

# HALLIBURTON

iCem<sup>®</sup> Service

## **PDC ENERGY EBUS**

### **High Plains 25F-301 Production**

Job Date: Saturday, December 16, 2017

Sincerely,

**Fort Lupton District Cement**

## Legal Notice

---

### Warning Disclaimer

Although the information contained in this report is based on sound engineering practices, the copyright owner(s) does (do) not accept any responsibility whatsoever, in negligence or otherwise, for any loss or damage arising from the possession or use of the report whether in terms of correctness or otherwise. The application, therefore, by the user of this report or any part thereof, is solely at the user's own risk.

### Limitations of Liability

Except as expressly set forth herein, there are no representations or warranties by Halliburton, express or implied, including implied warranties of merchantability and/or fitness for a particular purpose. In no event will Halliburton or its suppliers be liable for consequential, incidental, special, punitive or exemplary damages (including, without limitation, loss of data, profits, use of hardware, or software). Customer accepts full responsibility for any investment made based on results from the Software. Any interpretations, analyses or modeling of any data, including, but not limited to Customer data, and any recommendation or decisions based upon such interpretations, analyses or modeling are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional may differ. Accordingly, Halliburton cannot and does not warrant the accuracy, correctness or completeness of any such interpretation, recommendation, modeling or other products of the Software Product. As such, any interpretation, recommendation or modeling resulting from the Software for the purpose of any drilling, well treatment, production or financial decision will be at the sole risk of Customer. Under no circumstances will Halliburton or its suppliers be liable for any damages.

## Table of Contents

---

|     |                             |    |
|-----|-----------------------------|----|
| 1.0 | Cementing Job Summary ..... | 4  |
| 1.1 | Executive Summary .....     | 4  |
| 2.0 | Real-Time Job Summary ..... | 7  |
| 2.1 | Job Event Log .....         | 7  |
| 3.0 | Job Chart .....             | 11 |
| 3.1 | Job Chart.....              | 11 |

## 1.0 Cementing Job Summary

---

### 1.1 Executive Summary

---

Halliburton appreciates the opportunity to perform the cementing services on the **High Plains 25F-301** 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.

20 bbls of mud flush back 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**

## HALLIBURTON

## Cementing Job Summary

The Road to Excellence Starts with Safety

| Sold To #: 304535                                | Ship To #: 3806251     | Quote #: 0022384965               | Sales Order #: 0904503114 |               |                        |                             |               |              |                     |               |
|--|------------------------|-----------------------------------|---------------------------|---------------|------------------------|-----------------------------|---------------|--------------|---------------------|---------------|
| Customer: PDC ENERGY-EBUS                        |                        | Customer Rep: SHAWN DAVIS         |                           |               |                        |                             |               |              |                     |               |
| Well Name: HIGH PLAINS                           | Well #: 25F-301        | API/UWI #: 05-123-44970-00        |                           |               |                        |                             |               |              |                     |               |
| Field: WATTENBERG                                | City (SAP): KERSEY     | County/Parish: WELD               | State: COLORADO           |               |                        |                             |               |              |                     |               |
| Legal Description: NW NW-25-5N-65W-994FNL-749FWL |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| Contractor: ENSIGN DRLG                          |                        | Rig/Platform Name/Num: ENSIGN 158 |                           |               |                        |                             |               |              |                     |               |
| Job BOM: 7523 7523                               |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| Well Type: HORIZONTAL OIL                        |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| Sales Person: HALAMERICA\HX38199                 |                        | Srv Supervisor: Robert Davis      |                           |               |                        |                             |               |              |                     |               |
| <b>Job</b>                                       |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| Formation Name                                   |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| Formation Depth (MD)                             | Top                    | 1675                              | Bottom 17876              |               |                        |                             |               |              |                     |               |
| Form Type  | BHST                   |                                   |                           |               |                        |                             |               |              |                     |               |
| Job depth MD                                     | 17863ft                |                                   | Job Depth TVD 6823        |               |                        |                             |               |              |                     |               |
| Water Depth                                      |                        |                                   | Wk Ht Above Floor 5       |               |                        |                             |               |              |                     |               |
| Perforation Depth (MD)                           | From                   |                                   | To                        |               |                        |                             |               |              |                     |               |
| <b>Well Data</b>                                 |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| 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             | 1675         |                     | 1675          |
| Casing   |                        | 5.5                               | 4.778                     | 20            |                        |                             | 0             | 17863        |                     | 6823          |
| Open Hole Section                                |                        |                                   | 8.5                       |               |                        |                             | 1675          | 17876        | 6152                | 6823          |
| <b>Tools and Accessories</b>                     |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| Type   | Size in                | Qty                               | Make                      | Depth ft      | Type                   | Size in                     | Qty           | Make         |                     |               |
| Guide Shoe                                       | 5.5                    |                                   |                           | 17863         | Top Plug               | 5.5                         |               | HES          |                     |               |
| Float Shoe                                       | 5.5                    |                                   |                           |               | Bottom Plug            | 5.5                         |               | HES          |                     |               |
| Float Collar                                     | 5.5                    |                                   |                           |               | SSR plug set           | 5.5                         |               | HES          |                     |               |
| Insert Float                                     | 5.5                    |                                   |                           |               | Plug Container         | 5.5                         | 1             | HES          |                     |               |
| Stage Tool                                       | 5.5                    |                                   |                           |               | Centralizers           | 5.5                         |               | HES          |                     |               |
| <b>Fluid Data</b>                                |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| Stage/Plug #: 1                                  |                        |                                   |                           |               |                        |                             |               |              |                     |               |
| Fluid #  | Stage Type             | Fluid Name                        | Qty                       | Qty UoM       | Mixing Density lbm/gal | Yield ft <sup>3</sup> /sack | Mix Fluid Gal | Rate bbl/min | Total Mix Fluid Gal |               |
| 1  | Mud Flush III (Powder) | Mud Flush III                     | 50                        | bbl           | 8.4                    |                             |               | 5            |                     |               |
| 42 gal/bbl                                       |                        | FRESH WATER                       |                           |               |                        |                             |               |              |                     |               |
| Fluid #  | Stage Type             | Fluid Name                        | Qty                       | Qty UoM       | Mixing Density lbm/gal | Yield ft <sup>3</sup> /sack | Mix Fluid Gal | Rate bbl/min | Total Mix Fluid Gal |               |

**HALLIBURTON**

**Cementing Job Summary**

|  |                    |  |                           |                |  |                       |                      |                     |                            |
|--|--------------------|--|---------------------------|----------------|--|-----------------------|----------------------|---------------------|----------------------------|
| 2  | CLEANSPLACE R III  | CLEANSPACER III                                      | 50                        | bbbl           | 12                                     | 2.27                  |                      | 6.5                 |                            |
| 0 gal/bbl  |                    | FRESH WATER  |                           |                |  |                       |                      |                     |                            |
| <b>Fluid #</b>   | <b>Stage Type</b>  | <b>Fluid Name</b>                                    | <b>Qty</b>                | <b>Qty UoM</b> | <b>Mixing Density lbm/gal</b>          | <b>Yield ft3/sack</b> | <b>Mix Fluid Gal</b> | <b>Rate bbl/min</b> | <b>Total Mix Fluid Gal</b> |
| 3  | 13.2# ElastiCem    | ELASTICEM (TM) SYSTEM                                | 2395                      | sack           | 13.2                                   | 1.57                  |                      | 6.5                 | 7.52                       |
| 7.52 Gal   |                    | FRESH WATER  |                           |                |  |                       |                      |                     |                            |
| 0.40 %   |                    | HALAD(R)-344, 50 LB (100003670)                      |                           |                |  |                       |                      |                     |                            |
| 0.35 %   |                    | HR-5, 50 LB SK (100005050)                           |                           |                |  |                       |                      |                     |                            |
| <b>Fluid #</b>   | <b>Stage Type</b>  | <b>Fluid Name</b>                                    | <b>Qty</b>                | <b>Qty UoM</b> | <b>Mixing Density lbm/gal</b>          | <b>Yield ft3/sack</b> | <b>Mix Fluid Gal</b> | <b>Rate bbl/min</b> | <b>Total Mix Fluid Gal</b> |
| 4  | MMCR Displacement  | MMCR Displacement                                    | 30                        | bbbl           | 8.34                                   |                       |                      | 7                   |                            |
| 0.25 gal/bbl   |                    | MICRO MATRIX CEMENT RETARDER, 5 GAL PAIL (100003781) |                           |                |  |                       |                      |                     |                            |
| <b>Fluid #</b>   | <b>Stage Type</b>  | <b>Fluid Name</b>                                    | <b>Qty</b>                | <b>Qty UoM</b> | <b>Mixing Density lbm/gal</b>          | <b>Yield ft3/sack</b> | <b>Mix Fluid Gal</b> | <b>Rate bbl/min</b> | <b>Total Mix Fluid Gal</b> |
| 5  | Displacement fluid |  | 394                       | bbbl           | 8.34                                   |                       |                      | 7                   |                            |
| <b>Cement Left In Pipe</b>   | <b>Amount</b>      | 33 ft  |                           |                | <b>Reason</b>                          | <b>Shoe Joint</b>     |                      |                     |                            |
| <b>Mix Water:</b>  | pH 7               | <b>Mix Water Chloride:</b>                           | 500 ppm                   |                | <b>Mix Water Temperature:</b> 50 °F °C |                       |                      |                     |                            |
| <b>Cement Temperature:</b>   | ## °F °C           | <b>Plug Displaced by:</b>                            | 8.33 lb/gal kg/m3<br>XXXX |                | <b>Disp. Temperature:</b> ## °F °C     |                       |                      |                     |                            |
| <b>Plug Bumped?</b>  | Yes                | <b>Bump Pressure:</b>                                | 2350-2900 psi MPa         |                | <b>Floats Held?</b> Yes                |                       |                      |                     |                            |
| <b>Cement Returns:</b>   | N/A bbl m3         | <b>Returns Density:</b>                              | ## lb/gal kg/m3           |                | <b>Returns Temperature:</b> ## °F °C   |                       |                      |                     |                            |
| <b>Comment</b> BUMPED PLUG @ 388 BBLS FULL RETURNS THOUGHOUT THE JOB, FLOATS HELD 1 ½ BBLS BACK RUPTURED WET SHOE SUB @ 3830 PSI, 20 BBLS OF MUD FLUSH RETURNS TO SURFACE. |                    |  |                           |                |  |                       |                      |                     |                            |

## 2.0 Real-Time Job Summary

### 2.1 Job Event Log

| Type  | Seq. No. | Activity                                 | Graph Label                              | Date       | Time     | Source | Comb Pump Rate<br>(bbl/min) | DH Density<br>(ppg) | DS Pump Press<br>(psi) | Recirc Density<br>(ppg) | Comments   |
|-------|----------|--|--|------------|----------|--------|-----------------------------|---------------------|------------------------|-------------------------|--|
| Event | 1        | Call Out                                 | Call Out                                 | 12/16/2017 | 02:00:00 | USER   |                             |                     |                        |                         | CALLED OUT FROM FT. LUPTON COLORADO  |
| Event | 2        | Depart from Service Center or Other Site | Depart from Service Center or Other Site | 12/16/2017 | 04:30:00 | USER   |                             |                     |                        |                         | LEAVE YARD AFTER SAFTEY MEETING  |
| Event | 3        | Arrive at Location from Service Center   | Arrive at Location from Service Center   | 12/16/2017 | 06:00:00 | USER   |                             |                     |                        |                         | ARRIVED ON LOCATION AND TALKED TO COMPANY MAN ABOUT JOB FIGURES AND THE SPOTTING OF OUR EQUIPMENT              |
| Event | 4        | Assessment Of Location Safety Meeting    | Assessment Of Location Safety Meeting    | 12/16/2017 | 06:15:00 | USER   |                             |                     |                        |                         | ASSESSED LOCATION AN TOOK WATER SAMPLE   |
| Event | 5        | Rig-Up Equipment                         | Rig-Up Equipment                         | 12/16/2017 | 06:30:00 | USER   |                             |                     |                        |                         | SPOTTED EQUIPMENT AND RIGGED UP TO FLOOR RIG IS RUNNING CASING   |
| Event | 6        | Other                                    | Other                                    | 12/16/2017 | 06:45:00 | USER   |                             |                     |                        |                         | Water test=pH: 7 ____, Cl: _500__, temp _50__degrees Tannin-Lignin: __NEG.____; Sulfate: _200__                |
| Event | 7        | Other                                    | Other                                    | 12/16/2017 | 07:30:00 | USER   |                             |                     |                        |                         | Rig Circulation: ____ bbls<br>Circulation Rate: ____ bbl/min<br>Mud Density _10.1__ lb/gal<br>Mud YP/PV: _____ |
| Event | 8        | Other                                    | Other                                    | 12/16/2017 | 07:45:00 | USER   |                             |                     |                        |                         | Spacer: _100__ bbl<br>TOS __0__<br>Lead Cement: __670__ bbl, _2395__ sks,<br>TOC __1467__ Tail Cement:         |

| Event | Seq | Event Type       | Description      | Date       | Time     | User | Volume | Pressure | Flow    | Pressure | Notes   |
|-------|-----|------------------|------------------|------------|----------|------|--------|----------|---------|----------|---|
|       |     |                  |                  |            |          |      |        |          |         |          | ____ bbl, ____ sks,<br>TOC ____<br>Displacement: __394__<br>bblCMT left in<br>Pipe_3/4____<br>Reason __SHOE____   |
| Event | 9   | Other            | Other            | 12/16/2017 | 08:00:00 | USER |        |          |         |          | TD: __17876__ , TP<br>__17863__, SJ: __33__,<br>OH: __8.5__, Casing:<br>Size/Weight/Grade:<br>__5.5/20#/P110____<br>, Previous Casing Shoe:<br>__1675__ |
| Event | 10  | Rig-Up Completed | Rig-Up Completed | 12/16/2017 | 14:30:00 | USER | 0.00   | -0.01    | 54.00   | 0.00     | RIG UP COMPLETE SAFETY MEETING WITH RIG HANDS AND HALLIBURTON ABOUT THE DANGERS OF OUR EQUIPMENT AND WENT OVER JOB FIGURES. READY TO TEST LINES         |
| Event | 11  | Start Job        | Start Job        | 12/16/2017 | 14:41:59 | COM4 |        |          |         |          |   |
| Event | 12  | Test Lines       | Test Lines       | 12/16/2017 | 15:16:48 | COM4 | 0.00   | 8.24     | 5497.00 | 0.00     | FLOOD LINES W/ 2 BBLS OF FRESH WATER, LOW PSI TEST TO 500 PSI, HIGH PSI TEST TO 5500 PSI  |
| Event | 13  | Pump Spacer 1    | Pump Spacer 1    | 12/16/2017 | 15:21:04 | COM4 |        |          |         |          | MUD FLUSH III, 50 BBLS PUMPED @ 5 BPM @ 413 PSI   |
| Event | 14  | Pump Spacer 2    | Pump Spacer 2    | 12/16/2017 | 15:32:25 | COM4 |        |          |         |          | CLEAN SPACER III, 50 BBLS, @ 12 PPG, YEILD @ 2.27, GAL/SK @ 12.4, PUMPED @ 6.5 BPM @ 860 PSI, HOS-1043, TOS-424 FT                                      |
| Event | 15  | Pump Cement      | Pump Cement      | 12/16/2017 | 15:39:26 | COM4 |        |          |         |          | ELASTICEM, 2395 SKS @ 13.2 PPG, YEILD @ 1.57, GAL/SK @ 7.52, 3760.15  |

FT3, 670 BBLS, 429 BBLS OF WATER TO MIX, PUMPED @ 6.7 @ 500 PSI, HOC-16396, TOC-1467

|       |    |                               |                               |            |          |      |      |       |        |      |  |  |
|-------|----|-------------------------------|-------------------------------|------------|----------|------|------|-------|--------|------|--|--|
| Event | 16 | Drop Top Plug                 | Drop Top Plug                 | 12/16/2017 | 17:33:53 | COM4 |      |       |        |      |  | KLX TOP PLUG FOR WET SHOE  |
| Event | 17 | Pump Displacement             | Pump Displacement             | 12/16/2017 | 17:41:46 | COM4 |      |       |        |      |  | 394 BBLS CALCULATED DISPLACEMENT, FIRST 20 BBLS MMCR, PUMPED @ 7 BPM @ 250 PSI, THE REST BIOCIDE, PUMPED @ 7 BPM @ 2000 PSI, SLOWED RATE LAST 20 BBLS TO 5 BPM @ 2170 PSI, 20 BBLS OF MUD FLUSH RETURNS TO SURFACE.FULL RETURNS THOUGHOUT THE JOB. |
| Event | 18 | Bump Plug                     | Bump Plug                     | 12/16/2017 | 18:39:19 | COM4 |      |       |        |      |  | BUMPED PLUG 500 PSI OVER, BUMPED @ 2350 PSI TOOK TO 2900 PSI   |
| Event | 19 | Other                         | Other                         | 12/16/2017 | 18:41:38 | COM4 |      |       |        |      |  | RUPTURED WET SHOE SUB @ 3830 PSI   |
| Event | 20 | Other                         | Other                         | 12/16/2017 | 18:42:36 | COM4 |      |       |        |      |  | PUMPED 5 BBL WET SHOE @ 4 BPM @ 2025 PSI, CHECKED FLOATS, FLOATS HELD 1 1/2 BBLS BACK  |
| Event | 21 | Other                         | Other                         | 12/16/2017 | 18:45:00 | USER | 0.00 | 8.19  | 112.00 | 0.17 |  | WAIT ON RIG TO NIPPLE DOWN AND RIG DOWN FLOOR SO WE CAN TEST BACK SIDE.  |
| Event | 22 | Test Lines                    | Test Lines                    | 12/16/2017 | 20:46:48 | COM4 |      |       |        |      |  | TEST BACKSIDE, 1.4 BBLS @ 489 PSI HELD   |
| Event | 23 | Safety Meeting - Pre Rig-Down | Safety Meeting - Pre Rig-Down | 12/16/2017 | 21:00:00 | USER | 0.00 | -0.05 | -5.00  | 0.17 |  | SAFETY MEETING OVER RIGGING DOWN   |
| Event | 24 | Rig-Down Equipment            | Rig-Down Equipment            | 12/16/2017 | 21:15:00 | USER |      |       |        |      |  | RIG DOWN EQUIPMENT AND HOSES   |

|       |    |                                     |                                     |            |          |      |  |
|-------|----|-------------------------------------|-------------------------------------|------------|----------|------|--|
| Event | 25 | Rig-Down Completed                  | Rig-Down Completed                  | 12/16/2017 | 21:45:00 | USER | RIG DOWN COMPLETE                              |
| Event | 26 | Safety Meeting - Departing Location | Safety Meeting - Departing Location | 12/16/2017 | 22:00:00 | USER | SAFETY MEETING OVER DEPARTURE AND JOURNEY HOME |
| Event | 27 | Depart Location for Home            | Depart Location for Home            | 12/16/2017 | 22:30:00 | USER | LEAVE LOCATION                                 |