

HALLIBURTON

iCem[®] Service

PDC ENERGY - EBUS

J Clark 8N Production

Sincerely,
Meghan Jacobs

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1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **J Clark 8N 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 no returns to surface were observed.

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 #: 0003870582		Quote #: 0022471021		Sales Order #: 0905022776					
Customer: PDC ENERGY-EBUS				Customer Rep: Chris McMullen							
Well Name: J CLARK			Well #: 8N			API/UWI #: 05-123-46684-00					
Field: WATTENBERG		City (SAP): GREELEY		County/Parish: WELD		State: COLORADO					
Legal Description: NW NE-14-5N-65W-550FNL-2069FEL											
Contractor: ENSIGN DRLG					Rig/Platform Name/Num: ENSIGN 152						
Job BOM: 7523 7523											
Well Type: HORIZONTAL OIL											
Sales Person: HALAMERICA\HX38199					Srcv Supervisor: Kamereon White/Nick Cummins						
Job											
Formation Name											
Formation Depth (MD)		Top			Bottom						
Form Type											
BHST											
Job depth MD		12097ft			Job Depth TVD		6795				
Water Depth											
Wk Ht Above Floor 4											
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	1676			
Casing		5.5	4.778	20			0	12095			
Open Hole Section			8.5				1676				
Open Hole Section			8.5					12097			
Tools and Accessories											
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make		
						Top Plug	5.5	1	WTHR		
Float Shoe	5.5	1	WTHR	12095		Bottom Plug	5.5	1	HES		
Float Collar	5.5	1	WTHR	12060							
						Plug Container	5.5	1	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	Mud Flush III (Powder)	Mud Flush III	50	bbl	8.4			4			
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		

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Cementing Job Summary

2	11.1 lb/gal Tuned Spacer III	Tuned Spacer III	100	bbl	11.1	4.5	29.4	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
3	ElastiCem	ELASTICEM (TM) SYSTEM	815	sack	15.6	1.18		5	5.15
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	ElastiCem	ELASTICEM (TM) SYSTEM	775	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/min	Total Mix Fluid Gal
5	MMCR Displacement	MMCR Displacement	30	bbl	8.34			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
6	Displacement fluid	Water	238	bbl	8.34			5	
Cement Left In Pipe	Amount	Reason			Shoe Joint				
Mix Water:pH	7	Mix Water Chloride:	<400 ppm		Mix Water Temperature:70				
Plug Bumped?	Yes	Plug Displaced by:	8.33						
Cement Returns:	0	Bump Pressure:	2520 psi		Floats Held?Yes				
		Returns Density:	7.7						
Comment									

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>	DS Pump Press <i>(psi)</i>	Comments
Event	1	Call Out	Call Out	7/27/2018	16:00:00	USER				The crew was called out for a on location time of 2300.
Event	2	Depart from Service Center or Other Site	Depart from Service Center or Other Site	7/27/2018	20:00:00	USER				Crew held pre journey safety meeting. Supervisor called in journey. Crew departed from service center.
Event	3	Arrive at Location from Service Center	Arrive at Location from Service Center	7/27/2018	21:00:00	USER				Crew arrived on location safely. The rig was still running casing. The supervisor went and got numbers from company man. TD 12,097 TP 12,095' 5 1/2" 20# P-110 FC 12,060' PC 1,676' 9 5/8" 36# J-55 TVD 6,795' OH 8 1/2" Mud 10.7 ppg
Event	4	Assessment Of Location Safety Meeting	Assessment Of Location Safety Meeting	7/27/2018	21:05:00	USER				Crew held a safety meeting about all hazards they would encounter spotting trucks in.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	7/27/2018	21:50:00	USER				Crew held a safety meeting prior to rigging up to discuss process and all hazards.
Event	6	Other	Rig Up Equipment	7/27/2018	22:00:00	USER				Rigged up all HES equipment and lines.
Event	7	Other	Rig Up Completed	7/28/2018	00:00:00	USER	0.00	0.00	-27.00	Rig up completed. No one got hurt.
Event	8	Safety Meeting - Pre Job	Safety Meeting - Pre Job	7/28/2018	00:40:00	USER	8.39	0.00	-27.00	Crew held safety meeting with all employees affected. To discuss all hazards and job process.
Event	9	Other	Fill Lines	7/28/2018	00:51:33	COM4	8.39	3.10	614.00	We filled lines with 3 bbls of water at 3 bpm at 640 psi.
Event	10	Test Lines	Test Lines	7/28/2018	00:52:23	COM4	8.37	0.00	311.00	We pressure tested all HES lines to 4,500 psi.
Event	11	Pump Spacer 1	Pump Spacer 1	7/28/2018	00:58:21	COM4	8.36	0.00	116.00	We pumped 50 bbls of mud flush at 4 bpm with 700 psi.
Event	12	Drop Bottom Plug	Drop Top Plug	7/28/2018	01:09:00	USER	8.40	5.10	608.00	Dropped bottom plug. Tool hand witnessed plug drop.
Event	13	Shutdown	Shutdown	7/28/2018	01:13:40	COM4	8.40	0.00	512.00	We shut down to re secure the stand pipe chain that had come loose while pumping our 50 bbls of mud flush.
Event	14	Pump Spacer 2	Pump Spacer 2	7/28/2018	01:25:43	COM4	12.29	4.10	990.00	We pumped 100 bbls of spacer at 11.1 ppg 4.5 yield 29.4 gal/sk . 5 bpm with 850 psi. Estimated top of spacer is at 78'.

Event	15	Check Weight	Check Weight	7/28/2018	01:27:42	COM4	11.40	5.00	992.00	We scaled the spacer using pressurized scales. It weighed up at 11.1 ppg.
Event	16	Pump Lead Cement	Pump Lead Cement	7/28/2018	01:46:41	COM4	16.11	2.40	987.00	we pumped 171 bbls of lead cement at 15.6 ppg 1.18 yield 5.15 gals/sk. 5 bpm 650 psi. Estimated top of lead cement is 2165'.
Event	17	Check Weight	Check Weight	7/28/2018	01:50:33	COM4	15.81	4.00	721.00	We checked the weight of lead cement using pressurized scales. It weighed up at 15.6 ppg.
Event	18	Pump Tail Cement	Pump Tail Cement	7/28/2018	02:27:53	COM4	14.92	5.00	318.00	we pumped 234 bbls of tail cement at 14.4 ppg 1.7 yield 7.3 gals/sk. 8 bpm with 690 psi. Estimated top of tail is 6,363'.
Event	19	Check Weight	Check Weight	7/28/2018	02:28:12	COM4	14.58	5.00	292.00	We checked the weight of tail cement using pressurized scales. It weighed up at 14.4 ppg.
Event	20	Shutdown	Shutdown	7/28/2018	03:02:05	COM4	14.30	0.00	143.00	Shutdown to load top plug and clean lines.
Event	21	Clean Lines	Clean Lines	7/28/2018	03:07:44	COM4	14.29	2.20	8.00	Blew air from the manifold to clear lines. Washed pumps and lines after.
Event	22	Drop Top Plug	Drop Top Plug	7/28/2018	03:14:24	COM4	-0.33	0.00	-22.00	Tool hand witnessed top plug drop.
Event	23	Pump Displacement	Pump Displacement	7/28/2018	03:14:29	COM4	-0.33	0.00	-22.00	we displaced 268 bbls of water. The first 30 with MMCR, and biocide and stay clear till the last 40 bbls.
Event	24	Displ Reached Cement	Displ Reached Cement	7/28/2018	03:25:44	COM4	8.34	2.60	87.00	Displacement reached cement at 53 bbls away.
Event	25	Bump Plug	Bump Plug	7/28/2018	04:15:47	COM4	8.45	0.00	3035.00	We bumped the plug. Final circulating pressure was 2,520. We brought it 500 psi over to 3,100 psi.
Event	26	Other	Other	7/28/2018	04:20:26	COM4	8.41	0.00	2053.00	We pressured up to rupture at 4,192 psi. We pumped a 5 bbl wet shoe.
Event	27	End Job	End Job	7/28/2018	04:21:32	COM4	8.41	0.00	-16.00	Job complete.
Event	28	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	7/28/2018	04:25:00	USER	8.37	0.00	-22.00	Held pre rig down safety meeting to discuss rig down process and all hazards involved.
Event	29	Rig Down Lines	Rig Down Lines	7/28/2018	04:30:00	USER	8.34	0.00	46.00	Rig down all HES equipment and lines.
Event	30	Rig-Down Completed	Rig-Down Completed	7/28/2018	05:15:00	USER				Rig down completed. No one got hurt.
Event	31	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	7/28/2018	06:00:00	USER				Held pre journey safety meeting. Supervisor called in journey. Departed location.