

# HALLIBURTON

iCem<sup>®</sup> Service

## **EXTRACTION OIL & GAS-EBUS**

Date: Thursday, October 03, 2019

## **LIVINGSTON S19-25-12N PRODUCTION**

Job Date: Monday, September 23, 2019

Sincerely,  
**Tyler Hill**

## 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 ..... 8

    2.1    Job Event Log .....8

3.0    Attachments..... 12

    3.1    LIVINGSTON S19-25-12N PRODUCTION.png .....12

## 1.0 Cementing Job Summary

---

### 1.1 Executive Summary

---

Halliburton appreciates the opportunity to perform the cementing services on the **Livingston S19-25-12N** 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 Ft. Lupton**

*The Road to Excellence Starts with Safety*

<b>Sold To #:</b> 369404		<b>Ship To #:</b> 3883773		<b>Quote #:</b>		<b>Sales Order #:</b> 0905987775					
<b>Customer:</b> EXTRACTION OIL & GAS-EBUS						<b>Customer Rep:</b> DANNY					
<b>Well Name:</b> LIVINGSTON				<b>Well #:</b> S19-25-12N		<b>API/UWI #:</b> 05-014-20750-00					
<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-2331FSL-1330FEL											
<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> Lance Carpenter						
<b>Job</b>											
<b>Formation Name</b>											
<b>Formation Depth (MD)</b>		<b>Top</b>				<b>Bottom</b>					
<b>Form Type</b>					<b>BHST</b>						
<b>Job depth MD</b>		20836ft			<b>Job Depth TVD</b>	8090					
<b>Water Depth</b>					<b>Wk Ht Above Floor</b>	3					
<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		9.625	8.921	36			0	1610			
Casing		5.5	4.778	20			0	20836		8090	
Open Hole Section			8.75				1610	20849		8090	
<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			20836		Top Plug	5.5		HES		
Float Shoe	5.5					Bottom Plug	5.5	2	HES		
Float Collar	5.5			20823		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	Tuned Prime Cement Spacer Base - RKS/SE	TUNED PRIME CEMENT SPACER SYS	50	bbl	11.5	3.74			
1 lbm/bbl		FE-2, 2000 LB BAG - (1005549)							
5 lbm/bbl		SEM-94P, 35 LB SACK - (1023987)							
35.60 gal/bbl		FRESH WATER							
150.22 lbm/bbl		BARITE, BULK (100003681)							
5 lbm/bbl		SEM-93P, 35 LB SACK - (1023977)							
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	Cap	ELASTICEM (TM) SYSTEM	815	sack	12.5	1.79		8	9.06
9.06 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
3	GasStop B1	GASSTOP (TM) SYSTEM	615	sack	13.2	1.59		8	7.7
5.23 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	ElastiCem	ELASTICEM (TM) SYSTEM	1840	sack	13.2	1.56		8	7.62
7.62 Gal		FRESH WATER							
0.45 %		HR-5, 50 LB SK (100005050)							
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			8	
0.50 gal/bbl		MICRO MATRIX CEMENT RETARDER, 1 GAL PAIL (100003780)							
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	464	bbl	8.33			8	
Cement Left In Pipe		Amount	ft		Reason			Shoe Joint	

Mix Water:	pH 7	Mix Water Chloride:	100 ppm	Mix Water Temperature:	71 °F
Cement Temperature:	## °F °C	Plug Displaced by:	## lb/gal kg/m3 XXXX	Disp. Temperature:	## °F °C
Plug Bumped?	Yes	Bump Pressure:	2460 psi	Floats Held?	Yes
Cement Returns:	50 bbl	Returns Density:	## lb/gal kg/m3	Returns Temperature:	## °F °C

## Comment

JOB WENT WELL. NO ACCIDENT, INJURY OR SPILL. FIRST BOTTOM PLUG DROPPED BEFORE SPACER. ALL FLUIDS VERIFIED, SCALED AND MIX WATER CONFIRMED. SLOWED RATE AND WATCHED BOTTOM PLUG RUPTURE AT CALCULATED VOLUME. DROPPED SECOND BOTTOM PLUG BEFORE DISPLACEMENT. SPACER RETURNS TO SURFACE AT 370 BBL AWAY. CEMENT RETURNS TO SURFACE AT 435 BBL AWAY. ALL 50 BBL SPACER AND 50 BBL CEMENT TO SURFACE. BUMPED PLUG AT 2460 PSI AT 4 BPM. TOOK TO 2860 PSI. PRESSURED UP TO 3268 TO RUPTURE DISC AND PUMPED AT 6 BBL WET SHOE. CHECKED FLOATS, FLOATS HELD WITH 3.5 BBL BACK

CALCULATED TOPS

TOP OF TAIL – 8312'

TOP OF GASSTOP – 4445'

TOP OF LEAD – SURFACE WITH 50 BBL BACK

SPACER TO SURFACE 50 BBL

## 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	Check Floats	Call Out	9/23/2019	08:30:00	USER				CREW CALLED OUT. ON LOCATION TIME 1430 RTP 1800 DUE TO TRAVEL RESTRICTIONS
Event	2	Depart Shop for Location	Depart Shop for Location	9/23/2019	13:00:00	USER				CREW HAS VERIFIED EQUIPEMENT AND MATERIALS FOR THE JOB. CREW HAS JOURNEY MANAGEMENT SAFETY MEETING DISCUSSING ROUTE, CONVOY ORDER, FOLLOWING DISTANCE, COMMUNICATION, STOPS, HAZARDS, WALK AROUNDS AND DEPARTS FOR LOCATION
Event	3	Arrive At Loc	Arrive At Loc	9/23/2019	14:15:00	USER				CREW ARRIVES ON LOCATION. RIG RIH CASING 15900'. CREW ASSESSES LOCATION FOR HAZARDS AND EQUIPMENT LAYOUT. CREW HAS PRE RIG UP SAFETY MEETING DISCUSSING HAZARDS, RIG OPERATIONS, RED ZONES, MUSTER AREAS, PPE, TEAM LIFTING, SPOTTERS AND BEGIN RIGGING UP
Event	4	Casing on Bottom	Casing on Bottom	9/23/2019	17:15:00	USER	8.00	8.93	0.00	CASING ON BOTTOM.
Event	5	Comment	Pump Spacer 1	9/23/2019	17:41:39	COM6	9.00	8.92	0.00	DONE MIXING LATEX



Event	6	Safety Meeting	Safety Meeting	9/23/2019	18:30:00	USER	12.00	8.93	0.00	CREW, RIG CREW AND CUSTOMER REP HAVE PRE JOB SAFETY MEETING DISCUSSING HAZARDS, MUSTER AREAS, RED ZONES, CONTINGENCIES, ROLES, COMMUNICATION, SIM OPS, SLIPS TRIPS FALLS, 3 POINTS OF CONTACT AND THE JOB PROCEEDURE
Event	7	Drop Bottom Plug	Drop Bottom Plug	9/23/2019	19:17:47	COM6	236.00	8.78	1.40	BOTTOM PLUG DROPPED WITH CUSTOMER REP
Event	8	Test Lines	Test Lines	9/23/2019	19:21:19	COM6	4366.00	8.72	0.00	FILL LINES WITH 3 BBL WATER. PRESSURE TEST HES LINES TO 4500 PSI. HELD FOR A FEW MINUTES AND TEST WAS GOOD
Event	9	Pump Spacer 1	Pump Spacer 1	9/23/2019	19:23:17	COM6	50.00	8.58	0.00	PUMP 50 BBL TUNED PRIME SPACER 11.5# 3.74 YIELD 23.7 GAL
Event	10	Pump Lead Cement	Pump Lead Cement	9/23/2019	19:33:32	COM6	305.00	11.69	5.50	PUMP 260 BBL ELASTICEM CAP 12.5# 1.79 YIELD 9.06 GAL 815 SACKS
Event	11	Pump Cement	Pump Cement	9/23/2019	20:15:27	COM6	421.00	12.58	8.00	PUMP 174 BBL GASSTOP LEAD 13.2# 1.59 YIELD 7.7 GAL 615 SACKS
Event	12	Pump Tail Cement	Pump Tail Cement	9/23/2019	20:43:17	COM6	336.00	13.04	5.60	PUMP 511 BBL ELASTICEM TAIL 13.2# 1.56 YIELD 7.62 GAL 1840 SACKS
Event	13	Comment	Comment	9/23/2019	20:43:32	USER	574.00	13.09	5.60	BOTTOM PLUG LANDS ON FLOAT COLLAR AND RUPTURES
Event	14	Shutdown	Shutdown	9/23/2019	22:00:09	USER	83.00	14.46	0.00	SHUTDOWN. BLOW DOWN LINES TO THE PIT. WASH PUMPS TO THE PIT

Event	15	Drop Top Plug	Drop Top Plug	9/23/2019	22:09:50	COM6	95.00	8.51	4.00	DROP SECOND BOTTOM PLUG WITH CUSTOMER REP
Event	16	Pump Displacement	Pump Displacement	9/23/2019	22:11:10	COM6	30.00	2.44	0.00	PUMP 484 BBL DISPLACEMENT WATER WITH THE FIRST 20 BBL MMCR
Event	17	Displ Reached Cement	Displ Reached Cement	9/23/2019	22:22:01	COM6	224.00	8.41	6.00	DISPLACEMENT CATCHES PLUG. PICK UP RATE TO 10 BPM
Event	18	Bump Plug	Bump Plug	9/23/2019	23:14:42	USER	2749.00	8.41	4.20	BUMP PLUG. FINAL CIRCULATING PRESSURE 2460 PSI AT 4 BPM. TOOK TO 2840 PSI AND HELD FOR A MINUTE
Event	19	Comment	Comment	9/23/2019	23:15:29	USER	2946.00	8.41	1.20	PRESSURE UP TO 3260 PSI TO RUPTURE BOTTOM PLUG AND PUMP 6 BBL WET SHOE.
Event	20	Check Floats	Check Floats	9/23/2019	23:17:45	USER	2140.00	8.38	0.00	CHECK FLOATS. FLOATS HELD WITH 3.5 BBL BACK
Event	21	End Job	End Job	9/23/2019	23:21:08	COM6	62.00	8.32	0.00	END JOB
Event	22	Safety Meeting	Safety Meeting	9/23/2019	23:25:00	USER				CREW HAS RIG DOWN SAFETY MEETING DISCUSSING HAZARDS, LIGHTING, NOISE, DUST, PPE, TEAM LIFTING, SLIP TRIPS FALLS, TEAM LIFTING, COMMUNICATION, RIG OPERATIONS AND BEGIN RIGGING DOWN EQUIPMENT
Event	23	Depart Location for Shop	Depart Location for Shop	9/24/2019	02:00:00	USER				CREW IS RIGGED DOWN AND READY TO DEPART. CREW HAS JOURNEY MANAGEMENT SAFETY MEETING DISCUSSING ROUTE, HOURS OF SERVICE,

FIT FOR DUTY, STOPS, WALK  
AROUNDS, CONVOY ORDER,  
FOLLOWING DISTANCE AND  
DEPARTS FROM LOCATION

---

3.0 Attachments

3.1 LIVINGSTON S19-25-12N PRODUCTION.png

