

# HALLIBURTON

iCem<sup>®</sup> Service

## **PDC ENERGY-EBUS**

Date: Wednesday, July 19, 2017

### **Josephine 19M-234 Production**

Job Date: Monday, July 10, 2017

Sincerely,

**Bryce Hinsch**

## Legal Notice

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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 **Josephine 19M-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.

**Approximately 55 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 [Ft. Lupton]**

Sold To #: 304535	Ship To #: 3797133	Quote #:	Sales Order #: 0904147005
Customer: PDC ENERGY-EBUS		Customer Rep: Shane Paris	
Well Name: JOSEPHINE		Well #: 19M-234	API/UWI #: 05-123-44679-00
Field: WATTENBERG	City (SAP): KERSEY	County/Parish: WELD	State: COLORADO
Legal Description: SW NE-19-5N-64W-1714FNL-2150FEL			
Contractor: ENSIGN DRLG		Rig/Platform Name/Num: ENSIGN 158	
Job BOM: 7523 7523			
Well Type: HORIZONTAL OIL			
Sales Person: HALAMERICA\H139013		Srcv Supervisor: Bryan Kraft	

**Job**

**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	Spacer 1	MUD FLUSH III	50	bbl	8.4			5	2100
42 gal/bbl		<b>FRESH WATER</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
2	Spacer 2	TUNED SPACER III	50	bbl	12	3.16	20	5	1777
35.20 gal/bbl		<b>FRESH WATER</b>							
176.58 lbm/bbl		<b>BARITE, BULK (100003681)</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
3	Cement	ELASTICEM	2295	sack	13.2	1.57	7.53	8	17281
61.10 lbm		<b>TYPE I / II CEMENT, BULK (101439798)</b>							
7.53 Gal		<b>FRESH WATER</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
4	Displacement	FRESH WATER	290	bbl	8.33			8	12096

Cement Left In Pipe	Amount	0 ft	Reason	Wet Shoe
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Mix Water:	pH 6	Mix Water Chloride:	<100 ppm	Mix Water Temperature:	70 °F
Cement Temperature:	N/A	Plug Displaced by:	8.3 lb/gal Fresh Water	Disp. Temperature:	70 °F
Plug Bumped?	Yes	Bump Pressure:	2350 psi	Floats Held?	Yes
Cement Returns:	## bbl	Returns Density:	N/A	Returns Temperature:	N/A
<b>Comment:</b> Plug bumped @ calculated displacement @ 2350 PSI. Sleeve opened @ 4246 PSI, Pumped 5 BBL wet shoe, Floats Held, 2 BBLS back to the truck. Total of 55 BBLS of cement to surface with the 5 BBL wet shoe.					

**HALLIBURTON**

**Lab Results- Primary**

**Rockies, Brighton**

**Job Information**

Request/Slurry	2399605/1	Rig Name	ENSIGN 158	Date	06/JUL/2017
Submitted By	Bryce Hinsch	Job Type	Production Casing	Bulk Plant	Brighton
Customer	PDC Energy	Location	Weld	Well	Josephine 19M-234

**Well Information**

Casing/Liner Size	5.5 in	Depth MD	13108 ft	BHST	101°C / 213°F
Hole Size	8.5 in	Depth TVD	6798 ft	BHCT	82°C / 180°F
Pressure	3967 psi				

**Cement Information - Primary Design**

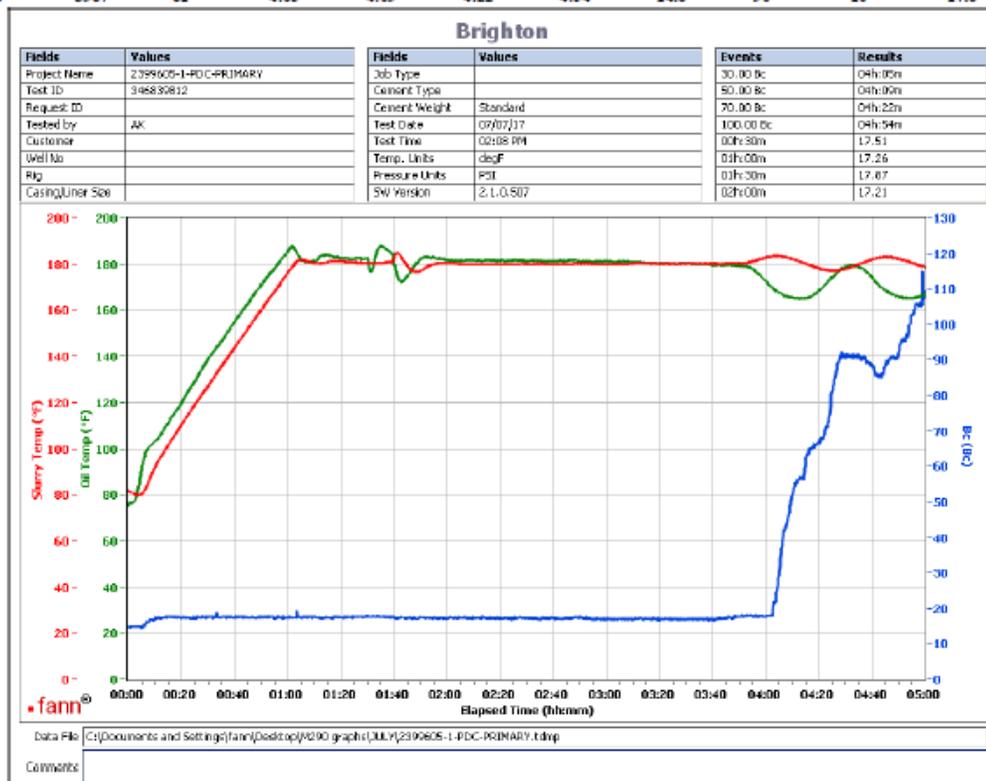
**Cement Properties**

Slurry Density	13.2	lbm/gal
Slurry Yield	1.57	ft <sup>3</sup> /sack
Water Requirement	7.53	gal/sack

**Operation Test Results Request ID 2399605/1**

**Thickening Time - ON-OFF-ON** 07/JUL/2017

Test Temp (°F)	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 (mins)	Static Period (min)	Peak reading (BC)
180	3967	61	4:05	4:09	4:22	4:54	14.6	90	10	17.6



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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>	Comb Pump Rate <i>(bbl/min)</i>	DS Pump Press <i>(psi)</i>	Comments
Event	1	Call Out	Call Out	7/9/2017	10:30:00	USER				CREW CALLED OUT AT 10:30 7/9/2017, REQUESTED ON LOCATION 16:30 7/9/2017. CREW PICKED UP CEMENT, CHEMICALS (200 LBS MUD FLUSH III, 10 GAL D-AIR, 10 GAL MMCR), 100 LBS OF SUGAR, AND PLUG CONTAINER FROM FORT LUPTON, CO. BULK 660: 12113644/10246780, BULK 660: 10897881/11633846, PUMP 11644701/11645460.
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	7/9/2017	13:45:00	USER				DISCUSSED ROUTES, HAZARDS, AND COMMUNICATION WITH CREW.
Event	3	Crew Leave Yard	Crew Leave Yard	7/9/2017	14:00:00	USER				STARTED JOURNEY MANAGEMENT.
Event	4	Arrive at Location from Service Center	Arrive at Location	7/9/2017	16:30:00	USER				END JOURNEY MANAGEMENT. MEET WITH CO. MAN TO DISCUSS JOB; SURFACE CASING: 36# 9.625" @ 1674', CASING: 20# 5.5" HCP-110 @ 13065', 31.65' SHOE JOINT, 8.5" OPEN HOLE, TVD @ 6818', 9.9 PPG WELL FLUID, FRESH WATER DISPLACEMENT. CASING LANDED @ 19:00 7/9/2017.
Event	5	Pre-Rig Up Safety	Pre-Rig Up Safety	7/9/2017	16:45:00	USER				HAZARD HUNT. DISCUSSED

		Meeting	Meeting							POSSIBLE HAZARDS ASSOCIATED WITH LOCATION, RIG UP AND WEATHER.
Event	6	Rig-Up Equipment	Rig-Up Equipment	7/9/2017	17:00:00	USER				CREW STAGED EQUIPMENT AND RIGGED UP BULK, IRON, AND WATER HOSES TO PERFORM JOB.
Event	7	Safety Meeting - Pre Job	Safety Meeting - Pre Job	7/9/2017	21:00:00	USER	8.43	0.00	-11.00	MEETING WITH HALLIBURTON AND RIG PERSONNEL. COMMUNICATED POTENTIAL SAFETY HAZARDS AND JOB DETAILS.
Event	8	Start Job	Start Job	7/9/2017	21:30:31	COM5				BEGIN RECORDING JOB DATA.
Event	9	Test Lines	Test Lines	7/9/2017	21:36:06	COM5				PRESSURE TESTED IRON TO 5000 PSI. KICKOUTS SET @ 500 PSI, KICKED OUT @ 1200 PSI, 5TH GEAR STALL OUT @ 1950 PSI.
Event	10	Pump Spacer 1	Pump Mud Flush Spacer	7/9/2017	21:43:11	COM5	8.37	1.30	-4.00	PUMP 50 BBLS OF MUD FLUSH SPACER @ 8.34 LB/GAL. ADDED 10 GAL D-AIR.
Event	11	Pump Spacer 2	Pump Tuned Spacer @ 12.0 ppg	7/9/2017	21:59:09	COM5	12.01	3.10	577.00	PUMP 50 BBLS OF TUNED SPACER @ 12.0 LB/GAL, 1.57 YIELD, 20 GAL/SKS, DENSITY VERIFIED BY PRESSURIZED MUD SCALES.
Event	12	Pump Cement	Pump Cement @ 13.2 ppg	7/9/2017	22:11:22	COM5	13.45	8.00	857.00	PUMP 2295 SKS OF ELASTICEM @ 13.2 LB/GAL, 1.57 YIELD, 7.53 GAL/SK, 642 BBLS, TOC @ SURFACE', DENSITY VERIFIED BY PRESSURIZED MUD SCALES.
Event	13	Shutdown	Shutdown	7/9/2017	23:43:08	COM5	14.18	0.00	16.00	SHUTDOWN TO WASH

Event	ID	Description	Category	Date	Time	User	Cost	Volume	Pressure	Notes
										PUMPS AND LINES/ DROP TOP PLUG.
Event	14	Clean Lines	Clean Lines	7/9/2017	23:47:12	USER	14.05	1.00	2.00	WASH UP PUMPS AND LINES CLEAR OF CEMENT.
Event	15	Drop Top Plug	Drop Top Plug	7/9/2017	23:50:46	COM5	7.96	0.00	-13.00	PLUG LEFT CONTAINER, VERIFIED BY CO. MAN AND TOOL HAND.
Event	16	Pump Displacement	Pump Fresh Water Displacement	7/9/2017	23:51:52	COM5	7.78	3.20	33.00	BEGIN CALCULATED DISPLACEMENT OF 290 BBLS WITH FRESH WATER.
Event	17	Cement Returns to Surface	Cement Returns to Surface	7/10/2017	00:23:12	USER	7.93	7.00	2535.00	CEMENT TO SURFACE @ 240 BBLS INTO DISPLACEMENT. TOTAL 55 BBLS OF CEMENT TO SURFACE WITH 5 BBL WET SHOE.
Event	18	Bump Plug	Bump Plug	7/10/2017	00:31:39	USER	7.94	5.00	2356.00	PLUG BUMPED AT CALCULATED DISPLACEMENT. PRESSURED 600 PSI OVER FINAL CIRCULATING PRESSURE OF 2350 PSI.
Event	19	Shutdown	Shutdown	7/10/2017	00:31:52	USER	7.95	0.00	2923.00	SHUTDOWN FOR 5 MINUTES @ 2970 PSI.
Event	20	Other	Shift Sleeve	7/10/2017	00:37:43	USER	8.03	1.20	4216.00	PRESSURE UP TO SHIFT SLEEVE. SLEEVE OPENED @ 4246 PSI.
Event	21	Pump Displacement	Pump Wet Shoe	7/10/2017	00:37:49	USER	8.04	2.90	2804.00	PUMP 5 BBLS FRESH WATER FOR A WET SHOE.
Event	22	Check Floats	Check Floats	7/10/2017	00:39:40	USER	7.92	0.00	1764.00	RELEASED PRESSURE, FLOATS HELD, 2 BBLS BACK.
Event	23	End Job	End Job	7/10/2017	00:41:13	COM5				STOP RECORDING JOB DATA.
Event	24	Pre-Rig Down Safety	Pre-Rig Down Safety	7/10/2017	00:50:00	USER				DISCUSSED POSSIBLE

		Meeting	Meeting					
								HAZARDS ASSOCIATED WITH WEATHER, LOCATION AND RIGGING DOWN IRON AND HOSES.
Event	25	Rig-Down Completed	Rig-Down Completed	7/10/2017	02:00:00	USER		ALL HALLIBURTON ITEMS WERE STOWED FOR TRAVEL, AND LOCATION WAS CLEAN.
Event	26	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	7/10/2017	02:15:00	USER		DISCUSSED ROUTES HAZARDS AND COMMUNICATION WITH CREW.
Event	27	Depart Location	Depart Location	7/10/2017	02:30:00	USER		THANK YOU FOR USING HALLIBURTON - BRYAN KRAFT AND CREW.