

HALLIBURTON

iCem[®] Service

PDC ENERGY - EBUS

Thistle Down 31G-232 Production

Sincerely,
Meghan Jacobs

Legal Notice

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1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Thistle Down 31G-232** 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 22 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 #: 0003819622	Quote #: 0022519505	Sales Order #: 0905390614
Customer: PDC ENERGY-EBUS		Customer Rep: Chris McMullen	
Well Name: THISTLE DOWN		Well #: 31G-232	API/UWI #: 05-123-45255-00
Field: WATTENBERG	City (SAP): KERSEY	County/Parish: WELD	State: COLORADO
Legal Description: NE SW-31-5N-64W-1429FSL-1357FWL			
Contractor: ENSIGN DRLG		Rig/Platform Name/Num: ENSIGN 152	
Job BOM: 7523 7523			
Well Type: HORIZONTAL OIL			
Sales Person: HALAMERICA/HX38199		Srvc Supervisor: Kendall Broom - H194727	

Job

Formation Name	
Formation Depth (MD)	Top Bottom
Form Type	BHST
Job depth MD	12328ft 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			0	2554		0
Casing		5.5	4.778	20			0	12320		0
Open Hole Section			8.5				1675	6700		
Open Hole Section			8.5				6700	12328		0

Tools and Accessories

Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make
Guide Shoe	5.5				Top Plug	5.5		HES
Float Shoe	5.5			12320	Bottom Plug	5.5		HES
Float Collar	5.5				SSR plug set	5.5		HES
Insert Float	5.5				Plug Container	5.5	1	HES
Stage Tool	5.5				Centralizers	5.5		HES

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	11.1 lb/gal Tuned Spacer III	Tuned Spacer III	150	bbl	12.5	2.72			

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	Gasstop B1	GASSTOP (TM) SYSTEM	1040	sack	13.2	1.55		6	5.01
3	ElastiCem	ELASTICEM (TM) SYSTEM	793	sack	14.4	1.7		8	7.29
4	MMCR Displacement	MMCR Displacement	20	bbl	8.34				
0.50 gal/bbl		MICRO MATRIX CEMENT RETARDER, 5 GAL PAIL (100003781)							
5	Displacement fluid		252	bbl	8.34				
Cement Left In Pipe		Amount	45 ft			Reason		Shoe Joint	
Mix Water:		pH 6	Mix Water Chloride: 0 ppm			Mix Water Temperature:		#71°F °C	
Plug Bumped?		Yes			Floats Held?		Yes		
Cement Returns:		22							
Comment									

2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	Comb Pump Rate <i>(bbl/min)</i>	DH Density <i>(ppg)</i>	DS Pump Press <i>(psi)</i>	Comments
Event	1	Call Out	Call Out	1/5/2019	03:30:00	USER				Called out the crew to be on location by 0830
Event	2	Depart Shop for Location	Depart shop forLocation	1/5/2019	06:00:00	USER				Held a safety huddle before leaving for location
Event	3	Arrive At Loc	Arrive At Loc	1/5/2019	07:00:00	USER				Held a Hazard Hunt before spotting in the trucks
Event	4	Rig-up Lines	Rig-up Lines	1/5/2019	07:20:00	USER				Held a safety meeting before rigging up lines
Event	5	Safety Meeting	Safety Meeting	1/5/2019	14:15:00	USER	0.00	8.41	-1.00	Held a safety meeting with the rig crew to discuss the operation and safety.
Event	6	Start Job	Start Job	1/5/2019	14:43:04	COM5	0.00	8.17	-3.00	Filled lines with 3 bbls water
Event	7	Test Lines	Test Lines	1/5/2019	14:45:50	COM5	0.00	8.45	82.00	Pressure test lines to 5600 psi with a 500 kick out and 5th gear stall.
Event	8	Pump Spacer 1	Pump Spacer 1	1/5/2019	15:05:32	COM5	3.40	13.17	585.00	Pumped 150 bbls Tuned Spacer. Pumped at 5 bpm and 520 psi.
Event	9	Pump Lead Cement	Pump Lead Cement	1/5/2019	15:36:27	COM5	8.00	13.47	536.00	Pumped 287 bbls Gasstop. Latex added with D-Air to the mix water. 1040 sks, 13.2#, 1.55 yield, 5.01 gal/sks. Pumped at 8 bpm and 659 psi.
Event	10	Check Weight	Check Weight	1/5/2019	15:53:00	COM5	8.00	13.27	653.00	Verified weight with the pressurized scale.
Event	11	Pump Tail Cement	Pump Tail Cement	1/5/2019	16:14:53	COM5	7.80	14.48	693.00	Pumped 240 bbls Elasticem. 793 sks, 14.4#, 1.7 yield, 7.29 gal/sks. Pumped at 8 bpm and 716 psi.
Event	12	Check Weight	Check Weight	1/5/2019	16:27:45	COM5	7.60	14.40	668.00	Verified weight with the pressurized scale.
Event	13	Shutdown	Shutdown	1/5/2019	16:50:56	COM5	0.10	1.70	96.00	Shut down and blew the lines with rig air, also washed up cement head.
Event	14	Drop Top Plug	Drop Top Plug	1/5/2019	17:05:31	COM5	0.00	8.19	-1.00	Dropped top plug. Witnessed by the company man and Weatherford.

Event	15	Pump Displacement	Pump Displacement	1/5/2019	17:05:36	COM5	0.00	8.18	-1.00	Pumped 272 bbls water displacement. First 20 bbls had MMCR and the balance had Bio-Cide .Got all the spacer back and 22 bbls cement back to surface.
Event	16	Bump Plug	Bump Plug	1/5/2019	17:51:43	COM5	0.00	8.32	2776.00	Bumped plug at 2650 psi final lift and kicked out at 2774 psi. Pressured up to 4051psi on the well to shift the shoe. Pumped a 5 bbl wet shoe. Checked floats and got 2 bbls back on the truck. Floats held.
Event	17	End Job	End Job	1/5/2019	17:57:17	COM5	0.00	8.24	19.00	
Event	18	Rig Down Lines	Rig Down Lines	1/5/2019	18:10:00	USER				Held a safety meeting before rigging down lines
Event	19	Depart Location	Depart Location	1/5/2019	19:30:00	USER				Held a safety huddle before leaving location