

# HALLIBURTON

iCem<sup>®</sup> Service

**Encana Oil & Gas (USA) INC. - EBUS**

**For: Randy**

Date: Wednesday, September 10, 2014

**Encana Vogl-McCoy 2E-5-H-F267**

Vogl-McCoy 2E-5H-F267

Sincerely,  
**Sheldon Cotts**

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## 1.1 Executive Summary

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Halliburton appreciates the opportunity to perform the cementing services on the **Vogl-McCoy 2E-5-H-F267** 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.

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  | Time Zone |
|-----------------------------------|--------|-------|-----------|
| <b>Requested Time On Location</b> | 6/5/14 | 20:00 | MST       |
| <b>Call Out</b>                   | 6/5/14 | 15:00 | MST       |
| <b>On Location</b>                | 6/5/14 | 18:00 | MST       |
| <b>Job Started</b>                | 6/5/14 | 22:06 | MST       |
| <b>Job Completed</b>              | 6/6/14 | 00:10 | MST       |
| <b>Depart Location</b>            | 6/6/14 | 01:30 | MST       |

## 1.2 Cementing Job Summary

HALLIBURTON

*Cementing Job Summary**The Road to Excellence Starts with Safety*

|   |                            |                          |       |                                |                        |                           |               |              |                     |               |
|---|----------------------------|--------------------------|-------|--------------------------------|------------------------|---------------------------|---------------|--------------|---------------------|---------------|
| Sold To #: 340078                                 |                            | Ship To #: 3191321       |       | Quote #:                       |                        | Sales Order #: 0901396029 |               |              |                     |               |
| Customer: ENCANA OIL & GAS (USA) INC. - EBUS      |                            |                          |       | Customer Rep:                  |                        |                           |               |              |                     |               |
| Well Name: VOGL-MCCOY                             |                            | Well #: 2E-5 H-F267      |       | API/UWI #: 05-123-37780-00     |                        |                           |               |              |                     |               |
| Field: WATTENBERG                                 |                            | City (SAP): FIRESTONE    |       | County/Parish: WELD            |                        | State: COLORADO           |               |              |                     |               |
| Legal Description: SE NW-5-2N-67W-2597FNL-2343FWL |                            |                          |       |                                |                        |                           |               |              |                     |               |
| Contractor:                                       |                            |                          |       | Rig/Platform Name/Num: H&P 278 |                        |                           |               |              |                     |               |
| Job BOM: 7523                                     |                            |                          |       |                                |                        |                           |               |              |                     |               |
| Well Type: HORIZONTAL OIL                         |                            |                          |       |                                |                        |                           |               |              |                     |               |
| Sales Person: HALAMERICA\HB50180                  |                            |                          |       | Srv Supervisor: Kc Smith       |                        |                           |               |              |                     |               |
| Job   |                            |                          |       |                                |                        |                           |               |              |                     |               |
| Formation Name                                    |                            |                          |       |                                |                        |                           |               |              |                     |               |
| Formation Depth (MD)                              |                            | Top                      |       | Bottom                         |                        |                           |               |              |                     |               |
| Form Type   |                            |                          |       | BHST                           |                        |                           |               |              |                     |               |
| Job depth MD                                      |                            | 14740ft                  |       | Job Depth TVD                  |                        |                           |               |              |                     |               |
| Water Depth                                       |                            |                          |       | Wk Ht Above Floor              |                        | 40                        |               |              |                     |               |
| Perforation Depth (MD)                            |                            | From                     |       | To                             |                        |                           |               |              |                     |               |
| Well Data   |                            |                          |       |                                |                        |                           |               |              |                     |               |
| Description                                       | New / Used                 | Size in                  | ID in | Weight lbm/ft                  | Thread                 | Grade                     | Top MD ft     | Bottom MD ft | Top TVD ft          | Bottom TVD ft |
| Casing  |                            | 7                        | 6.366 | 23                             |                        | N-80                      | 0             | 7360         | 0                   | 7100          |
| Casing  |                            | 4.5                      | 3.92  | 13.5                           |                        | P-110                     | 0             | 11600        | 0                   | 7100          |
| Open Hole Section                                 |                            |                          | 6.125 |                                |                        |                           | 7500          | 11600        |                     |               |
| Tools and Accessories                             |                            |                          |       |                                |                        |                           |               |              |                     |               |
| Type  | Size in                    | Qty                      | Make  | Depth ft                       | Type                   | Size in                   | Qty           | Make         |                     |               |
| Guide Shoe  | 4.5                        |                          |       |                                | Top Plug               | 4.5                       | 1             | BlackHawk    |                     |               |
| Float Shoe  | 4.5                        | 1                        |       | 14722                          | Bottom Plug            | 4.5                       |               | HES          |                     |               |
| Float Collar                                      | 4.5                        | 1                        |       | 14719                          | SSR plug set           | 4.5                       |               | HES          |                     |               |
| Insert Float                                      | 4.5                        |                          |       |                                | Plug Container         | 4.5                       |               | BlackHawk    |                     |               |
| Stage Tool  | 4.5                        |                          |       |                                | Centralizers           | 4.5                       |               | HES          |                     |               |
| Miscellaneous Materials                           |                            |                          |       |                                |                        |                           |               |              |                     |               |
| Gelling Agt                                       |                            | Conc                     |       | Surfactant                     |                        | Conc                      |               | Acid Type    | Qty                 | Conc          |
| Treatment Fld                                     |                            | Conc                     |       | Inhibitor                      |                        | Conc                      |               | Sand Type    | Size                | Qty           |
| Fluid Data  |                            |                          |       |                                |                        |                           |               |              |                     |               |
| 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   | 13 lb/gal Tuned Spacer III | Tuned Spacer III         | 30    | bbl                            | 13                     | 8.93                      | 33.9          | 4            |                     |               |
| 235.92 lbm/bbl                                    |                            | BARITE, BULK (100003681) |       |                                |                        |                           |               |              |                     |               |
| 24.20 gal/bbl                                     |                            | FRESH WATER              |       |                                |                        |                           |               |              |                     |               |

| Fluid #             | Stage Type       | Fluid Name                | Qty | Qty UoM | Mixing Density<br>lbm/gal | Yield<br>ft3/sack | Mix Fluid<br>Gal | Rate<br>bbl/min | Total Mix<br>Fluid<br>Gal |
|---------------------|------------------|---------------------------|-----|---------|---------------------------|-------------------|------------------|-----------------|---------------------------|
| 2                   | ExpandaCem<br>B2 | EXPANDACEM (TM)<br>SYSTEM | 540 | sack    | 13.8                      | 1.67              |                  | 6               | 7.7                       |
| 7.70 Gal            |                  | FRESH WATER               |     |         |                           |                   |                  |                 |                           |
|                     |                  |                           |     |         |                           |                   |                  |                 |                           |
| Fluid #             | Stage Type       | Fluid Name                | Qty | Qty UoM | Mixing Density<br>lbm/gal | Yield<br>ft3/sack | Mix Fluid<br>Gal | Rate<br>bbl/min | Total Mix<br>Fluid<br>Gal |
| 3                   | Fresh Water      | Fresh Water               | 219 | bbl     | 9.8                       |                   |                  | 219             |                           |
|                     |                  |                           |     |         |                           |                   |                  |                 |                           |
| Cement Left In Pipe |                  | Amount                    | ft  | Reason  |                           |                   | Shoe Joint       |                 |                           |
| Comment             |                  |                           |     |         |                           |                   |                  |                 |                           |

**1.3 Job Event Log**

| Type  | Seq. No. | Activity                                 | Graph Label                              | Date     | Time     | Source | PS Pump Press<br>(psi) | DH Density<br>(ppg) | Comb Pump Rate<br>(bbl/min) | Comment  |
|-------|----------|--|--|----------|----------|--------|------------------------|---------------------|-----------------------------|--|
| Event | 1        | Call Out                                 | Call Out                                 | 6/5/2014 | 15:00:00 | USER   |                        |                     |                             | Crew called out for job. Requested on location at 20:00.   |
| Event | 2        | Depart from Service Center or Other Site | Depart from Service Center or Other Site | 6/5/2014 | 17:30:00 | USER   |                        |                     |                             | Crew had a pre-journey safety meeting, entered into journey management, and departed for location.   |
| Event | 3        | Arrive at Location from Service Center   | Arrive at Location from Service Center   | 6/5/2014 | 18:00:00 | USER   |                        |                     |                             | Crew arrived safely on location, ended journey management and conducted a site assesment.  |
| Event | 4        | Comment                                  | Comment                                  | 6/5/2014 | 18:10:00 | USER   |                        |                     |                             | Crew spotted the equipment into position.  |
| Event | 5        | Rig-Up Equipment                         | Rig-Up Equipment                         | 6/5/2014 | 18:15:00 | USER   |                        |                     |                             | Crew conducted a pre-rig up safety meeting and began rigging up the lines and equipment.   |
| Event | 6        | Comment                                  | Comment                                  | 6/5/2014 | 20:00:00 | USER   | 1.00                   | 0.48                | 0.00                        | Had to wait for the rig to rig up the Blackhawk head and finish rigging down the casing crew.  |
| Event | 7        | Pre-Job Safety Meeting                   | Pre-Job Safety Meeting                   | 6/5/2014 | 21:30:00 | USER   | 6.00                   | 8.33                | 0.00                        | Crew met with the rig crew, company man, Halliburton tool hand, and the Blackhawk tool hands to go over the job procedure and cover the safety procedures associated with the job. |
| Event | 8        | Rig-Up Completed                         | Rig-Up Completed                         | 6/5/2014 | 21:45:00 | USER   | 7.00                   | 8.32                | 0.00                        | Crew finished rigging up the lines on the floor, primed the RCM, and did all of the final preparations prior to pumping the job.   |

|       |    |                     |                            |          |          |      |         |       |      |  |
|-------|----|---------------------|----------------------------|----------|----------|------|---------|-------|------|--|
| Event | 9  | Test Lines          | Test Lines                 | 6/5/2014 | 21:58:29 | COM1 | 5458.00 | 8.45  | 0.00 | Tested lines to 5458 psi.  |
| Event | 10 | Test Lines          | End Pressure Test          | 6/5/2014 | 22:00:39 | USER | 5367.00 | 8.53  | 0.00 | Bled Pressure Off.   |
| Event | 11 | Pump Spacer 1       | Pump Spacer 1              | 6/5/2014 | 22:06:53 | COM1 | 340.00  | 12.96 | 1.00 | Pumped 30 bbls of Tuned Spacer at 13#.   |
| Event | 12 | Shutdown            | Shutdown                   | 6/5/2014 | 22:16:08 | USER | 56.00   | 13.32 | 0.00 | Shutdown to Mix up Cement.   |
| Event | 13 | Pump Cement         | Pump Cement                | 6/5/2014 | 22:19:58 | COM1 | 152.00  | 13.32 | 4.60 | Pumped 540 sks(160 bbls) of ExpandaCem @ 13.8 lb/gal, 1.67 Yield, 7.7 gal/sk.  |
| Event | 14 | Shutdown            | Shutdown                   | 6/5/2014 | 23:00:30 | USER | 213.00  | 13.57 | 1.60 | Shutdown.  |
| Event | 15 | Other               | Washed the Pumps and Lines | 6/5/2014 | 23:05:06 | COM1 | 3.00    | 12.22 | 0.00 | Washed the pumps and lines into the Wise Transport.  |
| Event | 16 | Pump Displacement   | Pump Displacement          | 6/5/2014 | 23:09:42 | COM1 | 7.00    | -0.10 | 0.10 | Pumped 219.3 bbls of Fresh Water Displacement.   |
| Event | 17 | Comment             | Comment                    | 6/5/2014 | 23:17:53 | USER | 235.00  | 9.65  | 0.90 | Caught something in the pump and it set off our Kick outs. Shutdown briefly to check pump. Continued pumping and whatever it was worked its way out. |
| Event | 18 | Slow Rate           | Slow Rate                  | 6/5/2014 | 23:49:56 | USER | 2154.00 | 9.62  | 6.00 | Slowed our rate to 3 bpm to land the plug.   |
| Event | 19 | Bump Plug           | Bump Plug                  | 6/5/2014 | 23:51:23 | COM1 | 1451.00 | 9.65  | 3.00 | Bumped the plug at 219 bbls away.  |
| Event | 20 | Check Floats        | Check Floats               | 6/5/2014 | 23:56:48 | USER | 2584.00 | 9.69  | 0.00 | Checked floats, Floats held 1 1/2 bbls back.   |
| Event | 21 | End Job             | End Job                    | 6/6/2014 | 00:10:00 | COM1 | 111.00  | 9.64  | 1.10 | Job Complete.  |
| Event | 22 | Rig-Down Equipment  | Rig-Down Equipment         | 6/6/2014 | 00:15:00 | USER | 4.00    | 9.59  | 0.00 | Crew conducted a pre-rig down safety meeting and started rigging down.   |
| Event | 23 | Rig-Down Completed  | Rig-Down Completed         | 6/6/2014 | 01:15:00 | USER |         |       |      | Lines and Equipment all rigged down and equipment prepared to go back to the yard.   |
| Event | 24 | Depart Location for | Depart Location for        | 6/6/2014 | 01:30:00 | USER |         |       |      | Crew departed for Yard.  |

## **1.4 Planned Pumping Schedule**

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- 1. Fill Lines with Water**
  - a. Density = 8.33 lb/gal
  - b. Volume = 2 bbls
- 2. Pressure Test Lines to 5458psi**
- 3. Drop Bottom Plug**
- 4. Pump Tuned Spacer III**
  - a. Density = 13 lb/gal
  - b. Volume = 30 bbl
  - c. Rate = 4 bpm
- 5. Drop Bottom Plug**
- 6. Pump ExpandaCem (Primary)**
  - a. Density = 13.8 lb/gal
  - b. Yield = 1.67 ft<sup>3</sup>/sk
  - c. Water Requirement = 7.7 gal/sk
  - d. Volume = 540 sks (160 bbls)
  - e. Rate = 4 bpm
- 7. Drop Top Plug**
- 8. Start Displacement**
- 9. Pump Displacement Water**
  - a. Density = 9.8 lb/gal
  - b. Volume = 219.3 bbls
  - c. Rate = 6.0 bpm
10. Land Plug – Anticipated Final Circulation Pressure 1451 psi

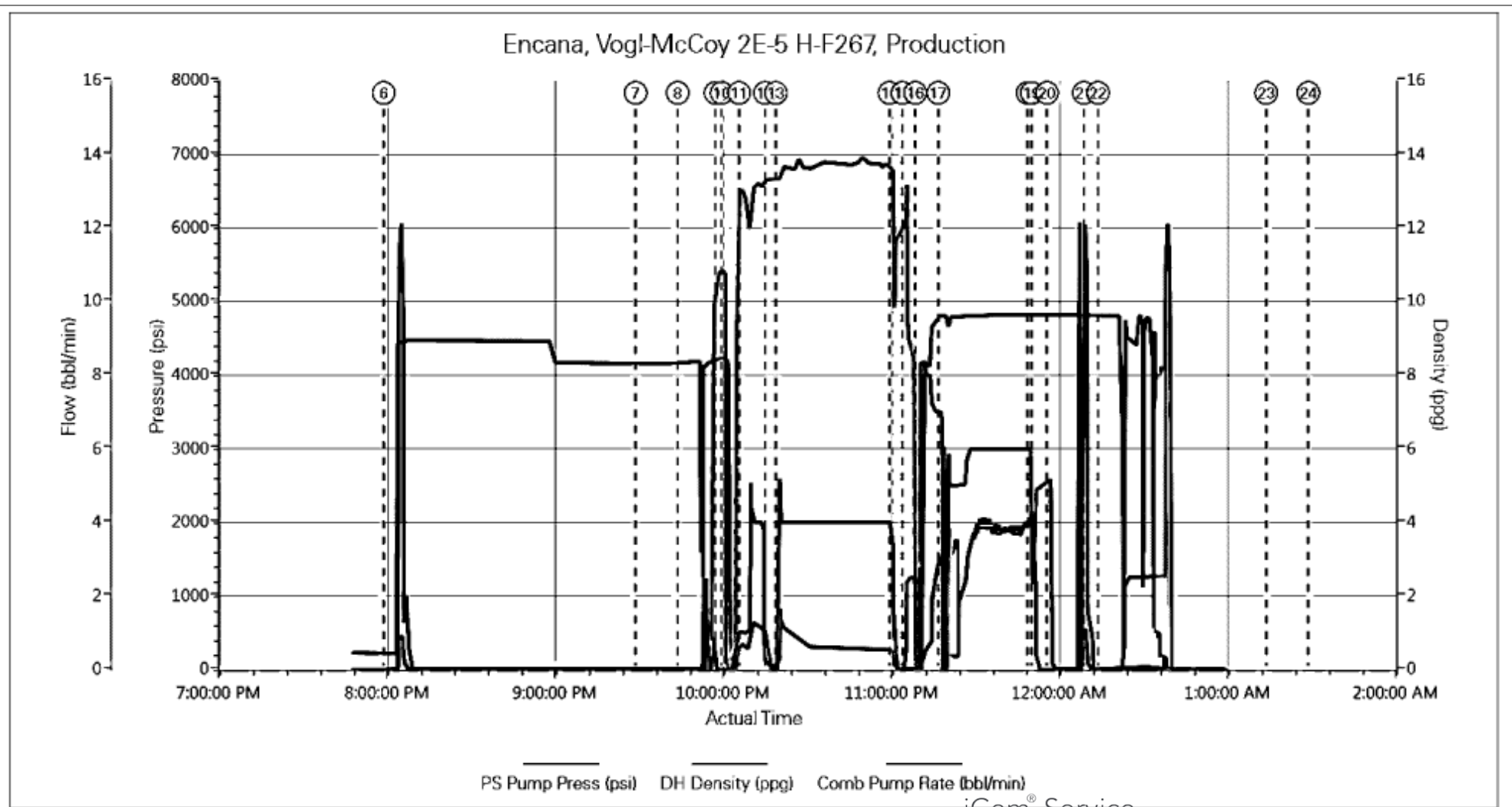


## 1.5 Field Water Test

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| Item             | Recorded Test Value | Units | Max. Acceptable Limit | Potential Problems in Exceeding Limit   |
|------------------|---------------------|-------|-----------------------|---|
| pH               | 6                   | ----  | 6.0 - 8.0             | Chemicals in the water can cause severe retardation   |
| Chlorides        | >400                | ppm   | 3000 ppm              | Can shorten thickening time of cement   |
| Sulfates         | 15                  | ppm   | 1500 ppm              | Will greatly decrease the strength of cement  |
| Total Hardness   |                     | ppm   | 500 mg/L              | High concentrations will accelerate the set of the cement   |
| Calcium          |                     | ppm   | 500 ppm               | High concentrations will accelerate the set of the cement   |
| Total Alkalinity |                     | ppm   | 1000 ppm              | Cement is greatly retarded to the point where it may not set up at all (typically occurs @ pH $\geq$ 8.3).  |
| Bicarbonates     |                     | ppm   | 1000 ppm              | Cement is greatly retarded to the point where it may not set up at all  |
| Potassium        |                     | ppm   | 5000 ppm              | High concentrations will shorten the pump time of cement (indicates the presence of chlorides, therefore if Potassium levels are measured as high, so should the chlorides) |
| Iron             |                     | ppm   | 300 ppm               | High concentrations will accelerate the set of the cement   |
| Temperature      | 68.9                | °F    | 50-80 °F              | High temps will accelerate; Low temps may risk freezing in cold weather   |

## 2.0 Custom Graph



## 3.0 Appendix

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Insert Planned Pump Schedule from Proposal or actual Job Procedure built for job