

HALLIBURTON

iCem[®] Service

PDC ENERGY - EBUS

Thistle Down 31I-302 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 31i-302** 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 51 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 #: 3825716	Quote #: 0022519415	Sales Order #: 0905311682							
Customer: PDC ENERGY-EBUS		Customer Rep: Chris McMullen								
Well Name: THISTLE DOWN	Well #: 31i-302	API/UWI #: 05-123-45456-00								
Field: WATTENBERG	City (SAP): KERSEY	County/Parish: WELD	State: COLORADO							
Legal Description: NE SW-31-5N-64W-1384FSL-1357FWL										
Contractor: ENSIGN DRLG		Rig/Platform Name/Num: ENSIGN 152								
Job BOM: 7523 7523										
Well Type: HORIZONTAL OIL										
Sales Person: HALAMERICA\HX38199		Srv Supervisor: Adam Covington								
Job										
Formation Name										
Formation Depth (MD)	Top	Bottom								
Form Type	BHST									
Job depth MD	13068ft	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	1675		
Casing		5.5	4.778	20			0	13068		0
Open Hole Section			8.5				1675	13069		0
Open Hole Section			8.5				1675	13069	0	
Tools and Accessories										
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make	
Guide Shoe	5.5			13068		Top Plug	5.5	1		
Float Shoe	5.5					Bottom Plug	5.5	1		
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 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		4		
Stage/Plug #: 2										
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	615	sack	13.2	1.55		6	7.61	

last updated on 12/3/2018 1:21:51 PM

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Cementing Job Summary

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
3	ElastiCem	ELASTICEM (TM) SYSTEM	910	sack	14.4	1.7		6	7.3
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
4	MMCR Displacement	MMCR Displacement	20	bbl	8.34			7.5	
0.50 gal/bbl		MICRO MATRIX CEMENT RETARDER, 5 GAL PAIL (100003781)							
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
5	Displacement fluid		269	bbl	8.34			7.5	
Cement Left In Pipe Amount 45 ft Reason Shoe Joint Mix Water: pH 7 Mix Water Chloride: 0 ppm Mix Water Temperature: 50°F °C Cement Temperature: 58 °F °C Plug Displaced by: 8.33 lb/gal kg/m ³ Disp. Temperature: 50 °F °C Plug Bumped? Yes Bump Pressure: 2370 psi MPa Floats Held? Yes Cement Returns: 0 bbl m ³ Returns Density: 12.5 lb/gal kg/m ³ Returns Temperature: ## °F °C Comment 51 bbls of Spacer to Surface. BUMPED PLUG AT 3 BPM, FCP 2370 PSI TOOK TO 3160 PSI. HELD FOR A MINUTE TO MAKE SURE PRESSURE WAS HOLDING. PRESSURED UP TO SHIFT SLEEVE. SLEEVE SHIFTED AT 3920 PSI. AT 2 BPM. WE THEN WENT IMMEDIATELY INTO PUMPING A 5 BBLs WET SHOE AT 4 BPM, 2450 PSI. TD-13,069' OH-8.5" TP-13,068' 5.5" 20#, WSS-13,033' TVD 6936' PC-1675' TOT-6303' TOL-2137' 51 BBLs OF SPACER BACK. WATER--50 DEGREES, CHLORIDES-0, PH-7, SULFATES-0.									

2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DS Pump Press (psi)	DH Density (ppg)	Comb Pump Rate (bbl/min)	Comments
Event	1	Other	Call Out	12/1/2018	05:30:00	USER				HES CREW WERE CALLED FOR AN ON LOCATION TIME OF 1200
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	12/1/2018	09:00:00	USER				MET WITH ALL HES CREW MEMBERS AND DISCUSSED DIRECTIONS AND FOLLOWING DISTANCES.
Event	3	Depart Shop for Location	Depart Shop for Location	12/1/2018	09:10:00	USER				JOURNEY MANAGMENT WAS CALLED.
Event	4	Arrive At Loc	Arrive At Loc	12/1/2018	10:00:00	USER				PERFORMED A HAZARD HUNT, GOT NUMBERS FROM COMPANY MAN AND DISCUSSED STRATEGY FOR RIG UP PROCESS.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	12/1/2018	10:10:00	USER				MET WITH ALL HES EMPLOYEES AND DISCUSSED SWINGS, TEAM LIFTS AND STAYING OUT OF REDZONE WHILE RIGGING UP. NO INCIDENTS.
Event	6	Other	Other	12/1/2018	13:05:26	COM4	0.00	0.00	0.00	STARTED TO MIX AND RECIRCULATE LATEX
Event	7	Pre-Job Safety Meeting	Pre-Job Safety Meeting	12/1/2018	14:00:00	USER	5.00	8.16	0.00	MET WITH ALL HES AND RIG EMPLOYEES. DISCUSSED PRESSURES, HAZARDS AND EMERGENCY PLANS.
Event	8	Drop Bottom Plug	Drop Bottom Plug	12/1/2018	14:34:38	COM4	7.00	8.14	0.00	ADAM COVINGTON DROPPED 5.5" WEATHERFORD BOTTOM PLUG. CO. MAN AND WEATHERFORD HAND WITNESSED.
Event	9	Start Job	Start Job	12/1/2018	14:35:18	COM4	5.00	8.17	0.00	FILLED LINES WITH 3 BBLS OF FRESH WATER, 2 BPM, 400 PSI.
Event	10	Test Lines	Test Lines	12/1/2018	14:39:22	COM4	90.00	8.16	0.00	PERFORMED A 6500 PSI PRESSURE TEST AFTER PERFORMING A 500 PSI KICKOUT TEST (850 PSI) AND A 5TH GEAR STALL (1860 PSI) THEN TOOK TO 6500 PSI AND HELD FOR 5 MINUTES AS PER CO. MAN.

Event	11	Pump Spacer 1	Pump Spacer 1	12/1/2018	14:47:28	COM4	38.00	8.15	0.00	PUMPED 150 BBLS OF 12.5#, 2.74y, 16.9wr TUNED SPACER III. 300 PSI, 3 BPM.
Event	12	Check Weight	Check Weight	12/1/2018	14:58:47	COM4	313.00	12.63	5.30	USED PRESSUREIZED MUD SCALES TO WEIGH UP SPACER. SPACER WEIGHED UP AT 12.5#.
Event	13	Check Weight	Check Weight	12/1/2018	14:59:02	COM4	313.00	12.61	5.30	USED PRESSUREIZED MUD SCALES TO WEIGH UP SPACER. SPACER WEIGHED UP AT 12.5#.
Event	14	Pump Lead Cement	Pump Lead Cement	12/1/2018	15:17:31	COM4	331.00	13.35	5.40	PUMPED 170 BBLS (615 SKS) OF 13.2#, 1.55y, 7.61wr GASSTOP LEAD CEMENT AT 6 BPM, 430 PSI. (WITH 1538 GALLONS OF FDP LATEX AND 62 GALLONS OF D-AIR.) WITH 20 GALLONS OF D-AIR IN 5 GALLON BUCKETS.
Event	15	Check Weight	Check Weight	12/1/2018	15:30:21	COM4	317.00	13.50	4.40	USED PRESSURIZED MUD SCALES TO WEIGH UP CEMENT. CEMENT WEIGHED UP AT 13.2#
Event	16	Check Weight	Check Weight	12/1/2018	15:41:20	COM4	296.00	13.20	5.80	USED PRESSURIZED MUD SCALES TO WEIGH UP CEMENT. CEMENT WEIGHED UP AT 13.2#
Event	17	Pump Tail Cement	Pump Tail Cement	12/1/2018	16:00:37	COM4	422.00	14.49	6.00	PUMPED 275.5 BBLS (910 SKS) OF 14.4#, 1.7y, 7.3wr ELASTICEM TAIL CEMENT AT 6 BPM, 460 PSI.
Event	18	Check Weight	Check Weight	12/1/2018	16:04:40	COM4	592.00	14.42	6.10	USED PRESSURIZED MUD SCALES TO WEIGH UP CEMENT. CEMENT WEIGHED UP AT 14.4#
Event	19	Check Weight	Check Weight	12/1/2018	16:18:07	COM4	428.00	14.40	6.10	USED PRESSURIZED MUD SCALES TO WEIGH UP CEMENT. CEMENT WEIGHED UP AT 14.4#
Event	20	Shutdown	Shutdown	12/1/2018	16:56:57	COM4	130.00	14.60	0.00	SHUTDOWN TO BLOW DOWN LINES, LOAD PLUG AND WASH PUMPS AND LINES.
Event	21	Drop Top Plug	Drop Top Plug	12/1/2018	17:11:24	COM4	9.00	-0.34	0.00	ADAM COVINGTON DROPPED WEATHERFORD 5.5" TOP PLUG. WEATHERFORD HAND AND DRILLER WITNESSED.
Event	22	Pump Displacement	Pump Displacement	12/1/2018	17:11:28	COM4	9.00	-0.34	0.00	PUMPED 289 BBLS OF DISPLACEMENT. FIRST 20 BBLS HAD MMCR IN THEM. THE REST HAD BIOCIDES PROVIDED BY THE COMPANY MAN DISPERSED THROUGHOUT. WENT 7.5 BPM SO WE COULD LINE OUT THE PRESSURE STAYED THERE MOST OF DISPLACEMENT. GOT 51 BBLS OF SPACER TO SURFACE.

Event	23	Bump Plug	Bump Plug	12/1/2018	18:04:06	COM4	3154.00	7.91	0.00	SLOWED RATE LAST 20 BBLS TO 3 BPM. BUMPED PLUG AT 3 BPM, FCP 2370 PSI TOOK TO 3160 PSI. HELD FOR A MINUTE TO MAKE SURE PRESSURE WAS HOLDING.
Event	24	Pressure Up Well	Pressure Up Well	12/1/2018	18:04:55	USER	3182.00	7.90	0.80	PRESSURED UP TO SHIFT SLEEVE. SLEEVE SHIFTED AT 3920 PSI. AT 2 BPM. WE THEN WENT IMMEDIATELY INTO PUMPING A 5 BBLS WET SHOE AT 4 BPM, 2450 PSI.
Event	25	Check Floats	Other	12/1/2018	18:07:56	COM4	1917.00	7.87	0.00	BLED PRESSURE BACK TO TRUCK TO CHECK FLOATS. GOT 2 BBLS OF WATER TO TRUCK AND STOPPED INDICATING THAT THE FLOATS HELD.
Event	26	End Job	End Job	12/1/2018	18:11:12	COM4	2.00	7.82	0.00	TD-13,069' OH-8.5" TP-13,068' 5.5" 20#, WSS-13,033' TVD 6936' PC-1675' TOT-6303' TOL-2137' 51 BBLS OF SPACER BACK. WATER--50 DEGREES, CHLORIDES-0, PH-7, SULFATES-0.
Event	27	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	12/1/2018	18:25:00	USER				MET WITH HES CREW. DISCUSSED BLOW DOWN PROCEDURE, TEAM LIFTS AND TO STRETCH.
Event	28	Depart Location Safety Meeting	Depart Location Safety Meeting	12/1/2018	20:15:00	USER				MET WITH ALL HES CREW MEMBERS. DISCUSSED SAFETY TO DRIVE, DIRECTIONS AND ROAD CONDITIONS.
Event	29	Depart Location	Depart Location	12/1/2018	20:30:00	USER				THANK YOU FOR CHOOSING HALLIBURTON.