

HALLIBURTON

iCem[®] Service

PDC ENERGY - EBUS

Thistle Down 31H-332 Production

Sincerely,
Meghan Jacobs

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Table of Contents

1.0 Cementing Job Summary 4

 1.1 Executive Summary and Lab Report4

2.0 Real-Time Job Summary 9

 2.1 Job Event Log9

3.0 Attachments..... 12

 3.1 Thistle Down 31H-332 Production – Job Chart with Events12

 3.2 Thistle Down 31H-332 Production – Job Chart without Events13

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Thistle Down 31H-332** cement **Production** 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.

Approximately 48 bbls of spacer were returned to surface.

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 Fort Lupton

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Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 304535		Ship To #: 3819653		Quote #: 0022519498		Sales Order #: 0905338417				
Customer: PDC ENERGY-EBUS				Customer Rep: Chris McMullen						
Well Name: THISTLE DOWN		Well #: 31H-332		API/UWI #: 05-123-45259-00						
Field: WATTENBERG	City (SAP): KERSEY	County/Parish: WELD		State: COLORADO						
Legal Description: NE SW-31-5N-64W-1414FSL-1357FWL										
Contractor: ENSIGN DRLG		Rig/Platform Name/Num: ENSIGN 152								
Job BOM: 7523 7523										
Well Type: HORIZONTAL OIL										
Sales Person: HALAMERICA\HX38199				Srv Supervisor: Luke Kosakewich						
Job										
Formation Name										
Formation Depth (MD)		Top		Bottom						
Form Type				BHST						
Job depth MD		12949ft		Job Depth TVD		6993				
Water Depth				Wk Ht Above Floor						
Perforation Depth (MD)		From		To						
Well Data										
Description	New / Used	Size in	ID in	Weight lbn/ft	Thread	Grade	Top MD ft	Bottom MD ft	Top TVD ft	Bottom TVD ft
Casing		9.625	8.921	36			0	1678	0	1678
Casing		5.5	4.778	20			0	12943	0	6993
Open Hole Section			8.5				1678	6700	1678	6700
Open Hole Section			8.5				6700	12949	6700	6993
Tools and Accessories										
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make	
Guide Shoe						Top Plug	5.5	1	Weatherford	
Float Shoe	5.5	1	Weatherford	12943		Bottom Plug	5.5	1	Weatherford	
Float Collar	5.5	1	Weatherford	12928		SSR plug set	5.5			
Wet Shoe Sub	5.5	1	Weatherford	12914		Plug Container	5.5	1	HES	
Stage Tool						Centralizers	5.5			
Fluid Data										
Stage/Plug #: 1										
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbn/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
1	12.5 lb/gal Tuned Spacer III	Tuned Spacer III	150	bbl	12.5	2.74		5		
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbn/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
2	Gasstop B1	GASSTOP (TM) SYSTEM	615	sack	13.2	1.55		5	7.61	

last updated on 12/18/2018 2:13:39 PM

Page 1 of 3

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Cementing Job Summary

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	ElastiCem	ELASTICEM (TM) SYSTEM	890	sack	14.4	1.7		8	7.3
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	MMCR Displacement	MMCR Displacement	20	bbl	8.34			5	
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 fluid	Fresh Water	266.4	bbl	8.34			7	
Cement Left In Pipe		Amount	0 ft		Reason			Wet Shoe	
Mix Water:		pH 7	Mix Water Chloride:0 ppm			Mix Water Temperature: 60 °F			
Plug Bumped?		Yes	Bump Pressure:2,400 psi			Floats Held?Yes			
Comment There were full returns throughout the job. Bumped the plug 500 psi. over 2,400 psi. at 3 bpm. Final pressure was 2,900 psi. Held for a minute. Pressure held. Pressured up the well to 4,000 psi. to burst the plug. Pumped 5 bbls. of fresh water at 4 bpm. for a wet shoe. Circulated 48 bbls. of spacer to surface. Estimated tops of cement are TOT at 6,354', TOL 2,193'.									

2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DS Pump Press (psi)	Comb Pump Rate (bbl/min)	DH Density (ppg)	Comments
Event	1	Call Out	Call Out	12/10/2018	03:00:00	USER				Crew was called out at 03:00 for an on location time of 10:00.
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	12/10/2018	08:00:00	USER				Crew held a pre journey safety meeting and JSA.
Event	3	Depart Shop for Location	Depart Shop for Location	12/10/2018	08:30:00	USER				Started journey management with dispatch and left location.
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	12/10/2018	09:30:00	USER				Crew performed a site assessment, safety meeting and hazard hunt on location. Checked in with the customer and discussed the job procedures, rig up and well bore schematics. The rig was on bottom ready for the cement job.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	12/10/2018	10:00:00	USER				Held a pre rig up safety meeting with my crew.
Event	6	Rig-Up Equipment	Rig-Up Equipment	12/10/2018	10:15:00	USER				The crew rigged up all lines, hoses and equipment for the job.
Event	7	Safety Meeting	Safety Meeting	12/10/2018	17:30:00	USER	4.00	0.00	8.36	Halliburton cement crew held a pre cement job safety meeting and JSA with third party personnel and rig crew.
Event	8	Start Job	Start Job	12/10/2018	17:51:01	COM5				Pumped 3 bbls. of fresh water at 3 bpm. to fill lines and establish circulation.
Event	9	Test Lines	Test Lines	12/10/2018	18:16:33	COM5	46.00	0.00	8.64	Pressure tested lines to 4,900 psi. with a 500 psi. electronic kick out test.
Event	10	Drop Bottom Plug	Drop Bottom Plug	12/10/2018	18:25:25	COM5	50.00	0.00	8.49	Halliburton loaded and dropped the bottom plug which, was witnessed by the customer.

Event	11	Pump Spacer 1	Pump Spacer 1	12/10/2018	18:25:35	COM5	51.00	0.00	8.49	Pumped 150 bbls. of Tuned Spacer III mixed at 12.5 ppg. Yield: 2.74 ft3/sks, 16.9 gal/sks. Density was verified by pressurized scales.
Event	12	Shutdown	Shutdown	12/10/2018	18:52:53	COM5	8.00	0.00	12.84	Batched up cement. Weighed 13.2 ppg. Density was verified by pressurized scales
Event	13	Pump Lead Cement	Pump Lead Cement	12/10/2018	18:55:33	COM5	7.00	0.00	12.88	Pumped 170 bbls. (615 sks.) of Gasstop B1 mixed at 13.2 ppg., Yield: 1.55 ft3/sks, 7.61 gal/sks. Density was verified by pressurized scales.
Event	14	Pump Tail Cement	Pump Tail Cement	12/10/2018	19:26:18	COM5	60.00	1.40	13.77	Pumped 269 bbls. (890 sks.) of Elasticem mixed at 14.4 ppg., Yield: 1.7 ft3/sks, 7.3 gal/sks. Density was verified by pressurized scales.
Event	15	Shutdown	Shutdown	12/10/2018	20:17:56	COM5	86.00	0.00	2.45	Washed and blew down pumps and lines until clean.
Event	16	Drop Top Plug	Drop Top Plug	12/10/2018	20:27:29	COM5	14.00	0.00	8.05	Halliburton loaded and dropped the top plug, which was witnessed by the customer.
Event	17	Pump Displacement	Pump Displacement	12/10/2018	20:32:14	COM5	11.00	0.00	-0.24	Pumped 286.4 bbls. of fresh water with MMCR in the first 20 bbls. Packer fluid was added throughout the rest of displacement.
Event	18	Bump Plug	Bump Plug	12/10/2018	21:21:12	COM5	2982.00	0.00	8.13	Bumped the plug 500 psi. over 2,400 psi. at 3 bpm. Final pressure was 2,900 psi. Held for a minute. Pressure held. Circulated 48 bbls. of spacer to surface. Estimated tops of cement are TOT at 6,354', TOL 2,193'.
Event	19	Other	Other	12/10/2018	21:23:04	COM5	3791.00	2.10	8.15	Pressured up the well to 4,000 psi. to burst the plug. Pumped 5 bbls. of fresh water at 4 bpm. for a wet shoe.
Event	20	Check Floats	Check Floats	12/10/2018	21:25:40	USER	2005.00	0.00	8.12	Bled off pressure to check floats. Floats held. Got 2 bbls. of fluid back to the truck.
Event	21	End Job	End Job	12/10/2018	21:27:27	COM5				Washed and blew down all pumps and lines until clean and dry.
Event	22	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	12/10/2018	21:45:00	USER	12.00	0.00	4.37	Halliburton cement crew held a pre rig down safety meeting and JSA.
Event	23	Rig-Down Equipment	Rig-Down Equipment	12/10/2018	21:50:00	USER	210.00	6.80	8.08	Rigged down all lines, hoses and equipment.

Event	24	Safety Meeting - Departing Location	Safety Meeting - Departing Location	12/10/2018	23:15:00	USER	Held a pre journey safety meeting with crew.
Event	25	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	12/10/2018	23:30:00	USER	Started journey management with dispatch and left location.