

HALLIBURTON

iCem[®] Service

Extraction Oil & Gas

For:

Date: 1/20/2015

Thornton 12,

Surface

Sincerely,

Sebastian Estensoro

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1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Thornton 12**, cement **Surface** 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	12/29/15	1200	MST
On Location		1715	MST
Job Started		2332	MST
Job Completed	12/30/15	0030	MST
Departed Location		0330	MST

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1.2 Cementing Job Summary

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Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 369404	Ship To #: 3593019	Quote #:	Sales Order #: 0901978883							
Customer: EXTRACTION OIL & GAS		Customer Rep: Larry								
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: 7521										
Well Type: HORIZONTAL OIL										
Sales Person: HALAMERICA\HB60191		Srv Supervisor: Mark Turner								
Job										
Formation Name										
Formation Depth (MD)	Top	Bottom								
Form Type		BHST								
Job depth MD	837ft	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		9.625	8.921	36	LTC	J-55	0	823		
Open Hole Section			13.5				0	837		
Tools and Accessories										
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make	
Guide Shoe	9.625			823		Top Plug	9.625	1	HES	
Float Shoe	9.625			40		Bottom Plug	9.625		HES	
Float Collar	9.625			783		SSR plug set	9.625		HES	
Insert Float	9.625					Plug Container	9.625		HES	
Stage Tool	9.625					Centralizers	9.625		HES	
Miscellaneous Materials										
Gelling Agt		Conc		Surfactant		Acid Type		Qty	Conc	
Treatment Fld		Conc		Inhibitor		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/min	Total Mix Fluid Gal	
1	Spacer	Mud Flush Spacer	10	bbl	8.4			6		
			4 lbm/bbl MUD FLUSH III, 40 LB SACK (101633304)							
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
2	Lead Cement	SWIFTCM (TM) SYSTEM	365	sack	14.2	1.54	7.66	6	7.66	

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Cementing Job Summary

7.66 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
3	Displacement	Displacement	61	bbl	8.33			6	
Cement Left In Pipe	Amount	40 ft			Reason	Shoe Joint			

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1.3 Planned Pumping Schedule

1. **Fill Lines with Water**
 - a. Density = 8.33ppg
 - b. Volume = 2bbl
2. **Pressure Test Lines to 2000psi**
3. **Pump MudFlush III Spacer**
 - a. Density = 8.4 lb/gal
 - b. Volume = 10 bbl
 - c. Rate = 2 bpm
4. **Pump SwiftCem (Lead)**
 - a. Density = 14.2
 - b. Yield = 1.54
 - c. Water Requirement = 7.66
 - d. Volume = 365 sks (100 bbls)
 - e. Rate = 8 bpm
5. **Drop Top Plug**
6. **Start Displacement**
7. **Pump Displacement Water**
 - a. Density = 8.33 lb/gal
 - b. Volume = 61 bbls
 - c. Rate = 6 bpm
8. Land Plug – Anticipated Final Circulation Pressure 280 psi

Calculated Total Displacement = 61 bbls

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1.4 Job Overview

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

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1.5 Water Field Test

Item	Recorded Test Value	Units	Max. Acceptable Limit	Potential Problems in Exceeding Limit
pH		----	6.0 - 8.0	Chemicals in the water can cause severe retardation
Chlorides		ppm	3000 ppm	Can shorten thickening time of cement
Sulfates		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		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		ppm	300 ppm	High concentrations will accelerate the set of the cement
Temperature		$^{\circ}$ F	50-80 $^{\circ}$ F	High temps will accelerate; Low temps may risk freezing in cold weather

Submitted Respectfully by: _____

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1.6 Job Event Log

Type	Seq No.	Activity	Graph Label	Date	Time	Source	Comments
Event	1	Call Out	Call Out	12/29/2014	12:00:00	USER	Call out for Job
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	12/29/2014	15:50:00	USER	Pre departure safety meeting with crew to discuss route and driving safety
Event	3	Depart from Service Center or Other Site	Depart from Service Center or Other Site	12/29/2014	16:00:00	USER	Depart from yard after approval from journey management
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	12/29/2014	17:15:00	USER	Arrive safely at location, journey ended
Event	5	Standby Rig	Standby Rig	12/29/2014	17:16:00	USER	Standby for rig to finish running casing
Event	6	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	12/29/2014	21:20:00	USER	Pre rig up safety meeting with crew to discuss hazards during rig up
Event	7	Rig-Up Equipment	Rig-Up Equipment	12/29/2014	21:30:00	USER	Rig up all equipment on ground
Event	8	Pre-Job Safety Meeting	Pre-Job Safety Meeting	12/29/2014	22:45:00	USER	Pre job safety meeting with crew, rig crew, and customer to discuss job procedures and safety throughout the job
Event	9	Rig-up Lines	Rig-up Lines	12/29/2014	23:00:00	USER	Rig up cement head and line to cement head
Event	10	Start Job	Start Job	12/29/2014	23:32:52	COM4	Fill Lines with 2 bbl of Fresh Water
Event	11	Test Lines	Test Lines	12/29/2014	23:33:05	COM4	Test lines to 2000 psi, good test no leaks
Event	12	Pump Spacer 1	Pump Spacer 1	12/29/2014	23:39:30	COM4	Pump 10 BBL of Mud Flush Spacer, 8.4 ppg 4 bpm@ 300 psi
Event	13	Pump Lead Cement	Pump Lead Cement	12/29/2014	23:43:38	COM4	Pump 100 BBL of Cement @ 14.2 ppg, 8 bpm 280 psi
Event	14	Drop Top Plug	Drop Top Plug	12/30/2014	00:04:25	COM4	Drop Top Plug, customer witnessed
Event	15	Pump Displacement	Pump Displacement	12/30/2014	00:04:30	COM4	Pump 61 BBL of Fresh Water displacement, slow down to 3 bpm last 10 to land plug 500 psi over final circulating pressure. 25 BBL of Cement to surface.
Event	16	Bump Plug	Bump Plug	12/30/2014	00:20:43	COM4	Land plug @ calculated displacement 500 psi over final circulating pressure 280 to 300 psi
Event	17	Other	Other	12/30/2014	00:21:03	COM4	Bleed off pressure, 1 bbl back
Event	18	End Job	End Job	12/30/2014	00:30:54	COM4	Good returns throughout the job
Event	19	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	12/30/2014	00:35:00	USER	Pre rig down safety meeting with crew to discuss rig down hazards
Event	20	Rig-Down Equipment	Rig-Down Equipment	12/30/2014	00:45:00	USER	Rig down all equipment
Event	21	Rig-Down Completed	Rig-Down Completed	12/30/2014	02:00:00	USER	Rig down completed
Event	22	Depart Location	Depart Location	12/30/2014	03:30:00	USER	Depart from location
		Select...					

2.0 Real Time Chart

2.1 Job Chart

