

HALLIBURTON

iCem[®] Service

PDC ENERGY - EBUS

Date: Tuesday, March 05, 2019

CHALLENGER 4N PRODUCTION

Job Date: Wednesday, February 20, 2019

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 **Challenger 4N** 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 40 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 Ft. Lupton

The Road to Excellence Starts with Safety

Sold To #: 304535		Ship To #: 3840485		Quote #:		Sales Order #: 0905490794					
Customer: PDC ENERGY-EBUS				Customer Rep: CHRIS MCMULLEN							
Well Name: CHALLENGER			Well #: 4N		API/UWI #: 05-123-45896-00						
Field: WATTENBERG		City (SAP): KERSEY		County/Parish: WELD		State: COLORADO					
Legal Description: SE NW-8-4N-64W-1373FNL-2431FWL											
Contractor: ENSIGN DRLG				Rig/Platform Name/Num: ENSIGN 152							
Job BOM: 7523 7523											
Well Type: HORIZONTAL OIL											
Sales Person: HALAMERICA\HX38199				Srv Supervisor: Lance Carpenter							
Job											
Formation Name											
Formation Depth (MD)		Top		Bottom							
Form Type				BHST							
Job depth MD		14168ft		Job Depth TVD		6824					
Water Depth				Wk Ht Above Floor		5					
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	1677			
Casing		5.5	4.778	20			0	14163			
Open Hole Section			8.5				1677	6700			
Open Hole Section			8.5				6700	14168			
Tools and Accessories											
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make		
Guide Shoe	5.5			14163		Top Plug	5.5	1			
Float Shoe	5.5					Bottom Plug	5.5	1			
Float Collar	5.5					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											
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	12.5 lb/gal Tuned Spacer III	Tuned Spacer III			150	bbl	12.5	2.72			
205.69 lbm/bbl		BARITE, BULK (100003681)									

34.50 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	Gasstop B1	GASSTOP (TM) SYSTEM	625	sack	13.2	1.55		6	7.61	
5.01 Gal		FRESH WATER								
0.10 Gal		D-AIR 3000L, TOTETANK (101396181)								
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	ElastiCem	ELASTICEM (TM) SYSTEM	1060	sack	14.4	1.7		8	7.3	
0.45 %		HR-5, 50 LB SK (100005050)								
7.30 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	20	bbl	8.34					
0.50 gal/bbl		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		293	bbl	8.34					
Cement Left In Pipe		Amount	4 ft		Reason			Shoe Joint		
Mix Water:		pH 7.5	Mix Water Chloride:			200 ppm		Mix Water Temperature:		60 °F
Cement Temperature:		## °F °C		Plug Displaced by:		8.4 lb/gal Water		Disp. Temperature:		## °F °C
Plug Bumped?		Yes		Bump Pressure:		2300 psi		Floats Held?		Yes
Cement Returns:		## bbl m3		Returns Density:		## lb/gal kg/m3		Returns Temperature:		## °F °C
Comment JOB WENT WELL. FULL RETURNS THROUGHOUT. CAUGHT CEMENT 25 BBL INTO DISPLACEMENT. SPACER RETURNS TO SURFACE AT 275 BBL AWAY SO 40 BBL TO SURFACE. BUMPED PLUG 3 BPM AT 2300 PSI, TOOK TO 2900 PSI. PRESSURED UP TO OPEN WET SHOE SUB WHICH OPENED AT 3740 PSI, PUMPED 5 BBL WET SHOE ONCE OPENED. CHECKED FLOATS AND GOT 2 BBL BACK. FLOATS HELD. APPROXIMATE TOPS ARE AS FOLLOWS: TOP OF TAIL 6550' TOP OF LEAD 2350' TOP OF SPACER SURFACE.										

2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	PS Pump Press (psi)	DH Density (ppg)	Comb Pump Rate (bbl/min)	Comments
Event	1	Call Out	Call Out	2/20/2019	01:00:00	USER				CREW CALLED OUT WHILE ON ANOTHER JOB. ON LOCATION 0630. CHANGED TO 0530 BEFORE DEPARTING FROM PREVIOUS LOCATION AND TRAVELING TO THE YARD
Event	2	Depart Shop for Location	Depart Shop for Location	2/20/2019	04:15:00	USER				CREW IS READY FOR THE JOB, EVERYTHING VERIFIED. CREW HAS JOURNEY MANAGEMENT SAFETY MEETING DISCUSSING ROUTES, CONVOY ORDER, FOLLOWING DISTANCE, FOGGY WEATHER, HAZARDS AND DEPARTS FOR LOCATION
Event	3	Arrive At Loc	Arrive At Loc	2/20/2019	05:15:00	USER				CREW ARRIVES AT LOCATION. RIG ON BOTTOM CIRCULATING. CREW ASSESSES LOCATION FOR HAZARDS THEN HAS PRE RIG UP SAFETY MEETING DISCUSSING RIG OPERATIONS, HAZARDS, PINCH POINTS, SLIPS AND FALLS, LINE OF FIRE, COMMUNICATION AND THEN BEGIN RIGGING UP
Event	4	Other	Other	2/20/2019	05:30:00	USER				CONTAINMENT SPOTTED IN AND EQUIPMENT BEING SPOTTED

Event	5	Safety Meeting - Pre Job	Safety Meeting - Pre Job	2/20/2019	09:20:00	USER	6.00	7.89	0.00	CREW, RIG CREW AND CUSTOMER REP HAVE PRE JOB SAFETY MEETING DISCUSSING HAZARDS, MUSTER AREAS, RED ZONES, COMMUNICATION, JOB PROCEEDURES, ROLES
Event	6	Start Job	Start Job	2/20/2019	09:42:06	COM6	5.00	7.83	0.00	START JOB
Event	7	Test Lines	Test Lines	2/20/2019	09:59:31	COM6	4576.00	8.36	0.00	FILL LINES WITH 2.5 BBL WATER. PRESSURE TEST HES LINES TO 4500 PSI. HELD FOR A FEW MINUTES TO ENSURE A GOOD TEST.
Event	8	Pump Spacer 1	Pump Spacer 1	2/20/2019	10:04:32	COM6	-16.00	6.83	0.00	PUMP 150 BBL SPACER 12.5# 2.72 YIELD 16.8 GAL
Event	9	Shutdown	Shutdown	2/20/2019	10:29:57	USER	116.00	11.71	5.90	SHUTDOWN
Event	10	Drop Bottom Plug	Drop Bottom Plug	2/20/2019	10:34:22	USER	-55.00	12.43	0.00	DROP BOTTOM PLUG AND PRE LOAD THE TOP PLUG. WITNESSED BY WEATHERFORD REP AND CUSTOMER REP
Event	11	Pump Lead Cement	Pump Lead Cement	2/20/2019	10:38:51	COM6	-55.00	12.38	0.00	PUMP 172 BBL GASSTOP 13.2# 1.55 YIELD 7.61 GAL 640 SKS
Event	12	Pump Tail Cement	Pump Tail Cement	2/20/2019	11:11:35	COM6	241.00	13.32	7.00	PUMP 320 BBL ELASTICEM 14.4# 1.7 YIELD 7.3 GAL 1060 SKS
Event	13	Shutdown	Shutdown	2/20/2019	12:08:49	USER	227.00	13.84	5.00	SHUTDOWN. BLOWDOWN LINES TO THE PIT. WASH PUMP TO THE PIT
Event	14	Drop Top Plug	Drop Top Plug	2/20/2019	12:24:28	COM6	-46.00	7.89	0.00	DROP TOP PLUG
Event	15	Pump Displacement	Pump Displacement	2/20/2019	12:24:31	COM6	-46.00	7.89	0.00	PUMP 313 BBL DISPLACEMENT WATER 8.34# WITH MMCR IN THE FIRST 20 BBL AND BIOCID

										THROUGHOUT
Event	16	Bump Plug	Bump Plug	2/20/2019	13:14:15	COM6	2623.00	6.93	0.00	BUMP PLUG. FINAL CIRCULATING PRESSURE 2300 PSI AT 3 BPM. TOOK TO 2900 PSI
Event	17	Other	Other	2/20/2019	13:16:27	USER	2995.00	7.62	1.90	OPEN WET SHOE SUB AT 3740 PSI.
Event	18	Other	Other	2/20/2019	13:17:18	USER	2479.00	6.49	1.90	PUMP 5 BBL WET SHOE
Event	19	Other	Other	2/20/2019	13:19:07	USER	1816.00	6.14	0.00	CHECK FLOATS. GOT 2 BBL BACK. FLOATS HELD
Event	20	Other	Other	2/20/2019	13:25:00	USER	-53.00	1.41	0.00	CREW HAS PRE RIG DOWN SAFETY MEETING DISCUSSING HAZARDS, RIG OPERATIONS, SLIPS TRIPS AND FALLS, PINCH POINTS, ROLES, RED ZONES, TAG LINES AND BEGIN RIGGING DOWN
Event	21	Depart Location	Depart Location	2/20/2019	15:00:00	USER				CREW IS READY TO DEPART. HAS JOURNEY MANAGEMENT SAFETY MEETING DISCUSSING ROUTE, CONVOY ORDER, FOLLOWING DISTANCE, HOURS OF SERVICE, FIT FOR DUTY AND DEPARTS FROM LOCATION