

HALLIBURTON

iCem[®] Service

EXTRACTION OIL & GAS

Date: Thursday, February 26, 2015

THORNTON #3

H&P 280

Job Date: Sunday, February 22, 2015

Sincerely,
Jennifer Dattolo

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1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Thornton #3** cement **Intermediate** 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
Called Out	2/22/2015	1130	MST
On Location	2/22/2015	1800	MST
Job Started	2/23/2015	100	MST
Job Completed	2/23/2015	300	MST
Departed Location	2/23/2015	430	MST

1.2 Cementing Job Summary



Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 369404	Ship To #: 3593017	Quote #:	Sales Order #: 0902161644
Customer: EXTRACTION OIL & GAS		Customer Rep: Larry Siegel	
Well Name: THORNTON	Well #: 3	API/UWI #: 05-123-40257-00	
Field: WATTENBERG	City (SAP): AULT	County/Parish: WELD	State: COLORADO
Legal Description: NW SW-8-7N-66W-1409FSL-330FWL			
Contractor: H & P DRLG		Rig/Platform Name/Num: H & P 280	
Job BOM: 7522			
Well Type: HORIZONTAL OIL			
Sales Person: HALAMERICA/HB60191		Srcv Supervisor: Bradley Hinkle	
Job			

Formation Name			
Formation Depth (MD)	Top		Bottom
Form Type		BHST	225 degF
Job depth MD	8040ft		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
Casing	0	9.625	8.921	36	BTC	J-55	0	832	0	0
Casing	0	7	6.276	26	BTC	P-110	0	8040	0	0
Open Hole Section			8.75				832	8075	0	0

Tools and Accessories

Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make
Guide Shoe	7				Top Plug	7	1	HES
Float Shoe	7			8040	Bottom Plug	7	1	HES
Float Collar	7			7998	SSR plug set	7		HES
Insert Float	7				Plug Container	7	1	HES
Stage Tool	7				Centralizers	7		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 ³ /sack	Mix Fluid Gal	Rate bbl/mi n	Total Mix Fluid Gal	
1	Fresh Water	Fresh Water	0	bbi	8.33	0		6		
42 gal/bbi			FRESH WATER							
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/mi n	Total Mix Fluid Gal	

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Cementing Job Summary

2	11.5 lb/gal Tuned Spacer III	Tuned Spacer III	40	bbl	11.5	3.76	24.2	5		
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 ft3/sack	Mix Fluid Gal	Rate bbl/mi n	Total Mix Fluid Gal	
3	Lead Cement	ECONOCEM (TM) SYSTEM	472	sack	12.7	1.89		8	9.99	
9.99 Gal		FRESH WATER								
61.10 lbm		TYPE I / II CEMENT, BULK (101439798)								
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/mi n	Total Mix Fluid Gal	
4	Tail Cement	EXPANDACEM (TM) SYSTEM	335	sack	13.8	1.67		8	7.73	
0.10 %		HR-5, 50 LB SK (100005050)								
7.73 Gal		FRESH WATER								
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/mi n	Total Mix Fluid Gal	
5	Displacement	Water Based Mud	306	bbl	9.8			8		
Cement Left in Pipe		Amount	42 ft		Reason			Shoe Joint		
Mix Water: pH ##		Mix Water ## ppm Chloride:			Mix Water Temperature: ## °F °C					
Cement Temperature: ## °F °C		Plug Displaced by: ## lb/gal kg/m3 XXXX			Disp. Temperature: ## °F °C					
Plug Bumped? Yes/No		Bump Pressure: #### psi MPa			Floats Held? Yes/No					
Cement Returns: ## bbl m3		Returns Density: ## lb/gal kg/m3			Returns Temperature: ## °F °C					
Comment 40 bbls Tuned Spacer and 10 bbls Cement to Surface.										

1.3 Planned Pumping Schedule

1. **Fill Lines with Water**
 - a. Density = 8.33ppg
 - b. Volume = 2bbl
2. **Pressure Test Lines to 4000 psi**
3. **Pump Tuned Spacer**
 - a. Density = 11.5 lb/gal
 - b. Volume = 40 bbl
 - c. Rate = 2.0 bpm
4. **Drop Bottom Plug**
5. **Pump EconoCem (Lead)**
 - a. Density = 12.7 lb/gal
 - b. Yield = 1.89 ft³/sk
 - c. Water Requirement = 9.99 gal/sk
 - d. Volume = 472 sks (159 bbls)
 - e. Rate = 6.0 bpm
6. **Pump ExpandaCem (Tail)**
 - a. Density = 13.8 lb/gal
 - b. Yield = 1.67 ft³/sk
 - c. Water Requirement = 7.73 gal/sk
 - d. Volume = 335 sks (100 bbls)
 - e. Rate = 7.0 bpm
7. **Drop Top Plug**
8. **Start Displacement**
9. **Pump Displacement Mud**
 - a. Density = 9.6 lb/gal
 - b. Volume = 306 bbls
 - c. Rate = 8.0 bpm
10. Land Plug – Anticipated Final Circulation Pressure 1950 psi

Calculated Total Displacement = 306 bbls

1.4 Job Overview

		Units	Description
1	Surface temperature at time of job	°F	9
2	Mud type (OBM, WBM, SBM, Water, Brine)	-	WBM
3	Actual mud density	lb/gal	9.8
4	Time circulated before job	HH:MM	0:00
5	Mud volume circulated	Bbls	1:00
6	Rate at which well was circulated	Bpm	
7	Pipe movement during hole circulation	Y/N	N
8	Rig pressure while circulating	Psi	
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	306
12	Job displaced by	Rig/HES	HES
13	Annular flow before job?	Y/N	N
14	Annular flow after job?	Y/N	N
15	Length of rat hole	Ft	35
16	Units of gas detected while circulating	Units	0
17	Was lost circulation experienced at any time ?	Y/N	N

1.5 Water Field Test

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	0	ppm	500 mg/L	High concentrations will accelerate the set of the cement
Calcium	0	ppm	500 ppm	High concentrations will accelerate the set of the cement
Total Alkalinity	0	ppm	1000 ppm	Cement is greatly retarded to the point where it may not set up at all (typically occurs @ pH ≥ 8.3).
Bicarbonates	0	ppm	1000 ppm	Cement is greatly retarded to the point where it may not set up at all
Potassium	0	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	67	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	2/22/2015	18:00:00	USER				PERFORM A SITE ASSESSMENT AND PRE-RIG UP SAFETY MEETING. ABOUT 70 JOINTS OF CASING LEFT TO RUN.
Event	2	Safety Meeting	Safety Meeting	2/22/2015	23:30:00	USER				PRE-JOB SAFETY MEETING WITH ALL PERSONNEL ON LOCATION.
Event	3	Start Job	Start Job	2/23/2015	00:01:19	COM5	8.33	0.00	0.00	
Event	4	Test Lines	Test Lines	2/23/2015	00:05:07	COM5	8.33	0.0	4000.00	PRESSURE TEST LINES.
Event	5	Pump Spacer 1	Pump Spacer 1	2/23/2015	00:14:45	COM5	11.50	2.00	10.00	PUMP 40 BBLS TUNED SPACER MIXED AT 11.5 PPG USING SUPPLIED WATER. DENSITY VERIFIED BY SCALES.
Event	6	Check Weight	Check weight	2/23/2015	00:17:31	COM5	11.50	2.00	231.00	
Event	7	Shutdown	Shutdown	2/23/2015	00:28:04	COM5	11.50	0.00	94.00	SHUTDOWN TO WEIGH CEMENT.
Event	8	Drop Bottom Plug	Drop Bottom Plug	2/23/2015	00:28:09	COM5	11.50	0.00	73.00	BOTTOM PLUG PRELOADED.
Event	9	Pump Lead Cement	Pump Lead Cement	2/23/2015	00:37:31	COM5	12.70	6.00	44.00	PUMP 159 BBLS (472 SACKS) ECONOCEM MIXED AT 12.7 PPG USING SUPPLIED WATER. DENSITY VERIFIED BY SCALES.
Event	10	Check Weight	Check weight	2/23/2015	00:42:16	COM5	13.10	6.00	202.00	CEMENT WEIGHED AT 13.1 PPG. DOWNHOLE READING CORRECTLY.
Event	11	Check Weight	Check weight	2/23/2015	00:56:37	COM5	12.70	6.00	334.00	CEMENT WEIGHED AT 12.7 PPG AS DOWNHOLE READ.
Event	12	Pump Tail Cement	Pump Tail Cement	2/23/2015	01:05:04	COM5	13.80	7.00	241.00	PUMP 100 BBLS (335 SACKS) EXPANDACEM MIXED AT 13.8 PPG USING SUPPLIED WATER. DENSITY VERIFIED BY SCALES.
Event	13	Check Weight	Check weight	2/23/2015	01:06:05	COM5	13.80	7.00	128.00	CEMENT WEIGHED AT 13.8 PPG AS DOWNHOLE READ.
Event	14	Check Weight	Check weight	2/23/2015	01:10:07	COM5	13.90	7.00	447.00	CEMENT WEIGHED AT 13.9 PPG AS DOWNHOLE READ.
Event	15	Check Weight	Check weight	2/23/2015	01:21:18	COM5	13.85	7.00	442.00	CEMENT WEIGHED AT 13.85 PPG AS DOWNHOLE WAS READING.
Event	16	Shutdown	Shutdown	2/23/2015	01:29:38	COM5	13.80	0.00	80.00	
Event	17	Drop Top Plug	Drop Top Plug	2/23/2015	01:31:36	COM5	13.80	0.00	45.00	TOP PLUG PRELOADED.
Event	18	Pump Displacement	Pump Displacement	2/23/2015	01:31:38	COM5	9.60	8.00	49.00	PUMP 306 BBLS MUD SUPPLIED BY RIG. GOOD RETURNS THROUGHOUT. 40 BBLS SPACER AND 10 BBLS SPACER BACK TO SURFACE.
Event	19	Displ Reached Cmnt	Displ Reached Cmnt	2/23/2015	01:57:38	COM5	9.60	8.00	484.00	REACH CEMENT AT 128 BBLS AWAY.
Event	20	Bump Plug	Bump Plug	2/23/2015	02:27:34	COM5	8.33	0.00	2450.00	BUMP PLUG AT 1950 PSI AND INCREASED 500 PSI OVER. HELD FOR 2 MINUTES.
Event	21	Other	Other	2/23/2015	02:29:18	COM5	8.33	0.00	2000.00	CHECK FLOATS. FLOATS HELD. 2.5 BBLS BACK.

Event	22	End Job	End Job	2/23/2015	02:30:01	COM5	8.33	0.00	0.00
Event	23	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	2/23/2015	02:47:50	USER			PRE-RIG DOWN SAFETY MEETING WITH HES AND H&P PERSONNEL.

2.0 Attachments

2.1 Job Results



PS Pump Press (psi)			DH Density (ppg)			Comb Pump Rate (bbl/min)					
① Arrive at Location from Service Center n/a,n/a,n/a	⑤ Pump Spacer 1 10;8.21;0	⑨ Pump Lead Cement 44;11.01;0	⑬ Check weight 128;13.61;2.7	⑰ Drop Top Plug 45;13.53;0	21 Other 1999;8.32;0	② Safety Meeting -9;0.71;0	⑥ Check weight 231;11.37;2.8	⑩ Check weight 202;13.01;4	⑭ Check weight 447;13.97;8.1	⑱ Pump Displacement 49;13.51;1.1	22 End Job 59;8.31;0
③ Start Job 20;0.03;0	⑦ Shutdown 94;11.57;0	⑪ Check weight 334;12.69;8	⑮ Check weight 442;13.63;8	⑲ Displ Reached Cmnt 484;9.64;7.9	23 Pre-Rig Down Safety Meeting 563;8.33;12.6	④ Test Lines 77;8.31;0.4	⑧ Drop Bottom Plug 73;11.54;0	⑫ Pump Tail Cement 241;13.46;5.7	⑯ Shutdown 80;13.65;0	20 Bump Plug 2458;8.3;0	