

HALLIBURTON

iCem[®] Service

PDC ENERGY-EBUS

Date: Wednesday, April 11, 2018

Fern 11W-214 Production

Job Date: Sunday, April 08, 2018

Sincerely,
Tyler Hill

Legal Notice

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Table of Contents

1.0 Cementing Job Summary 4

 1.1 Executive Summary4

2.0 Real-Time Job Summary 10

 2.1 Job Event Log10

3.0 Attachments..... 13

 3.1 PDC FERN 11W-214 5.5 PRODUCTION.png13

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Fern 11W-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.

Approximately 23 bbls of mud flush were 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

The Road to Excellence Starts with Safety

Sold To #: 304535		Ship To #: 3791977		Quote #:		Sales Order #: 0904762384					
Customer: PDC ENERGY-EBUS				Customer Rep: VAUGHN							
Well Name: FERN			Well #: 11W-214		API/UWI #: 05-123-44583-00						
Field: WATTENBERG		City (SAP): GREELEY		County/Parish: WELD		State: COLORADO					
Legal Description: NW NW-11-5N-65W-396FNL-687FWL											
Contractor: ENSIGN DRLG				Rig/Platform Name/Num: ENSIGN 152							
Job BOM: 7523 7523											
Well Type: HORIZONTAL OIL											
Sales Person: HALAMERICA\HX38199				Srv Supervisor: Ryan Stevens							
Job											
Formation Name											
Formation Depth (MD)		Top		Bottom							
Form Type				BHST							
Job depth MD		15162ft		Job Depth TVD		6772					
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	1677		1667	
Casing	New	5.5	4.778	20	BTC		0	15162		6772	
Open Hole Section			8.5				1667	15165		6772	
Tools and Accessories											
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make		
Guide Shoe						Top Plug	5.5	1	weath		
Float Shoe	5.5	1	Weath	15162		Bottom Plug	5.5	1	Weath		
Float Collar	5.5	1	Weath	15129		SSR plug set	5.5				
Insert Float	5.5					Plug Container	5.5	1	HES		
Stage Tool	5.5					Centralizers	5.5				
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	Mud Flush III (Powder)	Mud Flush III			50	bbl	8.4				
42 gal/bbl		FRESH WATER									

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	11.3 lb/gal Tuned Spacer III	Tuned Spacer III	100	bbl	11.3	4.11			
36.20 gal/bbl		FRESH WATER							
135.74 lbm/bbl		BARITE, BULK (100003681)							
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 LEAD	ELASTICEM (TM) SYSTEM	810	sack	15.6	1.18	5.25	5	4,197
5.15 Gal		FRESH WATER							
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 Tail	ELASTICEM (TM) SYSTEM	1160	sack	14.4	1.7	7.3	5	8,468
0.40 %		HR-5, 50 LB SK (100005050)							
7.30 Gal		FRESH WATER							
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	20	bbl	8.34			8 / 6	
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/min	Total Mix Fluid Gal
6	Displacement fluid	Biocide Water	316	bbl	8.33			8 / 6	
Cement Left In Pipe		Amount	0 ft		Reason			Wet Shoe	

Mix Water:	pH 7	Mix Water Chloride:	0 ppm	Mix Water Temperature:	68 °F
Cement Temperature:		Plug Displaced by:	8.34 Lb/Gal	Disp. Temperature:	68 °F
Plug Bumped?	Yes	Bump Pressure:	3,080 psi	Floats Held?	Yes
Cement Returns:	## bbl	Returns Density:	8.8 Lb/Gal	Returns Temperature:	
Comment Calculated top of lead @ 2,393 Calculated top of tail @ 6,584 23 BBLS OF MUD FLUSH BACK TO SURFACE. PUMPED 7 BBLS WET SHOE. TOOL DID NOT SHEAR					

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)	Pump Stg Tot (bbl)	Comments
Event	1	Call Out	Call Out	4/8/2018	11:00:00	USER					CREW CALLED OUT @ 11:00, CUSTOMER REQUESTED ON LOCATION OF 15:00 4/8/18. CREW PICKED UP PUMP 11645460, BULK TRUCKS, CHEMICALS, AND PLUG CONTAINER FROM FT. LUPTON YARD.
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	4/8/2018	14:30:00	USER					CREW DISCUSSED HAZARDS ALONG ROUTE TO LOCATION.
Event	3	Crew Leave Yard	Crew Leave Yard	4/8/2018	14:40:00	USER					START JOURNEY MANGEMENT
Event	4	Arrive At Loc	Arrive At Loc	4/8/2018	15:30:00	USER					MEET WITH COMPANY MAN AND DISCUSS JOB PROCEDURES.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	4/8/2018	15:40:00	USER					CREW DISSCUSSED HAZARDS WITH RIGGING UP.
Event	6	Rig-Up Equipment	Rig-Up Equipment	4/8/2018	15:50:00	USER					CREW RIGGED UP BULK TRUCKS WATER HOSES AND IRON TO PERFORM JOB.
Event	7	Start Job	Start Job	4/8/2018	17:46:34	COM5	0.00	0.00	123.00	4.60	START RECORDING JOB DATAT
Event	8	Test Lines	Test Lines	4/8/2018	17:50:42	COM5	0.00	0.00	290.00	2.60	PRESUURE TEST LINES
Event	9	Pump Spacer 1	Pump Spacer 1	4/8/2018	18:00:54	COM5	0.00	4.40	682.00	12.00	PUMP 50 BBLS OF MUD FLUSH
Event	10	Pump Spacer 2	Pump Spacer 2	4/8/2018	18:13:34	COM5	8.45	0.00	645.00	0.00	PUMP 100 BBLS OF TUNED SPACER @ 11.3 PPG

											DENSITY VERIFIED BY PRESSUREIZED MUD SCALES
Event	11	Pump Lead Cement	Pump Lead Cement	4/8/2018	18:50:23	USER	15.70	5.00	881.00	8.20	PUMP 815 SXS OF ELASTICEM @ 15.6 PPG YILED 1.18 MIX WATER 5.15 CALCULATED TOP OF LEAD @ 2393'
Event	12	Check Weight	Check weight	4/8/2018	18:53:04	COM5	15.69	5.00	756.00	21.70	VERIFY DENSITY WITH PRESSUREIZED MUD SCALES
Event	13	Check Weight	Check weight	4/8/2018	19:02:14	COM5	15.62	5.00	476.00	67.70	VERIFY DENSITY WITH PRESSUREIZED MUD SCALES
Event	14	Check Weight	Check weight	4/8/2018	19:05:55	COM5	15.57	5.00	498.00	1.40	VERIFY DENSITY WITH PRESSUREIZED MUD SCALES
Event	15	Pump Tail Cement	Pump Tail Cement	4/8/2018	19:25:38	COM5	15.29	5.00	515.00	0.00	PUMP1160 SXS OF ELASTICEM @ 14.4 PPG YILED 1.7 MIX WATER 7.3
Event	16	Check Weight	Check weight	4/8/2018	19:33:16	COM5	14.31	3.00	244.00	30.80	VERIFY DENSITY WITH PRESSUREIZED MUD SCALES
Event	17	Check Weight	Check weight	4/8/2018	20:06:39	COM5	14.42	5.00	447.00	194.50	VERIFY DENSITY WITH PRESSUREIZED MUD SCALES
Event	18	Shutdown	Shutdown	4/8/2018	20:43:06	USER	14.64	0.00	121.00	371.70	SHUT DOWN TO WASH PIMS AND LINES
Event	19	Drop Top Plug	Drop Top Plug	4/8/2018	20:49:33	USER	8.73	3.40	134.00	375.40	DROP TOP PLUG VERIFIED BY COMPANY REP.
Event	20	Pump Displacement	Pump Displacement	4/8/2018	20:55:49	COM5	8.41	0.00	108.00	7.10	START CALCULATED DISPLACEMENT OF 336 BBLS FIRST 20 WITH MMCR. THEN BIOSIDE AND CLAY TREAT THROUGH OUT THE REST.
Event	21	Displ Reached Cement	Displ Reached Cmmt	4/8/2018	21:05:30	USER	8.34	8.00	1195.00	48.10	CAUGHT CEMENT @
Event	22	Other	Other	4/8/2018	21:21:46	USER	8.38	6.90	2689.00	178.20	SLOW RATE TO 6 BPM @ 170 BBLS AWAY
Event	23	Bump Plug	Bump Plug	4/8/2018	21:53:21	USER	8.40	2.50	3091.00	337.30	BUMP PLUG

Event	24	Other	Other	4/8/2018	21:57:48	USER	8.40	0.00	2883.00	338.50	ATTEMPTED TO SHEAR TOOL. TOOL DID NOT SHEAR
Event	25	Check Floats	Check Floats	4/8/2018	22:07:06	USER	8.43	0.00	2380.00	356.30	3 BBLS BACK
Event	26	End Job	End Job	4/8/2018	22:10:01	COM5					STOP RECORDING JOB DATA
Event	27	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	4/8/2018	22:20:00	USER					CREW DISCUSSED HAZARDS ALONG ROUTE
Event	28	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	4/8/2018	22:30:00	USER					CREW DISCUSSED HAZARDS ASSOCIATED WITH RIG DOWN
Event	29	Crew Leave Location	Crew Leave Location	4/8/2018	23:00:00	USER					THANKS RYAN STEVENS AND CREW