



Bison Oil Well Cementing

Tail & Lead

Date: 7/21/2017
 Invoice # 200129
 API# _____
 Foreman: Kirk Kallhoff

Customer: Noble Energy Inc.
 Well Name: wells ranch af 07-~~1414~~

County: Weld Consultant: john
 State: Colorado Rig Name & Number: H&P 517
 Distance To Location: 25
 Units On Location: 4028/4030/4034
 Time Requested: 430 pm
 Time Arrived On Location: 330 pm
 Time Left Location: _____

Sec: 20
 Twp: 9n
 Range: 58w

| WELL DATA | Cement Data |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Casing Size (in) : <u>9.625</u> Casing Weight (lb) : <u>36</u> Casing Depth (ft.) : <u>1,901</u> Total Depth (ft) : <u>1946</u> Open Hole Diameter (in) : <u>13.50</u> Conductor Length (ft) : <u>80</u> Conductor ID : <u>15.6</u> Shoe Joint Length (ft) : <u>46</u> Landing Joint (ft) : <u>35</u> Sacks of Tail Requested <u>100</u> HOC Tail (ft): <u>0</u> One or the other, cannot have quantity in both Max Rate: Max Pressure: | Lead Cement Name: <u>fn3 gel calcium</u> Cement Density (lb/gal) : <u>13.5</u> Cement Yield (cuft) : <u>1.7</u> Gallons Per Sack <u>9.00</u> % Excess <u>15%</u> Tail Cement Name: <u>bfn 3</u> Cement Density (lb/gal) : <u>15.2</u> Cement Yield (cuft) : <u>1.27</u> Gallons Per Sack: <u>5.89</u> % Excess: <u>0%</u> Fluid Ahead (bbls) <u>146.1</u> H2O Wash Up (bbls) <u>20.0</u> Spacer Ahead Makeup |

Casing ID 8.921 Casing Grade J-55 only used

| Lead Calculated Results | Tail Calculated Results |
|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| HOC of Lead <u>1567.00 ft</u> | Tail Cement Volume In Ann <u>127.00 cuft</u> |
| Casing Depth - HOC Tail | (HOC Tail) X (OH Ann) |
| Volume of Lead Cement <u>765.84 cuft</u> | Total Volume of Tail Cement <u>107.03 Cuft</u> |
| HOC of Lead X Open Hole Ann | (HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann) |
| Volume of Conductor <u>65.76 cuft</u> | bbbls of Tail Cement <u>22.62 bbbls</u> |
| (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 <u>831.60 cuft</u> | HOC Tail <u>219.00 ft</u> |
| (cuft of Lead Cement) + (Cuft of Conductor) | (Tail Cement Volume) ÷ (OH Ann) |
| bbbls of Lead Cement <u>170.32 bbbls</u> | Sacks of Tail Cement <u>100.00 sk</u> |
| (Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess) | (Total Volume of Tail Cement) ÷ (Cement Yield) |
| Sacks of Lead Cement <u>562.55 sk</u> | bbbls of Tail Mix Water <u>14.02 bbbls</u> |
| (Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement) | (Sacks of Tail Cement X Gallons Per Sack) ÷ 42 |
| bbbls of Lead Mix Water <u>120.55 bbbls</u> | Pressure of cement in annulus |
| (Sacks Needed) X (Gallons Per Sack) ÷ 42 | Hydrostatic Pressure <u>585.23 PSI</u> |
| Displacement <u>146.10 bbbls</u> | Collapse PSI: <u>2020.00 psi</u> |
| (Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length) | Burst PSI: <u>3520.00 psi</u> |
| Total Water Needed: <u>446.76 bbbls</u> | |

X Authorization To Proceed

