

# HALLIBURTON

iCem<sup>®</sup> Service

**EXTRACTION OIL & GAS**

**Livingston S19-25-3N 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..... 10

3.1 Livingston S19-25-3N Production – Job Chart.....10

## 1.0 Cementing Job Summary

---

### 1.1 Executive Summary

---

Halliburton appreciates the opportunity to perform the cementing services on the **Livingston S19-25-3N** 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 50 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**

*The Road to Excellence Starts with Safety*

<b>Sold To #:</b> 369404		<b>Ship To #:</b> 3883775		<b>Quote #:</b>		<b>Sales Order #:</b> 0905835831					
<b>Customer:</b> EXTRACTION OIL & GAS-EBUS						<b>Customer Rep:</b> Manny Parras					
<b>Well Name:</b> LIVINGSTON			<b>Well #:</b> S19-25-3N			<b>API/UWI #:</b> 05-014-20758-00					
<b>Field:</b> WATTENBERG		<b>City (SAP):</b> BROOMFIELD		<b>County/Parish:</b> BROOMFIELD		<b>State:</b> COLORADO					
<b>Legal Description:</b> NW SE-7-1S-68W-2332FSL-1492FEL											
<b>Contractor:</b> PATTERSON-UTI ENERGY					<b>Rig/Platform Name/Num:</b> PATTERSON 901						
<b>Job BOM:</b> 7523 7523											
<b>Well Type:</b> HORIZONTAL OIL											
<b>Sales Person:</b> HALAMERICA\HX38199					<b>Srv Supervisor:</b> Nicholas Roles						
<b>Job</b>											
<b>Formation Name</b>											
<b>Formation Depth (MD)</b>		<b>Top</b>	1630		<b>Bottom</b>	21396					
<b>Form Type</b>					<b>BHST</b>						
<b>Job depth MD</b>		21384ft			<b>Job Depth TVD</b>	8054					
<b>Water Depth</b>					<b>Wk Ht Above Floor</b>						
<b>Perforation Depth (MD)</b>		<b>From</b>			<b>To</b>						
<b>Well Data</b>											
<b>Description</b>	<b>New / Used</b>	<b>Size in</b>	<b>ID in</b>	<b>Weight lbm/ft</b>	<b>Thread</b>	<b>Grade</b>	<b>Top MD ft</b>	<b>Bottom MD ft</b>	<b>Top TVD ft</b>	<b>Bottom TVD ft</b>	
Casing	0	9.625	8.921	36			0	1630	0	1630	
Casing	0	5.5	4.892	17	BTC	P-110	0	21384	0	8054	
Open Hole Section			8.5				1630	9169	1630	8054	
Open Hole Section			8.75				9169	21396	0	0	
<b>Tools and Accessories</b>											
<b>Type</b>	<b>Size in</b>	<b>Qty</b>	<b>Make</b>	<b>Depth ft</b>		<b>Type</b>	<b>Size in</b>	<b>Qty</b>	<b>Make</b>		
Guide Shoe	5.5					Top Plug	5.5	1	Citadel		
Float Shoe	5.5			21384		Bottom Plug	5.5	1	Citadel		
Float Collar	5.5			21379		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>											
<b>Stage/Plug #:</b> 1											
<b>Fluid #</b>	<b>Stage Type</b>	<b>Fluid Name</b>			<b>Qty</b>	<b>Qty UoM</b>	<b>Mixing Density lbm/gal</b>	<b>Yield ft3/sack</b>	<b>Mix Fluid Gal</b>	<b>Rate bbl/min</b>	<b>Total Mix Fluid Gal</b>

1	FDP-C1337-18	SBM FDP-C1337-18 CEMENT SPACER SYS	50	bbl	12.5	2.74		8	
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	1.6		8	7.75
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	615	sack	13.2	1.6		8	7.71
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	ElastiCem	ELASTICEM (TM) SYSTEM	2255	sack	13.2	1.57		8	7.66
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	MMCR Displacement	MMCR Displacement	20	bbl	8.33			5	
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
6	Displacement	Displacement	376	bbl	8.33			10-3	
Cement Left In Pipe		Amount	0 ft		Reason			Wet Shoe	
Mix Water:		pH 06	Mix Water Chloride:			0 ppm		Mix Water Temperature: 70 °F °C	
Cement Temperature:		75 °F	Plug Displaced by:			8.33 lb/gal		Disp. Temperature: 70 °F °C	
Plug Bumped?		Yes	Bump Pressure:			2940 psi MPa		Floats Held? Yes	
Cement Returns:		50 bbl	Returns Density:			## lb/gal kg/m3		Returns Temperature: ## °F °C	
Comment Est TOT-6235', TOL-2346' Got 50bbbls cap cement to surface.									

## 2.0 Real-Time Job Summary

## 2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	Comb Pump Rate (bbl/min)	DH Density (ppg)	DS Pump Press (psi)	Comments
Event	1	Call Out	Call Out	7/15/2019	18:00:00	USER				Called out by Service Coordinator for O/L at 0000
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	7/15/2019	22:00:00	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	7/15/2019	22:15:00	USER				Journey Management prior to departure
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	7/15/2019	23:20:00	USER				Upon arrival met with company man to discuss job details and calculations, performed hazard hunt and site assessment.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	7/15/2019	23:33:00	USER				Discussed rigging up hazards and procedure according to HMS.
Event	6	Other	Other	7/16/2019	01:00:00	USER				Water test- PH-6, Chlor-0, Temp-65. Cement temp-70.
Event	7	Pre-Job Safety Meeting	Pre-Job Safety Meeting	7/16/2019	05:00:00	USER	0.00	7.85	-7.00	Held safety meeting with all job associated personnel to discuss job procedure, hazards and stop work authority.
Event	8	Start Job	Start Job	7/16/2019	06:05:08	COM4	0.00	7.97	-7.00	TD-8.5" 9169-21396', 8.75" 0-9169, TP-21384' 5.5" 17#, TVD-8884', SURF-1630' 9.625" 36#, MUD-10#
Event	9	Test Lines	Test Lines	7/16/2019	06:06:48	COM4	0.00	8.41	113.00	Pumped 5bbls fresh water to fill lines at 3bpm 280psi, shut manifold, and performed 500psi k/o function test, followed with 5th gear stall at 1620psi, proceeded to bring pressure to 4500psi, Pressure stabilized and held with no leaks.
Event	10	Pump Spacer 1	Pump Spacer 1	7/16/2019	06:12:14	COM4	0.00	8.43	16.00	Pumped 50bbls of 12.5# 2.74y 16.6g/s FDP Spacer with 10g D-air at 8bpm 420psi.
Event	11	Check Weight	Check Weight	7/16/2019	06:16:44	COM4	8.00	13.23	860.00	Weight verified with pressurized mud scales.

Event	12	Pump Lead Cement	Pump Lead Cement	7/16/2019	06:19:18	COM4	8.00	12.25	783.00	Pumped 585sks or 167bbbls of 13.2# 1.6y 7.75g/s Elasticem at 8bpm 350psi.
Event	13	Check Weight	Check Weight	7/16/2019	06:28:28	COM4	7.90	13.29	713.00	Weight verified with pressurized mud scales.
Event	14	Pump Cement	Pump Cement	7/16/2019	06:42:30	COM4	8.00	13.17	706.00	Pumped 615sks or 175bbbls of 13.2# 1.6y 7.71g/s GasStop with 1538g FDP Latex and 30g of D-Air at 8bpm 550psi.
Event	15	Check Weight	Check Weight	7/16/2019	06:44:23	COM4	8.00	13.25	782.00	Weight verified with pressurized mud scales.
Event	16	Pump Tail Cement	Pump Tail Cement	7/16/2019	07:06:38	COM4	8.20	13.16	857.00	Pumped 2255sks or 630bbbls of 13.2# 1.56y 7.65g/s Elasticem at 8bpm 488psi.
Event	17	Check Weight	Check Weight	7/16/2019	07:13:35	COM4	8.20	13.11	819.00	Weight verified with pressurized mud scales.
Event	18	Bump Plug	Bump Plug	7/16/2019	07:21:55	USER	8.00	13.12	2032.00	Caught bottom plug at 124bbbls into tail or 516bbbls total, and burst at 2032psi. pressure slowly fell off then rose again until leveling out at 1250psi.
Event	19	Check Weight	Check Weight	7/16/2019	07:52:37	COM4	8.20	13.07	781.00	Weight verified with pressurized mud scales.
Event	20	Shutdown	Shutdown	7/16/2019	08:15:19	COM4	0.00	24.48	60.00	Rig blew down iron, followed with 10bbbls fresh water through pumps and lines.
Event	21	Drop Top Plug	Drop Top Plug	7/16/2019	08:25:44	COM4	0.00	1.60	-7.00	Dropped by HES Supervisor, witnessed by company man.
Event	22	Pump Displacement	Pump Displacement	7/16/2019	08:25:48	COM4	0.00	3.04	-7.00	Pumped 496bbbls fresh water at 10bpm. Slowed down throughout to keep pressure below 2500psi.
Event	23	Shutdown	Shutdown	7/16/2019	08:51:20	COM4	0.00	7.28	1306.00	Rig had a leak on flow line and required a brief shutdown.
Event	24	Bump Plug	Bump Plug	7/16/2019	10:02:26	COM4	0.00	7.32	2866.00	Slowed down at 460bbbls away to 3bpm, final circulating pressure-2500psi. Bump pressure-2940psi.
Event	25	Pressure Up Well	Pressure Up Well	7/16/2019	10:04:14	COM4	1.00	7.32	3507.00	Pressured up to burst plug at 3700psi, continued to pump 5bbbls at 3bpm 2500psi.
Event	26	Other	Other	7/16/2019	10:07:19	COM4	0.00	7.35	2282.00	Released pressure and got 4bbbls back. Floats held.
Event	27	End Job	End Job	7/16/2019	10:09:49	COM4	0.00	7.26	-3.00	Est TOT-6235', TOL-2346' Got 50bbbls cap cement to surface.
Event	28	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	7/16/2019	10:15:00	USER	0.00	7.65	104.00	Discussed rigging down hazards and procedure according to HMS with all HES personnel



Event	29	Safety Meeting - Departing Location	Safety Meeting - Departing Location	7/16/2019	12:15:00	USER	Held meeting with all personnel in convoy to discuss directions and hazards associated with drive, all fit to drive.
Event	30	Depart Location for Service Center or Other Site	Depart Location for Service Center or Other Site	7/16/2019	12:30:00	USER	Pre journey management prior to departure.

## 3.0 Attachments

### 3.1 Livingston S19-25-3N Production – Job Chart

