

# HALLIBURTON

iCem<sup>®</sup> Service

## **PDC ENERGY-EBUS**

**For: Chris McMullen**

Date: Tuesday, May 14, 2019

## **HARVEY 5N**

HARVEY 5N

Job Date: Tuesday, May 14, 2019

Sincerely,

**Nick Roles and Crew**

## Legal Notice

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### Disclaimer:

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## 1.0 Cementing Job Summary

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### 1.1 Executive Summary

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Halliburton appreciates the opportunity to perform the cementing services on the **HARVEY 5N 5.5" 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 25 bbls of spacer 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 Fort Lupton**

*The Road to Excellence Starts with Safety*

Sold To #: 304535	Ship To #: 3894722	Quote #:	Sales Order #: 0905683539
Customer: PDC ENERGY-EBUS		Customer Rep:	
Well Name: HARVEY		Well #: 5N	API/UWI #: 05-123-47437-00
Field: WATTENBERG	City (SAP): LA SALLE	County/Parish: WELD	State: COLORADO
Legal Description: SW SE-32-4N-65W-745FSL-2434FEL			
Contractor: ENSIGN DRLG		Rig/Platform Name/Num: ENSIGN 158	
Job BOM: 7523 7523			
Well Type: HORIZONTAL OIL			
Sales Person: HALAMERICA\HX38199		Srvc Supervisor: Nicholas Roles	

**Job**

<b>Formation Name</b>			
<b>Formation Depth (MD)</b>	<b>Top</b>		<b>Bottom</b>
<b>Form Type</b>			<b>BHST</b>
<b>Job depth MD</b>	17338ft		<b>Job Depth TVD</b>
<b>Water Depth</b>			<b>Wk Ht Above Floor</b>
<b>Perforation Depth (MD)</b>	<b>From</b>		<b>To</b>

**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	1890	0	1890
Casing		5.5	4.778	20			0	17338		7126
Open Hole Section			8.5				1890	17345	1890	7126

**Tools and Accessories**

Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make
Guide Shoe	5.5			17338	Top Plug	5.5	1	KLX
Float Shoe	5.5				Bottom Plug	5.5	1	KLX
Float Collar	5.5			17307	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**

<b>Stage/Plug #: 1</b>									
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft <sup>3</sup> /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
1	FDP-C1337-18	SBM FDP-C1337-18 CEMENT SPACER SYS	150	bbl	12.5	2.79		5.5	

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	Gasstop B1	GASSTOP (TM) SYSTEM	625	sack	13.2	1.55		8	7.61
3	ElastiCem	ELASTICEM (TM) SYSTEM	1430	sack	14.4	1.7		8	7.3
4	MMCR Displacement	MMCR Displacement	20	bbl	8.35			5	
5	Displacement fluid		364	bbl	8.34			8	
<b>Cement Left In Pipe</b>									
<b>Amount</b>		0 ft			<b>Reason</b>			<b>Wet Shoe</b>	
Mix Water:		pH 7			Mix Water Chloride:		0 ppm		
Cement Temperature:		70 °F °C			Plug Displaced by:		8.33 lb/gal		
Plug Bumped?		Yes			Bump Pressure:		3100 psi MPa		
Cement Returns:		## bbl m3			Returns Density:		## lb/gal kg/m3		
							Returns Temperature: ## °F °C		
<b>Comment</b> Got 25bbbls spacer to surface. Est. TOT-6725' TOL-2362'.									

## 2.0 Real-Time Job Summary

### 2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	Comb Pump Rate <i>(bbl/min)</i>	DH Density <i>(ppg)</i>	DS Pump Press <i>(psi)</i>	Pump Stg Tot <i>(bbl)</i>	Comments
Event	1	Pressure Up Well	Call Out	5/13/2019	12:30:00	USER					Called out by Service Coordinator for O/L at 1800
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	5/13/2019	15:45:00	USER					Held meeting with all personnel in convoy to discuss directions and hazards associated with drive, all fit to drive.
Event	3	Depart from Service Center or Other Site	Depart from Service Center or Other Site	5/13/2019	16:00:00	USER					Journey Management prior to departure
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	5/13/2019	17:00:00	USER					Upon arrival met with company man to discuss job details and calculations, performed hazard hunt and site assessment.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	5/13/2019	17:15:00	USER					Discussed rigging up hazards and procedure according to HMS.
Event	6	Other	Other	5/13/2019	17:30:00	USER					Water test- PH-6, Chlor-0, Temp-60. Cement temp-60.
Event	7	Pre-Job Safety Meeting	Pre-Job Safety Meeting	5/13/2019	21:30:00	USER	0.00	8.31	19.00	21.30	Held safety meeting with all job associated personnel to discuss job procedure, hazards and stop work authority.
Event	8	Start Job	Start Job	5/13/2019	21:52:05	COM4	0.00	8.30	0.00	0.00	TD-17345', TP-17338' 5.5" 20#, FC-17307', TVD-7126', OH-8.5", SURF-1890' 9.625" 36#, MUD-11#

Event	9	Test Lines	Test Lines	5/13/2019	21:58:41	COM4	0.00	8.35	171.00	3.20	Pumped 5bbls fresh water to fill lines, closed manifold and performed 500psi k/o function test, proceeded to perform 5th gear stall at 1450psi, continued to bring pressure up to 5000psi. Pressure stabilized and held with no leaks.
Event	10	Pump Spacer 1	Pump Spacer 1	5/13/2019	22:08:12	COM4	0.00	8.25	1.00	0.00	Pumped 150bbls 12.5# 2.79y 16.7g/s FDP Spacer at 6bpm 443psi.
Event	11	Drop Bottom Plug	Drop Bottom Plug	5/13/2019	22:35:51	COM4	4.90	12.56	379.00	142.80	Dropped by HES supervisor, witnessed by company man.
Event	12	Pump Lead Cement	Pump Lead Cement	5/13/2019	22:36:58	COM4	4.90	12.91	374.00	148.30	Pumped 625sks or 173bbls 13.2# 1.55y 7.61g/s Gasstop w/ at 8bpm 560psi.
Event	13	Check Weight	Check Weight	5/13/2019	22:37:51	COM4	4.90	13.30	392.00	4.40	Weight verified with pressurized mud scales.
Event	14	Check Weight	Check Weight	5/13/2019	22:57:09	COM4	7.90	13.17	913.00	144.20	Weight verified with pressurized mud scales.
Event	15	Pump Tail Cement	Pump Tail Cement	5/13/2019	23:01:50	COM4	7.90	13.02	845.00	181.30	Pumped 1430sks or 433bbls 14.4# 1.7y 7.3g/s Elasticem at 8bpm 1015psi.
Event	16	Check Weight	Check Weight	5/13/2019	23:07:28	COM4	7.90	14.44	1070.00	44.60	Weight verified with pressurized mud scales.
Event	17	Check Weight	Check Weight	5/13/2019	23:16:42	COM4	7.90	14.34	999.00	117.70	Weight verified with pressurized mud scales.
Event	18	Check Weight	Check Weight	5/14/2019	00:08:40	COM4	5.00	14.44	230.00	356.20	Weight verified with pressurized mud scales.
Event	19	Check Weight	Check Weight	5/14/2019	00:11:05	COM4	5.00	14.16	203.00	368.30	Weight verified with pressurized mud scales.
Event	20	Check Weight	Check Weight	5/14/2019	00:30:40	COM4	8.30	14.38	518.00	501.70	Weight verified with pressurized mud scales.

Event	21	Shutdown	Shutdown	5/14/2019	00:48:29	COM4	0.00	14.41	155.00	614.00	Shutdown for rig to blow down iron and to wash up pumps and lines.
Event	22	Drop Top Plug	Drop Top Plug	5/14/2019	01:00:24	COM4	0.00	-0.20	0.00	626.70	Dropped by HES supervisor, witnessed by company man.
Event	23	Pump Displacement	Pump Displacement	5/14/2019	01:00:28	COM4	0.00	-0.20	-1.00	626.70	Pumped 384bbls fresh water with 10g MMCR in first 20bbls, 15g biocide throughout.
Event	24	Bump Plug	Bump Plug	5/14/2019	01:50:53	COM4	0.00	8.09	3028.00	387.20	Slowed down to 5bpm at 360bbls away, final circulating pressure- 2800psi, bump pressure- 3100psi
Event	25	Pressure Up Well	Pressure Up Well	5/14/2019	01:52:40	USER	1.90	8.10	3907.00	388.40	Pressured up to shear at 4033psi, continued to pump 5bbls at 5bpm 2926psi.
Event	26	Check Floats	Check Floats	5/14/2019	01:54:12	USER	0.00	8.09	2687.00	393.80	Released pressure and got 3bbls back to pump. Floats held.
Event	27	End Job	End Job	5/14/2019	01:56:11	COM4	0.00	8.07	-10.00	0.00	Got 25bbls spacer to surface. Est. TOT-6725' TOL-2362'.
Event	28	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	5/14/2019	02:00:00	USER					Discussed rigging down hazards and procedure according to HMS with all HES personnel
Event	29	Safety Meeting - Departing Location	Safety Meeting - Departing Location	5/14/2019	03:45:00	USER					Held meeting with all personnel in convoy to discuss directions and hazards associated with drive, all fit to drive.
Event	30	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	5/14/2019	04:00:00	USER					Pre journey management prior to departure.