

HALLIBURTON

iCem[®] Service

PDC ENERGY - EBUS

Thistle Down 31H-332 Production

Sincerely,
Meghan Jacobs

Legal Notice

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Table of Contents

| | | |
|-----|--|----|
| 1.0 | Cementing Job Summary | 4 |
| 1.1 | Executive Summary and Lab Report | 4 |
| 2.0 | Real-Time Job Summary | 9 |
| 2.1 | Job Event Log | 9 |
| 3.0 | Attachments..... | 12 |
| 3.1 | Thistle Down 31H-332 Production – Job Chart with Events | 12 |
| 3.2 | Thistle Down 31H-332 Production – Job Chart without Events | 13 |

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Thistle Down 31H-332** cement **Production** casing 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.

Approximately 48 bbls of spacer were returned to surface.

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 Fort Lupton

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Cementing Job Summary

The Road to Excellence Starts with Safety

| Sold To #: 304535 | | Ship To #: 3819653 | | Quote #: 0022519498 | | Sales Order #: 0905338417 | | | | |
|--|------------------------------|---------------------|-----------------|-----------------------------------|----------------------------|-----------------------------|---------------|--------------|---------------------|---------------|
| Customer: PDC ENERGY-EBUS | | | | Customer Rep: Chris McMullen | | | | | | |
| Well Name: THISTLE DOWN | | | Well #: 31H-332 | | API/UWI #: 05-123-45259-00 | | | | | |
| Field: WATTENBERG | | City (SAP): KERSEY | | County/Parish: WELD | | State: COLORADO | | | | |
| Legal Description: NE SW-31-5N-64W-1414FSL-1357FWL | | | | | | | | | | |
| Contractor: ENSIGN DRLG | | | | Rig/Platform Name/Num: ENSIGN 152 | | | | | | |
| Job BOM: 7523 7523 | | | | | | | | | | |
| Well Type: HORIZONTAL OIL | | | | | | | | | | |
| Sales Person: HALAMERICA\HX38199 | | | | Srvc Supervisor: Luke Kosakewich | | | | | | |
| Job | | | | | | | | | | |
| Formation Name | | | | | | | | | | |
| Formation Depth (MD) | | Top | | Bottom | | | | | | |
| Form Type | | | | BHST | | | | | | |
| Job depth MD | | 12949ft | | Job Depth TVD | | 6993 | | | | |
| Water Depth | | | | Wk Ht Above Floor | | | | | | |
| Perforation Depth (MD) | | From | | To | | | | | | |
| Well Data | | | | | | | | | | |
| Description | New / Used | Size in | ID in | Weight lbn/ft | Thread | Grade | Top MD ft | Bottom MD ft | Top TVD ft | Bottom TVD ft |
| Casing | | 9.625 | 8.921 | 36 | | | 0 | 1678 | 0 | 1678 |
| Casing | | 5.5 | 4.778 | 20 | | | 0 | 12943 | 0 | 6993 |
| Open Hole Section | | | 8.5 | | | | 1678 | 6700 | 1678 | 6700 |
| Open Hole Section | | | 8.5 | | | | 6700 | 12949 | 6700 | 6993 |
| Tools and Accessories | | | | | | | | | | |
| Type | Size in | Qty | Make | Depth ft | Type | Size in | Qty | Make | | |
| Guide Shoe | | | | | Top Plug | 5.5 | 1 | Weatherford | | |
| Float Shoe | 5.5 | 1 | Weatherford | 12943 | Bottom Plug | 5.5 | 1 | Weatherford | | |
| Float Collar | 5.5 | 1 | Weatherford | 12928 | SSR plug set | 5.5 | | | | |
| Wet Shoe Sub | 5.5 | 1 | Weatherford | 12914 | Plug Container | 5.5 | 1 | HES | | |
| Stage Tool | | | | | Centralizers | 5.5 | | | | |
| Fluid Data | | | | | | | | | | |
| Stage/Plug #: 1 | | | | | | | | | | |
| Fluid # | Stage Type | Fluid Name | Qty | Qty UoM | Mixing Density lbn/gal | Yield ft ³ /sack | Mix Fluid Gal | Rate bbl/min | Total Mix Fluid Gal | |
| 1 | 12.5 lb/gal Tuned Spacer III | Tuned Spacer III | 150 | bbl | 12.5 | 2.74 | | 5 | | |
| Fluid # | Stage Type | Fluid Name | Qty | Qty UoM | Mixing Density lbn/gal | Yield ft ³ /sack | Mix Fluid Gal | Rate bbl/min | Total Mix Fluid Gal | |
| 2 | Gasstop B1 | GASSTOP (TM) SYSTEM | 615 | sack | 13.2 | 1.55 | | 5 | 7.61 | |

last updated on 12/18/2018 2:13:39 PM

Page 1 of 3

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Cementing Job Summary

| Fluid # | Stage Type | Fluid Name | Qty | Qty UoM | Mixing Density lbm/gal | Yield ft ³ /sack | Mix Fluid Gal | Rate bbl/min | Total Mix Fluid Gal |
|--|--------------------|-----------------------|---------------------------|---------|------------------------------|--------------------------------|------------------|-----------------|---------------------------|
| 3 | ElastiCem | ELASTICEM (TM) SYSTEM | 890 | sack | 14.4 | 1.7 | | 8 | 7.3 |
| 4 | MMCR Displacement | MMCR Displacement | 20 | bbl | 8.34 | | | 5 | |
| 5 | Displacement fluid | Fresh Water | 266.4 | bbl | 8.34 | | | 7 | |
| Cement Left In Pipe | | Amount | Reason | | Wet Shoe | | | | |
| Mix Water: | | pH 7 | Mix Water Chloride: 0 ppm | | Mix Water Temperature: 60 °F | | | | |
| Plug Bumped? | | Yes | Bump Pressure: 2,400 psi | | Floats Held? Yes | | | | |
| <p>Comment There were full returns throughout the job. Bumped the plug 500 psi. over 2,400 psi. at 3 bpm. Final pressure was 2,900 psi. Held for a minute. Pressure held. Pressured up the well to 4,000 psi. to burst the plug. Pumped 5 bbls. of fresh water at 4 bpm. for a wet shoe. Circulated 48 bbls. of spacer to surface. Estimated tops of cement are TOT at 6,354', TOL 2,193'.</p> | | | | | | | | | |

2.0 Real-Time Job Summary

2.1 Job Event Log

| Type | Seq. No. | Activity | Graph Label | Date | Time | Source | DS Pump Press (psi) | Comb Pump Rate (bbl/min) | DH Density (ppg) | Comments |
|-------|----------|--|--|------------|----------|--------|------------------------|-----------------------------|---------------------|---|
| Event | 1 | Call Out | Call Out | 12/10/2018 | 03:00:00 | USER | | | | Crew was called out at 03:00 for an on location time of 10:00. |
| Event | 2 | Depart Yard Safety Meeting | Depart Yard Safety Meeting | 12/10/2018 | 08:00:00 | USER | | | | Crew held a pre journey safety meeting and JSA. |
| Event | 3 | Depart Shop for Location | Depart Shop for Location | 12/10/2018 | 08:30:00 | USER | | | | Started journey management with dispatch and left location. |
| Event | 4 | Arrive at Location from Service Center | Arrive at Location from Service Center | 12/10/2018 | 09:30:00 | USER | | | | Crew performed a site assessment, safety meeting and hazard hunt on location. Checked in with the customer and discussed the job procedures, rig up and well bore schematics. The rig was on bottom ready for the cement job. |
| Event | 5 | Pre-Rig Up Safety Meeting | Pre-Rig Up Safety Meeting | 12/10/2018 | 10:00:00 | USER | | | | Held a pre rig up safety meeting with my crew. |
| Event | 6 | Rig-Up Equipment | Rig-Up Equipment | 12/10/2018 | 10:15:00 | USER | | | | The crew rigged up all lines, hoses and equipment for the job. |
| Event | 7 | Safety Meeting | Safety Meeting | 12/10/2018 | 17:30:00 | USER | 4.00 | 0.00 | 8.36 | Halliburton cement crew held a pre cement job safety meeting and JSA with third party personnel and rig crew. |
| Event | 8 | Start Job | Start Job | 12/10/2018 | 17:51:01 | COM5 | | | | Pumped 3 bbls. of fresh water at 3 bpm. to fill lines and establish circulation. |
| Event | 9 | Test Lines | Test Lines | 12/10/2018 | 18:16:33 | COM5 | 46.00 | 0.00 | 8.64 | Pressure tested lines to 4,900 psi. with a 500 psi. electronic kick out test. |
| Event | 10 | Drop Bottom Plug | Drop Bottom Plug | 12/10/2018 | 18:25:25 | COM5 | 50.00 | 0.00 | 8.49 | Halliburton loaded and dropped the bottom plug which, was witnessed by the customer. |

| | | | | | | | | | | |
|-------|----|-----------------------------|-----------------------------|------------|----------|------|---------|------|-------|--|
| Event | 11 | Pump Spacer 1 | Pump Spacer 1 | 12/10/2018 | 18:25:35 | COM5 | 51.00 | 0.00 | 8.49 | Pumped 150 bbls. of Tuned Spacer III mixed at 12.5 ppg. Yield: 2.74 ft3/sks, 16.9 gal/sks. Density was verified by pressurized scales. |
| Event | 12 | Shutdown | Shutdown | 12/10/2018 | 18:52:53 | COM5 | 8.00 | 0.00 | 12.84 | Batched up cement. Weighed 13.2 ppg. Density was verified by pressurized scales |
| Event | 13 | Pump Lead Cement | Pump Lead Cement | 12/10/2018 | 18:55:33 | COM5 | 7.00 | 0.00 | 12.88 | Pumped 170 bbls. (615 sks.) of Gasstop B1 mixed at 13.2 ppg., Yield: 1.55 ft3/sks, 7.61 gal/sks. Density was verified by pressurized scales. |
| Event | 14 | Pump Tail Cement | Pump Tail Cement | 12/10/2018 | 19:26:18 | COM5 | 60.00 | 1.40 | 13.77 | Pumped 269 bbls. (890 sks.) of Elasticem mixed at 14.4 ppg., Yield: 1.7 ft3/sks, 7.3 gal/sks. Density was verified by pressurized scales. |
| Event | 15 | Shutdown | Shutdown | 12/10/2018 | 20:17:56 | COM5 | 86.00 | 0.00 | 2.45 | Washed and blew down pumps and lines until clean. |
| Event | 16 | Drop Top Plug | Drop Top Plug | 12/10/2018 | 20:27:29 | COM5 | 14.00 | 0.00 | 8.05 | Halliburton loaded and dropped the top plug, which was witnessed by the customer. |
| Event | 17 | Pump Displacement | Pump Displacement | 12/10/2018 | 20:32:14 | COM5 | 11.00 | 0.00 | -0.24 | Pumped 286.4 bbls. of fresh water with MMCR in the first 20 bbls. Packer fluid was added throughout the rest of displacement. |
| Event | 18 | Bump Plug | Bump Plug | 12/10/2018 | 21:21:12 | COM5 | 2982.00 | 0.00 | 8.13 | Bumped the plug 500 psi. over 2,400 psi. at 3 bpm. Final pressure was 2,900 psi. Held for a minute. Pressure held. Circulated 48 bbls. of spacer to surface. Estimated tops of cement are TOT at 6,354', TOL 2,193'. |
| Event | 19 | Other | Other | 12/10/2018 | 21:23:04 | COM5 | 3791.00 | 2.10 | 8.15 | Pressured up the well to 4,000 psi. to burst the plug. Pumped 5 bbls. of fresh water at 4 bpm. for a wet shoe. |
| Event | 20 | Check Floats | Check Floats | 12/10/2018 | 21:25:40 | USER | 2005.00 | 0.00 | 8.12 | Bled off pressure to check floats. Floats held. Got 2 bbls. of fluid back to the truck. |
| Event | 21 | End Job | End Job | 12/10/2018 | 21:27:27 | COM5 | | | | Washed and blew down all pumps and lines until clean and dry. |
| Event | 22 | Pre-Rig Down Safety Meeting | Pre-Rig Down Safety Meeting | 12/10/2018 | 21:45:00 | USER | 12.00 | 0.00 | 4.37 | Halliburton cement crew held a pre rig down safety meeting and JSA. |
| Event | 23 | Rig-Down Equipment | Rig-Down Equipment | 12/10/2018 | 21:50:00 | USER | 210.00 | 6.80 | 8.08 | Rigged down all lines, hoses and equipment. |

| | | | | | | | |
|-------|----|--|--|----------------|----------|------|--|
| Event | 24 | Safety Meeting - Departing Location | Safety Meeting - Departing Location | 12/10/201 8 | 23:15:00 | USER | Held a pre journey safety meeting with crew. |
| <hr/> | | | | | | | |
| Event | 25 | Depart Location for Service Center or Other Site | Depart Location for Service Center or Other Site | 12/10/201 8 | 23:30:00 | USER | Started journey management with dispatch and left location. |
| <hr/> | | | | | | | |