

# HALLIBURTON

iCem<sup>®</sup> Service

**EXTRACTION OIL & GAS**

**Duck Club 12W-20-6N Production**

Sincerely,  
**Meghan Jacobs**

## 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.....	11
3.1	Duck Club 12W-20-6N Production – Beginning of Job before Shutdown.....	11
3.2	Duck Club 12W-20-6N Production – Job Chart with Events from Spacer to End.....	12

## 1.0 Cementing Job Summary

---

### 1.1 Executive Summary

---

Halliburton appreciates the opportunity to perform the cementing services on the **Duck Club 12W-20-6N** 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 60 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 Fort Lupton**

## HALLIBURTON

## Cementing Job Summary

*The Road to Excellence Starts with Safety*

Sold To #: 369404		Ship To #: 3894457		Quote #:		Sales Order #: 0905336692					
Customer: EXTRACTION OIL & GAS-EBUS				Customer Rep: Danny Herrera							
Well Name: DUCK CLUB		Well #: 12W-20-6N		API/UWI #: 05-001-10161-00							
Field: WATTENBERG		City (SAP): BARR LAKE		County/Parish: ADAMS		State: COLORADO					
Legal Description: NW SW-12-1S-66W-2463FSL-689FWL											
Contractor: PATTERSON-UTI ENERGY				Rig/Platform Name/Num: PATTERSON 901							
Job BOM: 7523 7523											
Well Type: HORIZONTAL OIL											
Sales Person: HALAMERICA\HX38199				Srvc Supervisor: Nicholas Roles							
<b>Job</b>											
Formation Name											
Formation Depth (MD)		Top		1592ft		Bottom		17600ft			
Form Type				BHST							
Job depth MD		17588ft		Job Depth TVD		7246ft					
Water Depth				Wk Ht Above Floor						2ft	
Perforation Depth (MD)		From				To					
<b>Well Data</b>											
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	1592		1592	
Casing		5.5	4.778	20			0	17588		7246	
Open Hole Section			8.5				1592	17600		7246	
<b>Tools and Accessories</b>											
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make		
Guide Shoe	5.5			17588		Top Plug	5.5	1	KLX		
Float Shoe	5.5					Bottom Plug	5.5		HES		
Float Collar	5.5			17584		SSR plug set	5.5		HES		
Insert Float	5.5					Plug Container	5.5	1	HES		
Stage Tool	5.5					Centralizers	5.5		HES		
<b>Fluid Data</b>											
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	Tuned Spacer III	50	bbl	11.5	3.73		6			
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	ElastiCem	ELASTICEM (TM) SYSTEM	585	sack	13.2	1.57		8	7.66		

last updated on 12/17/2018 3:38:59 PM

Page 1 of 3

## HALLIBURTON

## Cementing Job Summary

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	GasStop	ELASTICEM (TM) SYSTEM	655	sack	13.2	1.56		8	7.61																													
4	ElastiCem	ELASTICEM (TM) SYSTEM	1590	sack	13.2	1.57		8	7.66																													
5	MMCR Displacement	MMCR Displacement	10	bbl	8.33			6																														
0.50 gal/bbl		MICRO MATRIX CEMENT RETARDER, 1 GAL PAIL (100003780)																																				
6	Displacement	Displacement	380	bbl	8.33			10																														
<table border="1"> <thead> <tr> <th>Cement Left In Pipe</th> <th>Amount</th> <th>oft</th> <th>Reason</th> <th>Wet Shoe</th> </tr> </thead> <tbody> <tr> <td>Mix Water:</td> <td>pH 06</td> <td>Mix Water Chloride:</td> <td>0 ppm</td> <td>Mix Water Temperature:</td> <td>65 °F °C</td> </tr> <tr> <td>Cement Temperature:</td> <td>## °F °C</td> <td>Plug Displaced by:</td> <td>8.33 lb/gal</td> <td>Disp. Temperature:</td> <td>65 °F °C</td> </tr> <tr> <td>Plug Bumped?</td> <td>Yes</td> <td>Bump Pressure:</td> <td>3125 psi MPa</td> <td>Floats Held?</td> <td>Yes</td> </tr> <tr> <td>Cement Returns:</td> <td>60 bbl m3</td> <td>Returns Density:</td> <td>## lb/gal kg/m3</td> <td>Returns Temperature:</td> <td>## °F °C</td> </tr> </tbody> </table>										Cement Left In Pipe	Amount	oft	Reason	Wet Shoe	Mix Water:	pH 06	Mix Water Chloride:	0 ppm	Mix Water Temperature:	65 °F °C	Cement Temperature:	## °F °C	Plug Displaced by:	8.33 lb/gal	Disp. Temperature:	65 °F °C	Plug Bumped?	Yes	Bump Pressure:	3125 psi MPa	Floats Held?	Yes	Cement Returns:	60 bbl m3	Returns Density:	## lb/gal kg/m3	Returns Temperature:	## °F °C
Cement Left In Pipe	Amount	oft	Reason	Wet Shoe																																		
Mix Water:	pH 06	Mix Water Chloride:	0 ppm	Mix Water Temperature:	65 °F °C																																	
Cement Temperature:	## °F °C	Plug Displaced by:	8.33 lb/gal	Disp. Temperature:	65 °F °C																																	
Plug Bumped?	Yes	Bump Pressure:	3125 psi MPa	Floats Held?	Yes																																	
Cement Returns:	60 bbl m3	Returns Density:	## lb/gal kg/m3	Returns Temperature:	## °F °C																																	
Comment Got 60bbls Cement to surface. Brought roughly 40sks or 10bbls extra cement out to be sure we were on target for wasted cement. Got back calculated cement.																																						

## 2.0 Real-Time Job Summary

### 2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	Comb Pump Rate <i>(bbl/min)</i>	DH Density <i>(ppg)</i>	DS Pump Press <i>(psi)</i>	Comments
Event	1	Call Out	Call Out	12/11/2018	17:00:00	USER				Called out by Service Coordinator for O/L at 2300
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	12/11/2018	21:45:00	USER				Held meeting with all personnel in convoy to discuss directions and hazards associated with drive, all fit to drive.
Event	3	Depart from Service Center or Other Site	Depart from Service Center or Other Site	12/11/2018	22:00:00	USER				Journey Management prior to departure
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	12/11/2018	22:30:00	USER				Upon arrival met with company man to discuss job details and calculations, performed hazard hunt and site assessment. Rig had 3000ft casing left to run.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	12/11/2018	23:00:00	USER				Discussed rigging up hazards and procedure according to HMS.
Event	6	Other	Other	12/11/2018	23:30:00	USER				Water test- PH-6, Chlor-0, Temp-65.
Event	7	Safety Meeting - Pre Job	Safety Meeting - Pre Job	12/12/2018	02:00:00	USER	0.00	8.36	5.00	Held safety meeting with all job associated personnel to discuss job procedure, hazards and stop work authority.
Event	8	Start Job	Start Job	12/12/2018	03:50:00	COM2	0.00	8.36	-1.00	TD-17600', OH-8.5", TP-17588' 5.5" 20#, TVD-7246', SURF-1592' 9.625" 36#, MUD 9.1#
Event	9	Test Lines	Test Lines	12/12/2018	03:53:17	COM2	0.00	12.02	118.00	Pumped 5bbls fresh water to fill lines at 4bpm 320psi, shut manifold, and performed 500psi k/o function test, followed with 5th gear stall at 1800psi, proceeded to bring pressure to 4500psi, held well and no leaks.
Event	10	Pump Spacer 1	Pump Spacer 1	12/12/2018	03:58:14	COM2	0.00	11.82	77.00	Pumped 50bbls of 11.5# 3.91y 24.4g/s Tuned Spacer III with 25g Musol A, 25g Dual Spacer B and 10g D-air at 5bpm 320psi.

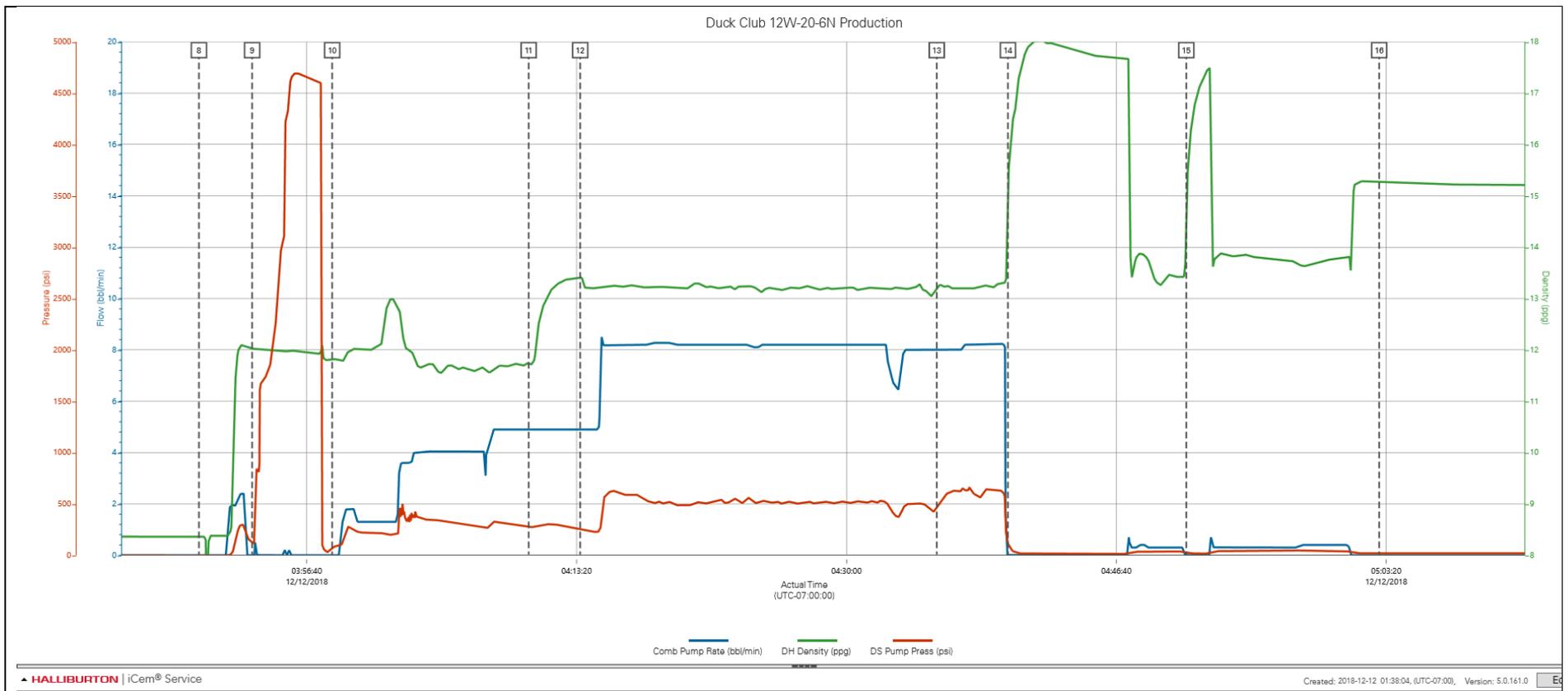
Event	11	Pump Lead Cement	Pump Lead Cement	12/12/2018	04:10:22	COM2	4.90	11.74	277.00	Pumped 585sks or 163.5bbls of 13.2# 1.57y 7.66g/s Elasticem at 8bpm 498psi.
Event	12	Check Weight	Check Weight	12/12/2018	04:13:33	COM2	4.90	13.41	249.00	Weight verified with pressurized mud scales.
Event	13	Pump Lead Cement	Pump Lead Cement	12/12/2018	04:35:34	COM2	8.00	13.20	460.00	
Event	14	Begin Standby Due to HES	Begin Standby Due to HES	12/12/2018	04:39:58	USER	0.00	15.12	111.00	
Event	15	Shutdown	Shutdown	12/12/2018	04:50:59	COM2	0.00	14.79	27.00	
Event	16	Shutdown	Shutdown	12/12/2018	05:02:54	USER	0.00	15.28	19.00	
Event	17	Standby - Other - see comments	Standby - Other - see comments	12/12/2018	15:00:00	USER				cement showed up to location, plus 264gal FDP latex, waited to get a confirmation on lab results by HES engineer. once confirmed, rig shutdown pumps and rigged up HES cement line.
Event	21	Pump Spacer	Pump Spacer	12/12/2018	15:31:42	USER				Pumped 50bbls of 11.5# 3.91y 24.4g/s Tuned Spacer III with 25g Musol A, 25g Dual Spacer B and 10g D-air at 5bpm 320psi.
Event	22	Pump Spacer 1	Pump Spacer 1*	12/12/2018	15:32:30	RTD Import				Pump Spacer 1*
Event	62	Pump Lead Cement	Pump Lead Cement*	12/12/2018	15:42:36	RTD Import				Pump Lead Cement*
Event	63	Pump Cap Cement	Pump Cap Cement	12/12/2018	15:42:48	USER				Pumped 585sks or 163.5bbls of 13.2# 1.57y 7.66g/s Elasticem at 8bpm 498psi.
Event	67	Comment	Mud Cup Sample Pulled	12/12/2018	15:44:30	RTD Import				Mud Cup Sample Pulled
Event	101	Pump Cement	Pump Cement*	12/12/2018	16:03:03	RTD Import				Pump Cement*
Event	105	Pump Lead Cement	Pump Lead Cement	12/12/2018	16:03:15	USER				Pumped 655sks or 171bbls of 13.2# 1.56y 7.61g/s GasStop with 1538g FDP Latex and 77g D-air at 8bpm.

Event	136	Pump Tail Cement	Pump Tail Cement	12/12/2018	16:27:21	USER	Pumped 1590sks or 428bbbls of Elasticem at 8bpm 488psi.
Event	137	Pump Tail Cement	Pump Tail Cement*	12/12/2018	16:27:31	RTD Import	Pump Tail Cement*
Event	316	Shutdown	Shutdown	12/12/2018	17:21:18	RTD Import	Shutdown
Event	323	Clean Lines	Clean Lines	12/12/2018	17:21:47	USER	Shutdown, rig blew down iron to pits, once clean, closed 2" to rig and washed up pump truck with 5bbbls fresh water to clean pump.
Event	340	Drop Top Plug	Drop Top Plug	12/12/2018	17:23:33	USER	Dropped by KLX tool hand, witnessed by company man and HES supervisor.
Event	345	Pump Displacement	Pump Displacement	12/12/2018	17:26:34	USER	Pumped 390bbbls fresh water at 10bpm.
Event	346	Pump Displacement	Pump Displacement*	12/12/2018	17:26:35	RTD Import	Pump Displacement*
Event	350	Bump Plug	Bump Plug	12/12/2018	18:16:11	USER	Slowed down at 370bbbls away to 5bpm, final circulating pressure-2630psi. Bump pressure-3125psi.
Event	351	Bump Plug	Bump Plug	12/12/2018	18:16:27	RTD Import	Bump Plug
Event	353	Pressure Up Well	Pressure Up Well	12/12/2018	18:18:32	RTD Import	Pressure Up Well
Event	354	Pressure Up Well	Pressure Up Well	12/12/2018	18:18:45	USER	Pressured up to burst plug at 3950psi, continued to pump 5bbbls at 5bpm 2550psi.
Event	355	Check Floats	Check Floats	12/12/2018	18:21:13	USER	Released pressure and got 3bbbls back. Floats held.
Event	356	End Job	End Job	12/12/2018	18:22:56	USER	Got 60bbbls Cement to surface. Brought roughly 40sks or 10bbbls extra cement out to be sure we were on target for wasted cement. Got back calculated cement.
Event	357	Safety Meeting - Pre Rig-Down	Safety Meeting - Pre Rig-Down	12/12/2018	18:25:00	USER	All HSE present. Discussed red zone areas and trapped pressure hazards. Watch for suspended loads and rig down procedures, including hand placement, lifting techniques, and swing radius.

Event	358	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	12/12/2018	19:30:00	USER	All HSE present and fit to drive. Aware of directions and hazards.
Event	359	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	12/12/2018	19:45:00	USER	Pre journey management prior to departure.

3.0 Attachments

3.1 Duck Club 12W-20-6N Production – Beginning of Job before Shutdown



3.2 Duck Club 12W-20-6N Production – Job Chart with Events from Spacer to End

