

HALLIBURTON

iCem[®] Service

PDC ENERGY-EBUS

Date: Monday, December 31, 2018

Thistle Down 31H-202 Production

Job Date: Wednesday, December 26, 2018

Sincerely,

Bryce Hinsch

Legal Notice

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Table of Contents

1.0 Cementing Job Summary 4

 1.1 Executive Summary4

2.0 Real-Time Job Summary 9

 2.1 Job Event Log9

3.0 Attachments..... 12

 3.1 PDC Thistle Down 31H-202 Production Job Chart.....12

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Thistle Down 31H-202** 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 10 bbls of cement 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

The Road to Excellence Starts with Safety

Sold To #: 304535		Ship To #: 3819577		Quote #: 0022519817		Sales Order #: 0905369680				
Customer: PDC ENERGY-EBUS				Customer Rep: Chris McMullen						
Well Name: THISTLE DOWN			Well #: 31H-202		API/UWI #: 05-123-45254-00					
Field: WATTENBERG		City (SAP): KERSEY		County/Parish: WELD		State: COLORADO				
Legal Description: NE SW-31-5N-64W-1459FSL-1357FWL										
Contractor: ENSIGN DRLG				Rig/Platform Name/Num: ENSIGN 152						
Job BOM: 7523 7523										
Well Type: HORIZONTAL OIL										
Sales Person: HALAMERICA\HX38199				Srvc Supervisor: Luke Kosakewich						
Job										
Formation Name										
Formation Depth (MD)		Top				Bottom				
Form Type						BHST				
Job depth MD		12854ft		Job Depth TVD		6845ft				
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			0	2518	0	2518
Casing		5.5	4.778	20			0	12848	0	6845
Open Hole Section			8.5				2518	6373	2518	6373
Open Hole Section			8.5				6373	12854	6373	6845
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	12848		Bottom Plug	5.5	1	Weatherford	
Wet Shoe Sub	5.5	1	Weatherford	12814		SSR plug set				
Insert Float						Plug Container	5.5	1	HES	
Stage Tool						Centralizers	5.5	178		
Fluid Data										
Stage/Plug #: 1										
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/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	2.72		5		

Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
2	Gasstop B1	GASSTOP (TM) SYSTEM	980	sack	13.2	1.55		8	7.73
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
3	ElastiCem	ELASTICEM (TM) SYSTEM	875	sack	14.4	1.7		7	7.3
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
4	MMCR Displacement	MMCR Displacement	20	bbl	8.34			8	
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
5	Displacement fluid	Fresh Water W Packer Fluid	264.2	bbl	8.34			8	
Cement Left In Pipe		Amount	ft		Reason			Wet Shoe	
Mix Water:		pH 7	Mix Water Chloride:			0 ppm		Mix Water Temperature:	59 °F
Plug Bumped?		Yes	Bump Pressure:			2,600 psi		Floats Held?	Yes
Comment Bumped the plug 500 psi. over 2,500 psi. at 3 bpm. Final pressure was 3,100 psi. Held for a minute. Pressure held.									
Pressured up the well to 4,027 psi. to shift the sleeve. Pumped 5 bbls. of fresh water at 4 bpm. for a wet shoe. Bled off pressure to check floats. Floats held. Got 2 bbls. of fluid back to the truck. Circulated 150 bbls. of spacer and 10 bbls of cement to surface. Estimated TOT at 5,947'									

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)	Pump Stg Tot (bbl)	Comments
Event	1	Call Out	Call Out	12/25/2018	08:15:00	USER					Crew was called out at 08:15 for a ready to pump cement job time of 15:00.
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	12/25/2018	13:15:00	USER					Crew held a pre journey safety meeting and JSA.
Event	3	Depart Shop for Location	Depart Shop for Location	12/25/2018	13:30:00	USER					Started journey management with dispatch and left location.
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	12/25/2018	14:15:00	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 running casing.
Event	5	Other	Other	12/25/2018	14:20:00	USER					Well bore: MD: 12,854', TP: 5.5" 20# set at 12,848', FC: 12,814', WSS: 12,914, TVD: 6,845', SC: 9.625" 36 # set at 2,518', OH: 8.5". Mud # 10.5 ppg. Water test: PH: 7, Chlorides: 0, Temp: 59 Degrees.
Event	6	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	12/25/2018	14:30:00	USER					Held a pre rig up safety meeting with my crew.
Event	7	Rig-Up Equipment	Rig-Up Equipment	12/25/2018	14:45:00	USER					The crew rigged up all lines, hoses and equipment for the job.

Event	8	Safety Meeting	Safety Meeting	12/25/2018	19:30:00	USER	-1.00	0.00	8.46	6.10	Halliburton cement crew held a pre cement job safety meeting and JSA with third party personnel and rig crew.
Event	9	Start Job	Start Job	12/25/2018	19:52:49	COM5	-4.00	0.00	8.46	6.10	Pumped 3 bbls. of fresh water at 3 bpm. to fill lines and establish circulation.
Event	10	Test Lines	Test Lines	12/25/2018	19:57:20	COM5	78.00	0.00	8.63	8.60	Pressure tested lines to 6,500 psi. with a 500 psi. electronic kick out test.
Event	11	Drop Bottom Plug	Drop Bottom Plug	12/25/2018	20:10:00	COM5	602.00	3.10	12.56	9.70	Halliburton dropped the bottom plug which, was witnessed by the customer.
Event	12	Pump Spacer 1	Pump Spacer 1	12/25/2018	20:10:12	COM5	441.00	3.10	12.81	10.30	Pumped 150 bbls. of Tuned Spacer III mixed at 12.5 ppg.,Yield: 2.72 ft3/sks, 16.8 gal/sks. Density was verified by pressurized scales.
Event	13	Pump Lead Cement	Pump Lead Cement	12/25/2018	20:34:14	COM5	175.00	4.10	12.67	126.60	Pumped 271 bbls. (980 sks.) of Gasstop B1 mixed at 13.2 ppg.,Yield: 1.55 ft3/sks, 7.73 gal/sks. Density was verified by pressurized scales.
Event	14	Pump Tail Cement	Pump Tail Cement	12/25/2018	21:10:40	COM5	244.00	4.40	13.27	0.00	Pumped 265 bbls. (875 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	12/25/2018	21:58:53	COM5	27.00	0.00	0.31	282.80	Washed and blew down pumps and iron until clean.
Event	16	Drop Top Plug	Drop Top Plug	12/25/2018	22:08:17	COM5	8.00	0.00	8.19	292.00	Halliburton loaded and dropped the top plug, which was witnessed by the customer.
Event	17	Pump Displacement	Pump Displacement	12/25/2018	22:08:21	COM5	7.00	0.00	8.19	292.00	Pumped 284.2 bbls. of

				8							fresh water with MMCR in the first 20 bbls. Packer fluid was added throughout the rest of displacement.
Event	18	Bump Plug	Bump Plug	12/25/2018	22:47:49	COM5	2907.00	0.00	8.27	277.70	Bumped the plug 500 psi. over 2,500 psi. at 3 bpm. Final pressure was 3,100 psi. Held for a minute. Pressure held.
Event	19	Pressure Up	Pressure Up	12/25/2018	22:51:57	USER	3872.00	1.90	8.29	278.40	Pressured up the well to 4,027 psi. to shift the sleeve. Pumped 5 bbls. of fresh water at 4 bpm. for a wet shoe. Circulated 150 bbls. of spacer and 10 bbls of cement to surface. Estimated TOT at 5,947'.
Event	20	Check Floats	Check Floats	12/25/2018	22:54:44	USER	2061.00	0.00	8.24	283.50	Bled off pressure to check floats. Floats held. Got 2 bbls. of fluid back to the truck.
Event	21	Shutdown	Shutdown	12/25/2018	22:57:19	COM5	10.00	0.00	8.19	283.50	Shutdown.
Event	22	End Job	End Job	12/25/2018	23:03:11	COM5					Washed and blew down all pumps and lines until clean and dry.
Event	23	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	12/25/2018	23:10:00	USER	6.00	0.00	8.15	283.50	Halliburton cement crew held a pre rig down safety meeting and JSA.
Event	24	Rig-Down Equipment	Rig-Down Equipment	12/25/2018	23:20:00	USER	1.00	0.00	8.15	283.50	Rigged down all lines, hoses and equipment.
Event	25	Safety Meeting - Departing Location	Safety Meeting - Departing Location	12/26/2018	00:50:00	USER					Held a pre journey safety meeting with crew.
Event	26	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	12/26/2018	01:00:00	USER					Started journey management with dispatch and left location.