

# HALLIBURTON

iCem<sup>®</sup> Service

## **PDC ENERGY - EBUS**

Date: Tuesday, August 07, 2018

## **J Clark 10N Production**

Job Date: Tuesday, July 17, 2018

Sincerely,

**Julia Nichols**

## 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 **J Clark 10N 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.

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]**

**HALLIBURTON**

**Cementing Job Summary**

*The Road to Excellence Starts with Safety*

Sold To #: 304535		Ship To #: 0003870543		Quote #: 0022466879		Sales Order #: 0904998572					
Customer: PDC ENERGY-EBUS				Customer Rep: Chris McMullen							
Well Name: J CLARK			Well #: 10N			API/UWI #: 05-123-46698-00					
Field: WATTENBERG		City (SAP): GREELEY		County/Parish: WELD		State: COLORADO					
Legal Description: NW NE-14-5N-65W-550FNL-2039FEL											
Contractor: ENSIGN DRLG				Rig/Platform Name/Num: ENSIGN 152							
Job BOM: 7523 7523											
Well Type: HORIZONTAL OIL											
Sales Person: HALAMERICA\HX38199					Srvc Supervisor: Kamereon White						
Job											
Formation Name											
Formation Depth (MD)		Top			Bottom						
Form Type					BHST						
Job depth MD		12014ft			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	1676			
Casing		5.5	4.778	20			0	12026			
Open Hole Section			8.5				1676	12031			
Open Hole Section			8.5				6797	12031			
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	12026	Bottom Plug	5.5	1	WTHR			
Float Collar	5.5	1	WTHR	11990	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 <sup>3</sup> /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
1	Mud Flush III (Powder)	Mud Flush III			50	bbl	8.4			6	
42 gal/bbl		FRESH WATER									
Fluid #	Stage Type	Fluid Name			Qty	Qty UoM	Mixing Density lbm/gal	Yield ft <sup>3</sup> /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	36.5	6		
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	HALCEM (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	755	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		
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 ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
6	Displacement fluid		236	bbl	8.34			6		
Cement Left In Pipe		Amount	35 ft		Reason			Shoe Joint		
Mix Water:		pH 7	Mix Water Chloride: 200 > ppm		Mix Water Temperature: 76 °F					
			Plug Displaced by: 3.33 ppg							
Plug Bumped?		Yes	Bump Pressure: 2400 psi		Floats Held?			Yes		
Cement Returns:		0 bbl	Returns Density: 8.4 lb/gal							
Comment										

## 2.0 Real-Time Job Summary

### 2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DS Pump Press <i>(psi)</i>	DH Density <i>(ppg)</i>	Comb Pump Rate <i>(bbl/min)</i>	Comments
Event	1	Job Called In	Job Called In	7/17/2018	06:00:00	USER				Ensign 152 requested a crew to arrive on location at 1200.
Event	2	Casing on Bottom	Casing on Bottom	7/17/2018	08:15:00	USER				Casing on bottom rig curiculated 2.5 bottoms up
Event	3	Depart Yard Safety Meeting	Depart Yard Safety Meeting	7/17/2018	10:55:00	USER				Crew held safety meeting about driving hazards to location.
Event	4	Depart from Service Center or Other Site	Depart from Service Center or Other Site	7/17/2018	11:00:00	USER				Crew left service center for rig.
Event	5	Arrive at Location from Service Center	Arrive at Location from Service Center	7/17/2018	11:35:00	USER				Crew arrived on location. Went and got numbers from company man. TD12031' TP12026' 5.5 20# CP-110 FC 11990' SC 1676' 9.6.25 36# J-55 TVD 6797 Mud 10.8ppg
Event	6	Assessment Of Location Safety Meeting	Assessment Of Location Safety Meeting	7/17/2018	11:40:00	USER				Crew assesed location for hazards before spotting in Halliburton equipment.
Event	7	Pre-Rig Up Safety Meeting	Assessment Of Location Safety Meeting	7/17/2018	11:50:00	USER				Crew held saftey meeting beofre riging up all halliburton equipment and lines.
Event	8	Rig-Up Equipment	Rig-Up Equipment	7/17/2018	12:00:00	USER				Crew rigged up all Halliburton equipment and lines
Event	9	Rig-Up Completed	Rig-Up Completed	7/17/2018	12:45:00	USER				Rig up completed no one got hurt.
Event	10	Pre-Job Safety Meeting	Pre-Job Safety Meeting	7/17/2018	13:00:00	USER	-7.00	8.32	0.00	Had a saftey meeting with all personel involved with cement job.
Event	11	Other	Fill Lines	7/17/2018	13:15:36	COM4	-6.00	8.39	0.90	Filled lines with 3bbbls of water at 3bpm a 515 psi.
Event	12	Test Lines	Test Lines	7/17/2018	13:18:41	COM4	4598.00	8.46	0.00	Pressure tested all halliburton lines to 4500 psi. There was no leaks.
Event	13	Pump Spacer 1	Pump Spacer 1	7/17/2018	13:21:44	COM4	7.00	8.33	0.00	We pumpd 50 bbls of mud flush at 6 bpm at 540 psi. At 48 bbls away we dropped the bottom plug.
Event	14	Shutdown	Shutdown	7/17/2018	13:38:40	COM4	209.00	8.39	0.20	Shutdown per customer request to re pressure test lines.

Event	15	Test Lines	Test Lines	7/17/2018	13:41:37	COM4	4648.00	8.51	0.00	Pressure tested lines to 4500 psi. There were no leaks.
Event	16	Pump Spacer 2	Pump Spacer 2	7/17/2018	13:46:10	COM4	648.00	12.02	2.30	We pumped 100bbls of Tuned spacer 6 bpm at 560 psi. 11.1ppg 4.5 yield 36.5 gal/sk. ADC was having mixing issues we slowed rate to try and maintain density.
Event	17	Pump Lead Cement	Pump Lead Cement	7/17/2018	14:10:01	COM4	865.00	15.70	5.00	We pumped 171 bbls of Lead cement 5 bpm at 670 psi. 15.6 ppg 1.18 yield 5.15 gal/sk.
Event	18	Check Weight	Check Weight	7/17/2018	14:12:16	COM4	758.00	15.81	5.00	Used pressurized scales and it weighed up at 15.3 ppg.
Event	19	Check Weight	Check Weight	7/17/2018	14:14:17	COM4	640.00	15.67	5.00	Used pressurized scales and it weighed up at 15.5ppg.
Event	20	Pump Tail Cement	Pump Tail Cement	7/17/2018	14:49:05	COM4	243.00	14.62	5.00	We pumped 228 bbls of tail cement 8bpm at 530 psi. 14.4 ppg 1.7 yield 7.3 gal/sk.
Event	21	Check Weight	Check Weight	7/17/2018	14:50:01	COM4	499.00	14.47	8.00	Used pressurized scales and it weighed up at 14.4 ppg.
Event	22	Shutdown	Shutdown	7/17/2018	15:22:26	COM4	412.00	15.23	4.00	Shutdown to load top plug.
Event	23	Clean Lines	Clean Lines	7/17/2018	15:40:04	COM4	59.00	8.08	0.90	Washed pumps and lines.
Event	24	Drop Top Plug	Drop Top Plug	7/17/2018	15:40:38	COM4	21.00	8.10	0.00	Company man witnessed plug drop.
Event	25	Pump Displacement	Pump Displacement	7/17/2018	15:41:53	COM4	-6.00	4.32	0.90	We displaced 266 bbls of water. With MMCR in the first 30 and Biocide through till the last 40 bbls
Event	26	Displ Reached Cement	Displ Reached Cement	7/17/2018	15:51:18	COM4	132.00	8.14	5.10	Displacement reached cement at 44 bbls away.
Event	27	Bump Plug	Bump Plug	7/17/2018	16:43:28	COM4	2829.00	8.25	0.00	We bumped the plug at 2400 psi and brought it up to 4900 then shut the pump down.
Event	28	Other	Pressure Up To Rupture Disc	7/17/2018	16:44:39	COM4	2870.00	8.26	0.00	Pressured up to 3984 psi to rupture the disk and pumped a 5 bbl wet shoe at 4 bpm. Checked floats got 2 bbls back. Floats held.
Event	29	End Job	End Job	7/17/2018	16:48:15	COM4	-4.00	8.21	0.00	Cement job complete.
Event	30	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	7/17/2018	16:50:00	USER	-8.00	8.18	0.00	Crew held a rig down safety to discuss rig down process and hazards.
Event	31	Rig-Down Equipment	Rig-Down Equipment	7/17/2018	16:55:00	USER	-11.00	8.17	0.00	Crew rigged down all Halliburton equipment and lines.
Event	32	Rig-Down Completed	Rig-Down Completed	7/17/2018	17:30:00	USER				Rig down completed no one got hurt.
Event	33	Depart Location Safety Meeting	Depart Location Safety Meeting	7/17/2018	18:25:00	USER				Crew held pre journey safety meeting to depart location.

Event	34	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	7/17/2018	18:30:00	USER
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Crew departed location for  
service center.

## HALLIBURTON Rockies, Brighton

Lab Results- Lead

Job Information					
Request/Slurry	2488208/1	Rig Name	ENSIGN 152	Date	15/JUL/2018
Submitted By	Julia Nichols	Job Type	Production Casing	Bulk Plant	Brighton
Customer	PDC Energy	Location	Sublette	Well	J Clark 10N

Well Information					
Casing/Liner Size	5.5 in	Depth MD	12014 ft	BHST	104°C / 220°F
Hole Size	8.5 in	Depth TVD	6700 ft	BHCT	82°C / 180°F
Pressure	4000 psi				

Cement Information - Lead Design			
Cement Properties			
Slurry Density	15.6	lbm/gal	
Slurry Yield	1.185	ft <sup>3</sup> /sack	
Water Requirement	5.154	gal/sack	

### Operation Test Results Request ID 2488208/1

Thickening Time - ON-OFF-ON									16/JUL/2018	
Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:min)	50 Bc (hh:min)	70 Bc (hh:min)	100 Bc (hh:min)	Start Bc	Stirring before stop (mins)	Static Period (min)	Peak reading (BC)
180	4000	60	6:16	6:20	6:24	6:29	21	85	10	22

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## HALLIBURTON Rockies, Brighton

Lab Results- Tail

Job Information					
Request/Slurry	2488209/1	Rig Name	ENSIGN 152	Date	15/JUL/2018
Submitted By	Julia Nichols	Job Type	Production Casing	Bulk Plant	Brighton
Customer	PDC Energy	Location	Weld	Well	J Clark 10N

Well Information					
Casing/Liner Size	5.5 in	Depth MD	12014 ft	BHST	104°C / 220°F
Hole Size	8.5 in	Depth TVD	6700 ft	BHCT	82°C / 180°F
Pressure	4000 psi				

Cement Information - Tail Design 			
Cement Properties			
Slurry Density	14.4	lbm/gal	
Slurry Yield	1.703	ft <sup>3</sup> /sack	
Water Requirement	7.298	gal/sack	

Operation Test Results Request ID 2488209/1										
Thickening Time - ON-OFF-ON										16/JUL/2018
Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:min)	50 Bc (hh:min)	70 Bc (hh:min)	100 Bc (hh:min)	Start Bc	Stirring before stop (mins)	Static Period (min)	Peak reading (BC)
180	4000	60	5:07	5:14	5:16	5:19	14	90	10	16

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