

HALLIBURTON

iCem[®] Service

NOBLE ENERGY INC - EBUS

United States of America, COLORADO

Date: Monday, May 21, 2018

Larson A23-645 Production

Job Date: Wednesday, May 09, 2018

Sincerely,

Adam McKay

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.

Table of Contents

1.0 Cementing Job Summary 4

 1.1 Executive Summary4

2.0 Real-Time Job Summary 7

 2.1 Job Event Log7

3.0 Attachments..... 9

 3.1 Pressure Tests.png.....9

 3.2 Cement Job Without Events .png.....10

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Larson A23-645** 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.

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]

HALLIBURTON

Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 345242		Ship To #: 3827258		Quote #:		Sales Order #: 0904832197				
Customer: NOBLE ENERGY INC - EBUS				Customer Rep: Jim Turner						
Well Name: LARSON		Well #: A23-645		API/UWI #: 05-123-45515-00						
Field: WATTENBERG		City (SAP): GILL		County/Parish: WELD		State: COLORADO				
Legal Description: SW NW-19-6N-63W-2397FNL-535FWL										
Contractor: H & P DRLG				Rig/Platform Name/Num: H & P 321						
Job BOM: 7523 7523										
Well Type: HORIZONTAL OIL										
Sales Person: HALAMERICA\HB70026				Srvc Supervisor: Kamereon White						
Job										
Formation Name										
Formation Depth (MD)		Top		Bottom						
Form Type				BHST		230 degF				
Job depth MD		18040ft		Job Depth TVD		6687				
Water Depth				Wk Ht Above Floor						
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		J-55	0	1960	0	
Casing	0	5.5	4.778	20	BUTTRESS	P-110	0	18025.6'	0	0
Open Hole Section			8.5				2500	6687		
Open Hole Section			8.5				6687	18040		
Fluid Data										
Stage/Plug #: 1										
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
1	11.5 lb/gal Tuned Spacer III w/ Chems	Tuned Spacer III	120	bbl	11.5	3.73	23.3			
34.70 gal/bbl		FRESH WATER								
0.60 gal/bbl		DUAL SPACER SURFACTANT B, 5 GAL PAIL (100003665)								
149.34 lbm/bbl		BARITE, BULK (100003681)								
0.60 gal/bbl		MUSOL A, 330 GAL TOTE - (790828)								
Fluid Data										
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
2	ElastiCem Cap	ELASTICEM (TM) SYSTEM	150	sack	13.2	1.57		6	7.53	
7.53 Gal		FRESH WATER								
0.90 %		SCR-100 (100003749)								

iCem® Service

(v. 4.5.139)

Created: Monday, May 21, 2018

HALLIBURTON

Cementing Job Summary

Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
3	ElastiCem w/ SCBL	ELASTICEM (TM) SYSTEM	487	sack	13.2	1.6		6	7.69
7.69 Gal		FRESH WATER							
0.45 %		SCR-100 (100003749)							
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
4	NeoCem NT1	NeoCem TM	1251	sack	13.2	2.04		6	9.75
9.75 Gal		FRESH WATER							
0.08 %		SCR-100 (100003749)							
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
5	Displacement	Displacement	398	bbl	8.33				
Cement Left In Pipe		Amount	Reason				Shoe Joint		
Mix Water:		7 pH	Mix Water Chloride: < 400 ppm				Mix Water Temperature: 54		
Cement Temperature:			Plug Displaced by: 8.33 lb/gal				Disp. Temperature:		
Plug Bumped?		Yes	Bump Pressure: 1960 psi				Floats Held? Yes		
Cement Returns:			Returns Density:				Returns Temperature:		
Comment									

2.0 Real-Time Job Summary

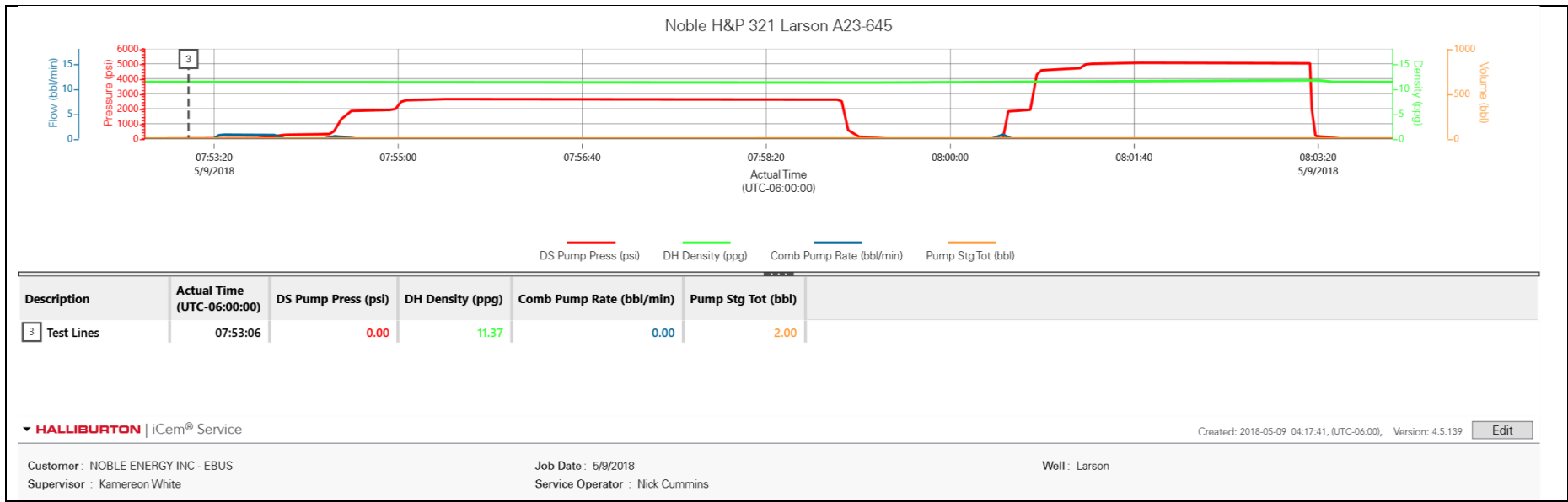
2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DS Pump Press (psi)	DH Density (ppg)	Comb Pump Rate (bbl/min)	Comments
Event	1	Call Out	Call Out	5/8/2018	20:30:00	USER				Crew Called out and was request to be o/l @ 5-9-2018 02:30
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	5/8/2018	23:50:00	USER				Discussed JSA and route of travel
Event	3	Depart from Service Center or Other Site	Depart from Service Center or Other Site	5/9/2018	00:00:00	USER				Crew left the yard and SS called in a journey
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	5/9/2018	01:30:00	USER				Crew arrived on location before time requested
Event	5	Assessment Of Location Safety Meeting	Assessment Of Location Safety Meeting	5/9/2018	01:40:00	USER				Assessed location
Event	6	Safety Meeting - Pre Rig-Up	Safety Meeting - Pre Rig-Up	5/9/2018	01:50:00	USER				Discussed rig up procedures and spot in trucks
Event	7	Casing on Bottom	Casing on Bottom	5/9/2018	02:00:00	USER				Casing on bottom @ 18,025.6' Rig circulated a bottoms up and got gas kick back so they shut in the well.
Event	8	Rig-Up Equipment	Rig-Up Equipment	5/9/2018	02:00:00	USER				Rig up all HES equipment and lines
Event	9	Crew Notified Date/Time	Crew Notified Date/Time	5/9/2018	02:30:00	USER				On Location was @ 02:30 on 5/9/201
Event	10	Rig-Up Completed	Rig-Up Completed	5/9/2018	03:30:00	USER				All HES equipment and lines rigged up safely
Event	11	Safety Meeting - Pre Job	Safety Meeting - Pre Job	5/9/2018	07:00:00	USER				Discussed job procedure and psi
Event	12	Start Job	Start Job	5/9/2018	07:48:06	COM5				Start job and filled lines
Event	13	Test Lines	Test Lines	5/9/2018	07:50:06	COM5	2637.00	11..39		Test Lines to 2500 psi at request of the customer
Event	14	Test Lines	Test Lines	5/9/2018	07:53:06	COM5	5066.00	11.37		Tested lines to 5000psi and held for 2 min no leaks. Before tests were performed, customer loaded first bottom plug.
Event	15	Pump Spacer 1	Pump Spacer 1	5/9/2018	08:04:10	COM5	241.00	11.68	3.80	Pumped 120 bbls of tuned spacer @11.5ppg

Event	16	Shutdown	Shutdown	5/9/2018	08:34:07	COM5	189.00	11.49	3.50	Shutdown to get cap cement up to weight and scaled
Event	17	Pump Cap Cement	Pump Cap Cement	5/9/2018	08:35:32	COM5	459.00	13.84	6.10	Pumped 42 bbls of Lead cap cement @ 13.2ppg
Event	18	Drop Bottom Plug	Drop Bottom Plug	5/9/2018	08:37:01	COM5				Drop the second bottom plug
Event	19	Check Weight	Check Weight	5/9/2018	08:39:16	COM5	202.00	13.74	4.10	Check weight with pressurized mud scales
Event	20	Check Weight	Check Weight	5/9/2018	08:42:07	COM5	416.00	13.66	6.20	Check weight with pressurized mud scales
Event	21	Pump Lead Cement	Pump Lead Cement	5/9/2018	08:51:45	COM5	137.00	13.05	3.90	Pumped 139 bbls of Lead #2 Cement 13.2ppg
Event	22	Check Weight	Check Weight	5/9/2018	09:00:27	COM5	594.00	13.31	8.10	Check weight with pressurized mud scales
Event	23	Pump Tail Cement	Pump Tail Cement	5/9/2018	09:10:07	COM5	544.00	13.14	8.10	Pumped 455 bbls of Tail cement @ 13.2ppg
Event	24	Check Weight	Check Weight	5/9/2018	09:27:08	COM5	780.00	13.17	8.10	Check weight with pressurized mud scales
Event	25	Check Weight	Check Weight	5/9/2018	09:41:19	COM5	831.00	13.38	8.10	Check weight with pressurized mud scales
Event	26	Shutdown	Shutdown	5/9/2018	10:16:40	COM5				Shutdown
Event	27	Drop Top Plug	Drop Top Plug	5/9/2018	10:18:00	USER				Drop 5.5" Top plug
Event	28	Pump Displacement	Pump Displacement	5/9/2018	10:42:00	USER				Pumped 398 bbls of fresh water with the first 20 bbls with MMCR and Biocide throughout. Left the last 60 bbls with no chemicals added.
Event	29	Slow Rate	Slow Rate	5/9/2018	11:26:00	USER				Slow rate the last 20 bbls of displ to 3bpm to land the plug
Event	30	Bump Plug	Bump Plug	5/9/2018	11:30:00	USER				Bumped the plug FCP-1960 psi took 500psi over FCP to 2400 psi and shutdown
Event	31	Other	Other	5/9/2018	11:34:00	USER				Waited 3 min before we checked the floats, floats held got 4 bbls back
Event	32	Post-Job Safety Meeting (Pre Rig-Down)	Post-Job Safety Meeting (Pre Rig-Down)	5/9/2018	11:37:00	USER				Reviewed JSA
Event	33	Rig-Down Equipment	Rig-Down Equipment	5/9/2018	11:40:00	USER				Rig down all HES Equipment and lines
Event	34	Job Complete	Job Complete	5/9/2018	13:00:00	USER				All HES Equipment and lines rigged down safely no one got hurt
Event	35	Depart Location	Depart Location	5/9/2018	14:00:00	USER				Kamereon White and crew would like to thank you for your business and choosing Halliburton Cement. Please give us a call if you have any questions.

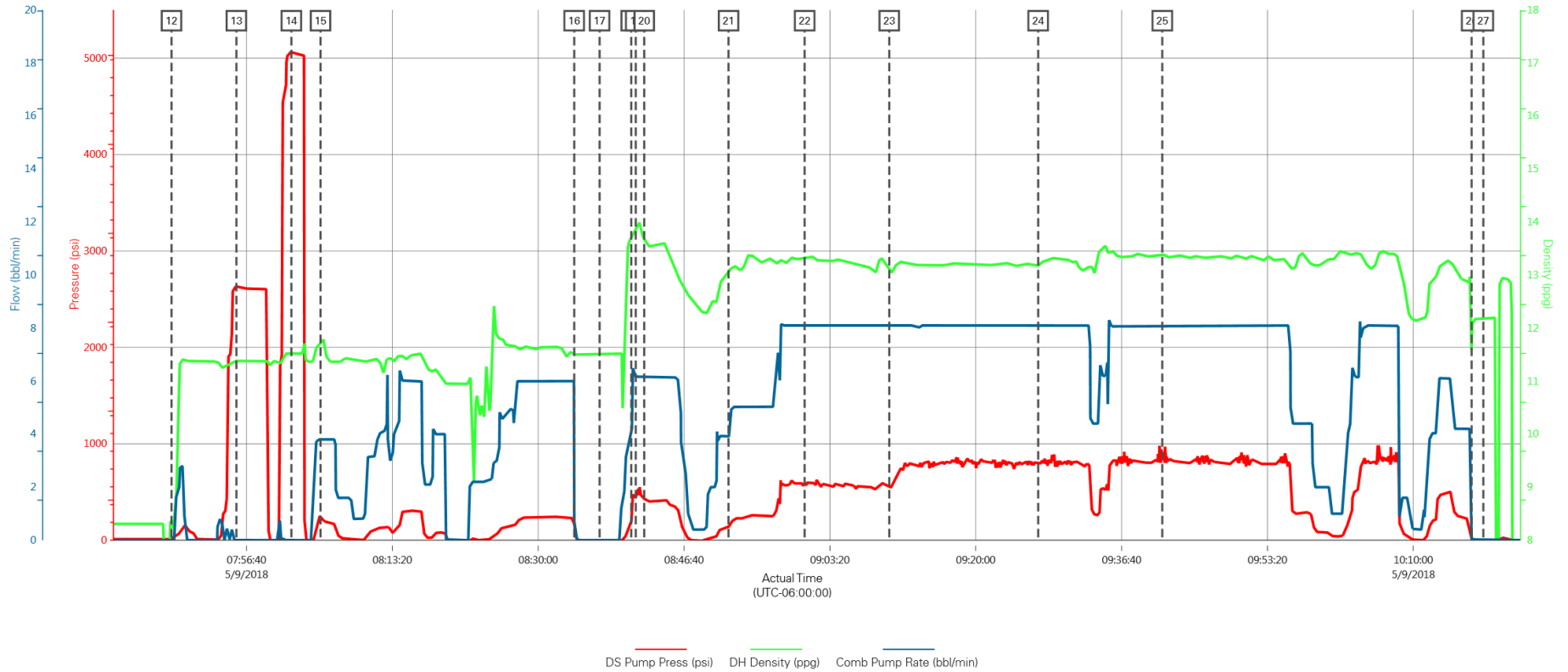
3.0 Attachments

3.1 Pressure Tests.png



3.2 Cement Job Without Events .png

Noble H&P 321 Larson A23-645



▼ HALLIBURTON | iCem® Service

Created: 2018-05-09 04:17:41, (UTC-06:00), Version: 4.5.139

Edit

Customer: NOBLE ENERGY INC - EBUS
Supervisor: Kamereon White

Job Date: 5/9/2018
Service Operator: Nick Cummins

Well: Larson