization of additional team members. After arriving on location and discussing the current situation a basic plan was made. Clear location and rig up fire fighting equipment before removing the blind rams to be replaced with blind shear rams. Began putting a project memo together for the client to review and decide how best to move forward.

Time	Details
0000-0100	Laid down the lubricator and check the severing charge, still on the tool. Removed the wireline pump-in sub and installed the high pressure sub, installed pump in lines and opened to truck to monitor pressures. Drillpipe pressure at 257 psi.
0100-0200	Held conference call with OKC office. Discussed the current situation, and forward plans. Going to locate a spinner log to determine where the leak is inside the drillpipe and additional HWDP magna range plugs. Decided to pressure up on drill pipe to 600 psi to monitor for bleed off.
0200-0300	Pumped into well at .1 bpm with truck kick out at 300 psi, pressure kicked out at 300 psi, pressure fell to 277 psi, did this 3 times with same result. Set kick out at 400 psi on truck and brought the rate up to .4 bpm, the pump kicked out at 400 psi and immediately fell to 277 psi. Monitor pressures while waiting on equipment to arrive. Casing pressure = 380 psi, DPP = 276 psi.
0300-0700	DPP = 274 psi. Casing Pressure = 425 psi.
0700-0900	Monitor well casing pressure at 500psi, Note: E&P wiring company sending truck out of Sonora and crew driving from Corpus with spinner survey tools, ETA 2100hr tonight.
0900-1100	Monitor well. Casing pressure 500psi, Drill pipe pressure 250psi.



*Wild Well Control Inc.*



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Kirk Johnson	4/4/13	1	
Ben Chorney	4/4/13	1	
Jason McNew	4/4/13	1	
By	Dicky Robichaux/TA Strickland		
Customer	Devon Energy Corporation		