

# HALLIBURTON

iCem<sup>®</sup> Service

## **WHITING OIL & GAS CORP - EBUS**

1700 Broadwat  
Denver, CO 80290

### **For:**

Date: Tuesday, March 24, 2015

## **WHITING RAZOR 11 H-0215A LINER**

WHITING RAZOR 11 H-0215A LINER  
Job Date: Sunday, March 22, 2015

Sincerely,  
Sebastian Estenssoro

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## 1.0 Cementing Job Summary

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### 1.1 Executive Summary

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Halliburton appreciates the opportunity to perform the cementing services on the **Razor 11H-0215A** cement **Production Liner** 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.

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 Brighton**

#### Job Times

|                                | Date      | Time |
|--------------------------------|-----------|------|
| Requested Time<br>On Location: |           |      |
| Called Out Time:               | 3/21/2015 | 1500 |
| Arrived On<br>Location At:     |           | 2030 |
| Job Started At:                | 3/22/2015 | 0600 |
| Job Completed At:              |           | 1200 |
| Departed Location<br>At:       |           | 1300 |

1.2 Planned Pumping Schedule

| Event         | Pressure (psi) | Rate (bpm) | Volume (bbl) | Sacks | Density (ppg) | Yield (ft3/sk) | WR (gal/sk) |
|---------------|----------------|------------|--------------|-------|---------------|----------------|-------------|
| START JOB     |                |            |              |       |               |                |             |
| FILL LINES    |                |            | 2            |       | 8.33          |                |             |
| PRESSURE TEST | 6612           |            |              |       |               |                |             |

|                        |      |   |           |     |      |      |      |
|------------------------|------|---|-----------|-----|------|------|------|
| TUNED SPACER           |      | 2 | 20        |     | 12   | 3.13 | 19.8 |
| CEMENT                 |      | 4 | 149.87115 | 510 | 13.8 | 1.65 | 7.53 |
| DROP DART              |      |   |           |     |      |      |      |
| MMCR Displacement      |      |   | 10        |     |      |      |      |
| Clay-Web Displacement  |      | 5 | 140       |     | 8.33 |      |      |
| SLOW RATE THROUGH TOOL |      | 2 |           |     |      |      |      |
| SLOW RATE TO BUMP PLUG |      | 4 |           |     |      |      |      |
| BUMP PLUG              | 2614 |   |           |     |      |      |      |
| PRESSURE UP            | 5860 |   |           |     |      |      |      |

|                         |  |   |            |  |  |  |  |
|-------------------------|--|---|------------|--|--|--|--|
| CHECK FLOATS            |  |   | 2 bbl back |  |  |  |  |
| CIRCULATE OFF LINER TOP |  | 7 |            |  |  |  |  |
| END JOB                 |  |   |            |  |  |  |  |

|                  |  |  |  |  |  |  |  |
|------------------|--|--|--|--|--|--|--|
| MAX PRESSURE     |  |  |  |  |  |  |  |
| MIX WATER NEEDED |  |  |  |  |  |  |  |

|                   |  |  |       |  |  |  |  |
|-------------------|--|--|-------|--|--|--|--|
| SPACER TO SURFACE |  |  | trace |  |  |  |  |
| CEMENT TO SURFACE |  |  |       |  |  |  |  |

## HALLIBURTON

## Cementing Job Summary

The Road to Excellence Starts with Safety

| Sold To #: 366960                                  |                            | Ship To #: 3272088       |       | Quote #: 0022016722                |                        | Sales Order #: 0902238877 |               |              |                     |               |
|--|----------------------------|--------------------------|-------|------------------------------------|------------------------|---------------------------|---------------|--------------|---------------------|---------------|
| Customer: WHITING OIL & GAS CORP - EBUS            |                            |                          |       | Customer Rep:                      |                        |                           |               |              |                     |               |
| Well Name: RAZOR                                   |                            | Well #: 11 H-0215A       |       | API/UWI #: 05-123-38598-00         |                        |                           |               |              |                     |               |
| Field: WILDCAT                                     |                            | City (SAP): RAYMER       |       | County/Parish: WELD                |                        | State: COLORADO           |               |              |                     |               |
| Legal Description: SE NE-11-10N-58W-2180FNL-368FEL |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Contractor: FRONTIER DRLG                          |                            |                          |       | Rig/Platform Name/Num: FRONTIER 26 |                        |                           |               |              |                     |               |
| Job BOM: 7525                                      |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Well Type: HORIZONTAL OIL                          |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Sales Person: HALAMERICA/HX41066                   |                            |                          |       | Srcv Supervisor: Joseph Fantasia   |                        |                           |               |              |                     |               |
| <b>Job</b>   |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Formation Name                                     |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Formation Depth (MD)                               |                            | Top                      |       | Bottom                             |                        |                           |               |              |                     |               |
| Form Type  |                            |                          |       | BHST                               |                        |                           |               |              |                     |               |
| Job depth MD                                       |                            | 12751ft                  |       | Job Depth TVD                      |                        |                           |               |              |                     |               |
| Water Depth  |                            |                          |       | Wk Ht Above Floor                  |                        |                           |               |              |                     |               |
| Perforation Depth (MD)                             |                            | From                     |       | To                                 |                        |                           |               |              |                     |               |
| <b>Well Data</b>                                   |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Description  | New / Used                 | Size in                  | ID in | Weight lbm/ft                      | Thread                 | Grade                     | Top MD ft     | Bottom MD ft | Top TVD ft          | Bottom TVD ft |
| Drill Pipe   |                            | 4                        | 3.34  | 14                                 |                        |                           | 0             | 5186         | 0                   | 0             |
| Casing   |                            | 7                        | 6.184 | 29                                 | LTC                    | L-80                      | 0             | 6297         | 0                   | 0             |
| Casing   |                            | 4.5                      | 4     | 11.6                               | LTC                    | L-80                      | 5186          | 12751        | 0                   | 5847          |
| Open Hole Section                                  |                            |                          | 6.125 |                                    |                        |                           | 6297          | 12751        | 0                   | 5847          |
| <b>Tools and Accessories</b>                       |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Type   | Size in                    | Qty                      | Make  | Depth ft                           | Type                   | Size in                   | Qty           | Make         |                     |               |
| Guide Shoe   | 4.5                        |                          |       | 12751                              | Top Plug               | 4.5                       |               | HES          |                     |               |
| Float Shoe   | 4.5                        |                          |       |                                    | Bottom Plug            | 4.5                       |               | HES          |                     |               |
| Float Collar                                       | 4.5                        |                          |       |                                    | SSR plug set           | 4.5                       |               | HES          |                     |               |
| Insert Float                                       | 4.5                        |                          |       |                                    | Plug Container         | 4.5                       |               | HES          |                     |               |
| Stage Tool   | 4.5                        |                          |       |                                    | Centralizers           | 4.5                       |               | HES          |                     |               |
| <b>Miscellaneous Materials</b>                     |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Gelling Agt  |                            | Conc                     |       | Surfactant                         |                        | Conc                      | Acid Type     | Qty          | Conc                |               |
| Treatment Fid                                      |                            | Conc                     |       | Inhibitor                          |                        | Conc                      | Sand Type     | Size         | Qty                 |               |
| <b>Fluid Data</b>                                  |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Stage/Plug #: 1                                    |                            |                          |       |                                    |                        |                           |               |              |                     |               |
| Fluid #  | Stage Type                 | Fluid Name               | Qty   | Qty UoM                            | Mixing Density lbm/gal | Yield ft3/sack            | Mix Fluid Gal | Rate bbl/min | Total Mix Fluid Gal |               |
| 1  | 12 lb/gal Tuned Spacer III | Tuned Spacer III         | 20    | bbl                                | 12                     | 3.13                      | 19.8          | 4            |                     |               |
| 35.30 gal/bbl                                      |                            | FRESH WATER              |       |                                    |                        |                           |               |              |                     |               |
| 178.42 lbm/bbl                                     |                            | BARITE, BULK (100003681) |       |                                    |                        |                           |               |              |                     |               |

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*Cementing Job Summary*

| Fluid #                             | Stage Type                                     | Fluid Name           | Qty                                    | Qty UoM                              | Mixing Density<br>lbm/gal | Yield<br>ft <sup>3</sup> /sack | Mix Fluid<br>Gal  | Rate<br>bbl/mi<br>n | Total Mix<br>Fluid<br>Gal |
|-------------------------------------|--|----------------------|--|--------------------------------------|---------------------------|--------------------------------|-------------------|---------------------|---------------------------|
| 2                                   | Lead Cement                                    | ECONOCEM (TM) SYSTEM | 510                                    | sack                                 | 13.8                      | 1.65                           | 7.53              | 5                   | 7.53                      |
| 7.53 Gal                            |  | FRESH WATER          |  |                                      |                           |                                |                   |                     |                           |
| Fluid #                             | Stage Type                                     | Fluid Name           | Qty                                    | Qty UoM                              | Mixing Density<br>lbm/gal | Yield<br>ft <sup>3</sup> /sack | Mix Fluid<br>Gal  | Rate<br>bbl/mi<br>n | Total Mix<br>Fluid<br>Gal |
| 3                                   | Displacement                                   | Displacement         | 150                                    | bbl                                  | 8.33                      |                                |                   | 4                   |                           |
| <b>Cement Left In Pipe</b>          | <b>Amount</b>                                  | <b>ft</b>            | <b>Reason</b>                          |                                      |                           |                                | <b>Shoe Joint</b> |                     |                           |
| <b>Mix Water: pH ##</b>             | <b>Mix Water Chloride: ## ppm</b>              |                      | <b>Mix Water Temperature: ## °F °C</b> |                                      |                           |                                |                   |                     |                           |
| <b>Cement Temperature: ## °F °C</b> | <b>Plug Displaced by: ## lb/gal kg/m3 XXXX</b> |                      |  | <b>Disp. Temperature: ## °F °C</b>   |                           |                                |                   |                     |                           |
| <b>Plug Bumped? Yes/No</b>          | <b>Bump Pressure: #### psi MPa</b>             |                      |  | <b>Floats Held? Yes/No</b>           |                           |                                |                   |                     |                           |
| <b>Cement Returns: ## bbl m3</b>    | <b>Returns Density: ## lb/gal kg/m3</b>        |                      |  | <b>Returns Temperature: ## °F °C</b> |                           |                                |                   |                     |                           |
| <b>Comment</b>                      |  |                      |  |                                      |                           |                                |                   |                     |                           |

1.3 Job Overview

|    |   | Units   | Description                                       |
|----|---|---------|---|
| 1  | Surface temperature at time of job            | °F      | 40  |
| 2  | Mud type (OBM, WBM, SBM, Water, Brine)        | -       | WBM   |
| 3  | Actual mud density                            | lb/gal  | 10.8  |
| 7  | Time circulated before job                    | HH:MM   | 01:00   |
| 8  | Mud volume circulated                         | bbls    | 240   |
| 9  | Rate at which well was circulated             | bpm     | 4   |
| 10 | Pipe movement during hole circulation         | Y/N     | N   |
| 11 | Rig pressure while circulating                | psi     | 800   |
| 12 | Time from end mud circulation to start of job | HH:MM   | 00:30   |
| 13 | Pipe movement during cementing                | Y/N     | N   |
| 14 | Calculated displacement                       | bbls    | 154   |
| 15 | Job displaced by                              | Rig/HES | HES   |
| 16 | Annular flow before job                       | Y/N     | N   |
| 17 | Annular flow after job                        | Y/N     | N   |
| 18 | Length of rat hole                            | ft      | 1   |
| 19 | Units of gas detected while circulating       | units   | 0   |
| 20 | Was lost circulation experienced at any time? | Y/N     | PARTIAL LOSSES DURING DISP. NOT FORMALLY RECORDED |

1.4 Lost Circulation Details

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| Lost Circulation Details   |
|--|
| Returns slowed twice during displacement at 80bbl away and 120bbl away |

1.5 Water Field Test

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| Item           | Recorded 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                                   |
| Sulfates       | <200           | ppm   | 1500 ppm             | Will greatly decrease the strength of cement                            |
| Total Hardness | 12             | ppm   | 500 mg/L             | High concentrations will accelerate the set of the cement               |
| Iron           | 0              | ppm   | 300 ppm              | High concentrations will accelerate the set of the cement               |
| Temperature    | 50             | °F    | 50-80 °F             | High temps will accelerate; Low temps may risk freezing in cold weather |

Submitted Respectfully by:

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## 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) | PS Pump Press<br>(psi) | Comments  |
|-------|----------|--|--|-----------|----------|--------|-----------------------------|---------------------|------------------------|---|
| Event | 1        | Arrive at Location from Service Center | Arrive at Location from Service Center | 3/21/2015 | 20:30:00 | USER   |                             |                     |                        | ARRIVE AT LOCATION. RIG RUNNING IN LINER. PERFORM PRE RIG UP SAFETY MEETING AND SITE ASSESSMENT WITH CREW.  |
| Event | 2        | Casing on Bottom                       | Casing on Bottom                       | 3/22/2015 | 06:00:00 | USER   |                             |                     |                        | CASING ON BOTTOM  |
| Event | 3        | Start Job                              | Start Job                              | 3/22/2015 | 07:00:00 | COM4   | 0.00                        | 0.03                | -21.00                 | HELD PRE JOB SAFETY MEEITNG WITH ALL PRESENT PERSONELL PRIOR TO JOB.  |
| Event | 4        | Test Lines                             | Test Lines                             | 3/22/2015 | 07:44:40 | COM4   | 0.00                        | 8.61                | 6612.00                | PRESSURE TEST LINES TO 6500 PSI.  |
| Event | 5        | Pump Spacer 1                          | Pump Spacer 1                          | 3/22/2015 | 07:51:22 | COM4   | 2.50                        | 11.99               | 758.00                 | PUMP 20 BBLS TUNED SPACER MIXED AT 12 PPG USING SUPPLIED WATER. DENSITY VERIFIED BY SCALE   |
| Event | 6        | Pump Cement                            | Pump Cement                            | 3/22/2015 | 08:02:48 | COM4   | 2.10                        | 13.92               | 633.00                 | PUMP 149 BBLS (510 SKS) ECONOCEM MIXED AT 13.8 PPG USING SUPPLIED WATER. DENSITY VERIFIED BY SCALE.   |
| Event | 7        | Shutdown                               | Shutdown                               | 3/22/2015 | 08:45:40 | USER   | 1.80                        | 13.93               | 52.00                  |   |
| Event | 8        | Clean Lines                            | Clean Lines                            | 3/22/2015 | 08:46:34 | USER   | 0.60                        | 8.11                | -5.00                  |   |
| Event | 9        | Pump Displacement                      | Pump Displacement                      | 3/22/2015 | 08:47:23 | COM4   | 2.50                        | 8.00                | -9.00                  | DISPLACE 150 BBLS FRESH WATER. 5 GAL MMCR ADDED TO FIRST 10 BBLS AND 10 GAL CLAYWEB ADDED THROUGHOUT THE REMAING DISPLAEMENT. RETURNS SLOWED TWICE DURING DISPLACEMENT. 80 BBLS AWAY. AND 120 BBLS AWAY |
| Event | 10       | Bump Plug                              | Bump Plug                              | 3/22/2015 | 09:24:31 | COM4   | 0.40                        | 7.96                | 2614.00                | PLUG LANDED AT 2614 PSI. PRESSURE BROUGHT TO 3100 PSI AND HELD 2 MIN.   |
| Event | 11       | Check Floats                           | Check Floats                           | 3/22/2015 | 09:26:04 | USER   | 0.00                        | 7.97                | 3055.00                | FLOATS HELD. 2 BBLS BACK.   |
| Event | 12       | Set Tool                               | Set Tool                               | 3/22/2015 | 09:34:58 | USER   | 0.00                        | 8.03                | 5866.00                | PRESSURE UP TO 5860 PSI TO SET HANGER/PACKER.   |
| Event | 13       | Pressure Test                          | Pressure Test                          | 3/22/2015 | 09:47:18 | USER   | 0.00                        | 7.96                | 1935.00                | PRESSURE UP ON ANNULUS USING RIG PUMPS. BACKSIDE PRESSURE TEST PERFORMED AND RECORDED BY RIG.   |
| Event | 14       | Sting out                              | Sting out                              | 3/22/2015 | 09:52:12 | USER   | 0.00                        | 7.90                | 567.00                 | RIG STINGS OUT OF HANGER.   |

|       |    |                |                |           |          |      |      |       |        |  |
|-------|----|----------------|----------------|-----------|----------|------|------|-------|--------|--|
| Event | 15 | Circulate Well | Circulate Well | 3/22/2015 | 09:57:27 | USER | 0.00 | 7.90  | 536.00 | CIRCULATE ON LINER TOP UNTIL CLEAN. PUMP 160 BBLS FRESH WATER. TRACES OF SPACER TO SURFACE BUT NOTHING SOLID ENOUGH TO CALL SPACER TO SURFACE. |
| Event | 16 | End Job        | End Job        | 3/22/2015 | 10:52:18 | COM4 | 0.00 | -0.34 | -10.00 | HOLD PRE RIG DOWN SAFETY MEETING WITH CREW PRIOR TO RIGGING DOWN EQUIPMENT.  |

## 3.0 Attachments

### 3.1 WHITING RAZOR 11 H-0215A LINER-Custom Results.png



