

# HALLIBURTON

iCem<sup>®</sup> Service

## **TERRA ENERGY PARTNERS-EBUS**

Rock Springs District, COLORADO

### **For: H&P 318**

Date: Monday, March 09, 2020

### **SG 521-22 Surface**

GARFIELD, STRAIGHT BOTTOM RANCH

API # 05-045-24005

TERRA 318 SG 521-22

Sincerely,

Rock Springs Cement Engineering

## 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

    1.2    Job Overview .....5

    1.3    Planned Pumping Schedule .....5

    1.4    Water Analysis Report .....6

2.0    Real-Time Job Summary ..... 7

    2.1    Job Event Log .....7

3.0    Attachments..... 10

    3.1    CHART WITHOUT EVENTS.png .....10

## 1.0 Cementing Job Summary

---

### 1.1 Executive Summary

---

Halliburton appreciates the opportunity to perform the cementing services for this cementing services 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.

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, Rock Springs

**Job Times**

	Date	Time	Time Zone
Called Out	3/09/2020	00:00	MST
On Location	3/09/2020	07:00	MST
Job Started	3/09/2020	16:26	MST
Job Complete	3/09/2020	17:18	MST
Depart Location	3/09/2020	18:00	MST

## 1.2 Job Overview

		Units	Description
1	Surface temperature at time of job	°F	49
2	Mud type (OBM, WBM, SBM, Water, Brine)	lb/gal	WBM
3	Actual mud density	lb/gal	9.4
4	Time circulated before job	HH:MM	1:00
5	Mud volume circulated	Bbls	400
6	Rate at which well was circulated	Bpm	10
7	Pipe movement during hole circulation	Y/N	N
8	Rig pressure while circulating	Psi	153
9	Time from end mud circulation to start of job	HH:MM	00:11
10	Pipe movement during cementing	Y/N	N
11	Calculated displacement	Bbls	77
12	Job displaced by	Rig/HES	HES
13	Annular flow before job	Y/N	N
14	Annular flow after job	Y/N	N
15	Length of rat hole	Ft	10
16	Units of gas detected while circulating	Units	0
17	Was lost circulation experienced at any time ?	Y/N	N

## 1.3 Planned Pumping Schedule

Description	Stage No.	Density (ppg)	Rate (bbl/min)	Yield (ft <sup>3</sup> /sack)	Water Req. (gal/sack)	Volume (bbl)	Bulk Cement (sacks)	Duration (min)
TEP Surface Mud	1	8.40	4.00			0.00		0.00
Fresh Water Spacer	2	8.33	8.00			20.00		2.50
VariCem GJ1 Lead Q3 2018 2500622/1	3	12.30	8.00	2.3787	13.772	52.96	125.00	6.62
VariCem GJ1 Tail Q3 2018 2500623/1	4	12.80	8.00	2.1124	11.779	56.44	150.00	7.05
Top Plug/Start Displacement								
Fresh Water Displacement	5-1	8.33	10.00			55.50		5.55
Fresh Water Displacement	5-2	8.33	2.00			20.00		10.00
Total:						204.90		31.72

1.4 Water Analysis Report

---

**CEMENT MIX WATER REQUIREMENTS**

Item	Recorded Test Value	Units	Max. Acceptable Limit	Potential Problems in Exceeding Limit
pH	7	----	6.0 - 8.0	Chemicals in the water can cause severe retardation
Chlorides	0	ppm	3000 ppm	Can shorten thickening time of cement
Temperature	55	°F	50-80 °F	High temps will accelerate; Low temps may risk freezing in cold weather

## 2.0 Real-Time Job Summary

## 2.1 Job Event Log

Type	Seq. No.	Graph Label	Date	Time	Source	PS Pump Press (psi)	DH Density (ppg)	Comb Pump Rate (bbl/min)	Pump Stg Tot (bbl)	Comments
Event	1	Call Out	3/9/2020	00:00:00	USER					CALLED OUT FOR TERRA SURFACE ON LOCATION AT 6:00
Event	2	Pre-Convoy Safety Meeting	3/9/2020	01:15:00	USER					HALLIBURTON CEMENT CREW DISCUSSED THE HAZARDS OF DRIVING AND THE DIRECTIONS TO LOCATION
Event	3	Crew Leave Yard	3/9/2020	01:30:00	USER					
Event	4	Arrive At Loc	3/9/2020	07:00:00	USER					STILL RUNNING CASING. TD= 1050, TP 9.625", 1040' 36#. HOLE= 13.5", MUD= 9.4#, SHOE= 44.31'
Event	5	Assessment Of Location Safety Meeting	3/9/2020	07:10:00	USER					HALLIBURTON CEMENT CREW DISCUSSED THE HAZARDS OF THE LOCATION.
Event	6	Pre-Rig Up Safety Meeting	3/9/2020	07:20:00	USER					HALLIBURTON CEMENT CREW DISCUSSED THE HAZARDS OF RIGGING UP THE EQUIPMENT.
Event	7	Rig-Up Equipment	3/9/2020	07:30:00	USER					
Event	8	Pre-Job Safety Meeting	Pre-Job Safety Meeting	3/9/2020	15:10:05	10.82	8.22	2.05	0.59	HALLIBURTON CEMENT CREW, RIG CREW AND COMPANY REP. DISCUSSED THE HAZARDS OF THE JOB AND THE JOB PROCEEDURE.
Event	9	Pump Water	Pump Water	3/9/2020	15:15:00	614.58	12.44	7.95	14.07	PUMP 5 BBLS OF WATER TO FILL PUMPS AND LINES.
Event	10	Shutdown	Shutdown	3/9/2020	15:17:00	10.82	8.22	2.05	0.59	
Event	11	Pressure Test	Pressure Test	3/9/2020	15:19:00	42.69	8.33	2.04	4.69	PRESSURE TESTED HES LINES: 500 PSI LOW KICK OUT, 3500 PSI FOR HIGH PRESSURE.
Event	12	Pump Spacer	Pump Spacer 1	3/9/2020	15:27:00	2850.55	8.38	0.16	5.22	PUMPED 20 BBLS OF H2O AT 4 BPM.
Event	13	Pump Lead Cement	Pump Lead Cement	3/9/2020	15:32:00	129.88	8.36	3.50	1.31	PUMPED 125 SACKS OF VARICEM LEAD CEMENT AT 12.3 PPG 2.38 YLD., 13.74 GAL/ SACK AT 8 BPM

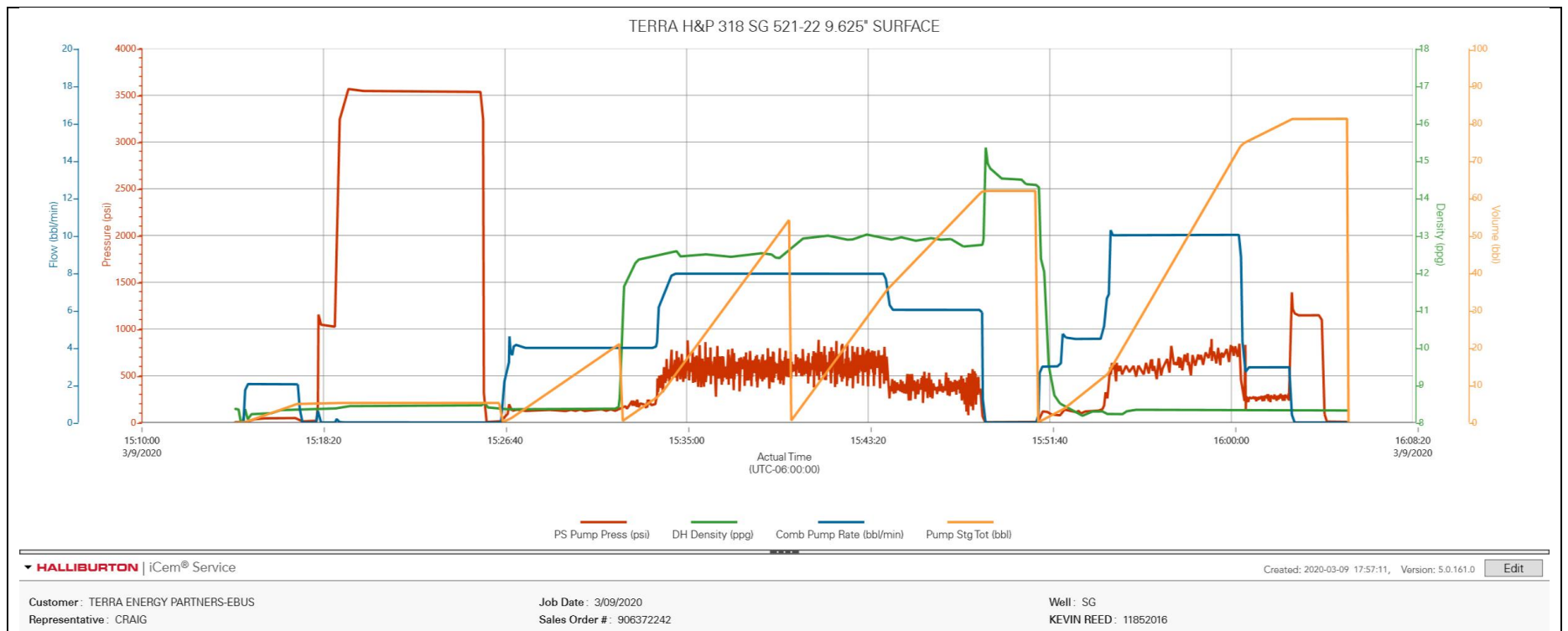
Event	14	Mud Cup Sample Pulled	Mud Cup Sample Pulled	3/9/2020	15:32:16	143.95	10.05	3.99	0.13	Mud Cup Sample Pulled
Event	15	Check Weight	Check Weight	3/9/2020	15:33:00	146.76	11.82	3.98	1.20	
Event	16	Pump Tail Cement	Pump Tail Cement	3/9/2020	15:40:00	173.01	12.39	3.99	4.12	PUMPED 150 SACKS OF VARICEM TAIL CEMENT AT 12.8 PPG 2.11 YLD., 11.74 GAL/ SACK AT 8 BPM. EST. TOP OF TAIL: 431.1'
Event	17	Check Weight	Check Weight	3/9/2020	15:41:00	563.01	12.78	7.95	2.06	
Event	18	Shutdown	Shutdown	3/9/2020	15:48:00	478.64	12.96	7.97	10.01	
Event	19	Drop Top Plug	Drop Top Plug	3/9/2020	15:49:00	359.57	12.73	6.02	58.40	COMPANY REP. WITNESSED THE PLUG DROP
Event	20	Pump Displacement	Pump Displacement	3/9/2020	15:51:00	2.38	14.76	0.00	61.92	PUMP 77 BBLS OF H2O DISPLACEMENT AT 10 BPM
Event	21	Slow Rate	Slow Rate	3/9/2020	16:01:00	5.19	14.35	0.00	61.92	PUMPED 10 BBLS OF H2O AT 3 BPM. FOR A TOTAL OF 77 BBLS OF DISPLACEMENT.
Event	22	Bump Plug	BUMP PLUG	3/9/2020	16:02:30	248.01	8.32	2.97	75.94	BUMP PLUG AT 254 PSI WENT 500 PSI OVER FINAL CIRCULATING PRESSURE
Event	23	Check Floats	Check Floats	3/9/2020	16:04:00	257.38	8.32	2.97	80.38	FLOATS HELD WITH 1 BBLS BACK TO HALLIBURTON PUMP.
Event	24	End Job	End Job	3/9/2020	17:18:00	1145.21	8.35	0.00	81.19	FULL RETURNS THROUGHOUT JOB GOT 20 BBLS OF LEAD CEMENT AND 20 BBLS OF SPACER TO SURFACE. HAD TO PULL RTD FILE FROM FLECS. CAUSING REAL TIME TO BE OFF BY 1:10.
Event	25	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	3/9/2020	17:18:00					HALLIBURTON CEMENT CREW DISCUSSED THE HAZARDS OF RIGGING DOWN THE EQUIPMENT
Event	26	Rig-Down Equipment	Rig-Down Equipment	3/9/2020	17:20:00					
Event	27	Pre-Convoy Safety Meeting	Pre-Convoy	3/9/2020	17:50:00					HALLIBURTON CEMENT CREW DISCUSSES THE HAZARDS OF DRIVING.



			Safety Meeting			
Event	28	Crew Leave Location	Crew Leave Location	3/9/2020	18:00:00	
Event	29	Job Complete	Job Complete	3/9/2020	18:00:01	NO ACCIDENTS, NO INCIDENTS. THANKS FROM THE ROCK SPRINGS HALLIBURTON CEMENT CREW.

## 3.0 Attachments

### 3.1 CHART WITHOUT EVENTS.png



## 3.2 CHART WITH EVENTS.png

