

# HALLIBURTON

iCem<sup>®</sup> Service

**NOBLE ENERGY INC-EBUS**

Ft. Lupton District, Colorado

**Borys C22-765 Surface**

Job Date: Thursday, August 31, 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 ..... 10

    Real Time iCem Job Chart ..... 10

## 1.0 Cementing Job Summary

---

### 1.1 Executive Summary

---

Halliburton appreciates the opportunity to perform the cementing services on the **Borys C22-765 - Surface**. 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 23 bbls of cement were returned to surface. Final pumping pressure was 600psi, followed by a 30-min casing test where floats held bringing 1.5bbls back to the truck.

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 #:	05-123-48904
City, County:	Kersey, Weld

Job Times		
	Date (mm/dd/yyyy)	Time (hh:mm)
Requested Time On Location:	08/31/2023	4:00
Called Out Time:	08/30/2023	21:00
Arrived On Location:	08/31/2023	21:00
Job Started:	08/31/2023	5:57
Job Completed:	08/31/2023	8:11
Departed Location:	08/31/2023	9:30

	Description	Units	Value
1	Surface temperature at the time of the job	degree F	70
2	Mud type (OBM, WBM, Synthetic, Water, Brine)	-	WBM
3	Mud density	ppg	8.9
4	Casing set depth (shoe)	ft	1925
5	TVD	ft	1936
6	Float collar depth	ft	1880
7	Length of rate hole	ft	11
8	Previous casing shoe depth	ft	80
9	Pre-job mud circulation time	hh:mm	00:30
10	Pre-job mud circulation rate	bpm	8
11	Pre-job mud circulation volume	bbls	200

12	Mud circulation pressure at start of cement	psi	100
13	Annual flow before the start of job	Y/N	Y
14	Pipe movement during cement job	Y/N	N
15	Calculated displacement	bbls	143
16	Job displaced by	Rig/HES	HES
17	Estimated returns % during job	%	100
18	Fluid returns to surface	Spacer/Cement, bbls	30/23
19	Final circulation pressure, rate prior to plug bump	psi @ bpm	600
20	Number of Centralizers	-	
21	Number of bottom plugs	-	

### 1.3 Water Field Test

---

	Recorded Value	Unit	Acceptable Limit	Potential Problems if Values Exceed the Limit
<b>pH</b>	7		6.0 - 8.0	Chemicals in water can cause severe retardation
<b>Temperature</b>	65	F	60 - 80 F	Can can pre-mature setting of cement
<b>Chlorides</b>	200	ppm	3000 ppm	Can shorten thickening time

### 1.4 Actual Pump Schedule

---

	Density (ppg)	Volume (bbls)	Yield (ft <sup>3</sup> /sk)	Water Requirement (gal/sk)	Bulk Sacks (sks)	Total Water (gals)
<b>Spacer Fluid</b>	8.33	30				
<b>Lead Cement</b>	13.5	164	1.78	9.47	543	5141
<b>Tail Cement</b>	14.8	25	1.39	6.69	102	682
<b>Top Plug</b>	1					
<b>Displacement Fluid</b>	8.33	143				

## 2.0 Real-Time Job Summary

### 2.1 Job Event Log

Seq No.	Activity	Date	Time	Comments
1	Call Out	8/30/2023	21:00:00	Crew called out at 2100 on 8/31/2023 for a requested-on location time of 0400 on 8/31/2023.
2	Arrive At Loc	8/30/2023	21:00:00	Crew arrived on location at 2100 hrs. Meet with costumer TD 1936', 13.5 OH, TP 1925 9.625' 36#, FC 1880', TVD 1936', P/C 80' 16' 55#, WBM WEIGHT 8.9 PPG.
3	Safety Meeting - Pre Rig-Up	8/31/2023	04:30:00	Discuss hazards around rig up area.
4	Rig-Up Completed	8/31/2023	05:30:00	Rig up completed.
5	Safety Meeting - Pre Job	8/31/2023	05:30:00	Pre job safety meeting discussed all hazards prior to job and reviewed job procedure.
6	Start Job	8/31/2023	05:57:00	Start recording data.
7	Test Lines	8/31/2023	05:59:54	Pressure tested HES lines to 3500 psi.
8	Pump Spacer 1	8/31/2023	06:03:27	Pumped 30 bbls of green dye spacer @5bpm.
9	Pump Lead Cement	8/31/2023	06:11:07	Pumped 172 bbls (543 sks) of SwiftCem Lead @13.5ppg/1.78ft3/9.47gal/sack. Mix gallons was 5141 gallons. Average rate was 7bpm with 220 psi on the line. TOLC= 0' 23 bbls of cement to surface.
10	Check Weight	8/31/2023	06:17:52	Weight verified by mud scales.
11	Check Weight	8/31/2023	06:34:32	Weight verified by mud scales.
12	Pump Tail Cement	8/31/2023	06:47:01	Pumped 25 bbls (102 sks) of VariCem Tail cement @14.8ppg/1.39ft3/6.69gal/sack. Mix gallons was 682 gallons. Average rate was 5bpm with 130 psi on the line. TOTC= 1649'.
13	Shutdown	8/31/2023	06:55:20	Shutdown to drop top plug.
14	Drop Top Plug	8/31/2023	07:00:30	Top plug verified by DSR.

15	Pump Displacement	8/31/2023	07:00:33	Pumped 143 bbls of freshwater displacement with an average rate of 8bpm.
16	Bump Plug	8/31/2023	07:34:34	FCP was 600 psi @2bpm bumped up to 1100 psi.
17	Other	8/31/2023	07:39:14	Pressured up to 2695 psi. for casing test. Pressure @25 mins was=. Pressure at full 30 minutes was =.
18	Other	8/31/2023	08:04:28	2728 psi @ 25 minutes away.
19	Other	8/31/2023	08:09:18	2730 psi after 30 minutes.
20	Other	8/31/2023	08:10:22	1.5 bbls back floats holding.
21	End Job	8/31/2023	08:11:36	Stop recording.
22	Safety Meeting - Pre Rig-Down	8/31/2023	08:30:00	Discuss blow down and any new hazards that could have come up during job.
23	Rig-Down Completed	8/31/2023	09:30:00	Rig down completed.

3.0 Attachments

3.1 Real Time iCem Job Chart

