



**Bison Oil Well Cementing
Tail & Lead**

Date: 12/23/2016
 Invoice # 20008
 API# _____
 Foreman: Kirk Kallhoff

Customer: Noble Energy Inc.
 Well Name: earp federal lc 23-735

County: Weld Consultant: justin
 State: Colorado Rig Name & Number: H&P 524
 Distance To Location: 65
 Units On Location: 4028/4033
 Time Requested: 1130 am
 Time Arrived On Location: 1030 am
 Range: 58w Time Left Location: 3:30 PM

WELL DATA	Cement Data
Casing Size (in) : <u>9.625</u> Casing Weight (lb) : <u>36</u> Casing Depth (ft.) : <u>1,867</u> Total Depth (ft) : <u>1912</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>45</u> Landing Joint (ft) : <u>35</u> Sacks of Tail Requested <u>100</u> HOC Tail (ft): <u>0</u> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> One or the other, cannot have quantity in both </div> 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>143.5</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>1532.11 ft</u>	Tail Cement Volume In Ann <u>127.00 cuft</u> (HOC Tail) X (OH Ann)
Casing Depth - HOC Tail	Total Volume of Tail Cement <u>107.47 Cuft</u> (HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)
Volume of Lead Cement <u>748.79 cuft</u>	bbbls of Tail Cement <u>22.62 bbbls</u> (HOC of Tail) X (OH Ann) + (Cement Yield) X (Shoe Joint Ann) X (.1781) X (% Excess)
HOC of Lead X Open Hole Ann	HOC Tail <u>219.89 ft</u> (Tail Cement Volume) ÷ (OH Ann)
Volume of Conductor <u>65.76 cuft</u> (Conductor ID Squared) - (Casing Size OD Squared) X (.005454) X (Conductor Length ft)	Sacks of Tail Cement <u>100.00 sk</u> (Total Volume of Tail Cement) ÷ (Cement Yield)
Total Volume of Lead Cement <u>814.55 cuft</u> (cuft of Lead Cement) + (Cuft of Conductor)	bbbls of Tail Mix Water <u>14.02 bbbls</u> (Sacks of Tail Cement X Gallons Per Sack) ÷ 42
bbbls of Lead Cement <u>166.83 bbbls</u> (Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess)	Pressure of cement in annulus
Sacks of Lead Cement <u>551.02 sk</u> (Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	Hydrostatic Pressure <u>585.23 PSI</u>
bbbls of Lead Mix Water <u>118.08 bbbls</u> (Sacks Needed) X (Gallons Per Sack) ÷ 42	Collapse PSI: <u>2020.00 psi</u>
Displacement <u>143.55 bbbls</u> (Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	Burst PSI: <u>3520.00 psi</u>
Total Water Needed: <u>439.19 bbbls</u>	

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.

