



**Bison Oil Well Cementing  
Tail & Lead**

Date: 12/29/2016

Invoice # 2000010

API#

Foreman: Kirk Kallhoff

Customer: Noble Energy Inc.

Well Name: earp federal lc 23-740

Consultant: dave

County: Weld

Rig Name & Number: H&P 524

State: Colorado

Distance To Location: 65

Sec: 20

Units On Location: 4028/4020/4032

Twp: 9n

Time Requested: 330 pm

Range: 58w

Time Arrived On Location: 300 pm

Time Left Location: 7:30pm

WELL DATA	Cement Data
<p>Casing Size (in) : 9.625</p> <p>Casing Weight (lb) : 36</p> <p>Casing Depth (ft) : 1,894</p> <p>Total Depth (ft) : 1939</p> <p>Open Hole Diameter (in) : 13.50</p> <p>Conductor Length (ft) : 80</p> <p>Conductor ID : 15.6</p> <p>Shoe Joint Length (ft) : 46</p> <p>Landing Joint (ft) : 35</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:</p> <p>Max Pressure:</p>	<p><b>Lead</b></p> <p>Cement Name: fn3 gel calcium</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><b>Tail</b></p> <p>Cement Name: bfn 3</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) : 145.6</p> <p>H2O Wash Up (bbls) : 20.0</p> <p><b>Spacer Ahead Makeup</b></p>

Casing ID 8.921 Casing Grade J-55 only used

Lead Calculated Results	Tail Calculated Results
HOC of Lead : 1560.00 ft	Tail Cement Volume In Ann (HOC Tail) X (OH Ann) : 127.00 cuft
Casing Depth - HOC Tail	Total Volume of Tail Cement : 107.03 Cuft
Volume of Lead Cement : 762.42 cuft	(HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)
HOC of Lead X Open Hole Ann	bbls of Tail Cement : 22.62 bbls
Volume of Conductor : 65.76 cuft	(HOC of Tail) X (OH Ann) + (Cement Yield) X (Shoe Joint Ann) X (.1781) X (% Excess)
(Conductor ID Squared) - (Casing Size OD Squared) X (.005454) X (Conductor Length ft)	HOC Tail : 219.00 ft
Total Volume of Lead Cement : 828.18 cuft	(Tail Cement Volume) ÷ (OH Ann)
(cuft of Lead Cement) + (Cuft of Conductor)	Sacks of Tail Cement : 100.00 sk
bbls of Lead Cement : 169.62 bbls	(Total Volume of Tail Cement) ÷ (Cement Yield)
(Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess)	bbls of Tail Mix Water : 14.02 bbls
Sacks of Lead Cement : 560.24 sk	(Sacks of Tail Cement X Gallons Per Sack) ÷ 42
(Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	Pressure of cement in annulus
bbls of Lead Mix Water : 120.05 bbls	Hydrostatic Pressure : 585.23 PSI
(Sacks Needed) X (Gallons Per Sack) ÷ 42	Collapse PSI: 2020.00 psi
Displacement : 145.56 bbls	Burst PSI: 3520.00 psi
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	
Total Water Needed: 445.19 bbls	

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.

