



**Bison Oil Well Cementing
Tail & Lead**

Date: 6/22/2017

Invoice # 666154

API# 05-123-42970

Supervisor: Nick Vigil

Customer: Noble Energy Inc.

Well Name: Diamondback Federal LC22-770

| | |
|-----------------|---------------------------------|
| County: Weld | Consultant: Jim |
| State: Colorado | Rig Name & Number: H&P 524 |
| Sec: 22 | Distance To Location: 67 miles |
| Twp: 9N | Units On Location: 4023/4032 |
| Range: 59W | Time Requested: 16:30 |
| | Time Arrived On Location: 15:30 |
| | Time Left Location: |

| WELL DATA | Cement Data |
|---|---|
| <p>Casing Size (in) : 9.625</p> <p>Casing Weight (lb) : 36</p> <p>Casing Depth (ft.) : 1,948</p> <p>Total Depth (ft) : 1958</p> <p>Open Hole Diameter (in) : 13.50</p> <p>Conductor Length (ft) : 80</p> <p>Conductor ID : 15.25</p> <p>Shoe Joint Length (ft) : 47</p> <p>Landing Joint (ft) :</p> <p>Sacks of Tail Requested 100</p> <p>HOC Tail (ft): 0</p> <p>One or the other, cannot have quantity in both</p> <p>Max Rate: 8</p> <p>Max Pressure: 2000</p> | <p>Lead</p> <p>Cement Name:</p> <p>Cement Density (lb/gal) : 13.5</p> <p>Cement Yield (cuft) : 1.7</p> <p>Gallons Per Sack 9.00</p> <p>% Excess 15%</p> <p>Tail</p> <p>Cement Name:</p> <p>Cement Density (lb/gal) : 15.2</p> <p>Cement Yield (cuft) : 1.27</p> <p>Gallons Per Sack: 5.89</p> <p>% Excess: 0%</p> <p>Fluid Ahead (bbls) 30.0</p> <p>H2O Wash Up (bbls) 20.0</p> <p>Spacer Ahead Makeup</p> <p>Dye in second 10 bbl</p> |

Casing ID 8.921 Casing Grade J-55 only used

| Lead Calculated Results | Tail Calculated Results |
|---|---|
| HOC of Lead 1645.88 ft | Tail Cement Volume In Ann 127.00 cuft |
| Casing Depth - HOC Tail | (HOC Tail) X (OH Ann) |
| Volume of Lead Cement 804.39 cuft | Total Volume of Tail Cement 106.60 Cuft |
| HOC of Lead X Open Hole Ann | (HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann) |
| Volume of Conductor 61.05 cuft | bbls of Tail Cement 22.62 bbls |
| (Conductor ID Squared) - (Casing Size OD Squared) X (.005454) X (Conductor Length ft) | (HOC of Tail) X (OH Ann) + (Cement Yield) X (Shoe Joint Ann) X (.1781) X (% Excess) |
| Total Volume of Lead Cement 865.44 cuft | HOC Tail 218.12 ft |
| (cuft of Lead Cement) + (Cuft of Conductor) | (Tail Cement Volume) ÷ (OH Ann) |
| bbls of Lead Cement 177.26 bbls | Sacks of Tail Cement 100.00 sk |
| (Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess) | (Total Volume of Tail Cement) ÷ (Cement Yield) |
| Sacks of Lead Cement 585.45 sk | bbls of Tail Mix Water 14.02 bbls |
| (Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement) | (Sacks of Tail Cement X Gallons Per Sack) ÷ 42 |
| bbls of Lead Mix Water 125.45 bbls | Pressure of cement in annulus |
| (Sacks Needed) X (Gallons Per Sack) ÷ 42 | Hydrostatic Pressure 585.23 PSI |
| Displacement 147.26 bbls | |
| (Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length) | Collapse PSI: 2020.00 psi |
| Total Water Needed: 336.73 bbls | Burst PSI: 3520.00 psi |

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.

