

HALLIBURTON

iCem[®] Service

PDC ENERGY EBUS

Date: Saturday, March 24, 2018

Fern 11U-434 Production

Job Date: Wednesday, February 21, 2018

Sincerely,

Bryce Hinsch

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Table of Contents

1.0 Cementing Job Summary 4

1.1 Executive Summary4

2.0 Real-Time Job Summary 8

2.1 Job Event Log8

3.0 Attachments..... 10

3.1 PDC Fern 11U-434 Production Job Chart10

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Fern 11U-434** 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 returns were seen at 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]

The Road to Excellence Starts with Safety

Sold To #: 304535		Ship To #: 3791914		Quote #:		Sales Order #: 0904653474					
Customer: PDC ENERGY-EBUS				Customer Rep: CHRIS MCMULLIN							
Well Name: FERN			Well #: 11U-434		API/UWI #: 05-123-44579-00						
Field: WATTENBERG		City (SAP): GREELEY		County/Parish: WELD		State: COLORADO					
Legal Description: NW NW-11-5N-65W-276FNL-689FWL											
Contractor:				Rig/Platform Name/Num: Ensign 152							
Job BOM: 7523 7523											
Well Type: HORIZONTAL OIL											
Sales Person: HALAMERICA\HX38199				Srv Supervisor: Vitali Neverdasov							
Job											
Formation Name											
Formation Depth (MD)		Top		Bottom							
Form Type				BHST							
Job depth MD		15137ft		Job Depth TVD		6889					
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	1636	0	1636	
Casing	0	5.5	4.778	20	BUTTRESS	HCP110	0	15137	0	6889	
Open Hole Section			8.5				1636	15145	1636	6889	
Tools and Accessories											
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make		
Guide Shoe	5.5					Top Plug	5.5	1	WHED		
Float Shoe	5.5	1	WHED	15137		Bottom Plug	5.5	0	N/A		
Float Collar	5.5	1	WHED	15104		SSR plug set	5.5		N/A		
Insert Float	5.5					Plug Container	5.5	1	HES		
Stage Tool	5.5					Centralizers	5.5	200	WHED		
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			4.5	
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	CLEANSACER III	CLEANSACER III	50	bbl	12	2.27		4	
0 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
3	13.2# ElastiCem	ELASTICEM (TM) SYSTEM	1846	sack	13.2	1.57		7.5	7.52
7.52 Gal		FRESH WATER							
0.40 %		HALAD(R)-344, 50 LB (100003670)							
0.35 %		HR-5, 50 LB SK (100005050)							
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	MMCR Displacement	30	bbl	8.34			7.5	
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
5	Displacement fluid		297	bbl	8.34			7.5	
Cement Left In Pipe		Amount	0 ft		Reason			WET SHOE	
Comment : ESTIMATED TOC @ 2485. TOP OF CLEAN SPACER @ 1334. TOP OF MUD FLUSH III @ 291. TOTAL DISPLACEMENT 327.									

HALLIBURTON

Rockies, Brighton

Lab Results- Primary

Job Information

Request/Slurry	2454003/2	Rig Name	ENSIGN 152	Date	17/FEB/2018
Submitted By	Bryce Hinsch	Job Type	Production Casing	Bulk Plant	Brighton
Customer	PDC Energy	Location	Weld	Well	Fern 11U-434

Well Information

Casing/Liner Size	5.5 in	Depth MD	15150 ft	BHST	104°C / 220°F
Hole Size	8.5 in	Depth TVD	6923 ft	BHCT	82°C / 180°F
Pressure	4000 psi				

Cement Information - Primary Design

Cement Properties

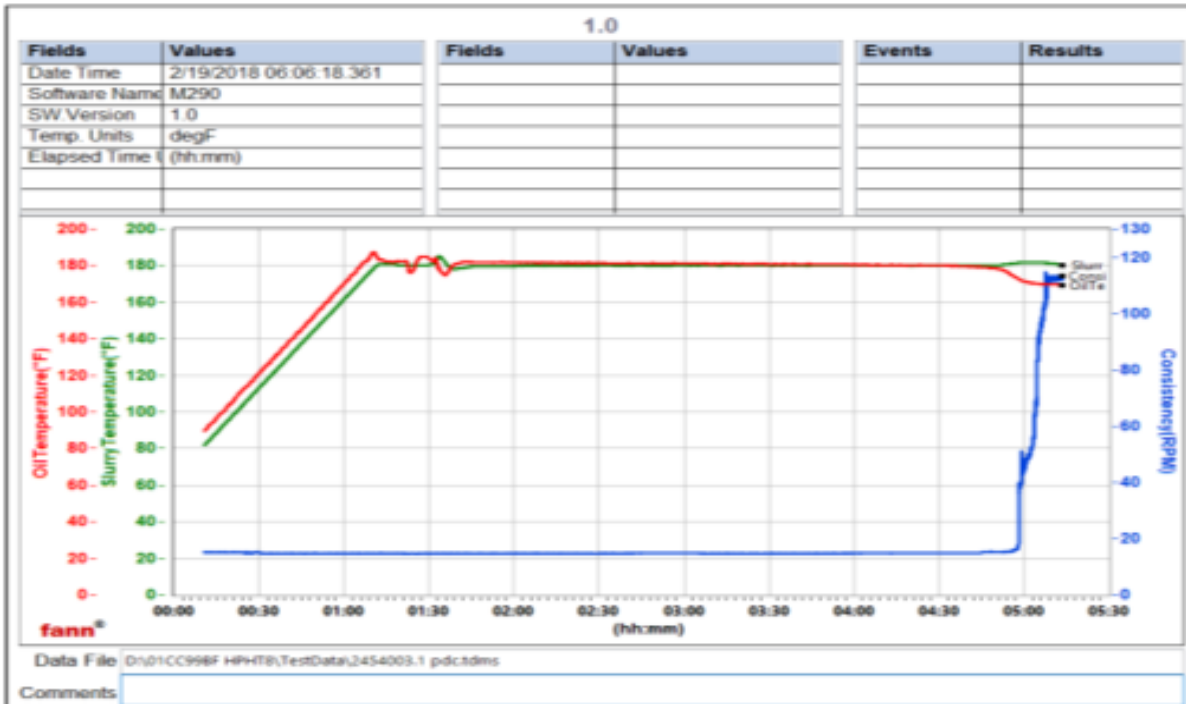
Slurry Density	13.2	lbm/gal
Slurry Yield	1.57	ft ³ /sack
Water Requirement	7.523	gal/sack

Operation Test Results Request ID 2454003/2

Thickening Time - ON-OFF-ON

19/FEB/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 (min)	Static Period (min)	Peak reading (BC)
180	4000	70	4:58	5:02	5:04	5:06	16.2	82	10	14.9



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(v. 4.2.393)

Created: Saturday, March 24, 2018

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)	PS Pump Press (psi)	Pump Stg Tot (bbl)	Comments
Event	1	Call Out	Call Out	2/21/2018	12:00:00	USER					ON LOCATION @ 19:00
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	2/21/2018	14:45:00	USER					
Event	3	Depart Shop for Location	Depart Shop for Location	2/21/2018	15:00:00	USER					
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	2/21/2018	18:30:00	USER					37 MILES. DISCUSS NUMBERS AND JOB PROCEDURE WITH CUSTOMER. RIG IS CIRCULATING. PER CUSTOMER BE READY FOR SAFETY MEETING @ 21:15.
Event	5	Other	Other	2/21/2018	18:50:00	USER					SPOT TRUCKS
Event	6	Safety Meeting - Pre Rig-Up	Safety Meeting - Pre Rig-Up	2/21/2018	18:58:00	USER					HELD PRE RIG UP SAFETY MEETING
Event	7	Rig-up Lines	Rig-up Lines	2/21/2018	19:03:00	USER					RIG UP ALL LINES
Event	8	Safety Meeting - Pre Job	Safety Meeting - Pre Job	2/21/2018	21:17:00	USER	0.34	0.00	-1.00	0.0	PRE JOB SAFETY MEETING WITH ALL PERSONEL INVOLVED
Event	9	Start Job	Start Job	2/21/2018	22:02:14	COM4	0.35	0.00	-3.00	0.0	
Event	10	Test Lines	Test Lines	2/21/2018	22:18:00	COM4	8.74	0.00	4974.00	16.9	LOAD LINE AND PRESSURE TEST TO 4917 PSI
Event	11	Pump Spacer 1	Pump Spacer 1	2/21/2018	22:20:12	COM4	8.67	1.30	447.00	17.1	PUMP MUD FLUSH III @ 5 BPM
Event	12	Pump Spacer 2	Pump Spacer 2	2/21/2018	22:35:45	COM4	11.65	3.30	945.00	5.9	BATCH/ WEIGH/ PUMP 50 BBLS OF CLEANSPOACER III @

											12 PPG
Event	13	Pump Lead Cement	Pump Lead Cement	2/21/2018	22:46:36	COM4	13.04	6.00	1025.00	0.1	BATCH/ WEIGH/ PUMP 1846 SKS (516.2 BBLS) OF ELASTICEM @ 13.2 PPG
Event	14	Shutdown	Shutdown	2/22/2018	00:04:00	USER	13.90	0.80	83.00	529.1	WASH PUMPS AND LINES
Event	15	Drop Top Plug	Drop Top Plug	2/22/2018	00:10:00	USER	9.29	2.40	5.00	530.7	LOAD AND DROP TOP PLUG
Event	16	Pump Displacement	Pump Displacement	2/22/2018	00:18:23	USER	8.43	7.80	114.00	4.3	335 BBLS FRESH WATER DISPLACEMENT. FIRST 50 BBLS WITH MMCR. REMAINING WITH BIOCID EXCEPT FOR LAST 20.
Event	17	Slow Rate	Slow Rate	2/22/2018	01:00:00	USER	8.34	4.00	1765.00	314.9	4 BPM
Event	18	Bump Plug	Bump Plug	2/22/2018	01:04:00	USER	8.35	0.00	2487.00	327.3	BUMP PLUG WITH 500 OVER FINAL CIRCULATING PRESSURE OF 1880 PSA AND HOLD FOR 1 MIN TO TEST CASING. TOTAL DISPLACEMENT 327 BBLS
Event	19	Other	Other	2/22/2018	01:07:00	USER	8.42	2.00	2350.00	328.5	PRESSURE UP AND SHIFT WET SHOE SUB @ 3433 PSI. PUMP 5 BBLS WET SHOE.
Event	20	Shutdown	Shutdown	2/22/2018	01:08:00	USER	8.35	4.40	1675.00	332.5	
Event	21	Check Floats	Check Floats	2/22/2018	01:09:00	USER	8.33	0.00	1212.00	333.6	FLOATS HOLD
Event	22	End Job	End Job	2/22/2018	01:13:35	COM4	8.31	0.00	-11.00	333.6	
Event	23	Safety Meeting - Pre Rig-Down	Safety Meeting - Pre Rig- Down	2/22/2018	01:15:00	USER	8.32	10.80	265.00	343.6	RIG DOWN SAFETY MEETING
Event	24	Depart Location Safety Meeting	Depart Location Safety Meeting	2/22/2018	02:30:00	USER					

3.0 Attachments

3.1 PDC Fern 11U-434 Production Job Chart

