

# HALLIBURTON

iCem<sup>®</sup> Service

**PDC ENERGY - EBUS**

**PDC Barr 11L-321 Production**

Sincerely,  
**Meghan Jacobs**

## Legal Notice

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## 1.0 Cementing Job Summary

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### 1.1 Executive Summary

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Halliburton appreciates the opportunity to perform the cementing services on the **Bar 11L-321 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 12bbls of MudFlush Spacer 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 [Ft. Lupton]**

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*Cementing Job Summary*

*The Road to Excellence Starts with Safety*

Sold To #: 304535		Ship To #: 3832712		Quote #: 0022432290		Sales Order #: 0904792025				
Customer: PDC ENERGY-EBUS				Customer Rep: Chris McMullen						
Well Name: BARR		Well #: 11L-321		API/UWI #: 05-123-45689-00						
Field: WATTENBERG	City (SAP): KERSEY	County/Parish: WELD		State: COLORADO						
Legal Description: SE SE-11-5N-65W-244FSL-364FEL										
Contractor: ENSIGN DRLG				Rig/Platform Name/Num: ENSIGN 152						
Job BOM: 7523 7523										
Well Type: HORIZONTAL OIL										
Sales Person: HALAMERICA\HX38199				Srv Supervisor: Nicholas Peterson						
<b>Job</b>										
Formation Name										
Formation Depth (MD)		Top		Bottom						
Form Type										
BHST										
Job depth MD		12,044'		Job Depth TVD		5'				
Water Depth				Wk Ht Above Floor		6,847'				
Perforation Depth (MD)		From		To						
<b>Well Data</b>										
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	1636		
Casing	0	5.5	4.778	20			0	12044		0
Open Hole Section			8.5				1636	12050		0
<b>Tools and Accessories</b>										
Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make		
Guide Shoe	5.5	1	WEATH	12,044	Top Plug	5.5	1	WEATH		
Float Shoe	5.5				Bottom Plug	5.5	1	WEATH		
Wet Shoe Sub	5.5	1	WEATH	12,010						
					Plug Container	5.5	1	HES		
					Centralizers	5.5	175	MTRX/WEA		
<b>Fluid Data</b>										
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	Pre Flush	Mud Flush III	50	bbl	8.4			6	2,100	
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	Weighted Spacer	Tuned Spacer III	100	bbl	11	4.72	31	8	3,687	

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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/min	Total Mix Fluid Gal	
3	Lead	HALCEM (TM) SYSTEM	815	sack	15.6	1.18	5.16	8	4,205	
4	Tail	ELASTICEM (TM) SYSTEM	730	sack	14.4	1.7	7.32	8	5,344	
5	MMCR	MMCR Displacement	30	bbl	8.34			8		
0.25 gal/bbl		MICRO MATRIX CEMENT RETARDER								
6	Biocide/Stafil	Displacement	247	bbl	8.34			8		
Cement Left In Pipe		Amount	0'		Reason			Wet Shoe		
Mix Water:		pH 7.0	Mix Water Chloride:		0 ppm		Mix Water Temperature:			64 °F
Cement Temperature:		## °F	Plug Displaced by:		8.33 lb/gal		Disp. Temperature:			64 °F
Plug Bumped?		Yes	Bump Pressure:		2,511 psi		Floats Held?			Yes
Cement Returns:		0 bbl	Returns Density:		8.4 lb/gal		Returns Temperature:			## °F
Comment: Pumped 50 bbls Mud Flush, 100 bbls Tuned Spacer, 171 bbls Lead, 221 bbls Tail. 267 bbls fresh water displacement with MMCR in the first 30, biocide, and Stafil in the remaining 210 bbls. Mud Flush to surface @ 245 away 12 bbls Mud Flush to surface.										

## 2.0 Real-Time Job Summary

### 2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DH Density <i>(ppg)</i>	Comb Pump Rate <i>(bbl/min)</i>	PS Pump Press <i>(psi)</i>	Comments
Event	1	Call Out	Call Out	4/19/2018	13:00:00	USER				CREW CALLED OUT AT 13:00, REQUESTED ON LOCATION 19:00. CREW PICKED UP CEMENT, CHEMICALS, AND PLUG CONTAINER FROM FT. LUPTON, CO. BULK 660 10025030, Bulk 660 11019273, AND PUMP 11189145.
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	4/19/2018	17:30:00	USER				DISCUSSED ROUTES, HAZARDS, AND COMMUNICATION WITH CREW.
Event	3	Crew Leave Yard	Crew Leave Yard	4/19/2018	17:35:00	USER				STARTED JOURNEY MANAGEMENT.
Event	4	Arrive at Location from Service Center	Arrive at Location	4/19/2018	18:30:00	USER				END JOURNEY MANAGEMENT. MEET WITH CO. MAN TO DISCUSS JOB; SURFACE CASING- 9.625" 36 LB/FT @ 1,636', 5.5" CASING: 20 LB/FT TOTAL 12,044', 8.5" HOLE, TD 12,050', 34' SHOE TRAC, TVD- 6,847'. PUMP FRESH WATER DISPLACEMENT WITH MMCR FIRST 30 BBL. CASING LANDED @ 16:00 04/19/2018. RIG CIRCULATED 3 BOTTOMS UP.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	4/19/2018	18:45:00	USER				HAZARD HUNT. DISCUSSED POSSIBLE HAZARDS ASSOCIATED WITH LOCATION, RIG UP AND WEATHER.
Event	6	Rig-Up Completed	Rig-Up Completed	4/19/2018	18:45:00	USER				RIG WAS READY WHEN CREW SHOWED UP.
Event	7	Safety Meeting - Pre Job	Safety Meeting - Pre Job	4/19/2018	19:00:00	USER				MEETING WITH HALLIBURTON AND RIG PERSONNEL. COMMUNICATED POTENTIAL SAFETY HAZARDS AND JOB DETAILS.
Event	8	Rig-Up Equipment	Rig-Up Equipment	4/19/2018	19:30:00	USER				CREW STAGED EQUIPMENT AND RIGGED UP BULK, IRON, AND WATER HOSES TO PERFORM JOB.
Event	9	Start Job	Start Job	4/19/2018	19:54:50	COM5	8.14	0.00	-1.00	BEGIN RECORDING JOB DATA.
Event	10	Test Lines	Test Lines	4/19/2018	19:58:46	COM5	8.08	0.00	160.00	PRESSURE TESTED IRON TO 6,000 PSI. KICKOUTS SET @ 500 PSI, KICKED OUT @ 900 PSI, 5TH GEAR STALL OUT @ 1,947 PSI.

Event	11	Pump Spacer 1	Pump Spacer 1	4/19/2018	20:09:01	COM5	8.32	0.00	-1.00	PUMP 50 BBLS OF MUD FLUSH @ 8.4 LBS/GAL. HOMF CALCULATED @ 228.70' TOMF @ SURFACE. PUMP RATE 6 BBLS/MIN @ 480 PSI.
Event	12	Drop Bottom Plug	Drop Bottom Plug	4/19/2018	20:20:17	USER	8.10	4.10	466.00	PLUG LEFT CONTAINER, VERIFIED BY CO. MAN.
Event	13	Pump Spacer 2	Pump Spacer 2	4/19/2018	20:21:00	COM5	8.12	1.20	434.00	PUMP 100 BBLS OF TUNED SPACER III @ 11.0 LB/GAL, 5 GALS D-AIR. DENSITY VERIFIED BY PRESSURIZED MUD SCALES. CALCULATED HOS @ 2,206.1' CALCULATED TOS @ 228.70'. PUMP RATE 8 BBLS/MIN @ 529 PSI.
Event	14	Pump Lead Cement	Pump Lead Cement	4/19/2018	20:54:47	COM5	15.80	4.90	763.00	PUMPED 815 SKS OF HALCEM @ 15.6 LB/GAL, 1.18 FT3/SK, 5.16 GAL/SK. 171.28 BBLS, HOL CALCULATED @ 4,198.04', TOL CALCULATED @ 2,434.80'. DENSITY VERIFIED BY PRESSURIZED MUD SCALES. PUMP RATE 7 BBLS/MIN 585 PSI.
Event	15	Pump Tail Cement	Pump Tail Cement	4/19/2018	21:24:26	COM5	14.11	7.50	472.00	PUMP 730 SKS OF ELASTICEM @ 14.4 LB/GAL, 1.7 FT3/SK, 7.32 GAL/SK, 221.02 BBLS. HOT CALCULATED @ 5,417.15', TOT CALCULATED @ 6,632.84'. DENSITY VERIFIED BY PRESSURIZED MUD SCALES. PUMP RATE 7.5 BBLS/MIN @ 640 PSI.
Event	16	Clean Lines	Clean Lines	4/19/2018	21:58:47	USER	14.01	3.40	152.00	CLEANED LINES WITH 10 BBLS FRESH WATER.
Event	17	Drop Top Plug	Drop Top Plug	4/19/2018	22:13:53	COM5	8.33	0.00	10.00	PLUG LEFT CONTAINER, VERIFIED BY CO. MAN.
Event	18	Pump Displacement	Pump Displacement	4/19/2018	22:16:56	COM5	8.18	0.00	5.00	BEGIN CALCULATED DISPLACEMENT OF 267 BBLS WITH FRESH WATER. PUMPED THE FIRST 30 BBLS WITH MMCR, PUMPED 227 BBLS WITH BIOCID, AND STACLEAR. SLOWED RATE TO 4 BBLS/MIN @ 240 BBLS AWAY. MUD FLUSH TO SURFACE @ 245 BBLS AWAY 12 BBLS MUD FLUSH TO SURFACE.
Event	19	Slow Rate	Slow Rate	4/19/2018	22:45:51	USER	8.43	8.00	2897.00	SLOWED RATE TO 4 BBLS/MIN MUD FLUSH BACK @ 245 BBLS AWAY. 12 BBLS TO SURFACE.
Event	20	Bump Plug	Bump Plug	4/19/2018	22:51:24	COM5	8.41	0.50	2704.00	PLUG BUMPED AT CALCULATED DISPLACEMENT. 2,511 PSI PRESSURED 500 PSI OVER BUMP.
Event	21	Shift Tool - Lower	Shift Tool - Lower	4/19/2018	22:53:31	USER	8.42	2.00	3607.00	TOOL SHIFTED @ 3,712 PSI, PUMPED 5 BBL WET SHOE.
Event	22	Check Floats	Check Floats	4/19/2018	22:55:46	USER	8.38	0.00	1946.00	RELEASED PRESSURE, FLOATS HELD, 2 BBLS BACK.
Event	23	End Job	End Job	4/19/2018	22:57:06	COM5	8.31	0.00	-8.00	STOP RECORDING JOB DATA.

Event	24	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	4/19/2018	23:00:00	USER	DISCUSSED POSSIBLE HAZARDS ASSOCIATED WITH WEATHER, LOCATION AND RIGGING DOWN IRON AND HOSES.
Event	25	Rig-Down Equipment	Rig-Down Equipment	4/19/2018	23:15:00	USER	RIG DOWN BULK AND MIXING EQUIPMENT.
Event	26	Rig-Down Completed	Rig-Down Completed	4/20/2018	00:00:00	USER	ALL HALLIBURTON ITEMS WERE STOWED FOR TRAVEL, AND LOCATION WAS CLEAN.
Event	27	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	4/20/2018	00:15:00	USER	DISCUSSED ROUTES HAZARDS AND COMMUNICATION WITH CREW.
Event	28	Depart Location	Depart Location	4/20/2018	00:30:00	USER	THANK YOU FOR USING HALLIBURTON - NICK PETERSON AND CREW.