

# HALLIBURTON

iCem<sup>®</sup> Service

## **PDC ENERGY-EBUS**

United States of America, COLORADO

### **For: PDC Energy**

Date: Friday, July 13, 2018

### **J Clark 12N Foam Production**

Job Date: Sunday, July 08, 2018

Sincerely,

**Ryan Keeran**

## 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 **J Clark 12N** cement foam 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 ~25bbls of Mud Flush were returned to surface.**

**Based on our post job analysis we have determined that Nitrogen was not being pumped. After multiple attempts to try and remediate the problem we had thought we got it figured out, but we were incorrect. That said without pumping any N2 based on a gauge hole and 5% washout in the vertical we are looking at the following:**

**Gauge Hole:**

**TOC: ~2,693ft**

**5% Washout in Vertical:**

**TOC: ~2,854ft**

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*

<b>Sold To #:</b> 304535		<b>Ship To #:</b> 0003870598		<b>Quote #:</b> 0022463280		<b>Sales Order #:</b> 0904981426				
<b>Customer:</b> PDC ENERGY-EBUS				<b>Customer Rep:</b> Tony						
<b>Well Name:</b> J CLARK			<b>Well #:</b> 12N		<b>API/UWI #:</b> 05-123-46685-00					
<b>Field:</b> WATTENBERG		<b>City (SAP):</b> GREELEY		<b>County/Parish:</b> WELD		<b>State:</b> COLORADO				
<b>Legal Description:</b> NW NE-14-5N-65W-550FNL-2009FEL										
<b>Contractor:</b> ENSIGN DRLG				<b>Rig/Platform Name/Num:</b> ENSIGN 152						
<b>Job BOM:</b> 14143 14143										
<b>Well Type:</b> HORIZONTAL OIL										
<b>Sales Person:</b> HALAMERICA\HX38199				<b>Srv Supervisor:</b> Nicholas Roles						
<b>Job</b>										
<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>		11962ft			<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>						
<b>Well Data</b>										
<b>Description</b>	<b>New / Used</b>	<b>Size in</b>	<b>ID in</b>	<b>Weight lbm/ft</b>	<b>Thread</b>	<b>Grade</b>	<b>Top MD ft</b>	<b>Bottom MD ft</b>	<b>Top TVD ft</b>	<b>Bottom TVD ft</b>
Casing		9.625	8.921	36	LTC	J-55	0	1675		1675
Casing		5.5	4.778	20		P-110	0	11962		6785
Open Hole Section			8.5				1675	6700	1675	6398
Open Hole Section			8.5				6700	11966	6398	6785
<b>Tools and Accessories</b>										
<b>Type</b>	<b>Size in</b>	<b>Qty</b>	<b>Make</b>	<b>Depth ft</b>		<b>Type</b>	<b>Size in</b>	<b>Qty</b>	<b>Make</b>	
<b>Guide Shoe</b>	5.5			11962		<b>Top Plug</b>	5.5	1	WTF	
<b>Float Shoe</b>	5.5					<b>Bottom Plug</b>	5.5	1	WTF	
<b>Float Collar</b>	5.5					<b>SSR plug set</b>	5.5		HES	
<b>Insert Float</b>	5.5					<b>Plug Container</b>	5.5	1	HES	
<b>Stage Tool</b>	5.5					<b>Centralizers</b>	5.5		HES	
<b>Fluid Data</b>										
<b>Stage/Plug #:</b> 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			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	12.5 lb/gal Tuned Spacer III	Tuned Spacer III	100	bbl	12.5	2.69	16.7	5	
207.44 lbm/bbl		BARITE, BULK (100003681)							
34.60 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	HalCem Cap	HALCEM (TM) SYSTEM	100	sack	15.6	1.18		5	5.19
0.40 %		HALAD-766, 55 LB SACK (101477695)							
5.19 Gal		FRESH WATER							
0.35 %		HR-601, 50 LB BAG (101328348)							
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	HalSeal	HALSEAL (TM) SYSTEM	620	sack	15.6	1.19		5	5.19
1.50 %		FOAMER 1026, TOTE (102166506)							
0.35 %		HALAD-766, 55 LB SACK (101477695)							
5.19 Gal		FRESH WATER							
0.40 %		HR-601, 50 LB BAG (101328348)							
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	14.4# ElastiCem	ELASTICEM (TM) SYSTEM	750	sack	14.4	1.7		5	7.3
7.30 Gal		FRESH WATER							
0.20 %		HALAD(R)-344, 50 LB (100003670)							
0.36 %		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

6	MMCR Displacement	MMCR Displacement	20	bbl	8.34			7	
0.50 gal/bbl		<b>MICRO MATRIX CEMENT RETARDER, 5 GAL PAIL (100003781)</b>							
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
7	Water	Water	245	bbl	8.33			7	
Cement Left In Pipe		Amount	0 ft		Reason			Wet Shoe	
Mix Water:		pH 06	Mix Water Chloride:		1 ppm		Mix Water Temperature:		65 °F
Cement Temperature:		## °F °C	Plug Displaced by:		8.33lb/gal		Disp. Temperature:		65 °F
Plug Bumped?		Yes	Bump Pressure:		2850 psi MPa		Floats Held?		Yes
Cement Returns:		## bbl m3	Returns Density:		## lb/gal kg/m3		Returns Temperature:		## °F °C
<b>Comment</b> Got 25bbls Mud Flush III to surface. Est. Tot-6398, TOL-3212, CAP-2697, SPCR-464									

## 2.0 Real-Time Job Summary

### 2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DS Pump Press (psi)	Line Pressure (psi)	DH Density (ppg)	Comb Pump Rate (bbl/min)	Pump Stg Tot (bbl)	Comments
Event	1	Call Out	Call Out	7/8/2018	00:26:00	USER						CREW CALLED OUT AT 00:26, REQUESTED ON LOCATION 06:00. CREW PICKED UP CEMENT, CHEMICALS, AND PLUG CONTAINER FROM FT. LUPTON, CO. BULK 660 11527037, IT 12100990, N2 11291534, FOAM UNIT AND PUMP 11189145.
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	7/8/2018	04:00:00	USER						CREW DISCUSSED ROUTES, HAZARDS, AND COMMUNICATION WITH CREW.
Event	3	Crew Leave Yard	Crew Leave Yard	7/8/2018	04:10:00	USER						STARTED JOURNEY MANAGEMENT.
Event	4	Arrive At Loc	Arrive At Loc	7/8/2018	05:10:00	USER						END JOURNEY MANAGEMENT. MEET WITH CO. MAN TO DISCUSS JOB; SURFACE CASING- 9.625" 36 LB/FT @ 1,675', 5.5" CASING: 20 LB/FT TOTAL 11,966', 8.5" HOLE, TD 11,966', 39" SHOE TRAC, TVD- 6,785'. PUMP FRESH WATER DISPLACEMENT WITH MMCR FIRST 20 BBLs. RIG CIRCULATED CASING TO TRY AND GET RID OF GAS
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	7/8/2018	07:00:00	USER						HAZARD HUNT. DISCUSSED POSSIBLE HAZARDS ASSOCIATED WITH



LOCATION, RIG UP, AND WEATHER.												
Event	6	Rig-Up Equipment	Rig-Up Equipment	7/8/2018	07:10:00	USER						CREW STAGED EQUIPMENT AND RIGGED UP BULK, IRON AND WATER HOSES TO PERFORM JOB.
Event	7	Pre-Job Safety Meeting	Pre-Job Safety Meeting	7/8/2018	09:50:00	USER						SAFETY MEETING WITH HALLIBURTON, AND RIG PERSONNEL. CREW COMMUNICATED POTENTIAL SAFETY HAZARDS, AND JOB DETAILS.
Event	8	Start Job	Start Job	7/8/2018	12:44:00	COM6	-11.00	35.00	8.17	0.00	0.00	BEGIN RECORDING JOB DATA.
Event	9	Test Lines	Test Lines	7/8/2018	12:49:04	COM6	7143.00	7150.00	8.19	0.00	5.10	PRESSURE TESTED IRON TO 7,000 PSI. KICKOUTS SET @ 500 PSI, KICKED OUT @ 900 PSI, 5TH GEAR STALL OUT @ 2,000 PSI. N2 PRESSURE TESTED TO 9,000 PSI. HAD ISSUES PRESSURE TESTING BUT FINALLY GOT IT FIGURED OUT.
Event	10	Pump Spacer 1	Pump Spacer 1	7/8/2018	14:02:36	COM6	5.00	3.00	8.07	0.00	0.00	PUMP 50 BBLS OF MUD FLUSH @ 8.4 LBS/GAL. PUMP RATE 5 BBLS/MIN.
Event	11	Pump Spacer 2	Pump Spacer 2	7/8/2018	14:13:39	COM6	600.00	526.00	8.28	0.80	0.00	PUMP 100 BBLS OF TUNED SPACER @ 12.5 LB/GAL, 5 GALLONS D-AIR. DENSITY VERIFIED BY PRESSURIZED MUD SCALES. PUMP RATE 4-5 BBLS/MIN.
Event	12	Pump Cap Cement	Pump Lead Cement	7/8/2018	14:33:37	COM6	254.00	209.00	12.31	0.00	0.00	PUMPED CAP 100 SKS OF HALCEM @ 15.6 LB/GAL, 1.18 FT3/SK, 5.18 GAL/SK. 21.02 BBLS, HOCAP

CALCULATED @ 515.19',  
 TOL CALCULATED @  
 ~2,193'. DENSITY VERIFIED  
 BY PRESSURIZED MUD  
 SCALES. PUMP RATE 5  
 BBLs/MIN.

Event	13	Check Weight	Check Weight	7/8/2018	14:43:19	COM6	573.00	437.00	15.78	5.00	10.80	
												<p>PUMPED 620 SKS OF          HALSEAL @ 13.7 LB/GAL,          1.57 FT3/SK, 7.54 GAL/SK.          149.85 BBLs, HOL          CALCULATED @ 3,703.2',          TOL CALCULATED @          2,709.1'. DENSITY          VERIFIED.</p> <p>USED 15,387SCF FOR JOB          AND 30,670SCF FOR          COOLDOWN</p>
Event	14	Pump Foam Cement	Pump Lead Cement	7/8/2018	14:45:44	COM6	606.00	439.00	15.66	5.00	0.00	<p>HAD ISSUES WITH N2          COMING ON LINE AND          OBTAINING THE CORRECT          RATE. PRESSURE DROP WAS          NOT NOTICED WHILE          PUMPING N2. WHILE          HAVING ISSUES WITH N2          WE ALSO RAN INTO ISSUES          WITH THE FOAMER UNIT.          THE LA PUMP WAS NOT          OPERATING AND WE WERE          NOT MOVING FLUID AS          WELL AS CAN BE. WE HAD A          FEW SHUTDOWNS.</p>
Event	15	Check Weight	Check Weight	7/8/2018	15:03:34	COM6	472.00	315.00	15.64	5.00	55.60	<p>USED A TOTAL OF 42 GAL          OF FOAMER</p>
Event	16	Pump Tail Cement	Pump Tail Cement	7/8/2018	15:24:04	COM6	446.00	294.00	15.21	5.00	0.00	<p>PUMP 750 SKS OF          ELASTICEM @ 14.4 LB/GAL,          1.7 FT3/SK, 7.3 GAL/SK,          227.4 BBLs. HOT</p>

iCem® Service

(v. 4.5.139)

Created: Friday, July 13, 2018

CALCULATED @ 372.7' OFF  
OF TVD, TOT CALCULATED  
@ 6,412.3'. DENSITY  
VERIFIED BY PRESSURIZED  
MUD SCALES. PUMP RATE 5  
BBLs/MIN.

Event	17	Check Weight	Check Weight	7/8/2018	15:29:30	COM6	422.00	253.00	14.41	5.00	27.20	
Event	18	Shutdown	Shutdown	7/8/2018	16:20:21	USER	154.00	100.00	14.58	0.70	256.10	SHUTDOWN TO WASH LINES.
Event	19	Drop Top Plug	Drop Top Plug	7/8/2018	16:28:34	COM6	11.00	2.00	8.05	0.00	274.20	PLUG LEFT CONTAINER, VERIFIED BY CO. MAN.
Event	20	Pump Displacement	Pump Displacement	7/8/2018	16:43:25	COM6	0.00	-10.00	8.06	0.00	276.40	BEGIN CALCULATED DISPLACEMENT OF 264.5 BBLs WITH FRESH WATER. PUMPED THE FIRST 20 BBLs WITH MMCR, PUMPED 205 BBLs WITH BIOCID, AND STAFILL.
Event	21	Spacer Returns to Surface	Spacer Returns to Surface	7/8/2018	17:20:33	USER	2854.00	2730.00	8.44	7.00	236.00	MUD FLUSH III SPACER TO SURFACE @ 236 BBLs INTO DISPLACEMENT. 28.5 BBLs OF MUD FLUSH III TO SURFACE.
Event	22	Slow Rate	Slow Rate	7/8/2018	17:23:04	USER	2907.00	2754.00	8.43	7.00	253.60	SLOW RATE TO 3 BPM @ 253.6 BBLs INTO DISPLACEMENT.
Event	23	Bump Plug	Bump Plug	7/8/2018	17:28:07	COM6	2713.00	2665.00	8.43	0.00	269.40	PLUG BUMPED AT CALCULATED DISPLACEMENT. 2,658 PSI.
Event	24	Other	Rupture Wet Shoe Sub	7/8/2018	17:28:53	USER	2676.00	2643.00	8.43	0.00	269.40	RUPTURED WET SHOE SUB AND PUMP 7BBL WET SHOE AT 4BPM.
Event	25	Check Floats	Check Floats	7/8/2018	17:31:19	USER	2241.00	2190.00	8.42	0.00	277.50	RELEASED PRESSURE, FLOATS HELD, 2 BBLs BACK.
Event	26	End Job	End Job	7/8/2018	17:33:29	COM6						

Event	27	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	7/8/2018	17:35:21	USER	7.00	-26.00	8.36	0.00	0.00	DISCUSSED POSSIBLE HAZARDS ASSOCIATED WITH WEATHER, LOCATION AND RIGGING DOWN IRON AND HOSES.
Event	28	Rig-Down Completed	Rig-Down Completed	7/8/2018	18:00:00	USER						
Event	29	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	7/8/2018	19:30:00	USER						CREW DISCUSSED ROUTES HAZARDS AND COMMUNICATION WITH CREW.
Event	30	Crew Leave Location	Crew Leave Location	7/8/2018	19:45:00	USER						THANK YOU FOR USING HALLIBURTON – NICHOLAS ROLES AND CREW.