

# HALLIBURTON

iCem<sup>®</sup> Service

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

**For: MANNY PARRAS**

Date: Thursday, August 29, 2019

### **LIVINGSTON S19-25-8C**

EXTRACTION LIVINGSTON S19-25-8C PRODUCTION

Job Date: Thursday, August 29, 2019

Sincerely,

**NICK KORNAFEL & CREW**

## Legal Notice

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### 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.

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## 1.0 Cementing Job Summary

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### 1.1 Executive Summary

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Halliburton appreciates the opportunity to perform the cementing services on the cement 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 41 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> 3883647		<b>Quote #:</b> 0022602041		<b>Sales Order #:</b> 0905932078					
<b>Customer:</b> EXTRACTION OIL & GAS-EBUS				<b>Customer Rep:</b> MANNY PARRAS							
<b>Well Name:</b> LIVINGSTON			<b>Well #:</b> S19-25-8C		<b>API/UWI #:</b> 05-014-20754-00						
<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-1402FEL											
<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>Srvc Supervisor:</b> Nikolaus Kornafel							
<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>		21173ft				<b>Job Depth TVD</b>					
<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		9.625	8.921	36			0	1636		0	
Casing		5.5	4.778	20			0	21173		0	
Open Hole Section			8.75				1636	21183	0	8408	
<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>		
<b>Guide Shoe</b>	5.5	1		21173		<b>Top Plug</b>	5.5	1	HES		
						<b>Bottom Plug</b>	5.5	1	HES		
<b>Float Collar</b>	5.5	1		21158							
						<b>Plug Container</b>	5.5	1	HES		
						<b>Centralizers</b>	5.5				
<b>Fluid Data</b>											
<b>Stage/Plug #: 1</b>											
<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 ft<sup>3</sup>/sack</b>	<b>Mix Fluid Gal</b>	<b>Rate bbl/min</b>	<b>Total Mix Fluid Gal</b>
1	SPACER	TUNED PRIME CEMENT SPACER SYS			50	bbl	11.5	3.74	23.7	6	1,779

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	870	sack	12.5	1.79	9.06	8	7,882
3	LATEX CEMENT	GASSTOP (TM) SYSTEM	615	sack	13.2	1.6	7.7	8	4,735
4	TAIL CEMENT	ELASTICEM (TM) SYSTEM	2101	sack	13.2	1.59	7.89	8	16,576
5	MMCR Displacement	MMCR Displacement	20	bbl	8.33			8	
6	Displacement	Displacement	471	bbl	8.33				
<div> <div>Cement Left In Pipe</div> <div>Amount</div> <div>0 ft</div> <div>Reason</div> <div>WET SHOE</div> </div>									
<div> <div>Mix Water:</div> <div>pH 7</div> <div>Mix Water Chloride:</div> <div>0 ppm</div> <div>Mix Water Temperature:</div> <div>75 °F</div> </div>									
<div> <div>Cement Temperature:</div> <div>N/A</div> <div>Plug Displaced by:</div> <div>8.33 lb/gal</div> <div>Disp. Temperature:</div> <div>75 °F</div> </div>									
<div> <div>Plug Bumped?</div> <div>Yes</div> <div>Bump Pressure:</div> <div>2,550 psi</div> <div>Floats Held?</div> <div>Yes</div> </div>									
<div> <div>Cement Returns:</div> <div>40 bbl</div> <div>Returns Density:</div> <div>N/A</div> <div>Returns Temperature:</div> <div>N/A</div> </div>									
<b>Comment</b> PUMPED 50 BBLs OF SPACER FOLLOWED BY 277 BBLs OF CAP CEMENT FOLLOWED BY 175 BBLs OF LEAD LATEX CEMENT FOLLOWED BY 595 BBLs OF TAIL CEMENT. DROPPED TOP PLUG AND DISPLACED WITH 491 BBLs OF FRESH WATER. GOOD RETURNS THROUGHOUT THE JOB. BUMPED THE PLUG AND THE PRESSURED UP TO BURST THE DISK AND THE PUMPED A 5 BBL WET SHOE AND THEN RELEASED PRESSURE AND CHECKED FLOATS, FLOATS HELD, 4 BBLs BACK.									

## 2.0 Real-Time Job Summary

### 2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DH Density (ppg)	Comb Pump Rate (bbl/min)	DS Pump Press (psi)	Pump Stg Tot (bbl)	Comments
Event	1	Call Out	Call Out	8/28/2019	08:00:00	USER					CREW CALLED OUT AT 0800, REQUESTED ON LOCATION 15:00. CREW PICKED UP CEMENT, CHEMICALS, AND PLUG CONTAINER FROM FT. LUPTON, CO. BULK 660 10784082, BULK 660 10866493, SOFTSIDE 12051673 AND PUMP 11826999.
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	8/28/2019	13:00:00	USER					CREW DISCUSSED ROUTES, HAZARDS, AND COMMUNICATION WITH CREW.
Event	3	Crew Leave Yard	Crew Leave Yard	8/28/2019	13:15:00	USER					STARTED JOURNEY MANAGEMENT.
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	8/28/2019	14:30:00	USER					END JOURNEY MANAGEMENT. MEET WITH CO. MAN TO DISCUSS JOB; SURFACE CASING- 9.625" 36 LB/FT @ 1,636, 5.5" CASING: 17 LB/FT TOTAL 21,173', 8.75" HOLE, TD 21,183', SHOE TRAC- 15', TVD- 8,408'. PUMP FRESH WATER DISPLACEMENT 491 BBLS. CASING LANDED @ 22:00 08/20/2019. RIG CIRCULATED BOTTOMS UP.

Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	8/28/2019	15:00:00	USER					HAZARD HUNT. DISCUSSED POSSIBLE HAZARDS ASSOCIATED WITH LOCATION, RIG UP, AND WEATHER.
Event	6	Rig-Up Equipment	Rig-Up Equipment	8/28/2019	15:15:00	USER					CREW STAGED EQUIPMENT AND RIGGED UP BULK, IRON AND WATER HOSES TO PERFORM JOB.
Event	7	Pre-Job Safety Meeting	Pre-Job Safety Meeting	8/28/2019	22:00:00	USER	8.34	0.00	2.00	3.70	SAFETY MEETING WITH HALLIBURTON, AND RIG PERSONNEL. CREW COMMUNICATED POTENTIAL SAFETY HAZARDS, AND JOB DETAILS.
Event	8	Check Weight	Check Weight	8/28/2019	22:07:36	COM5	8.34	0.00	0.00	3.70	WEIGHT VERIFIED BY PRESSURIZED MUD SCALES.
Event	9	Start Job	Start Job	8/28/2019	23:40:22	COM5	8.42	0.00	-1.00	0.00	BEGIN RECORDING JOB DATA.
Event	10	Drop Bottom Plug	Drop Bottom Plug	8/28/2019	23:41:43	COM5	8.37	2.90	313.00	1.40	BOTTOM PLUG LEFT PLUG CONTAINER, WITNESSED BY COMPANY MAN
Event	11	Test Lines	Test Lines	8/28/2019	23:42:23	COM5	8.33	0.00	227.00	3.00	PRESSURE TESTED IRON TO 5,000 PSI. KICKOUTS SET @ 500 PSI, KICKED OUT @ 900 PSI, 5TH GEAR STALL OUT @ 2,100 PSI.
Event	12	Pump Spacer 1	Pump Spacer 1	8/28/2019	23:47:10	COM5	8.33	0.00	13.00	3.00	PUMP 50 BBLS OF FDP SPACER @ 11.5 LB/GAL, 3.74 FT3/SK, 23.7 GAL/SK 10 GALLONS D-AIR. DENSITY VERIFIED BY PRESSURIZED MUD SCALES. PUMP RATE 8 BBLS/MIN @ 440 PSI.
Event	13	Check Weight	Check Weight	8/28/2019	23:51:46	COM5	12.17	8.50	702.00	20.30	DENSITY VERIFIED BY PRESSURIZED MUD SCALES.



Event	14	Check Weight	Check Weight	8/28/2019	23:55:07	COM5	12.05	5.50	397.00	32.80	DENSITY VERIFIED BY PRESSURIZED MUD SCALES.
Event	15	Pump Lead Cement	Pump Lead Cement	8/28/2019	23:56:23	COM5	11.87	5.50	416.00	0.00	PUMPED 870 SKS OF ELASTICEM @ 12.5 LB/GAL, 1.79 FT3/SK, 9.06 GAL/SK. 277 BBLs, CAP CEMENT TO SURFACE. DENSITY VERIFIED BY PRESSURIZED MUD SCALES. PUMP RATE 8 BBLs/MIN @ 580 PSI.
Event	16	Check Weight	Check Weight	8/28/2019	23:58:59	COM5	12.63	7.90	724.00	18.20	DENSITY VERIFIED BY PRESSURIZED MUD SCALES.
Event	17	Pump Cement	Pump Cement	8/29/2019	00:32:31	COM5	12.46	8.40	449.00	0.10	PUMPED 615 SKS OF GASTOP @ 13.2 LB/GAL, 1.6 FT3/SK, 7.7 GAL/SK. 175 BBLs, 1,538 GALS LATEX. ESTIMATED TOP OF LATEX CEMENT AT 4,067'. DENSITY VERIFIED BY PRESSURIZED MUD SCALES. PUMP RATE 8 BBLs/MIN @ 640 PSI.
Event	18	Check Weight	Check Weight	8/29/2019	00:34:33	COM5	13.06	8.40	544.00	17.10	DENSITY VERIFIED BY PRESSURIZED MUD SCALES.
Event	19	Pump Tail Cement	Pump Tail Cement	8/29/2019	00:56:01	COM5	13.20	8.40	689.00	196.90	PUMP 2,101 SKS OF ELASTICEM @ 13.2 LB/GAL, 1.59 FT3/SK, 7.89 GAL/SK, 595 BBLs. TOT CALCULATED @ 7,961'. DENSITY VERIFIED BY PRESSURIZED MUD SCALES. PUMP RATE 8 BBLs/MIN @ 650 PSI.
Event	20	Check Weight	Check Weight	8/29/2019	01:04:09	COM5	13.12	8.30	650.00	41.10	DENSITY VERIFIED BY PRESSURIZED MUD SCALES.
Event	21	Check Weight	Check Weight	8/29/2019	01:36:28	COM5	13.11	8.40	590.00	297.70	DENSITY VERIFIED BY PRESSURIZED MUD SCALES.
Event	22	Shutdown	Shutdown	8/29/2019	02:12:09	COM5	33.86	0.00	60.00	591.90	SHUTDOWN TO WASH PUMPS AND LINES.

Event	23	Drop Top Plug	Drop Top Plug	8/29/2019	02:22:02	COM5	7.93	0.00	1.00	608.00	PLUG LEFT CONTAINER, VERIFIED BY CO. MAN.
Event	24	Pump Displacement	Pump Displacement	8/29/2019	02:22:06	COM5	7.94	0.00	0.00	0.00	BEGIN CALCULATED DISPLACEMENT OF 491 BBLS WITH FRESH WATER. 415 BBLS INTO DISPLACEMENT SPACER RETURNS TO SURFACE. 40 BBLS OF CEMENT TO SURFACE.
Event	25	Displ Reached Cement	Displ Reached Cement	8/29/2019	02:26:14	COM5	8.32	10.10	1058.00	33.30	CAUGHT CEMENT @ 30 BBLS INTO DISPLACEMENT.
Event	26	Bump Plug	Bump Plug	8/29/2019	04:01:06	COM5	8.37	0.00	2934.00	498.80	SLOW RATE TO 3 BPM @ 460 BBLS INTO DISPLACEMENT. PLUG BUMPED AT CALCULATED DISPLACEMENT. 2,550 PSI PRESSURED UP 500 PSI OVER FINAL CIRCULATING PRESSURE.
Event	27	Pressure Up Well	Pressure Up Well	8/29/2019	04:01:41	COM5	8.36	0.00	2961.00	498.80	PRESSURED UP TO 3,521 PSI TO BURST THE DISC AND THEN PUMPED A 5 BBL WET SHOE.
Event	28	Other	Other	8/29/2019	04:04:29	COM5	8.37	0.00	2378.00	506.90	RELEASED PRESSURE, FLOATS HELD, 4 BBLS BACK.
Event	29	End Job	End Job	8/29/2019	04:05:40	COM5	8.25	0.00	5.00	0.00	STOP RECORDING JOB DATA.
Event	30	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	8/29/2019	04:10:00	USER					DISCUSSED POSSIBLE HAZARDS ASSOCIATED WITH WEATHER, LOCATION AND RIGGING DOWN IRON AND HOSES.

Event	31	Rig-Down Completed	Rig-Down Completed	8/29/2019	05:30:00	USER	ALL HALLIBURTON ITEMS WERE STOWED FOR TRAVEL, AND LOCATION WAS CLEAN.
Event	32	Safety Meeting - Departing Location	Safety Meeting - Departing Location	8/29/2019	06:00:00	USER	CREW DISCUSSED ROUTES HAZARDS AND COMMUNICATION WITH CREW.
Event	33	Crew Leave Location	Crew Leave Location	8/29/2019	06:05:00	USER	THANK YOU FOR USING HALLIBURTON – NICK KORNAFEL AND CREW.

## 3.0 Attachments

### 3.1 EXTRACTION LIVINGSTON S19-25-8C PRODUCTION-Custom Results.png

