# Bison Oil Well Cementing
## Tail & Lead

Date: 11/15/2018
Invoice # 200364
API#
Foreman: Kirk Kallhoff

Customer: Noble Energy Inc.
Well Name: dorothy state lg 16-757

County: Weld
State: Colorado
Sec: 4
Twp: 8n
Range: 59w

Consultant: charles
Rig Name & Number: H&P 321
Distance To Location: 53
Units On Location: 4028/4032
Time Requested: 11:00 AM
Time Arrived On Location: 1000 am
Time Left Location: 16:00pm

## WELL DATA

| | |
|---|---|
| Casing Size (in) : | 9.625 |
| Casing Weight (lb) : | 36 |
| Casing Depth (ft.) : | 1,898 |
| Total Depth (ft) : | 1944 |
| Open Hole Diameter (in) : | 13.50 |
| Conductor Length (ft) : | 110 |
| Conductor ID : | 15.15 |
| Shoe Joint Length (ft) : | 41 |
| Landing Joint (ft) : | 35 |
| Sacks of Tail Requested | 100 |
| HOC Tail (ft): | 0 |

One or the other, cannot have quantity in both

**Max Rate:** 8
**Max Pressure:** 2500

## Cement Data

**Lead**

| | |
|---|---|
| Cement Name: | BFN III |
| Cement Density (lb/gal) : | 13.5 |
| Cement Yield (cuft) : | 1.68 |
| Gallons Per Sack | 8.90 |
| % Excess | 15% |

**Tail** Type III

| | |
|---|---|
| Cement Name: | |
| Cement Density (lb/gal) : | 15.2 |
| Cement Yield (cuft) : | 1.27 |
| Gallons Per Sack: | 5.80 |
| % Excess: | 0% |
| **Fluid Ahead (bbls)** | 30.0 |
| **H20 Wash Up (bbls)** | 20.0 |

**Spacer Ahead Makeup**
30 BBL ahed with Die in 2nd 10

Casing ID 8.921
Casing Grade J-55 only used

## Lead Calculated Results

| | | |
|---|---|---|
| HOC of Lead | 1529.56 | ft |
| Casing Depth - HOC Tail | | |
| Volume of Lead Cement | 747.54 | cuft |
| HOC of Lead X Open Hole Ann | | |
| Volume of Conductor | 82.12 | cuft |
| (Conductor ID Squared) -(Casing Size OD Squared) X (.005454) X (Conductor Length ft) | | |
| Total Volume of Lead Cement | 829.66 | cuft |
| (cuft of Lead Cement) + (Cuft of Conductor) | | |
| bbls of Lead Cement | 169.93 | bbls |
| (Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess) | | |
| Sacks of Lead Cement | 567.92 | sk |
| (Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement) | | |
| bbls of Lead Mix Water | 120.35 | bbls |
| (Sacks Needed) X (Gallons Per Sack) ÷ 42 | | |
| Displacement | 146.25 | bbls |
| (Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length) | | |
| Total Water Needed: | 330.41 | bbls |

## Tail Calculated Results

| | | |
|---|---|---|
| Tail Cement Volume In Ann | 127.00 | cuft |
| (HOC Tail) X (OH Ann) | | |
| Total Volume of Tail Cement | 109.20 | Cuft |
| (HOC Tail X OH Ann) - ( Shoe Length X Shoe Joint Ann) | | |
| bbls of Tail Cement | 22.62 | bbls |
| (HOC of Tail) X (OH Ann) + (Cement Yield) X (Shoe Joint Ann) X (.1781) X (% Excess) | | |
| HOC Tail | 223.44 | ft |
| (Tail Cement Volume) ÷ (OH Ann) | | |
| Sacks of Tail Cement | 100.00 | sk |
| (Total Volume of Tail Cement) ÷ (Cement Yield) | | |
| bbls of Tail Mix Water | 13.81 | bbls |
| (Sacks of Tail Cement X Gallons Per Sack) ÷ 42 | | |
| Pressure of cement in annulus | | |
| Hydrostatic Pressure | 585.23 | PSI |
| Collapse PSI: | 2020.00 | psi |
| Burst PSI: | 3520.00 | psi |

X
Authorization To Proceed

Customers hereby acknowledges and specifically agrees to the terms and condition on this work order, including, without limitation, the provisions on this work order.

# Bison Oil Well Cementing
## Two Cement Surface Pipe

| | |
|---|---|
| Customer | Noble Energy Inc. |
| Well Name | dorothy state lg 16-757 |

| | |
|---|---|
| Date | 11/15/2018 |
| INVOICE # | 200364 |
| LOCATION | Weld |
| FOREMAN | Kirk Kallhoff |

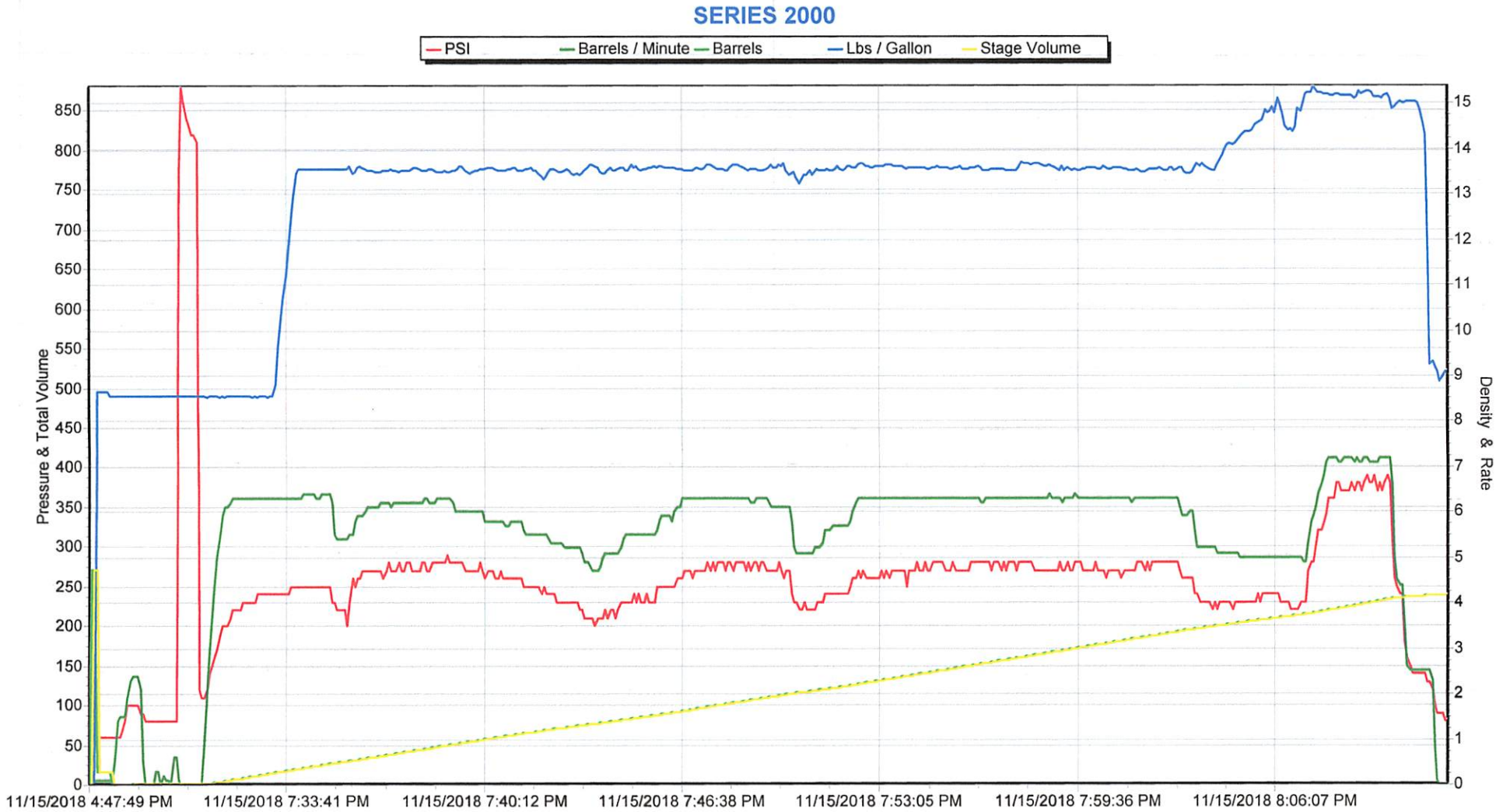
**Treatment Report Page 2**

| Amount Pumped | | Time | Event | Description | Rate | BBLs | Pressure |
|---|---|---|---|---|---|---|---|
| **Lead mixed bbls** | 120.3 | 1000 am | ARRIVE ON LOCATION | ASSESS LOCATION | | | |
| **Lead % Excess** | 15% | 440 pm | JSA | Bison/SPOT EQUIPMENT IN | | | |
| **Lead Sacks** | 568 | 655 pm | JSA | Bison and Rig Crew | | | |
| | | 730 pm | PRESSURE TEST | PRESSURE TEST TO 1000 PSI | | | 1000 |
| | | 731 pm | SPACER AHEAD | WATER S. . | 6 | 30 | 200 |
| **Tail mixed bbls** | 13.81 | 735 pm | LEAD CEMENT | CEMENT MIXED AT 13.5 PPG PG. 571 sks | 6 | 169.3 | 220 |
| **Tail % Excess** | 0% | 806 pm | TAIL CEMENT | CEMENT MIXED AT 15.2 PPG PG. 100 sks | 6 | 22.6 | 300 |
| **Tail Sacks** | 100 | 811 pm | SHUT DOWN | | | | |
| | | 815 pm | DROP PLUG | PLUG PRELOADED | | | |
| **Total Sacks** | 668 | 815 pm | DISPLACEMENT | RIG DISPLACE | 8 | 146.2 | 350 |
| **Water Temp** | 60 | 857 pm | Bump Plug | (1050 PSI) | 1 | 146.2 | 570 |
| **bbl Returns** | 33 | 857 pm | Casing TEST | Held for 15 Min. | | | 1070 |
| | | 912 pm | Check Floats | FLOATS I held 2.5 BBL Back | | | |
| Notes: | | 945 pm | RIG DOWN | PRE RIG DOWN MEETING | | | |
| Montered well for | | 1000 pm | Leave Location | | | | |
| 30 Min. No top out | | | | | | | |
| Needed | | | | | | | |

X _____ Work Preformed

X WSS Title

X 11-15-18 Date


SERIES 2000
PSI
Barrels / Minute
Barrels
Lbs / Gallon
Stage Volume
Pressure & Total Volume
Density & Rate
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
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11/15/2018 7:33:41 PM
11/15/2018 7:40:12 PM
11/15/2018 7:46:38 PM
11/15/2018 7:53:05 PM
11/15/2018 7:59:36 PM
11/15/2018 8:06:07 PM