

HALLIBURTON

iCem[®] Service

TERRA ENERGY PARTNERS-EBUS

Rock Springs District, Wyoming

For: H&P 318

Date: Sunday, January 12, 2020

PJR - RWF-332-12 Surface

API# 05-045-24284-00

Sincerely,

John Keane

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 Summary4

 1.2 Job Overview5

 1.3 Planned Pumping Schedule5

 1.4 Water Analysis Report6

2.0 Real-Time Job Summary 7

 2.1 Job Event Log7

3.0 Attachments..... 9

 3.1 TEP-RWF-332-12-Surface.png.....9

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	1-12-2019	04:00	MST
On Location	1-12-2019	09:00	MST
Job Started	1-12-2019	12:50	MST
Job Complete	1-12-2019	13:45	MST
Depart Location	1-12-2019	15:05	MST

1.2 Job Overview

		Units	Description
1	Surface temperature at time of job	°F	22
2	Mud type (OBM, WBM, SBM, Water, Brine)	lb/gal	WBM
3	Actual mud density	lb/gal	9.8
4	Time circulated before job	HH:MM	00:30
5	Mud volume circulated	Bbls	300
6	Rate at which well was circulated	Bpm	10
7	Pipe movement during hole circulation	Y/N	N
8	Rig pressure while circulating	Psi	148
9	Time from end mud circulation to start of job	HH:MM	00:05
10	Pipe movement during cementing	Y/N	N
11	Calculated displacement	Bbls	77.1
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 ³ /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	62	°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	1/12/2020	04:00:00	USER					REQUESTED ON LOCATION TIME 10:00
Event	2	Pre-Convoy Safety Meeting	1/12/2020	08:00:00	USER					WITH HES, JSA COMPLETED, 1 IRON TRUCK, 1 ELITE CEMENTING UNIT, 1 660 BULK TRUCK
Event	3	Arrive At Loc	1/12/2020	09:00:00	USER					RIG ON BOTTOM WITH CASING, CIRCULATING UPON HES ARRIVAL
Event	4	Assessment Of Location Safety Meeting	1/12/2020	09:15:00	USER					WITH HES, JSA COMPLETED, SDS OFFERED FOR ALL HES MATERIALS
Event	5	Pre-Rig Up Safety Meeting	1/12/2020	09:30:00	USER					WITH HES, 1 LINE RAN TO THE FLOOR, 1 9.625 IN QUICK-LATCH PLUG CONTAINER
Event	6	Rig-Up Equipment	1/12/2020	09:45:00	USER					
Event	7	Water Test	1/12/2020	10:00:00	USER					TEMP 62 DEG F, PH 7.0, CHLOR 0
Event	8	Comment	1/12/2020	10:10:00	USER					TD 1052 FT, TP 1042 9.625 IN 36 LB/FT J-55, HOLE 13.5 IN, SHOE 44.6 FT
Event	9	Comment	1/12/2020	10:15:00	USER					RIG CIRCULATION, 300 BBL, 10 BBL/MIN, 148 PSI, MWT 9.8 LB/GAL WBM, PIPE WAS STATIC, RAT HOLE LENGTH 10 FT
Event	10	Pre-Job Safety Meeting	1/12/2020	12:00:00	USER					WITH HES, TEP, AND H&P 318
Event	11	Start Job	1/12/2020	12:43:35	COM6					
Event	12	Fill Lines	1/12/2020	12:50:15	USER	94.00	8.41	3.00	1.70	5 BBL FRESH WATER
Event	13	Test Lines	1/12/2020	12:54:11	USER	3532.00	8.31	0.00	3.10	LOW TEST AT 1000 PSI, HIGH TEST AT 3500 PSI, PRESSURE HOLDING
Event	14	Pump Fresh Water Spacer	1/12/2020	13:01:04	USER	74.00	8.26	3.90	0.80	20 BBL FRESH WATER
Event	15	Pump Lead Cement	1/12/2020	13:06:09	USER	189.00	12.33	4.00	1.00	MIXED AT 12.3 LB/GAL, (VARICEM) 125 SKS, 2.38 FT3/SK, 13.74 GAL/SK, DENSITY VERIFIED USING PRESSURIZED MUD SCALES

Event	16	Pump Tail Cement	1/12/2020	13:15:45	USER	283.00	12.80	6.00	1.00	MIXED AT 12.8 LB/GAL, (VARICEM) 150 SKS, 2.11 FT3/SK, 11.74 GAL/SK, DENSITY VERIFIED USING PRESSURIZED MUD SCALES
Event	17	Shutdown	1/12/2020	13:21:58	USER	310.00	12.69	6.20	46.10	
Event	18	Drop Top Plug	1/12/2020	13:23:00	USER	-22.00	-0.03	0.00	47.60	PLUG LAUNCHED, CUSTOMER WITNESSED
Event	19	Pump Displacement	1/12/2020	13:24:11	USER	104.00	9.20	4.00	1.50	FRESH WATER
Event	20	Slow Rate	1/12/2020	13:33:00	USER	217.00	8.03	2.10	69.40	SLOWED AT 67 BBL AWAY TO 2 BBL/MIN
Event	21	Bump Plug	1/12/2020	13:36:20	USER	228.00	8.01	2.00	76.20	PLUG BUMPED AT CALCULATED DISPLACEMENT, 245 PSI
Event	22	Check Floats	1/12/2020	13:37:36	USER	770.00	8.01	0.00	76.90	FLOATS HOLDING, 745 PSI PRESSURE HOLDING, .5 BBL RETURNED TO THE TANKS
Event	23	End Job	1/12/2020	13:45:00	USER	2.00	7.97	0.60	76.90	GOOD CIRCULATION, NO ADD HOURS, RIG DID NOT USE SUGAR, RIG USED TOP PLUG,
Event	24	Pre-Rig Down Safety Meeting	1/12/2020	13:50:00	USER					WITH HES, JSA COMPLETED
Event	25	Rig Down Lines	1/12/2020	14:00:00	USER					
Event	26	Pre-Convoy Safety Meeting	1/12/2020	15:00:00	USER					WITH HES, JSA COMPLETED
Event	27	Comment	1/12/2020	15:05:00	USER					SPACER 20 BBL FRESH WATER, LEAD CEMENT 53 BBL, TAIL CEMENT 56 BBL, FINAL DISPLACEMENT 77 BBL, 14 BBL CEMENT CIRCULATED TO SURFACE, TOP OF TAIL CEMENT 434 FT
Event	28	Crew Leave Location	1/12/2020	15:10:00	USER					THANKS FOR USING HALLIBURTON, JOHN KEANE AND CREW

3.0 Attachments

3.1 TEP-RWF-332-12-Surface.png

