

HALLIBURTON

iCem[®] Service

PDC ENERGY - EBUS

J Clark 9C 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 9C** 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 44bbls 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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Rockies, Brighton

Lab Results- Lead

Job Information

Request/Slurry	2488854/2	Rig Name	ENSIGN 152	Date	18/JUL/2018
Submitted By	Meghan Jacobs	Job Type	Production Casing	Bulk Plant	Brighton
Customer	PDC Energy	Location	Sublette	Well	J Clark 9C

Well Information

Casing/Liner Size	5.5 in	Depth MD	12233 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 ³ /sack
Water Requirement	5.154	gal/sack
Total Mix Fluid	5.154	gal/sack

Operation Test Results Request ID 2488854/2

Mixability (0 - 5) - 0 is not mixable

19/JUL/2018

Mixability rating (0 - 5)

Avg rpm mixing under load (~12,000)

5

12000

Thickening Time - ON-OFF-ON

20/JUL/2018

Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)	100 Bc (hh:mm)	Start Bc	Stirring before stop (mins)	Static Period (min)	Peak reading (BC)
180	4000	60	3:37	6:39	6:47	6:51	29	85	10	29

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Rockies, Brighton

Lab Results- Tail

Job Information

Request/Slurry	2488855/2	Rig Name	ENSIGN 152	Date	18/JUL/2018
Submitted By	Meghan Jacobs	Job Type	Production Casing	Bulk Plant	Brighton
Customer	PDC Energy	Location	Weld	Well	J Clark 9C

Well Information

Casing/Liner Size	5.5 in	Depth MD	12233 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 ³ /sack
Water Requirement	7.302	gal/sack
Total Mix Fluid	7.302	gal/sack

Operation Test Results Request ID 2488855/2

Mixability (0 - 5) - 0 is not mixable

20/JUL/2018

Mixability rating (0 - 5)

Avg rpm mixing under load (~12,000)

4

12000

Thickening Time - ON-OFF-ON

20/JUL/2018

Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)	100 Bc (hh:mm)	Start Bc	Stirring before stop (mins)	Static Period (min)	Peak reading (BC)
180	4000	60	3:23	3:40	3:46	3:48	19	90	10	28

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Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 304535		Ship To #: 0003870546		Quote #: 0022468791		Sales Order #: 0905007759				
Customer: PDC ENERGY-EBUS				Customer Rep: Chris Mc Millen						
Well Name: J CLARK		Well #: 9C		API/UWI #: 05-123-46697-00						
Field: WATTENBERG		City (SAP): GREELEY		County/Parish: WELD		State: COLORADO				
Legal Description: NW NE-14-5N-65W-550FNL-2054FEL										
Contractor: ENSIGN DRLG				Rig/Platform Name/Num: ENSIGN 152						
Job BOM: 7523 7523										
Well Type: HORIZONTAL OIL										
Sales Person: HALAMERICA\HX38199				Srvc Supervisor: Kendall Broom - H194727						
Job										
Formation Name										
Formation Depth (MD)		Top		Bottom						
Form Type				BHST						
Job depth MD		12226ft		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	1677		
Casing		5.5	4.778	20			0	12219		
Open Hole Section			8.5				1675	6700		
Open Hole Section			8.5				6700	12226		
Tools and Accessories										
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make	
Guide Shoe	5.5					Top Plug	5.5		HES	
Float Shoe	5.5			12219		Bottom Plug	5.5		HES	
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 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					
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	

last updated on 7/24/2018 4:43:06 PM

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Cementing Job Summary

2	11.2 lb/gal Tuned Spacer III	Tuned Spacer III	100	bbl	11.2	4.3	28		
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/mi n	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/mi n	Total Mix Fluid Gal
4	ElastiCem	ELASTICEM (TM) SYSTEM	783	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/mi n	Total Mix Fluid Gal
5	MMCR Displacement	MMCR Displacement	30	bbl	8.34				
0.25 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/mi n	Total Mix Fluid Gal
6	Displacement fluid		270	bbl	8.34				
Cement Left In Pipe									
Cement Left In Pipe		Amount	34 ft	Reason				Shoe Joint	
Mix Water:		pH 7	Mix Water Chloride:	0 ppm	Mix Water Temperature:		72 °F °C		
Plug Bumped?		Yes			Floats Held?		Yes		
Comment Got 44 bbls mud flush back to surface. Bumped the plug at 270 bbl and 2890 psi. Burst the shoe at 3967 psi pumped a 5 bbl wet shoe.Floats held and got 1.5 bbls back on the truck.									

2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	Comb Pump Rate (bbl/min)	DH Density (ppg)	DS Pump Press (psi)	Comments
Event	1	Call Out	Call Out	7/23/2018	12:30:00	USER				Called crew out to be on location at 2100
Event	2	Depart Shop for Location	Depart Shop for Location	7/23/2018	18:30:00	USER				Held a safety meeting before leaving for location
Event	3	Arrive At Loc	Arrive At Loc	7/23/2018	19:15:00	USER				Arrive at location and met with the company man
Event	4	Rig-up Lines	Rig-up Lines	7/23/2018	19:30:00	USER				Held a hazard hunt before spotting in trucks and rigging up
Event	5	Safety Meeting	Safety Meeting	7/24/2018	02:30:00	USER	0.00	8.43	11.00	Held a safety meeting with the rig to discuss the operation and safety
Event	6	Start Job	Start Job	7/24/2018	02:48:32	COM5	0.00	8.43	11.00	Filled lines with 2 bbls water
Event	7	Test Lines	Test Lines	7/24/2018	02:55:50	COM5	0.00	8.70	4243.00	Test lines to 4500psi. With a 500psi kick out and 5th gear stall. Climbed to 4380 psi
Event	8	Pump Spacer 1	Pump Spacer 1	7/24/2018	03:01:45	COM5	1.60	8.60	517.00	Pumped 50 bbls Mud Flush. Pumped at 4 bpm and 550 psi. slowed or rate at 40 bbls away to 2 bpm and dropped the bottom plug. Preloaded and witnessed by weatherford.
Event	9	Pump Spacer 2	Pump Spacer 2	7/24/2018	03:16:42	COM5	4.00	11.61	738.00	Pumped 100 bbls Tuned Spacer. Pumped at 5 bpm and 850 psi. 11.2#, 4.3 yield, 28 gal/sks. Calculated TOSpacer is at 117ft.
Event	10	Check Weight	Check Weight	7/24/2018	03:18:44	COM5	4.00	11.32	708.00	Verified weight with pressurized scales.
Event	11	Check Weight	Check Weight	7/24/2018	03:25:39	COM5	5.10	11.20	746.00	Verified weight with pressurized scales
Event	12	Pump Lead Cement	Pump Lead Cement	7/24/2018	03:35:11	COM5	5.10	15.75	927.00	Pumped 171.27 bbls Elasticem. 815 sks, 15.6#, 1.18 yield, 5.15 gal/sks. Pumped at 5 bpm and 302 psi. Calculated TOLC 2230.11ft.
Event	13	Check Weight	Check Weight	7/24/2018	03:37:04	COM5	5.10	15.59	665.00	Verified weight with the pressurized scale
Event	14	Check Weight	Check Weight	7/24/2018	03:42:46	COM5	5.10	15.53	306.00	Verified weight with the pressurized scale

Event	15	Pump Tail Cement	Pump Tail Cement	7/24/2018	04:08:56	COM5	5.10	14.61	290.00	Pumped 237.06 bbls Elasticem. 783 sks, 14.4#, 1.7 yield, 7.3 gal/sks. Pumped at 5 bpm and 304 psi. Calculated TOTC is 6427.90ft
Event	16	Check Weight	Check Weight	7/24/2018	04:18:09	COM5	5.20	14.40	315.00	Verified weight with the pressurized scale
Event	17	Check Weight	Check Weight	7/24/2018	04:37:03	COM5	7.00	14.38	444.00	Verified weight with the pressurized scale
Event	18	Shutdown	Shutdown	7/24/2018	04:52:19	COM5	0.00	14.38	61.00	Shut down and washed up cement head and lines
Event	19	Drop Top Plug	Drop Top Plug	7/24/2018	05:04:32	COM5	0.00	0.15	-7.00	Dropped top plug, witnessed by the company man and weatherford
Event	20	Pump Displacement	Pump Displacement	7/24/2018	05:04:37	COM5	0.00	3.88	-6.00	Pumped 270 bbls water. first 30 bbl had MMCR, Biocide and KCL added throughout the balance of displacement. Pumped at 5 bpm and 2420 psi.
Event	21	Bump Plug	Bump Plug	7/24/2018	06:02:51	COM5	0.00	5.19	55.00	Bumped plug at 2890 final lift pressure and kicked out at 3200 psi. Pressured up the well to 3967 psi to shear the shoe. Pumped a 5 bbl wet shoe. Checked floats and got 1.5 bbls back on the truck. Floats held.
Event	22	End Job	End Job	7/24/2018	06:03:05	COM5	0.00	4.62	9.00	
Event	23	Rig Down Lines	Rig Down Lines	7/24/2018	06:15:00	USER	2.90	2.05	4.00	Held a safety meeting before rigging down the lines
Event	24	Depart Location	Depart Location	7/24/2018	07:00:00	USER				Held a safety huddle before leaving location