

HALLIBURTON

iCem[®] Service

PDC ENERGY-EBUS

Date: Monday, April 23, 2018

Fern 11V-234 Production

Job Date: Wednesday, March 28, 2018

Sincerely,
Tyler Hill

Legal Notice

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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-234** 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 Ft. Lupton

The Road to Excellence Starts with Safety

Sold To #: 304535	Ship To #: 3791915	Quote #:	Sales Order #: 0904737103
Customer: PDC ENERGY-EBUS		Customer Rep: Chris McMullen	
Well Name: FERN		Well #: 11V-234	API/UWI #: 05-123-44582-00
Field: WATTENBERG	City (SAP): GREELEY	County/Parish: WELD	State: COLORADO
Legal Description: NW NW-11-5N-65W-366FNL-688FWL			
Contractor:		Rig/Platform Name/Num: Ensign 152	
Job BOM: 7523 7523			
Well Type: HORIZONTAL OIL			
Sales Person: HALAMERICA\HX38199		Srvc Supervisor: Steven Markovich	

Job

Formation Name			
Formation Depth (MD)	Top		Bottom
Form Type	BHST		
Job depth MD	15152ft		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	1634	0	0
Casing	0	5.5	4.778	20	BUTTRESS	HCP110	0	15152	0	0
Open Hole Section			8.5				1634	15159	0	0

Tools and Accessories

Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make
Guide Shoe	5.5			15152	Top Plug	5.5		HES
Float Shoe	5.5				Bottom Plug	5.5		HES
Float Collar	5.5				SSR plug set	5.5		HES
Insert Float	5.5				Plug Container	5.5		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					
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	CLEANSPACER III	CLEANSPACER III	50	bbbl	12	2.27			
0 gal/bbbl		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	1855	sack	13.2	1.57		6	7.53
7.53 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	MMCR Displacement	MMCR Displacement	50	bbbl	8.34				
0.25 gal/bbbl		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		278	bbbl	8.34				
Comment Bumped plug at 328bbs away, final lifting pressure was 2170psi. Brought pressure 500psi over and held. Before burst WSS pressure was 2880. Kicked in pumps to sheer WSS, WSS sheered at 3941psi. Pumed a 5bbl wet shoe at 4bbls/min. Estimated Top of Cement at 2454'									

HALLIBURTON
Rockies, Brighton

Lab Results- Primary

Job Information

Request/Slurry	2462814/1	Rig Name	ENSIGN 152	Date	25/MAR/2018
Submitted By	Tyler Hill	Job Type	Production Casing	Bulk Plant	Brighton
Customer	PDC Energy	Location	Weld	Well	Fern 11V-234

Well Information

Casing/Liner Size	5.5 in	Depth MD	15184 ft	BHST	101°C / 214°F
Hole Size	8.5 in	Depth TVD	7000 ft	BHCT	82°C / 180°F
Pressure	4000 psi				

Cement Information - Primary Design

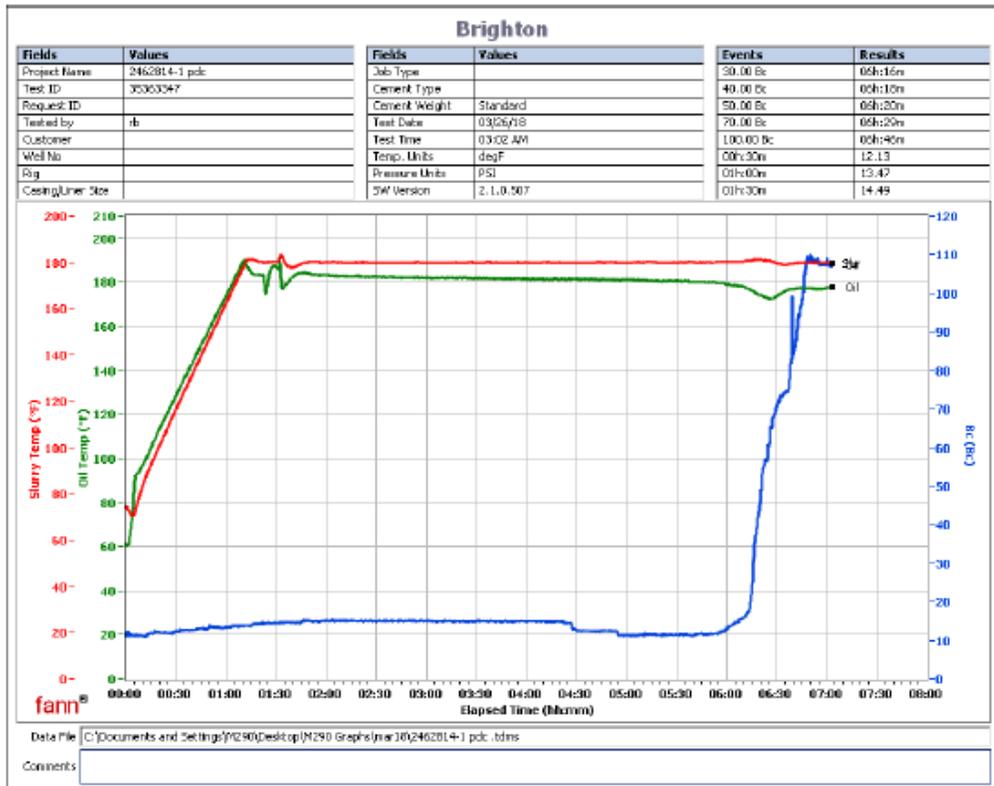
Cement Properties

Slurry Density	13.2	lbm/gal
Slurry Yield	1.57	ft ³ /sack
Water Requirement	7.52	gal/sack

Pilot Test Results Request ID 2462814/1

Thickening Time - ON-OFF-ON 26/MAR/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	70	6:16	6:20	6:29	6:46	11	82	10	14



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2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DH Density <i>(ppg)</i>	DS Pump Press <i>(psi)</i>	Comb Pump Rate <i>(bbl/min)</i>	Pump Stg Tot <i>(bbl)</i>	Comments
Event	1	Call Out	Call Out	3/28/2018	04:30:00	USER					Job called out with an on location time of 10:00 ready to pump at noon.
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	3/28/2018	08:40:00	USER					JSA with HES crew on driving safety and route to rig.
Event	3	Arrive at Location from Service Center	Arrive at Location from Service Center	3/28/2018	09:45:00	USER					Arrived on location, rig circulating until 12:30
Event	4	Assessment Of Location Safety Meeting	Assessment Of Location Safety Meeting	3/28/2018	09:50:00	USER					JSA and Hazard hunt with HES crew.
Event	5	Rig-Up Equipment	Rig-Up Equipment	3/28/2018	10:15:00	USER					Rigged up HES lines and equipment.
Event	6	Pre-Job Safety Meeting	Pre-Job Safety Meeting	3/28/2018	12:15:00	USER	8.51	-3.00	0.00	6.70	JSA with HES and rig crews on job safety and procedure.
Event	7	Start Job	Start Job	3/28/2018	12:45:32	COM4	8.56	-1.00	0.00	6.70	TD 15159' TP 15152' FC 15138' WSS 15124' 5 1/2" 20# Production casing, 8 1/2" open hole, 9 5/8" 36# Surface casing at 1634' TVD 6778'
Event	8	Test Lines	Test Lines	3/28/2018	12:50:34	COM4	8.37	153.00	0.00	4.00	Set kick outs to 500psi and check kick outs, then bring pressure up to 4500psi and hold.
Event	9	Pump Spacer 1	Pump Spacer 1	3/28/2018	12:58:55	COM4	8.34	2.00	0.00	0.00	Pump 50bbls of Mud Flush, pumped at 3bbl/min 400psi.
Event	10	Drop Bottom Plug	Drop Bottom Plug	3/28/2018	13:16:55	USER	8.33	11.00	0.00	55.00	Plug pre loaded into HES

											head. Plug dropped in front of company rep.
Event	11	Pump Spacer 2	Pump Spacer 2	3/28/2018	13:17:55	COM4	11.91	515.00	1.40	56.40	Pump 50bbbls of 12ppg 2.27yield Tuned Spacer, pumped at 6bbl/min 856psi.
Event	12	Check Weight	Check weight	3/28/2018	13:19:45	COM4	12.15	747.00	4.90	6.00	Weight verified by pressurized scales.
Event	13	Pump Cement	Pump Cement	3/28/2018	13:27:04	COM4	12.72	524.00	4.40	44.70	Pump 518bbbls (1855sks) of 13.2ppg 1.57yield Cement. Pumped at 8bbl/min 1505psi.
Event	14	Check Weight	Check weight	3/28/2018	13:27:17	COM4	13.15	560.00	4.60	1.00	Weight verified by pressurized scales.
Event	15	Check Weight	Check weight	3/28/2018	13:30:08	COM4	13.10	599.00	4.20	14.20	Weight verified by pressurized scales.
Event	16	Check Weight	Check weight	3/28/2018	13:54:59	COM4	13.19	615.00	8.00	199.00	Weight verified by pressurized scales.
Event	17	Check Weight	Check weight	3/28/2018	14:05:59	COM4	13.20	124.00	3.00	281.20	Weight verified by pressurized scales.
Event	18	Check Weight	Check weight	3/28/2018	14:08:37	COM4	13.13	118.00	3.00	289.20	Weight verified by pressurized scales.
Event	19	Check Weight	Check weight	3/28/2018	14:14:26	COM4	13.29	432.00	8.10	323.90	Weight verified by pressurized scales.
Event	20	Shutdown	Shutdown	3/28/2018	14:41:39	COM4	13.21	127.00	0.80	522.20	Shutdown and clean pumps and lines.
Event	21	Drop Top Plug	Drop Top Plug	3/28/2018	15:01:24	COM4	7.69	-2.00	0.00	545.30	Plug loaded and dropped in front of company rep.
Event	22	Pump Displacement	Pump Displacement	3/28/2018	15:01:29	COM4	7.69	-2.00	0.00	545.30	Pump 328bbbls of H2O. First 50bbbls with MMCR then 278 with biocide. Pumped at 8bbl/min and slowed rate to 4bbbls a min at 310bbbls away to bump plug.

Event	23	Bump Plug	Bump Plug	3/28/2018	15:45:52	COM4	8.39	2169.00	4.00	327.40	Bumped plug at 328bbbls away final lifting pressure was 2170psi brought pressure 500psi over and held.
Event	24	Other	Other	3/28/2018	15:49:38	USER	8.40	2846.00	0.00	328.00	Kicked in pumps to burst WSS, WSS burst at 3941psi. brought rate to 4bbl/min and pumped a 5bbl wet shoe. Opened release line to check floats and after 1.5bbbls back floats held.
Event	25	End Job	End Job	3/28/2018	16:11:24	COM4	-0.11	-11.00	0.00	334.80	Thank you Steve Markovich and crew.

3.0 Attachments

3.1 Fern 11V-234 Production.png

