HALLIBURTON

iCem® Service

# EXTRACTION OIL & GAS

Date: Sunday, November 2, 2014

**Diamond Valley East 12**

Frontier 10

Sincerely,

**Jennifer Dattolo**

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## 1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Diamond Valley East #12** cement **Surface** 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 |
|---|---|---|---|
| **Called Out** | 10/30/14 | 10:00 | MST |
| **On Location** | 10/30/14 | 14:00 | MST |
| **Job Started** | 10/31/14 | 03:08 | MST |
| **Job Completed** | 10/31/14 | 04:25 | MST |
| **Departed Location** | 10/31/14 | 06:00 | MST |

## 1.2 Cementing Job Summary

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# *Cementing Job Summary*

***The Road to Excellence Starts with Safety***

| | | | |
|---|---|---|---|
| **Sold To #:** 369404 | **Ship To #:** 3594481 | **Quote #:** | **Sales Order #:** 0901772844 |
| **Customer:** EXTRACTION OIL & GAS | | **Customer Rep:** Larry Siegel | |
| **Well Name:** DIAMOND VALLEY EAST | **Well #:** 12 | | **API/UWI #:** 05-123-40318-00 |
| **Field:** WATTENBERG | **City (SAP):** WINDSOR | **County/Parish:** WELD | **State:** COLORADO |
| **Legal Description:** SW SW-23-6N-67W-976FSL-155FWL | | | |
| **Contractor:** | | **Rig/Platform Name/Num:** Frontier 10 | |
| **Job BOM:** 7521 | | | |
| **Well Type:** HORIZONTAL OIL | | | |
| **Sales Person:** HALAMERICA\H117930 | | **Srvc Supervisor:** Steven Markovich | |

**Job**

| | | | | |
|---|---|---|---|---|
| **Formation Name** | | | | |
| **Formation Depth (MD)** | **Top** | | **Bottom** | |
| **Form Type** | | | **BHST** | |
| **Job depth MD** | 825ft | | **Job Depth TVD** | |
| **Water Depth** | | | **Wk Ht Above Floor** | |
| **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 | | 9.625 | 8.921 | 36 | LTC | J-55 | 0 | 825 | | |
| Open Hole Section | | | 13.5 | | | | 0 | 825 | | |

**Tools and Accessories**

| Type | Size in | Qty | Make | Depth ft | | Type | Size in | Qty | Make |
|---|---|---|---|---|---|---|---|---|---|
| **Guide Shoe** | 9.625 | 1 | | 850 | | **Top Plug** | 9.625 | 1 | HES |
| **Float Shoe** | 9.625 | 1 | | | | **Bottom Plug** | 9.625 | 1 | HES |
| **Float Collar** | 9.625 | 1 | | | | **SSR plug set** | 9.625 | 1 | HES |
| **Insert Float** | 9.625 | 1 | | | | **Plug Container** | 9.625 | 1 | HES |
| **Stage Tool** | 9.625 | 1 | | | | **Centralizers** | 9.625 | 1 | 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 | Fresh Water Spacer | Fresh Water Spacer | 10 | bbl | 8.33 | | | 6 | |

| Fluid # | Spacer | Mud Flush | 12 | bbl | Mixing Density lbm/gal | Yield ft3/sack | Mix Fluid Gal | Rate bbl/min | Total Mix Fluid Gal |
|---|---|---|---|---|---|---|---|---|---|
| 2 | Lead Cement | SWIFTCEM (TM) SYSTEM | 350 | sack | 14.2 | 1.54 | | 6 | 7.64 |

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# *Cementing Job Summary*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 7.64 Gal | | FRESH WATER | | | | | | | |
| | | | | | | | | | |
| **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** |
| 3 | Displacement | Displacement | 59.4 | bbl | 8.33 | | | 6 | |

| | | | | |
|---|---|---|---|---|
| **Cement Left In Pipe** | **Amount** | 42 ft | **Reason** | Shoe Joint |

**Comment** 23bbls of Cement to surface

## 1.3 Planned Pumping Schedule

1. **Fill Lines with Water**
    a. Density = 8.33ppg
    b. Volume = 2bbl
2. **Pressure Test Lines to 3000 psi**
3. **Pump Water Spacer**
    a. Density = 8.33 lb/gal
    b. Volume = 10 bbl
    c. Rate = 3.5 bpm
4. **Pump Mud Flush Spacer**
    a. Density = 8.33 lb/gal
    b. Volume = 12 bbl
    c. Rate = 3.5 bpm
5. **Pump Water Spacer**
    a. Density = 8.33 lb/gal
    b. Volume = 10 bbl
    c. Rate = 3.5 bpm
6. **Pump SwiftCem Cement**
    a. Density = 14.2
    b. Yield = 1.54
    c. Water Requirement = 7.64
    d. Volume = 350 sks (96 bbls)
    e. Rate = 4.45 bpm
7. **Drop Top Plug**
8. **Start Displacement**
9. **Pump Displacement Water**
    a. Density = 8.33 lb/gal
    b. Volume = 59.8 bbls
    c. Rate = 3.9 bpm
10. Land Plug – Anticipated Final Circulation Pressure 232 psi

**Calculated Total Displacement = 59.6 bbls**

## 1.4 Job Overview

| | | Units | Description |
|---|---|---|---|
| **1** | Surface temperature at time of job | °F | 38 |
| **2** | Mud type (OBM, WBM, SBM, Water, Brine) | - | WBM |
| **3** | Actual mud density | lb/gal | |
| **4** | Time circulated before job | HH:MM | 00:45 |
| **5** | Mud volume circulated | Bbls | |
| **6** | Rate at which well was circulated | Bpm | |
| **7** | Pipe movement during hole circulation | Y/N | |
| **8** | Rig pressure while circulating | Psi | |
| **9** | Time from end mud circulation to start of job | HH:MM | 00:10 |
| **10** | Pipe movement during cementing | Y/N | N |
| **11** | Calculated displacement | Bbls | 59.6 |
| **12** | Job displaced by | Rig/HES | HES |
| **13** | Annular flow before job? | Y/N | N |
| **14** | Annular flow after job | Y/N | N |
| **15** | Length of rat hole | Ft | |
| **16** | Units of gas detected while circulating | Units | |
| **17** | Was lost circulation experienced at any time ? | Y/N | N |

## 1.5 Water Field Test

| Item | Recorded Test 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 | | ppm | 3000 ppm | Can shorten thickening time of cement |
| Sulfates | | 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 ≥ 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 | 61 | $^{o}$F | 50-80 $^{o}$F | High temps will accelerate; Low temps may risk freezing in cold weather |

***Submitted Respectfully by: Steven Markovich***

## 1.6 Job Event Log

| Type | Seq. No. | Activity | Graph Label | Date | Time | Source | DH Density *(ppg)* | PS Pump Press *(psi)* | PS Pump Rate *(bbl/min)* | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| Event | 1 | Arrive at Location from Service Center | Arrive at Location from Service Center | 10/30/2014 | 14:00:00 | USER | | | | Arrived on location rig still drilling hole |
| Event | 2 | Assessment Of Location Safety Meeting | Assessment Of Location Safety Meeting | 10/30/2014 | 14:10:00 | USER | | | | JSA and Hazard hunt with HES crew |
| Event | 3 | Rig-Up Equipment | Rig-Up Equipment | 10/31/2014 | 02:00:00 | USER | 0.00 | 38.00 | 0.00 | Rigged up HES lines and equipment |
| Event | 4 | Safety Meeting - Pre Job | Safety Meeting - Pre Job | 10/31/2014 | 02:45:00 | USER | 0.00 | 40.00 | 0.00 | JSA with HES and rig crew |
| Event | 5 | Start Job | Start Job | 10/31/2014 | 03:08:08 | COM6 | 0.00 | 46.00 | 0.00 | |
| Event | 6 | Test Lines | Test Lines | 10/31/2014 | 03:11:52 | COM6 | 8.33 | 3121.00 | 0.00 | Test lines to 3000psi |
| Event | 7 | Pump Spacer 1 | Pump Spacer 1 | 10/31/2014 | 03:15:53 | COM6 | 8.33 | 0.00 | 3.50 | Pump 10bbls of Water |
| Event | 8 | Pump Spacer 2 | Pump Spacer 2 | 10/31/2014 | 03:19:55 | COM6 | 8.33 | 33.00 | 3.50 | Pump 12bbls of Mud Flush |
| Event | 9 | Pump Spacer 1 | Pump Spacer 1 | 10/31/2014 | 03:24:05 | COM6 | 8.33 | 28.00 | 3.50 | Pump 10bbls of Water |
| Event | 10 | Pump Cement | Pump Cement | 10/31/2014 | 03:29:48 | COM6 | 14.20 | 0.00 | 4.45 | Pump 96bbls of 14.2ppg Cement |
| Event | 11 | Shutdown | Shutdown | 10/31/2014 | 03:53:11 | COM6 | 14.20 | 0.00 | 0.00 | |
| Event | 12 | Drop Top Plug | Drop Top Plug | 10/31/2014 | 03:53:31 | COM6 | 14.20 | 0.00 | 0.00 | Plug pre loaded in HES head |
| Event | 13 | Pump Displacement | Pump Displacement | 10/31/2014 | 03:54:53 | COM6 | 8.33 | 0.00 | 3.90 | Pump 59.8bbls of water. Cement tio surface at 37 away giving us 23bbls to surface |
| Event | 14 | Bump Plug | Bump Plug | 10/31/2014 | 04:12:56 | COM6 | 8.33 | 885.00 | 0.00 | Bumped plug at 232psi and took 500 over. Pressure didnt hold due to a hole in wellhead. Bumped plug 3 times to verify. |
| Event | 15 | End Job | End Job | 10/31/2014 | 04:25:45 | COM6 | 8.33 | 4.00 | 0.00 | Thank you Markovich and crew |

## 2.0 Attachments

### 2.1 Diamond Valley East 12-Custom Results