

HALLIBURTON

iCem® Service

PDC ENERGY-EBUS

Date: Saturday, May 04, 2019

Harvey 12N Production

Job Date: Monday, April 15, 2019

Sincerely,

Bryce Hinsch

Legal Notice

Disclaimer:

All information in this report is provided subject to the terms and conditions which govern the services provided by Halliburton. Halliburton personnel use their best efforts in gathering information and their best judgment in interpreting it, but any interpretation, research, analysis or recommendation furnished by Halliburton are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and empirical relationships and assumptions are not infallible, and with respect to which professionals in the industry may differ. iCem 3D Displacement results are used to understand how fluids intermix during a cement job. Simulation and 3D displacement results are not intended as and should not be used as a replacement for bond logs in determining top of cement. Current 3D model calculations are known to model more volume than the input volume for standard cases due to known calculation improvements required. For rotational cases, the modeled volume will be impacted by the same calculations impacting the standard cases, as well as additional constraints imposed to make the calculation time required operationally feasible. Therefore, until further notice, 3D displacement results should not be used for replacement of a bond log, or used as an identifier of top of cement. HALLIBURTON IS UNABLE TO GUARANTEE THE ACCURACY OF ANY CHART INTERPRETATION, RESEARCH ANALYSIS, OR JOB RECOMMENDATION and any interpretation or recommendation is not for use of or reliance upon by any third party. The customer has full responsibility for any of its decisions which are based on the information provided in this report.

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1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Harvey 12N** 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 38 bbls of cement 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 #: 3894799		Quote #:		Sales Order #: 0905618794					
Customer: PDC ENERGY-EBUS				Customer Rep: Tony/ Shaun							
Well Name: HARVEY			Well #: 12N		API/UWI #: 05-123-47434-00						
Field: WATTENBERG		City (SAP): LA SALLE		County/Parish: WELD		State: COLORADO					
Legal Description: SW SE-32-4N-65W-640FSL-2434FEL											
Contractor: ENSIGN DRLG				Rig/Platform Name/Num: ENSIGN 158							
Job BOM: 7523 7523											
Well Type: HORIZONTAL OIL											
Sales Person: HALAMERICA\HX38199				Srvc Supervisor: Kamereon White							
Job											
Formation Name											
Formation Depth (MD)		Top		Bottom							
Form Type				BHST							
Job depth MD		17365ft		Job Depth TVD							
Water Depth				Wk Ht Above Floor		6'					
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	1887	0	1887	
Casing		5.5	4.778	20			0	17338		0	
Open Hole Section			8.5				1887	17340		0	
Tools and Accessories											
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make		
Guide Shoe	5.5					Top Plug	5.5	1	KLX		
Float Shoe	5.5					Bottom Plug	5.5	1	KLX		
Float Collar	5.5					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	FDP-C1337-18	SBM FDP-C1337-18 CEMENT SPACER SYS			150	bbl	12.5	2.78	16.7		

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HALLIBURTON

Field Ticket

Original

Field Ticket Number: 905618794	Field Ticket Date: Tuesday, April 16, 2018	Planning Order #: NA
Bill To: PDC ENERGY-EBUS DONOTMAIL-120 GENESIS BLVD BRIDGEPORT WV 26330	Job Name: 5 1/2" PRODUCTION Order Type: ZOH Well Name: HARVEY 12N Company Code: 1100 Customer PO No.: NA AFE: Shipping Point: Fort Lupton, CO Shipping Point Sales Office: ROCKY MOUNTAINS BD Well Type: HORIZONTAL OIL Well Category: Development Rig Name#: ENSIGN 158	
Ship To: HARVEY 12N,WELD HARVEY 12N LA SALLE CO 80645 USA		

Material	Description	QTY	UCM	Unit Amount	Gross Amount	Discount	Net Amount
7523	CMT PRODUCTION CASING BOM 7523	1	JOB		0.00		0.00
1	ZI-MILEAGE FROM NEAREST HES BASE/UNIT Number of Units	46 1	MI	9.79 USD / 1.00 MI	450.34	\$ 368.28	81.06
2	MILEAGE FOR CEMENTING CREW Number of Units	46 1	MI	5.76 USD / 1.00 MI	264.96	\$ 217.27	47.69
16091	ZI - PUMPING CHARGE DEPTH FEET/METERS (FT/M)	1 17338 FT	EA	57,421.00 USD / 1.00 EA	57,421.00	\$ 47,085.22	10,335.78
100005050	CHEM, HR-S, 50 LB HR-S	579	LB	13.28 USD / 1.00 LB	7,689.12	\$ 6,151.30	1,537.82
100003681	CHEM, BAR/TE, BULK Bottle	303	SK	31.07 USD / 1.00 SK	9,414.21	\$ 7,531.37	1,882.84
1098350	SBM FDP-C1337-15 CEMENT SPACER SYS	150	BBL				0.00
1023977	CHEM, SEM-93P, 35 LB SACK SEM-93P, 35 LB SACK	900	LB	31.80 USD / 1.00 LB	28,620.00	\$ 22,896.00	5,724.00
1023967	CHEM, SEM-94P, 35 LB SACK SEM-94P, 35 LB SACK	900	LB	41.70 USD / 1.00 LB	37,530.00	\$ 30,024.00	7,506.00
450261	CMT, ElastCem® system	1,440	SK		243,923.72	\$ 195,138.98	48,784.74
452966	CMT, GasStop (TM) system	625	SK		178,248.14	\$ 142,998.51	35,649.63
100003781	CHEM, MICRO MATRIX RETARDER, 5 GAL Micro Matrix Retarder	10	GAL	104.47 USD / 1.00 GAL	1,044.70	\$ 835.76	208.94
101007444	CHEM, D-AIR 3000L, 5 GAL PAIL	20	GAL				0.00
75400	MILEAGE, CMT MTLs DEL/RET MIN NUMBER OF TONS	23 134.735	MI	3.35 USD / 1.00 MI	10,381.33	\$ 8,305.06	2,076.27
3965	HANDLE&DUMP SVC CHR.G, CMT&ADDITIVES,ZI NUMBER OF EACH Unit of Measurement	3,436 1 EA	CF	5.49 USD / 1.00 CF	18,863.64	\$ 15,090.91	3,772.73
45	SPEC EQUIP CHR.G, NO PRICE ESTABLISHED ZI Containment	2	EA	1,000.00 USD / 1.00 EA	2,000.00		2,000.00
100054220	CHEM, Musol® A, 5 gal Musol(R) A	15	GAL	31.19 USD / 1.00 GAL	467.85	\$ 374.28	93.57
101007444	CHEM, D-AIR 3000L, 5 GAL PAIL D-AIR 3000L	15	GAL	140.55 USD / 1.00 GAL	2,108.25	\$ 1,686.60	421.65
100009028	CHEM, SUGAR, GRANULATED, 50LB BAG	100	LB	6.96 USD / 1.00 LB	696.00	\$ 556.60	139.20
Totals				USD	\$ 599,123.26	\$ 478,861.34	\$ 120,261.92

Last Printed: 4/16/2018 2:57 AM
1 of 2

Field Ticket Number: 905618794

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Original

Field Ticket Signature

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Ship To: HARVEY 12N,WELD HARVEY 12N LA SALLE CO 80645 USA		

THIS OUTPUT DOES NOT INCLUDE TAXES. APPLICABLE SALES TAX WILL BE BILLED ON THE FINAL INVOICE. CUSTOMER HEREBY ACKNOWLEDGES RECEIPT OF THE MATERIALS AND SERVICES DESCRIBED ABOVE, ON ANY PRECEDING PAGES, AND ATTACHED DOCUMENTS.

Gross Amount Total:	\$ 599,123.26
Item Discount Total:	\$ 478,861.34
Net Amount Total:	\$ 120,261.92 USD

0R002964
8100.112


Customer Representative Signature:

16/APR/19
Date:

Tony/ Shaun

Customer Representative

Kamereon White

Halliburton Representative

Was our HSE performance satisfactory? (Health, Safety, Environment)

☒ Yes ☐ No

Were you satisfied with our equipment?

☒ Yes ☐ No

Were you satisfied with our people?

☒ Yes ☐ No

Comments:

OVERALL GOOD JOB

Last Printed 4/16/2019 2:07 AM

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Field ticket Number: 905618794

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2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DS Pump Press (psi)	DH Density (ppg)	Comb Pump Rate (bbl/min)	Pump Stg Tot (bbl)	Comments
Event	1	Call Out	Call Out	4/15/2019	06:30:00	USER					Crew called out and was requested to be on location @ 1300.
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	4/15/2019	10:15:00	USER					Crew discussed the route of travel and supervisor called in a journey.
Event	3	Depart from Service Center or Other Site	Depart from Service Center or Other Site	4/15/2019	10:30:00	USER					Crew left the yard.
Event	4	Casing on Bottom	Casing on Bottom	4/15/2019	11:15:00	USER					Casing on Bottom with the landing Joint. The rig circulated 10 bpm 1220 psi.
Event	5	Arrive at Location from Service Center	Arrive at Location from Service Center	4/15/2019	11:30:00	USER					Crew arrived on location early and the rig was on bottom with casing.
Event	6	Safety Meeting - Assessment of Location	Safety Meeting - Assessment of Location	4/15/2019	11:40:00	USER					Spotting in trucks and supervisor met with the customer and got the well information. TD-17,340' TP-17,338' SJ-40' FC-17,298' Cas-5.5" 20# P110 PC-9.625" 36# Set @ 1887' Mud Weight-11.0 ppg OBM, Wet Shoe- 5 Bbls TVD-7151' OH-8.5."
Event	7	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	4/15/2019	11:50:00	USER					Discussed rig up procedure and signed the JSA.
Event	8	Rig-Up Equipment	Rig-Up Equipment	4/15/2019	12:00:00	USER					Rigged up all HES equipment and lines.
Event	9	Rig-Up Completed	Rig-Up Completed	4/15/2019	13:30:00	USER					All HES equipment and lines

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											rigged up safely.
Event	10	Pre-Job Safety Meeting	Pre-Job Safety Meeting	4/15/2019	17:30:00	USER	-18.00	8.37	0.00	9.50	Discussed the job procedure and pressures with all personnel involved with the cement job.
Event	11	Check Weight	Check Weight	4/15/2019	18:00:33	COM4	-19.00	8.37	0.00	9.50	Checked the weight of the spacer with the pressurized mud scales scaled @ 12.5 ppg.
Event	12	Other	Other	4/15/2019	20:35:39	COM4	-35.00	8.45	0.00	9.50	Fill lines with 3 bbls of water 3 bpm 270 psi.
Event	13	Test Lines	Test Lines	4/15/2019	20:40:04	COM4	5003.00	8.62	0.00	12.70	Tested the lines to 500 psi and 5000 psi no leaks.
Event	14	Pump Spacer 1	Pump Spacer 1	4/15/2019	20:42:43	COM4	117.00	8.44	0.80	0.00	Pumped 150 bbls of spacer @ 12.5 ppg 2.78 yield 16.7 gal/sk 6 bpm 450 psi.
Event	15	Check Weight	Check Weight	4/15/2019	20:49:14	COM4	250.00	12.51	1.50	14.40	Checked the weight of the spacer with the pressurized mud scales scaled @ 12.5 ppg.
Event	16	Check Weight	Check Weight	4/15/2019	21:07:57	COM4	246.00	12.25	5.10	107.30	Checked the weight of the spacer with the pressurized mud scales scaled @ 12.5 ppg.
Event	17	Drop Bottom Plug	Drop Bottom Plug	4/15/2019	21:24:47	COM4	-12.00	13.90	1.10	191.20	The customer, KLX and Halliburton rep witnessed the bottom plug being dropped and the plug indicator move.
Event	18	Pump Lead Cement	Pump Lead Cement	4/15/2019	21:27:27	COM4	124.00	13.05	4.10	198.40	Pumped 173 bbls of Latex Lead Cement @ 13.2 ppg 1.55 yield 7.61 gal/sk (625 sks) 6-8 bpm 680 psi.
Event	19	Check Weight	Check Weight	4/15/2019	21:28:43	COM4	216.00	13.34	6.10	7.10	Checked the weight of the Latex lead Cement with the

											pressurized mud scales scaled @ 13.2 ppg.
Event	20	Shutdown	Shutdown	4/15/2019	22:05:21	COM4	-3.00	-1.08	0.00	249.70	Shutdown to trouble shoot why the pump was not recirculating, we were pulling pieces of containment and rubber out of the witches hat on the pump truck, we finally got it un stuck and continued on with the cement job.
Event	21	Pump Tail Cement	Pump Tail Cement	4/15/2019	22:09:46	COM4	-21.00	0.26	1.50	0.00	Pumped 436 bbls of Tail cement @ 14.4 ppg 1.7 yield 7.3 gal/sk (1440 sks) 6-8 bpm 825 psi.
Event	22	Check Weight	Check Weight	4/15/2019	22:11:20	COM4	123.00	13.63	3.90	6.00	Checked the weight of the Tail Cement with the pressurized mud scales scaled @ 14.4 ppg.
Event	23	Pump Tail Cement	Pump Tail Cement	4/15/2019	22:25:23	COM4	-19.00	0.26	1.30	0.00	Started to pump Tail cement when we were having mixing issues again by Shutting down to trouble shoot why the pump was not recirculating, we were pulling pieces of containment and rubber out of the witches hat on the pump truck, we finally got it un stuck and continued on with the cement job.
Event	24	Check Weight	Check Weight	4/15/2019	22:25:42	COM4	-8.00	7.15	2.00	0.60	Checked the weight of the Tail Cement with the pressurized mud scales scaled @ 14.4 ppg.
Event	25	Check Weight	Check Weight	4/15/2019	22:27:41	COM4	70.00	13.98	2.00	4.50	we got tail lined out and checked the weight of the Tail Cement with the

											pressurized mud scales scaled @ 14.4 ppg.
Event	26	Check Weight	Check Weight	4/15/2019	23:19:56	COM4	960.00	14.43	8.50	406.50	Checked the weight of the Tail Cement with the pressurized mud scales scaled @ 14.4 ppg.
Event	27	Shutdown	Shutdown	4/15/2019	23:30:35	COM4	56.00	14.65	0.00	466.20	Shutdown to wash pumps and lines and to blow air back through to the wash up tank.
Event	28	Drop Top Plug	Drop Top Plug	4/15/2019	23:40:52	COM4	-18.00	8.06	0.00	486.70	The customer, KLX and Halliburton rep witnessed the Top plug being dropped and the plug indicator move.
Event	29	Pump Displacement	Pump Displacement	4/15/2019	23:40:55	COM4	-20.00	8.06	0.00	486.70	Pumped calculated displacement of a total of 384 bbls with the first 20 bbls with MMCR and throughout we used SCS- WAW3025 that the rig supplied.
Event	30	Displ Reached Cement	Displ Reached Cement	4/15/2019	23:43:30	COM4	668.00	8.31	10.00	24.10	@ 25 bbls away we caught the plug and slowed our rate down to 8 bpm.
Event	31	Bump Plug	Bump Plug	4/16/2019	00:34:37	COM4					Bumped the plug the final circulating psi was 3200 psi. We held psi for a 5 min casing test.
Event	32	Other	Other	4/16/2019	00:40:42	COM4	3557.00	8.40	0.00	400.00	Pressured up @ 2 bpm to rupture the disk and to shift the wet shoe sub , it shifted @ 3839 psi.
Event	33	Other	Other	4/16/2019	00:41:22	COM4	2807.00	8.39	5.10	402.00	Pumped a 5 bbl wet shoe @ 5 bpm, and shutdown.
Event	34	Other	Other	4/16/2019	00:42:22	COM4	2364.00	8.36	0.00	406.00	Checked the floats and the

											floats held we got 3 bbls back.
Event	35	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	4/16/2019	00:45:00	USER	-25.00	8.31	0.00	406.00	Crew held a safety meeting discussing the rig down and flush stack procedure. Also all potential hazards associated with rigging down all HES equipment and lines.
Event	36	End Job	End Job	4/16/2019	00:46:29	COM4	-31.00	8.31	0.00	406.00	Cement job complete, Calculated tops of cements-TOTC-6652' TOLC-2412' TOS we got 38 bbls back to surface along with the 20 bbls of diesel the rig pumped.
Event	37	Rig Down Lines	Rig Down Lines	4/16/2019	01:00:00	USER	63.00	8.45	4.30	436.60	The crew rigged down all HES equipment and lines.
Event	38	Rig-Down Completed	Rig-Down Completed	4/16/2019	02:30:00	USER					Rig down completed no one got hurt.
Event	39	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	4/16/2019	02:50:00	USER					The crew held a pre journey safety meeting discussing the route and potential hazards while driving.
Event	40	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	4/16/2019	03:00:00	USER					Kamereon White and crew would like to thank you for your business and choosing Halliburton Cement. If you have any questions please give us a call.