

HALLIBURTON

iCem[®] Service

PDC ENERGY EBUS

Date: Thursday, March 15, 2018

FERN 11V-214 PRODUCTION

Job Date: Monday, March 05, 2018

Sincerely,

Julia Nichols

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1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **FERN 11V-214** 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.

No spacer or cement 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 #: 3791975		Quote #:		Sales Order #: 0904684230				
Customer: PDC ENERGY-EBUS				Customer Rep: Chris McMullen						
Well Name: FERN		Well #: 11V-214		API/UWI #: 05-123-44585-00						
Field: WATTENBERG	City (SAP): GREELEY	County/Parish: WELD	State: COLORADO							
Legal Description: NW NW-11-5N-65W-306FNL-689FWL										
Contractor:		Rig/Platform Name/Num: Ensign 152								
Job BOM: 7523 7523										
Well Type: HORIZONTAL OIL										
Sales Person: HALAMERICA/HX38199		Srvc Supervisor: Bradley Hinkle								
Job										
Formation Name										
Formation Depth (MD)	Top		Bottom							
Form Type			BHST							
Job depth MD	14990ft		Job Depth TVD	6719ft						
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	1635	0	1635
Casing		5.5	4.778	20	BUTTRESS	HCP110	0	14990	0	6719
Open Hole Section			8.5				1635	14996	0	6719
Tools and Accessories										
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make	
						Top Plug	5.5	1	Weatherford	
Float Shoe	5.5		Weatherford	14990						
Float Collar	5.5		Weatherford	14975						
Wet Shoe Sub	5.5		Weatherford	14956.5		Plug Container	5.5	1	HES	
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			3		
Stage/Plug #: 2										
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	CLEAN SPACER III	50	bbl	12	2.27	12.4	5		

last updated on 3/15/2018 11:18:11 AM

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(v. 4.2.393)

Created: Thursday, March 15, 2018

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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	Primary Cement	ELASTICEM	1827	sack	13.2	1.57	7.52	6	13,739
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	MMCR Displacement	Fresh Water with MMCR	50	bbl	8.34			8	
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	Displacement	Biocide Water	282	bbl	8.34			8	
Cement Left In Pipe		Amount	0 ft		Reason			Wet Shoe by Design	
Mix Water:		pH 6	Mix Water Chloride:		0 ppm		Mix Water Temperature:		52 °F
Cement Temperature:		## °F °C	Plug Displaced by:		## lb/gal kg/m3 XXXX		Disp. Temperature:		## °F °C
Plug Bumped?		Yes	Bump Pressure:		1965 psi		Floats Held?		Yes
Cement Returns:		## bbl m3	Returns Density:		10.5 lb/gal		Returns Temperature:		## °F °C
Comment No mud flush or spacer to surface. Estimated top of cement based off of pre-job calculations at 2465 feet.									

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	3/5/2018	13:00:00	USER				Crew called for an on location of 2200. Crew was Bradley Hinkle, Luke Kosakewich, Galen Boddy, Martin Schmidt and Aaron Duncan.
Event	2	Depart Shop for Location	Depart Shop for Location	3/5/2018	20:00:00	USER				Pre-journey safety meeting.
Event	3	Arrive at Location from Service Center	Arrive at Location from Service Center	3/5/2018	21:00:00	USER				Sign-in, perform a site assessment and pre-rig up safety meeting.
Event	4	Other	Job Numbers	3/5/2018	21:30:00	USER				TD: 14996. TP: 14990. FC: 14975. WSS: 14956. TVD: 6719. 5.5" 20# casing inside a 8.5" OH. 9.625" 36# surface casing set at 1635. Approximately 100 psi to be held on the chokes during cement.
Event	5	Safety Meeting	Safety Meeting	3/6/2018	02:00:00	USER	0.00	0.00	9.00	Pre-job safety meeting with all personnel on location.
Event	6	Start Job	Start Job	3/6/2018	02:34:37	COM4	7.69	0.00	17.00	
Event	7	Test Lines	Test Lines	3/6/2018	02:41:41	COM4	7.81	0.00	5286.00	Pressure test lines with a 500 psi electronic kick-out test.
Event	8	Pump Spacer 1	Pump Spacer 1	3/6/2018	02:47:01	COM4	7.84	3.00	433.00	Pump 50 bbls mud flush.
Event	9	Pump Spacer 2	Pump Spacer 2	3/6/2018	03:10:41	COM4	12.11	2.50	622.00	Pump 50 bbls Clean Spacer mixed at 12 ppg (2.27 cuft/sk, 12.4 gal/sk). Density verified by pressurized scales.
Event	10	Pump Lead Cement	Pump Lead Cement	3/6/2018	03:24:49	COM4	13.26	4.50	611.00	Pump 511 bbls (1827 sacks, 1.57 cuft/sk, 7.52 gal/sk) ElastiCem mixed at 13.2 ppg. Density verified by pressurized scales. Pressure erratic at higher rate while taking returns through chokes. Slowed rate to 6.5 bbls/ min and pressure slowly lined out. Maintained that rate for duration of cement.
Event	11	Check Weight	Check weight	3/6/2018	03:54:02	COM4	13.23	6.50	248.00	Cement weighed at 13.15 ppg.
Event	12	Check Weight	Check weight	3/6/2018	04:19:21	COM4	13.24	6.50	356.00	Cement weighed at 13.2 ppg.

Event	13	Shutdown	Shutdown	3/6/2018	04:55:36	COM4	12.36	0.00	66.00	
Event	14	Clean Lines	Clean Lines	3/6/2018	05:03:04	COM4	0.72	0.00	4.00	Blow down lines until clear. Wash pump and lines until clean.
Event	15	Drop Top Plug	Drop Top Plug	3/6/2018	05:08:09	COM4	8.39	0.00	7.00	Top plug loaded. Witnessed by customer and Weaterford hand.
Event	16	Pump Displacement	Pump Displacement	3/6/2018	05:08:45	COM4	8.42	2.30	47.00	Pump 333 bbls, first 50 with MMCR, then Biocide throughout the remainder. Good returns throughout. No mud flush or spacer to surface. Top of cement calculated off pre-job numbers at 2465 feet.
Event	17	Displ Reached Cmnt	Displ Reached Cmnt	3/6/2018	05:12:01	COM4	8.42	8.00	811.00	Caught cement at 22 bbls away.
Event	18	Bump Plug	Bump Plug	3/6/2018	05:50:26	COM4	8.43	4.20	2163.00	Bump plug at 1965 psi and hold for 5 minutes.
Event	19	Pressure Up Well	Pressure Up Well	3/6/2018	05:55:58	COM4	8.45	2.00	3572.00	Pressure up to shift wet shoe sub at 3572 psi. Pump 5 bbl wet shoe at 4 bbls per minute.
Event	20	Check Floats	Check Floats	3/6/2018	05:58:17	USER	8.42	0.00	348.00	Floats held. 1.5 bbls back.
Event	21	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	3/6/2018	06:00:00	USER	8.47	0.00	-12.00	Pre-rig down safety meeting.
Event	22	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	3/6/2018	07:00:00	USER				Pre-journey safety meeting.