

# HALLIBURTON

iCem<sup>®</sup> Service

## **EXTRACTION OIL & GAS**

Ft. Lupton District, COLORADO

**For: DANNY HERRERA**

Date: Friday, July 26, 2019

## **5 ½ PRODUCTION**

LIVINGSTON S19-25-2C

Case 1

Job Date: Thursday, July 25, 2019

Sincerely,

**VITALI NEVERDASOV**

## 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	Appendix .....	<b>Error! Bookmark not defined.</b>
1.1	3D Wellbore Schematic .....	<b>Error! Bookmark not defined.</b>
2.0	Real-Time Job Summary .....	6
2.1	Job Event Log .....	6
3.0	Attachments.....	9
3.1	Case 1-Custom Results.png.....	9

*The Road to Excellence Starts with Safety*

Sold To #: 369404		Ship To #: 3883646		Quote #:		Sales Order #: 0905846616	
Customer: EXTRACTION OIL & GAS-EBUS				Customer Rep: DANNY HERRERA			
Well Name: LIVINGSTON			Well #: S19-25-2C			API/UWI #: 05-014-20753-00	
Field: WATTENBERG		City (SAP): BROOMFIELD		County/Parish: BROOMFIELD		State: COLORADO	
Legal Description: NW SE-7-1S-68W-2332FSL-1510FEL							
Contractor: PATTERSON-UTI ENERGY				Rig/Platform Name/Num: PATTERSON 901			
Job BOM: 7523 7523							
Well Type: HORIZONTAL OIL							
Sales Person: HALAMERICA\HX38199				Srcv Supervisor: Vitali Neverdasov			

**Job**

Formation Name			
Formation Depth (MD)		Top	Bottom
Form Type		BHST	
Job depth MD		21763ft	Job Depth TVD 8355
Water Depth		Wk Ht Above Floor	
Perforation Depth (MD)		From	To

**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	1636	0	1636
Casing	0	5.5	4.892	17	BTC	P-110	0	21763	0	8355
Open Hole Section			8.5				1636	9589	0	8355
Open Hole Section			8.75				9589	21773	0	0

**Tools and Accessories**

Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make
Guide Shoe	5.5				Top Plug	5.5	1	NA
Float Shoe	5.5	1	NA	21763	Bottom Plug	5.5		
Float Collar	5.5	1	NA	21758	SSR plug set	5.5		
Insert Float	5.5				Plug Container	5.5	1	HES
Stage Tool	5.5				Centralizers	5.5		

**Fluid Data**

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft <sup>3</sup> /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
1	FDP-C1337-18	SBM FDP-C1337-18 CEMENT SPACER SYS	50	bbl	12.5	2.76		5	

5 lbm/bbl	<b>SEM-94P, 35 LB SACK - (1023987)</b>
203.69 lbm/bbl	<b>BARITE, BULK (100003681)</b>
5 lbm/bbl	<b>SEM-93P, 35 LB SACK - (1023977)</b>
1 lbm/bbl	<b>FE-2 (100001615)</b>

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	1.59		8	7.92
0.85 %		<b>SCR-100 (100003749)</b>							
7.92 Gal		<b>FRESH WATER</b>							

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	1.59		7	7.89
0.85 %		<b>SCR-100 (100003749)</b>							
5.39 Gal		<b>FRESH WATER</b>							

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	2350	sack	13.2	1.59		6.5	7.66
7.66 Gal		<b>FRESH WATER</b>							

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		<b>MICRO MATRIX CEMENT RETARDER, 5 GAL PAIL (100003781)</b>							

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	505	bbl	8.33			8	

<b>Cement Left In Pipe</b>	<b>Amount</b>	0 ft	<b>Reason</b>	<b>Shoe Joint</b>
----------------------------	---------------	------	---------------	-------------------

**Comment:** 72 BBLs OF CEMENT BACK TO SURFACE. ESTIMATED TOP OF LED 2 @ 1978. TOP OF TAIL @ 5845'. HAD TO PUMP TAIL @ 6.5 BPM DUE TO LINE CAVITATION . DISPLACE CALCULATED VOLUME. DID NOT BUMP PLUG. FLOATS HELD.

## 1.0 Real-Time Job Summary

### 1.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	Comb Pump Rate <i>(bbl/min)</i>	DH Density <i>(ppg)</i>	PS Pump Press <i>(psi)</i>	Pump Stg Tot <i>(bbl)</i>	Comments
Event	1	Call Out	Call Out	7/25/2019	04:00:00	USER					ON LOCATION @ 12:00 RTP.
Event	2	Depart Yard Safety Meeting	Depart Yard Safety Meeting	7/25/2019	09:00:00	USER					HELD JSA PRIOR LEAVING THE YARD
Event	3	Depart from Service Center or Other Site	Depart from Service Center or Other Site	7/25/2019	09:15:00	USER					
Event	4	Arrive at Location from Service Center	Arrive at Location from Service Center	7/25/2019	10:00:00	USER					23 MILES. DISCUSS NUMBERS AND PROCEDURE WITH CUSTOMER. ALSO CONTINGENCY PLAN WAS DISCUSSED. RIG IS RUNNING CASING.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	7/25/2019	10:10:00	USER					JSA PRIOR SPOTTING EQUIPMENT AND RIGGING UP
Event	6	Other	SPOT TRUCKS	7/25/2019	10:15:00	USER					SPOT TRUCKS
Event	7	Other	RIG UP	7/25/2019	10:25:00	USER					RIG UP ALL SURFACE LINES TO THE BUFFER ZONE
Event	8	Casing on Bottom	Casing on Bottom	7/25/2019	15:30:00	USER					CASING LANDED
Event	9	Pre-Job Safety Meeting	Pre-Job Safety Meeting	7/25/2019	17:45:00	USER	0.00	8.51	-7.00	33.00	DISCUSS HAZARDS AND JOB PROCEDURE WITH ALL PERSONAL INVOLVED
Event	10	Start Job	Start Job	7/25/2019	18:29:04	COM4					
Event	11	Start Job	Start Job	7/25/2019	18:43:18	COM4	0.90	8.33	5.00	0.20	
Event	12	Pressure Test	Pressure Test	7/25/2019	18:52:00	USER	0.00	8.42	7426.00	2.80	LOAD LINE AND TEST TO 7505 PSI

Event	13	Pump Spacer	Pump Spacer	7/25/2019	18:56:00	USER	1.90	8.36	178.00	0.60	BATCH/ WEIGHT/ PUMP 50 BBLs OF FDP SPACER @ 12.5 PPG.
Event	14	Pump Lead Cement	Pump LEAD 1 Cement	7/25/2019	19:05:00	USER	4.80	12.40	433.00	41.20	BATCH/ WEIGHT/PUMP 585 SKS (165.7 BBLs) OF ELASTICEM @ 13.2 PPG.
Event	15	Check Weight	Check Weight	7/25/2019	19:07:41	COM4	4.90	12.92	575.00	8.10	
Event	16	Pump Lead Cement	Pump LEAD 2 Cement	7/25/2019	19:30:00	USER	7.80	13.16	692.00	177.10	WEIGHT/ PUMP 615 SKS (174.2 BBLs) OF GASSTOP CEMENT USING LATEX @ 13.2 PPG.
Event	17	Check Weight	Check Weight	7/25/2019	19:33:56	COM4	2.40	13.24	134.00	16.90	
Event	18	Pump Tail Cement	Pump Tail Cement	7/25/2019	20:04:00	USER	6.00	13.18	411.00	172.70	WEIGHT/ PUMP 2350 SKS (665.5 BBLs) OF ELASTICEM @ 13.2 PPG. ABOUT 70 BBLs INTO TAIL LINE STARTED TO CAVITATE ON THE FLOOR. HAD TO PUMP @ 6.5 BPM TO HAVE IT UNDER CONTROL.
Event	19	Check Weight	Check Weight	7/25/2019	20:05:42	COM4	6.00	13.04	381.00	1.80	
Event	20	Check Weight	Check Weight	7/25/2019	21:07:04	COM4	6.50	13.13	234.00	395.50	
Event	21	Shutdown	Shutdown	7/25/2019	22:17:00	USER	6.30	13.36	1287.00	828.60	FINISHED PUMPING CEMENT
Event	22	Clean Lines	Clean Lines	7/25/2019	22:19:00	USER	0.00	13.34	2.00	832.70	BLOW DOWN AND WASH PUMPS AND LINES.
Event	23	Drop Top Plug	Drop Top Plug	7/25/2019	22:20:00	USER	0.00	13.34	108.00	832.70	CUSTOMER DROP TOP PLUG.
Event	24	Pump Displacement	Pump Displacement	7/25/2019	22:27:00	USER	0.00	8.86	-9.00	848.30	504.8 BBLs OF FRESH WATER DISPLACEMENT. FIRST 20 BBLs WIRH MMCR.
Event	25	Other	Other	7/25/2019	22:30:00	USER	6.90	8.34	244.00	11.10	CUSTOMER DID NOT WANT TO EXCEED 2500 PSI DURING DICPLACEMENT.

HAD TO SLOW RATE TO 4 BPM AT 200 BBLs AWAY. AT 310 AWAY DECISION WAS MADE TO PICK UP RATE TO 5BPM IN ORDER TO HAVE ENOUGH TIME TO PLACE CEMENT.

Event	26	Shutdown	Shutdown	7/26/2019	00:28:00	USER	0.00	8.48	3851.00	541.70	PER CUSTOMER SHUTDOWN AT CALCULATED DISPLACEMENT VOLUME AND CHECK FLOATS.
Event	27	Check Floats	Check Floats	7/26/2019	00:31:00	USER	0.00	8.42	2986.00	541.70	FLOATS HELD. 3.5 BBLs BACK
Event	28	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	7/26/2019	00:40:00	USER	0.00	8.39	-6.00	541.70	HELD JSA PRIOR TO RIG DOWN
Event	29	End Job	End Job	7/26/2019	00:41:59	COM4	0.00	8.41	-7.00	541.70	

## 2.0 Attachments

### 2.1 Case 1-Custom Results.png

