

# HALLIBURTON

iCem<sup>®</sup> Service

## **EXTRACTION OIL & GAS**

Date: Thursday, January 15, 2015

### **EXTRACTION THORNTON #12**

H&P 280

Job Date: Tuesday, January 13, 2015

Sincerely,  
Jennifer Dattolo

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## 1.1 Executive Summary

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Halliburton appreciates the opportunity to perform the cementing services on the **Thornton 12** cement **Production Liner** casing job. A pre-job safety meeting was held before the job where details of the job were discussed, potential safety hazards were reviewed, and environmental compliance procedures were outlined.

Halliburton maintains a continuous quality improvement process and appreciates any comments or suggestions that you may have. Halliburton again thanks you for the opportunity to perform service work on this well. We hope to be your solutions provider for future projects.

Respectfully,

**Halliburton Brighton**

Job Times			
	Date	Time	Time Zone
<b>Called Out</b>	1/12/2015	0830	MST
<b>On Location</b>	1/12/2015	1400	MST
<b>Job Started</b>	1/13/2015	1145	MST
<b>Job Completed</b>	1/13/2015	1600	MST
<b>Departed Location</b>	1/13/2015	1700	MST

1.2 Cementing Job Summary

**HALLIBURTON**

*Cementing Job Summary*

The Road to Excellence Starts with Safety

Sold To #: 369404	Ship To #: 3593019	Quote #:	Sales Order #: 0902006140
Customer: EXTRACTION OIL & GAS		Customer Rep: Larry Siegel	
Well Name: THORNTON	Well #: 12	API/UWI #: 05-123-40264-00	
Field: WATTENBERG	City (SAP): AULT	County/Parish: WELD	State: COLORADO
Legal Description: SW SW-8-7N-66W-1157FSL-332FWL			
Contractor: H & P DRLG		Rig/Platform Name/Num: H & P 280	
Job BOM: 7525			
Well Type: HORIZONTAL OIL			
Sales Person: HALAMERICA/H117930		Srcv Supervisor: Bradley Hinkle	

**Job**

Formation Name	
Formation Depth (MD)	Top Bottom
Form Type	BHST
Job depth MD	17427ft Job Depth TVD
Water Depth	Wk Ht Above Floor
Perforation Depth (MD)	From To

**Well Data**

Description	New / Used	Size in	ID in	Weight lbm/ft	Thread	Grade	Top MD ft	Bottom MD ft	Top TVD ft	Bottom TVD ft
Drill Pipe		4	3.34	14			0	7036		0
Casing		7	6.184	29		L-80	0	8014		0
Casing		4.5	4	11.6		L-80	7250	17427		0
Open Hole Section			6				7315	17431		0

**Tools and Accessories**

Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make
Guide Shoe	4.5			17427	Top Plug	4.5		HES
Float Shoe	4.5				Bottom Plug	4.5		HES
Float Collar	4.5			17421	SSR plug set	4.5		HES
Insert Float	4.5				Plug Container	4.5		HES
Stage Tool	4.5				Centralizers	4.5		HES

**Miscellaneous Materials**

Gelling Agt	Conc	Surfactant	Conc	Acid Type	Qty	Conc
Treatment Fld	Conc	Inhibitor	Conc	Sand Type	Size	Qty

**Fluid Data**

Stage/Plug #: 1										
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft <sup>3</sup> /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
1	11.5 lb/gal Tuned Spacer III	Tuned Spacer III	40	bbl	11.5	3.76	24.2	4		
149.34 lbm/bbl		BARITE, BULK (100003681)								
36.20 gal/bbl		FRESH WATER								

Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft <sup>3</sup> /sack	Mix Fluid Gal	Rate bbl/mi n	Total Mix Fluid Gal	
2	Lead Cement	ECONOCEM (TM) SYSTEM	960	sack	13.8	1.4		4.5	6.48	
6.48 Gal		FRESH WATER								
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft <sup>3</sup> /sack	Mix Fluid Gal	Rate bbl/mi n	Total Mix Fluid Gal	
3	Displacement	Fresh Water	232	bbl	8.33			5		
<b>Cement Left In Pipe</b>	<b>Amount</b>	<b>ft</b>	<b>Reason</b>				<b>Shoe Joint</b>			
Mix Water:pH	##	Mix Water Chloride:	## ppm		Mix Water Temperature:## °F °C					
Cement Temperature:	## °F °C	Plug Displaced by:	## lb/gal kg/m <sup>3</sup> XXXX		Disp. Temperature:## °F °C					
Plug Bumped?	Yes/No	Bump Pressure:	#### psi MPa		Floats Held? Yes/No					
Cement Returns:	## bbl m <sup>3</sup>	Returns Density:	## lb/gal kg/m <sup>3</sup>		Returns Temperature:## °F °C					
<b>Comment</b> 40 bbls Spacer and 70 bbls Cement to surface when rolling 7" casing clean.										

### 1.3 Planned Pumping Schedule

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1. **Fill Lines with Water**
  - a. Density = 8.33ppg
  - b. Volume = 2bbl
2. **Pressure Test Lines to 4800 psi**
3. **Pump Tuned Spacer**
  - a. Density = 11.5 lb/gal
  - b. Volume = 40 bbl
  - c. Rate = 2.0 bpm
4. **Pump ExpandaCem**
  - a. Density = 13.8 lb/gal
  - b. Yield = 1.40 ft<sup>3</sup>/sk
  - c. Water Requirement =6.48 gal/sk
  - d. Volume = 960 sks (239 bbls)
  - e. Rate = 4.0 bpm
5. **Drop Top Plug**
6. **Start Displacement**
7. **Pump Displacement Water**
  - a. Density = 8.33 lb/gal
  - b. Volume = 242 bbls
  - c. Rate = 3.0 bpm
8. Land Plug – Anticipated Final Circulation Pressure 1800 psi

Calculated Total Displacement =242 bbls

## 1.4 Job Overview

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		Units	Description
1	Surface temperature at time of job	°F	31
2	Mud type (OBM, WBM, SBM, Water, Brine)	-	WBM
3	Actual mud density	lb/gal	9.6
4	Time circulated before job	HH:MM	2:00
5	Mud volume circulated	Bbls	360
6	Rate at which well was circulated	Bpm	3
7	Pipe movement during hole circulation	Y/N	N
8	Rig pressure while circulating	Psi	1500
9	Time from end mud circulation to start of job	HH:MM	0:30
10	Pipe movement during cementing	Y/N	N
11	Calculated displacement	Bbls	232
12	Job displaced by	Rig/HES	HES
13	Annular before job)?	Y/N	N
14	Annular flow after job	Y/N	N
15	Length of rat hole	Ft	4
16	Units of gas detected while circulating	Units	35
17	Was lost circulation experienced at any time ?	Y/N	N

## 1.5 Water Field Test

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Item	Recorded Test Value	Units	Max. Acceptable Limit	Potential Problems in Exceeding Limit
pH	7	----	6.0 - 8.0	Chemicals in the water can cause severe retardation
Chlorides	0	ppm	3000 ppm	Can shorten thickening time of cement
Sulfates	>200	ppm	1500 ppm	Will greatly decrease the strength of cement
Total Hardness		ppm	500 mg/L	High concentrations will accelerate the set of the cement
Calcium		ppm	500 ppm	High concentrations will accelerate the set of the cement
Total Alkalinity		ppm	1000 ppm	Cement is greatly retarded to the point where it may not set up at all (typically occurs @ pH $\geq$ 8.3).
Bicarbonates	0	ppm	1000 ppm	Cement is greatly retarded to the point where it may not set up at all
Potassium		ppm	5000 ppm	High concentrations will shorten the pump time of cement (indicates the presence of chlorides, therefore if Potassium levels are measured as high, so should the chlorides)
Iron	72	ppm	300 ppm	High concentrations will accelerate the set of the cement
Temperature	7	°F	50-80 °F	High temps will accelerate; Low temps may risk freezing in cold weather

*Submitted Respectfully by: Brad Hinkle*

## 1.6 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DH Density (ppg)	Comb Pump Rate (bbl/min)	PS Pump Press (psi)	Comments
Event	1	Arrive at Location from Service Center	Arrive at Location from Service Center	1/12/2015	14:00:00	USER				PERFORM A SITE ASSESSMENT. RIG HAVING ISSUES AND WAITING ON WIRELINE.
Event	2	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	1/13/2015	01:00:00	USER				PRE-RIG UP SAFETY MEETING WITH HES AND RIG PERSONNEL. BEGIN RIGGING UP TRUCKS AND IRON.
Event	3	Drop Ball	Drop Ball	1/13/2015	11:00:00	USER				BALL DROPPED. RIG SET AND BLEW BALL SEAT.
Event	4	Safety Meeting	Safety Meeting	1/13/2015	11:05:00	USER				PRE-JOB SAFETY MEETING WITH ALL PERSONNEL ON LOCATION.
Event	5	Start Job	Start Job	1/13/2015	11:46:57	COM5	8.33	0.00	11.00	
Event	6	Test Lines	Test Lines	1/13/2015	11:49:15	COM5	8.33	0.00	4800.00	PRESSURE TEST LINES.
Event	7	Pump Spacer 1	Pump Spacer 1	1/13/2015	11:57:01	COM5	11.50	2.00	14.00	PUMP 40 BBLS TUNED SPACER MIXED AT 11.5 PPG. DENSITY VERIFIED BY SCALES.
Event	8	Pump Lead Cement	Pump Lead Cement	1/13/2015	12:16:48	COM5	13.80	4.00	138.00	PUMP 239 BBLS (960 SACKS) EXPANDACEM MIXED AT 13.8 PPG. DENSITY VERIFIED BY SCALES.
Event	9	Check Weight	Check weight	1/13/2015	12:33:04	COM5	13.85	4.00	552.00	DENSITY SCALED AT 13.85 PPG.
Event	10	Shutdown	Shutdown	1/13/2015	13:21:12	COM5	13.85	0.00	39.00	
Event	11	Clean Lines	Clean Lines	1/13/2015	13:24:59	COM5	8.33	0.00	56.00	WASH PUMP AND LINES TO WASTE TANK.
Event	12	Drop Top Plug	Drop Top Plug	1/13/2015	13:31:55	COM5	8.33	0.00	20.00	THIRD PARTY DART DROPPED.
Event	13	Pump Displacement	Pump Displacement	1/13/2015	13:32:07	COM5	8.33	3.00	25.00	PUMP 242 BBLS FRESH WATER. GOOD RETURNS THROUGHOUT.
Event	14	Shutdown	Shutdown	1/13/2015	13:43:42	USER	8.33	0.00	628.00	LEAK ON SWAGE TIED INTO DRILL PIPE. SHUTDOWN, BLED OFF PRESSURE AND TIGHTENED SWAGE.
Event	15	Other	Other	1/13/2015	13:56:26	USER	8.33	2.00	2037.00	SLOWED RATE TO ALLOW DART TO PASS THROUGH TOOL.
Event	16	Bump Plug	Bump Plug	1/13/2015	14:47:20	COM5	8.33	0.00	2314.00	BUMP PLUG AT 1814 PSI AND BROUGHT 500 PSI OVER. HELD FOR 2 MINUTES.
Event	17	Check Floats	Check Floats	1/13/2015	14:50:10	USER	8.33	0.00	0.00	FLOATS HELD. 1 BBL BACK.
Event	18	Set Packer	Set Packer	1/13/2015	14:53:37	USER	8.33	0.00	1000.00	RIG SET PACKER. HES APPLIED 1000 PSI DOWN DRILL PIPE.
Event	19	Other	Other	1/13/2015	15:02:33	COM5	8.33	0.00	0.00	PUMP 3 BBLS TO PRIME BACKSIDE FOR PRESSURE TEST.
Event	20	Pressure Up Well	Pressure Up Well	1/13/2015	15:11:39	COM5	8.33	0.00	2500.00	PRESSURE TEST BACKSIDE TO 2500 PSI FOR 15

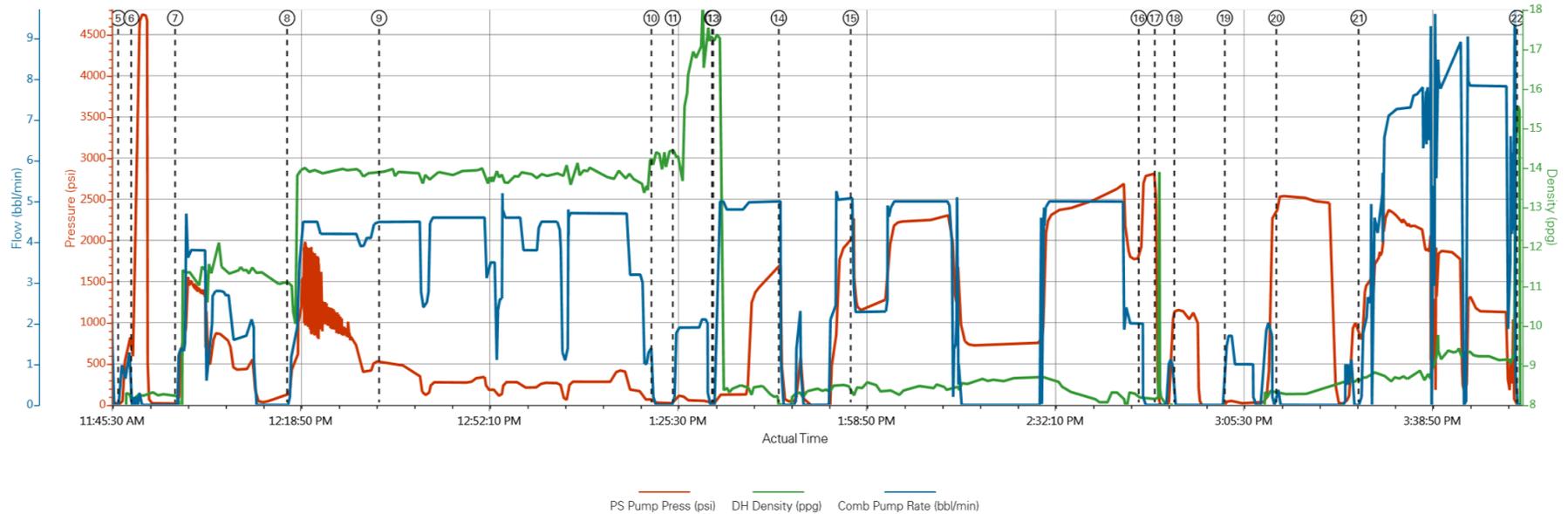
MINUTES.

Event	21	Clean Hole	Clean Hole	1/13/2015	15:26:11	COM5	8.33	0.00	785.00	PUMP 180 BBLS FRESH WATER UNTIL CLEAN. 40 BBLS SPACER AND 70 BBLS CEMENT TO SURFACE.
Event	22	End Job	End Job	1/13/2015	15:54:12	COM5	8.33	0.00	0.00	
Event	23	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	1/13/2015	16:17:01	USER				PRE-RIG DOWN SAFETY MEETING WITH HES AND RIG PERSONNEL.

## 2.0 Attachments

### 2.1 Job Results

Thornton 12 H&P 280 Job Results



① Arrive at Location from Service Center <i>n/a,n/a,n/a</i>	④ Safety Meeting <i>7,-0.09,0</i>	⑦ Pump Spacer 1 <i>14,8.24,0</i>	⑩ Shutdown <i>39,14.41,0</i>	⑬ Pump Displacement <i>25,1723,1.2</i>	⑯ Bump Plug <i>2015,8.17,2</i>	⑲ Other <i>52,733,1.7</i>	⑳ End Job <i>-8,15.45,0</i>
② Pre-Rig Up Safety Meeting <i>n/a,n/a,n/a</i>	⑤ Start Job <i>11,-4.19,1</i>	⑧ Pump Lead Cement <i>138,11.06,0</i>	⑪ Clean Lines <i>56,14.36,1.3</i>	⑭ Shutdown <i>628,782,0</i>	⑰ Check Floats <i>386,8.19,0</i>	⑳ Pressure Up Well <i>2518,8.31,0</i>	㉑ Pre-Rig Down Safety Meeting <i>n/a,n/a,n/a</i>
③ Drop Ball <i>6,-0.08,0</i>	⑥ Test Lines <i>579,8.02,0</i>	⑨ Check weight <i>552,13.88,4.5</i>	⑫ Drop Top Plug <i>20,172,0</i>	⑮ Other <i>2037,8.31,5.1</i>	⑰ Set Packer <i>1156,785,0</i>	㉑ Clean Hole <i>785,8.73,0</i>	