

HALLIBURTON

iCem[®] Service

NOBLE ENERGY INC-EBUS

Date: Thursday, December 20, 2018

Dorothy State LG16-748 Production

Job Date: Thursday, December 13, 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 Summary	4
2.0	Real-Time Job Summary	7
2.1	Job Event Log	7
3.0	Attachments.....	10
3.1	Cement Job With Events .png	10
3.2	Cement Job Without events .png.....	11

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Dorothy State LG16-748** 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]

The Road to Excellence Starts with Safety

Sold To #: 345242	Ship To #: 3902747	Quote #:	Sales Order #: 0905336255
Customer: NOBLE ENERGY INC-EBUS		Customer Rep: Jim Turner	
Well Name: DOROTHY STATE		Well #: LG16-748	API/UWI #: 05-123-47705-00
Field: WATTENBERG	City (SAP): RAYMER	County/Parish: WELD	State: COLORADO
Legal Description: SW SE-4-8N-59W-350FSL-1535FEL			
Contractor: H & P DRLG		Rig/Platform Name/Num: H & P 321	
Job BOM: 7523 7523			
Well Type: HORIZONTAL OIL			
Sales Person: HALAMERICA\HB70026		Srv Supervisor: Kamereon White	

Job

Formation Name	
Formation Depth (MD)	Top <input type="text"/> Bottom <input type="text"/>
Form Type	BHST 230 degF
Job depth MD	16925ft Job Depth TVD <input type="text"/>
Water Depth	Wk Ht Above Floor 4
Perforation Depth (MD)	From <input type="text"/> To <input type="text"/>

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	0	9.625	8.921	36			0	1945	0	
Casing	0	5.5	4.778	20			0	16926.2	0	
Open Hole Section			8.5				2500	5687		
Open Hole Section			8.5				5687	16940		

Tools and Accessories

Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make
					Top Plug	5.5	1	HES
Float Shoe	5.5	1	HES	16926	Bottom Plug	5.5	2	HES
Float Collar	5.5	1	HES	16878.2				

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	11.5 lb/gal Tuned Spacer III w/ Chems	Tuned Spacer III	120	bbl	11.5	3.78	23.5			

2.0 Real-Time Job Summary

2.1 Job Event Log

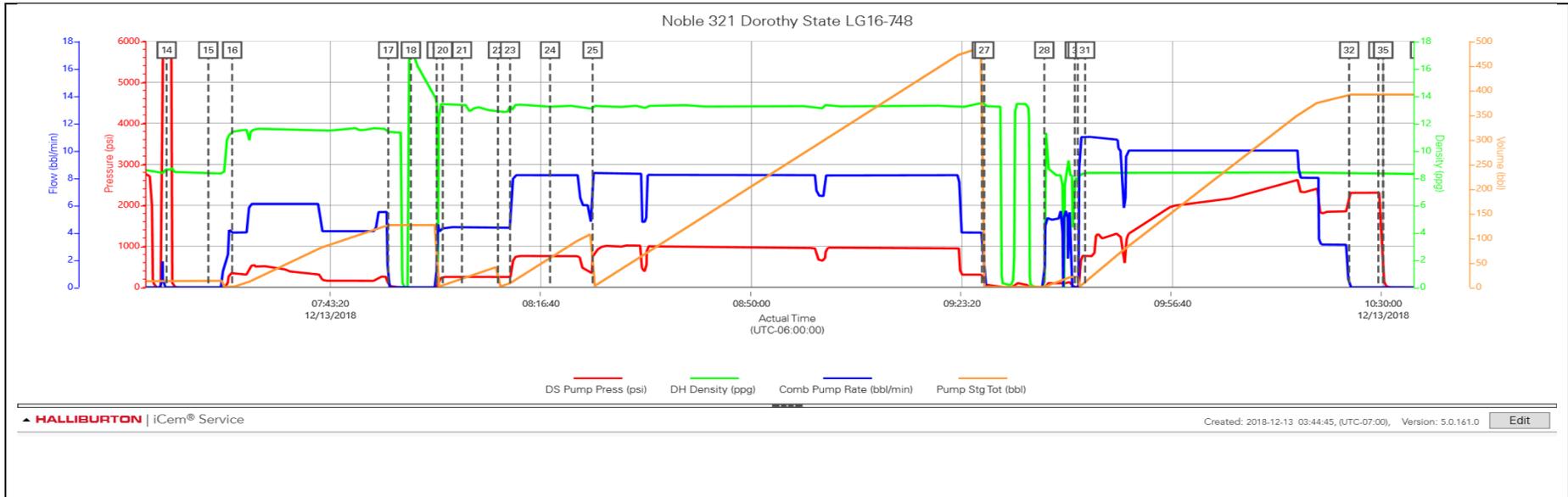
Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DS Pump Press (psi)	DH Density (ppg)	Comb Pump Rate (bbl/min)	Comments
Event	1	Job Called In	Call Out	12/12/2018	19:00:00	USER				Crew called out and was requested to be on location @ 02:00 am.
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	12/12/2018	22:20:00	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	12/12/2018	22:30:00	USER				Crew left the yard.
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	12/13/2018	01:00:00	USER				Crew arrived on location early and the rig was running casing.
Event	5	Assessment Of Location Safety Meeting	Safety Meeting - Assessment of Location	12/13/2018	01:50:00	USER				Spotting in trucks and supervisor met with the customer and got the well information. TD-16,940' TP-16,926.2' SJ-48' FC-16,878.2' Cas-5.5" 20# P110 PC-9.625" 36# Set @ 1945' Mud Weight-9.4 ppg OBM,TVD-6018.78' OH-8.5."
Event	6	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	12/13/2018	02:00:00	USER				Discussed rig up procedure and signed the JSA.
Event	7	Rig-Up Equipment	Rig-Up Equipment	12/13/2018	02:10:00	USER				Rigged up all HES equipment and lines.
Event	8	Rig-Up Completed	Rig-Up Completed	12/13/2018	03:00:00	USER				All HES equipment and lines rigged up safely.
Event	9	Casing on Bottom	Casing on Bottom	12/13/2018	04:30:00	USER				Casing on Bottom with the landing Joint.
Event	10	Pre-Job Safety Meeting	Pre-Job Safety Meeting	12/13/2018	06:30:00	USER				Discussed the job procedure and pressures with all personnel involved with the cement job.
Event	11	Job Called In	Start Job	12/13/2018	07:05:25	COM4				Started recording Data
Event	12	Drop Bottom Plug	Drop Bottom Plug	12/13/2018	07:05:46	COM4				Customer and Halliburton rep witnessed the first bottom plug being loaded.
Event	13	Other	Other	12/13/2018	07:10:38	COM4				Fill lines with 3 bbls of water 3 bpm 160 psi.
Event	14	Test Lines	Test Lines	12/13/2018	07:17:25	COM4	5896.00	8.62	0.00	Closed in the rigs IBOP and tested it to 2500 psi and held for 1 min no leaks, after we tested the IBOP we bled the psi off and performed HES pressure test to 4500 psi , no leaks.

Event	15	Check Weight	Check Weight	12/13/2018	07:24:01	COM4				Checked the weight of the spacer with the pressurized mud scales scaled @ 11.5 ppg.
Event	16	Pump Spacer 1	Pump Spacer 1	12/13/2018	07:27:47	COM4	331.00	11.42	4.00	Pumped 120 bbls of tuned spacer @ 11.5 ppg 3.78 yield 23.5 gal/sk with Musol A and Dual B added through out.6 bpm 470 psi.
Event	17	Shutdown	Shutdown	12/13/2018	07:52:30	COM4				
Event	18	Drop Bottom Plug	Drop Bottom Plug	12/13/2018	07:56:05	COM4				Shutdown released the psi and loaded the second bottom plug Witnessed by the customer and Halliburton rep.
Event	19	Pump Cap Cement	Pump Cap Cement	12/13/2018	08:00:10	COM4	-20.00	13.65	1.30	Stung back in with the CRT and pumped 42 bbls of Cap Cement @ 13.2 ppg 1.67 yield 8.06 gal/sk (140 sks) 5 bpm 560 psi
Event	20	Check Weight	Check Weight	12/13/2018	08:01:08	COM4	254.00	13.37	4.30	Checked the weight of the Cap Cement with the pressurized mud scales scaled @ 13.2 ppg.
Event	21	Check Weight	Check Weight	12/13/2018	08:04:10	COM4	237.00	13.32	4.40	Checked the weight of the Cap Cement with the pressurized mud scales scaled @ 13.3 ppg.
Event	22	Pump Lead Cement	Pump Lead Cement	12/13/2018	08:09:52	COM4	245.00	12.93	4.40	Pumped 88 bbls of Lead Cement @ 13.2 ppg 1.67 yield 8.06 gal/sk (295 sks) 8 bpm 730 psi.
Event	23	Check Weight	Check Weight	12/13/2018	08:11:47	COM4	240.00	13.27	4.30	Checked the weight of the Cap Cement with the pressurized mud scales scaled @ 13.3 ppg.
Event	24	Check Weight	Check Weight	12/13/2018	08:18:07	COM4	758.00	13.21	8.20	Checked the weight of the Cap Cement with the pressurized mud scales scaled @ 13.2 ppg.
Event	25	Pump Tail Cement	Pump Tail Cement	12/13/2018	08:24:51	COM4	689.00	13.22	8.60	Pumped 460 bbls of Tail Cement @ 13.2 ppg 2.04 yield 9.75 gal/sk (1267 sk) 8 bpm 983 psi.
Event	26	Pump Shoe Cement	Pump Shoe Cement	12/13/2018	09:26:28	COM4	310.00	13.53	4.00	Pumped 1.06 bbl @ 13.5 ppg for a good shoe Track.
Event	27	Shutdown	Shutdown	12/13/2018	09:26:51	COM4				Shutdown to open the 1" going to the wash up tank so the rig could sting out with the CRT to load the top plug.
Event	28	Clean Lines	Clean Lines	12/13/2018	09:36:21	COM4				Washed pumps and lines up.
Event	29	Drop Top Plug	Drop Top Plug	12/13/2018	09:41:11	COM4				Customer and Halliburton rep witnessed the Top Plug being loaded and pushed down with the CRT into the casing.
Event	30	Pump Displacement	Pump Displacement	12/13/2018	09:41:39	COM4	786	8.30	11.00	Pumped calculated displacement with the first 20 bbls with MMCR and then we swapped over to Biocide for the remainder of displacement, left the last 30 bbls fresh water.
Event	31	Displ Reached Cement	Displ Reached Cement	12/13/2018	09:42:49	COM4	781.00	8.34	11.00	@ 20 bpm we caught the plug we maintained 10 bpm.

Event	32	Bump Plug	Bump Plug	12/13/2018	10:24:37	COM4	1875.00	8.37	3.10	Bumped the plug on calculated displacement, the final circulating psi was 1900 psi and took 500 psi over to 2300 psi and shutdown.
Event	33	Other	Other	12/13/2018	10:29:14	COM4				Checked the floats and the floats held, we got 4 bbls back to the truck.
Event	34	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	12/13/2018	10:30:00	USER				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	35	Rig Down Lines	Rig Down Lines	12/13/2018	10:30:00	USER				The crew flushed the rigs stack with sugar water and rigged down all HES equipment and lines.
Event	36	End Job	End Job	12/13/2018	10:35:50	COM4				Cement Job complete, Calculated tops of cement-TOTC-5679',TOLC #2-3527', TOCap-1465' TOS- 11 bbls back to surface.
Event	37	Rig-Down Completed	Rig-Down Completed	12/13/2018	11:30:00	USER				Rig down completed no one got hurt.
Event	38	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	12/13/2018	11:50:00	USER				The crew held a pre journey safety meeting discussing the route and potential hazards while driving. The supervisor called in a journey.
Event	39	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	12/13/2018	12:00:00	USER				Kamereon White and crew would like to thank you for your business and choosing Halliburton Cement. If you have any questions please feel free to call.

3.0 Attachments

3.1 Cement Job With Events .png



3.2 Cement Job Without events .png

