

HALLIBURTON

iCem[®] Service

NOBLE ENERGY INC-EBUS

Ft. Lupton District, CO

Booth State CC30-725 Production

Job Date: Monday, April 03, 2023

Sincerely,

Meghan Van Zyl

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

Cementing Job Summary	4
Executive Summary	4
Job Overview	5
Water Field Test	7
Actual Pump Schedule	7
Real-Time Job Summary	8
Job Event Log	8
Attachments	11
Real Time iCem Job Chart	11

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Booth State CC30-725 - Production**. 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.

Job was pumped per design with an average cement density of 13.12 ppg at 7.28 bbl/min. Cement was displaced with 20 bbl. of treated water with retarder and 372 bbl. of treated freshwater displacement. Plug was landed at 2,650 psi and bumped to 3,100 psi. Pressure was bled off and 5.5 bbls. of fluid was returned to the truck. Approximately 68 bbl. of spacer was returned to surface indicating a top of cement around 947'.

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 Rockies Cement Team

1.2 Job Overview

Job Details	
API #:	05-123-49272-00
City, County:	KERSEY, WELD

Job Times		
	Date (mm/dd/yyyy)	Time (hh:mm)
Requested Time On Location:	4/3/2022	0400
Called Out Time:	4/2/2022	2200
Arrived On Location:	4/3/2022	0300/ BULK 0545
Job Started:	4/3/2022	0656
Job Completed:	4/3/2022	1120
Departed Location:	4/3/2022	1300

	Description	Units	Value
1	Surface temperature at the time of the job	degree F	30
2	Mud type (OBM, WBM, Synthetic, Water, Brine)	-	OBM
3	Mud density	ppg	10.6 PPG
4	Casing set depth (shoe)	ft	16900.4
5	TVD	ft	6742
6	Float collar depth	ft	16893.3
7	Length of rat hole	ft	7
8	Previous casing shoe depth	ft	1962
9	Pre-job mud circulation time	hh:mm	1:30
10	Pre-job mud circulation rate	bpm	11.9
11	Pre-job mud circulation volume	bbls	700

12	Mud circulation pressure at start of cement	psi	750
13	Annual flow before the start of job	Y/N	Y
14	Pipe movement during cement job	Y/N	Y
15	Calculated displacement	bbls	392.8
16	Job displaced by	Rig/HES	HES
17	Estimated returns % during job	%	100
18	Fluid returns to surface	Spacer/Cement, bbls	68/0
19	Final circulation pressure, rate prior to plug bump	psi @ bpm	2650
20	Number of Centralizers	-	204
21	Number of bottom plugs	-	(2) 1000 PSI

1.3 Water Field Test

	Recorded Value	Unit	Acceptable Limit	Potential Problems if Values Exceed the Limit
pH	7		6.0 - 8.0	Chemicals in water can cause severe retardation
Temperature	60	F	60 - 80 F	Can pre-mature setting of cement
Chlorides	LESS 200	ppm	3000 ppm	Can shorten thickening time

1.4 Actual Pump Schedule

	Density (ppg)	Volume (bbls)	Yield (ft ³ /sk)	Water Requirement (gal/sk)	Bulk Sacks (sks)	Total Water (gals)
Spacer Fluid	11.5	120	3.88	24.45		4246
Cap Cement	13.2	39.65	1.59	8.07	140	1130
Lead Cement	13.2	212.14	1.68	8.1	709	5743
Tail Cement	13.2	404.54	2.05	9.83	1108	10892
Top Plug	(1)					
Displacement Fluid	8.33	392.8				

2.0 Real-Time Job Summary

2.1 Job Event Log

Seq No.	Activity	Date	Time	Comments
1	Call Out	4/2/2023	22:00:00	CREW CALLED OUT 4/2/2023 2200 HRS. REQUESTED ON LOCATION 4/3/2023 0400 HRS.
2	Pre-Convoy Safety Meeting	4/2/2023	23:00:00	DISCUSS ROUTE AND HAZARDS OF DRIVING
3	Crew Leave Yard	4/3/2023	01:45:00	CREW LEAVES YARD
4	Arrive At Loc	4/3/2023	03:00:00	ARRIVE AT LOCATION. MEET WITH CUSTOMER. 660 BULK TRUCK ARRIVES AT 0545 HRS. EXPLAINED TO CUSTOMER DRIVER WAS RUNNING LATE, BUT SHOULD BE HERE WHEN CHARLES IS READY FOR A PRE-JOB MEETING. CREW RIGGED UP EVERYTHING WHILE WAITING ON 660. TD 16907', 17# P-110 SHOE 16900.4', F/C 16893.3', 8.5" HOLE, TVD 6742', 36# J-FF SHOE 1962', OBM 10.6 PPG. MIX WATER 62 DEGREES.
5	Pre-Rig Up Safety Meeting	4/3/2023	04:45:00	DISCUSS RIG-UP AND ANY HAZARDS THAT MAY EXIST
6	Rig-Up Equipment	4/3/2023	04:50:00	RIG-UP EQUIPMENT
7	Pre-Job Safety Meeting	4/3/2023	06:45:00	DISCUSS JOB PROCEDURES AND HAZARDS OF JOB, PRESSURE AND HAZARDS OF HES EQUIPMENT. RIG CIRCULATES BOTTOMS UP 11.9 BPM/1200 PSI
8	Start Job	4/3/2023	06:55:49	
9	Start Job	4/3/2023	06:56:48	BEGIN RECORDING DATA
10	Test Lines	4/3/2023	06:59:27	TEST HES LINES 6000 PSI, TEST RIG VALVE 1800 PSI
11	Drop Bottom Plug	4/3/2023	07:08:53	CITADEL 1000 PSI BOTTOM PLUG BY CHARLES

12	Pump Spacer 1	4/3/2023	07:15:50	120 BBLS TUNED PRIME SPACER. 11.5 PPG, 3.88 YIELD, 24.45 GAL/SACK. MIX D-AIR ON FLY
13	Shutdown	4/3/2023	07:37:29	SHUTDOWN
14	Drop Bottom Plug	4/3/2023	07:38:42	CITADEL 1000 PSI BOTTOM PLUG BY CHARLES
15	Pump Cap Cement	4/3/2023	07:41:02	140 SACKS ECONOCEM CAP CEMENT. 39.65 BBLS. 13.2 PPG, 1.59 YIELD, 8.07 GAL/SACK. TOCC=947' PRE-JOB CALCULATIONS
16	Pump Lead Cement	4/3/2023	07:49:35	709 SACKS ELASTICEM LEAD CEMENT. 212.14 BBLS., 13.2 PPG, 1.68 YIELD, 8.1 GAL/SACK. TOLC=1789' PRE-JOB CALCULATIONS.
17	Pump Tail Cement	4/3/2023	08:20:08	1108 SACKS NEOCEM TAIL CEMENT. 404.54 BBLS. 13.2 PPG, 2.05 YIELD, 9.83 GAL/SACK. TOTC=6989' PRE-JOB CALCULATIONS.
18	Shutdown	4/3/2023	09:15:17	SHUTDOWN
19	Clean Lines	4/3/2023	09:16:55	CLEAN PUMPS AND LINES
20	Shutdown	4/3/2023	09:23:13	SHUTDOWN
21	Drop Top Plug	4/3/2023	09:25:10	CITADEL 2250 PSI TOP PLUG BY CHARLES
22	Pump Displacement	4/3/2023	09:25:13	392.8 BBLS FRESH WATER DISPLACEMENT. 1ST 20 BBLS HAS 10 GALLONS MICRO MATRIX CEMENT RETARDER. REMAINING HAS 10 GALLONS MC MX 820-6 AND 20 GALLONS BELLACIDE 300W.
23	Bump Plug	4/3/2023	10:15:21	FCP 2650 PSI/2 BPM, BUMP PRESSURE 3100 PSI. HOLD 5 MINUTES, APPROX 68 BBLS SPACER TO SURFACE
24	Check Floats	4/3/2023	10:20:14	FLOATS HOLD. 5.5 BBLS BACK
25	Pressure Up Well	4/3/2023	10:23:50	PRESSURE UP WELL AT 1 BPM, PRESSURE CLIMBS 2600 PSI. RIG STATES WE HAVE RETURNS, PUMP 10 BBLS. PRESSURE STARTED CLIMBING TO 3240 PSI, PUMPED 5 MORE BBLS, FCP 2400/1 BPM

26	Check Floats	4/3/2023	10:47:00	FLOATS HOLD. 1/2 BBL BACK
27	Other	4/3/2023	10:50:54	START 30 MINUTE IN-FLOW TEST. GAINED 1/2 BBL DURING 30 MINUTES
28	End Job	4/3/2023	11:17:10	STOP RECORDING DATA.
29	Pre-Rig Down Safety Meeting	4/3/2023	11:30:00	DISCUSS HAZARDS OF RIG-DOWN AND ANY OTHER HAZARDS THAT MAY EXIST
30	Rig-Down Equipment	4/3/2023	11:35:00	RIG-DOWN EQUIPMENT
31	Rig-Down Completed	4/3/2023	12:00:00	RIG-DOWN COMPLETED
32	Crew Leave Location	4/3/2023	13:00:00	CREW DEPARTS LOCATION. THANK YOU FOR CHOOSING HALLIBURTON.

3.0 Attachments

3.1 Real Time iCem Job Chart

