

HALLIBURTON

iCem[®] Service

PDC ENERGY-EBUS

Date: Friday, June 22, 2018

J Clark 16N Foamed Production

Job Date: Wednesday, June 20, 2018

Sincerely,

Ryan Keeran

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 **J Clark 16N** cement **Foamed 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.

Very little indications of mud flush 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 #: 3870494		Quote #: 0022455254		Sales Order #: 0904931537					
Customer: PDC ENERGY-EBUS				Customer Rep:							
Well Name: J CLARK			Well #: 16N			API/UWI #: 05-123-46682-00					
Field: WATTENBERG		City (SAP): KERSEY		County/Parish: WELD		State: COLORADO					
Legal Description: NW NE-14-5N-65W-550FNL-1949FEL											
Contractor: ENSIGN DRLG					Rig/Platform Name/Num: ENSIGN 152						
Job BOM: 14143 14143											
Well Type: HORIZONTAL OIL											
Sales Person: HALAMERICA/HX38199					Srv Supervisor: Nicholas Peterson						
Job											
Formation Name											
Formation Depth (MD)		Top			Bottom						
Form Type											
BHST											
Job depth MD		12,097'			Job Depth TVD		6,801'				
Water Depth											
Wk Ht Above Floor 5'											
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	1680		1662	
Casing	0	5.5	4.778	20			0	12097		0	
Open Hole Section			8.5				1680	6801		6488	
Open Hole Section			8.5				6801	12097	1680	6801	
Tools and Accessories											
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make		
Float Shoe	5.5	1	WEATH	12,091		Top Plug	5.5	1	WEATH		
Float Collar	5.5	1	WEATH	12,079		Bottom Plug	5.5	1	WEATH		
Float Collar	5.5	1	WEATH	12,077		SSR plug set					
Wet Shoe Sub	5.5	1	WEATH	12,063		Plug Container	5.5	1	HES		
						Centralizers	5.5	176	WEATH		
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	Spacer	Mud Flush III			50	bbl	8.4			5	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	Spacer	Tuned Spacer III			100	bbl	12.5	2.69	16.7	5	3,486

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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	720	sack	15.6	1.18	5.26	5	3,787	
4	Tail	ELASTICEM (TM) SYSTEM	760	sack	14.4	1.7	7.3	5	5,548	
5	Displacement	MMCR Displacement	30	bbl	8.34			5		
6	Displacement	Biocide Displacement	238	bbl	8.34			8		
Cement Left In Pipe		Amount	34 ft		Reason			Shoe Joint		
Mix Water:	pH 6.8	Mix Water Chloride:	0 ppm		Mix Water Temperature:			73 °F		
Cement Temperature:	## °F	Plug Displaced by:	8.33 lb/gal		Disp. Temperature:			73 °F		
Plug Bumped?	Yes	Bump Pressure:	2,700 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, 21 bbls Cap cement, 131 bbls Foamed Lead, 231 bbls Tail cement, 268 bbls Fresh water displacement.										

2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DH Density (ppg)	Comb Pump Rate (bbl/min)	DS Pump Press (psi)	Comments
Event	1	Call Out	Call Out	6/20/2018	04:30:00	USER				CREW CALLED OUT AT 04:30, REQUESTED ON LOCATION ASAP. CREW PICKED UP CEMENT, CHEMICALS, AND PLUG CONTAINER FROM FT. LUPTON, CO. BULK 660 10867531, Bulk 660 11566182, N2 11291534, FOAM UNIT AND PUMP 11189145.
Event	2	Safety Meeting	Safety Meeting - Pre Job	6/20/2018	07:00:00	USER				PRE CONVOY SAFETY MEETING. CREW DISCUSSED ROUTES, HAZARDS, AND COMMUNICATION WITH CREW.
Event	3	Crew Leave Yard	Crew Leave Yard	6/20/2018	07:30:00	USER				STARTED JOURNEY MANAGEMENT
Event	4	Arrive At Loc	Arrive At Loc	6/20/2018	08:30:00	USER				END JOURNEY MANAGEMENT. MEET WITH CO. MAN TO DISCUSS JOB; SURFACE CASING- 9.625" 36 LB/FT @ 1,673', 5.5" CASING: 20 LB/FT TOTAL 12,093', 8.5" HOLE, TD 12,097', 29.67' SHOE TRAC, TVD- 6,801'. PUMP FRESH WATER DISPLACEMENT WITH MMCR FIRST 30 BBLS. CASING LANDED @ 10:45 06/20/2018. RIG CIRCULATED 2 BOTTOMS UP.
Event	5	Safety Meeting - Pre Rig-Up	Safety Meeting - Pre Rig-Up	6/20/2018	09:00:00	USER				HAZARD HUNT. DISCUSSED POSSIBLE HAZARDS ASSOCIATED WITH LOCATION, RIG UP, AND WEATHER.
Event	6	Safety Meeting - Pre Job	Safety Meeting - Pre Job	6/20/2018	14:00:00	USER	8.05	0.00	14.00	SAFETY MEETING WITH HALLIBURTON, AND RIG PERSONNEL. CREW COMMUNICATED POTENTIAL SAFETY HAZARDS, AND JOB DETAILS
Event	7	Start Job	Start Job	6/20/2018	15:12:54	COM6	8.07	0.00	8.00	BEGIN RECORDING DATA
Event	8	Test Lines	Test Lines	6/20/2018	15:19:27	COM6	8.10	0.00	225.00	Test cement lines to 5000 psi and held for a minimum of 5 min. While holding pressure on cement lines, pressure tested N2 lines to 7000 psi. Once everything held, bled of N2 pressure to 1000 psi and completely bled off cement lines.
Event	9	Pump Spacer 1	Pump Spacer 1	6/20/2018	15:38:31	USER	8.11	5.00	726.00	Pumped 50 bbls Mud Flush at 5bpm

Stage	2	Next Stage	Next Stage	6/20/2018	15:38:45	USER	8.11	5.00	731.00	
Event	10	Pump Spacer 2	Pump Spacer 2	6/20/2018	15:45:01	COM6	8.02	5.00	899.00	Pump 100 bbls of 12.5ppg Tuned Spacer III at 5bpm
Event	11	Pump Cap Cement	Pump Cap Cement	6/20/2018	16:09:32	COM6	12.29	0.00	360.00	Pump 21 bbls (100 sks) of 15.6ppg cap HalCem. Yield: 1.18 ft3/sk. Water Requirement: 16.91 gal/sk. Pumped at 5 bpm and brought on foamer approximately 5 bbls in for a foam concentration of 0.368 gal/bbl.
Event	12	Pump Foam Cement	Pump Foam Cement	6/20/2018	16:14:59	COM6	15.74	5.00	1122.00	Pump 130.5 bbls (620 sks) of foamed HalCem. Cement foamed from 15.6ppg mix density to 13.7ppg final density. Mix yield at 1.18 gal/sk and mix water requirement at 5.18 gal/sk. Foamer concentration at 0.368 gal/bbl. Approximately 22,000 scf N2 used for cement and another 50,000 scf N2 used for cool down. Pumped at 5bpm.
Event	13	Pump Tail Cement	Pump Tail Cement	6/20/2018	16:46:18	COM6	14.26	6.00	664.00	Pump 230.5 bbls (760 sks) of 14.4 tail ElastiCem. Yield: 1.70 ft3/sk. Water Requirement: 7.30 gal/sk. Pumped at 5 bpm. No foamer or N2. Pumped at 5bpm.
Event	14	Shutdown	Shutdown	6/20/2018	17:37:40	COM6	14.52	0.00	213.00	Shut down to blow down lines and drop top plug. Rig shut in choke. Top plug was verified by company rep.
Event	15	Drop Top Plug	Drop Top Plug	6/20/2018	17:44:18	COM6	8.23	0.00	12.00	PLUG LEFT CONTAINER, VERIFIED BY CO. MAN.
Event	16	Pump Displacement	Pump Displacement	6/20/2018	17:44:23	COM6	8.21	0.00	12.00	Pumped calculated displacement of 265 bbls. MMCR added to first 20 bbls and BioCide added throughout.
Event	17	Displ Reached Cement	Displ Reached Cement	6/20/2018	17:51:14	COM6	8.28	5.10	224.00	
Event	18	Bump Plug	Bump Plug	6/20/2018	18:36:34	COM6	8.39	0.00	2771.00	BUMPED PLUG AT CALCULATED DISPLACEMENT. TRACE AMOUNTS MUD FLUSH TO SURFACE. RELEASED PRESSURE. FLOATS HELD. 2 BBLS BACK.
Event	19	Other	Other	6/20/2018	18:40:50	COM6	8.42	0.00	2972.00	Shifted open wet shoe sub and pumped 5 bbl wet shoe
Event	20	Check Floats	Check Floats	6/20/2018	18:44:53	COM6	8.36	0.00	2184.00	RELEASED PRESSURE, FLOATS HELD, 2 BBLS BACK.
Event	21	End Job	End Job	6/20/2018	18:47:44	USER	8.33	0.00	22.00	STOP RECORDING JOB DATA.
Event	22	Safety Meeting - Pre Rig-Down	Safety Meeting - Pre Rig-Down	6/20/2018	19:30:00	USER				DISCUSSED POSSIBLE HAZARDS ASSOCIATED WITH WEATHER, LOCATION AND RIGGING DOWN IRON AND HOSES.

Event	23	Rig-Down Completed	Rig-Down Completed	6/20/2018	20:50:00	USER	ALL HALLIBURTON ITEMS WERE STOWED FOR TRAVEL, AND LOCATION WAS CLEAN.
Event	24	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	6/20/2018	21:00:00	USER	CREW DISCUSSED ROUTES HAZARDS AND COMMUNICATION WITH CREW.
Event	25	Crew Leave Location	Crew Leave Location	6/20/2018	21:15:00	USER	THANK YOU FOR USING HALLIBURTON – NICK PETERSON AND CREW.