



# Bison Oil Well Cementing Tail & Lead

Date: 8/28/2017  
 Invoice #: 900164  
 API#: 05-123-44959  
 Foreman: Corey B.

Customer: Noble Energy Inc.  
 Well Name: Wells Ranch BB11-658

County: Weld  
 State: Colorado  
 Sec: 8  
 Twp: 5N  
 Range: 62W

Consultant: Matt  
 Rig Name & Number: H&P 517  
 Distance To Location: 24  
 Units On Location: 4027/3103-4032/3203  
 Time Requested: 100  
 Time Arrived On Location: 1145  
 Time Left Location:

WELL DATA	Cement Data
Casing Size (in) : 9.625 Casing Weight (lb) : 36 Casing Depth (ft.) : 1,921 Total Depth (ft) : 1931 Open Hole Diameter (in) : 13.50 Conductor Length (ft) : 80 Conductor ID : 15.25 Shoe Joint Length (ft) : 48 Landing Joint (ft) : 4  Sacks of Tail Requested : 100 HOC Tail (ft): 0 <small>One or the other, cannot have quantity in both</small>  Max Rate: 8 Max Pressure: 2500	<b>Lead</b> Cement Name: BFN III Cement Density (lb/gal) : 13.5 Cement Yield (cuft) : 1.68 Gallons Per Sack : 8.90 % Excess : 15%  <b>Tail Type III</b> Cement Name: Cement Density (lb/gal) : 15.2 Cement Yield (cuft) : 1.27 Gallons Per Sack: 5.80 % Excess: 0%  Fluid Ahead (bbls) : 50.0 H2O Wash Up (bbls) : 20.0  <b>Spacer Ahead Makeup</b> 50 BBL ahead with Die in 2nd 10

Casing ID 8.921 Casing Grade J-55 only used

Lead Calculated Results	Tail Calculated Results
<b>HOC of Lead</b> 1619.77 ft	<b>Tail Cement Volume In Ann</b> 127.00 cuft
Casing Depth - HOC Tail	(HOC Tail) X (OH Ann)
<b>Volume of Lead Cement</b> 791.63 cuft	<b>Total Volume of Tail Cement</b> 106.17 Cuft
HOC of Lead X Open Hole Ann	(HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)
<b>Volume of Conductor</b> 61.05 cuft	<b>bbls of Tail Cement</b> 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)
<b>Total Volume of Lead Cement</b> 852.68 cuft	<b>HOC Tail</b> 217.23 ft
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
<b>bbls of Lead Cement</b> 174.64 bbls	<b>Sacks of Tail Cement</b> 100.00 sk
(Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess)	(Total Volume of Tail Cement) ÷ (Cement Yield)
<b>Sacks of Lead Cement</b> 583.68 sk	<b>bbls of Tail Mix Water</b> 13.81 bbls
(Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	(Sacks of Tail Cement X Gallons Per Sack) ÷ 42
<b>bbls of Lead Mix Water</b> 123.68 bbls	<b>Pressure of cement in annulus</b>
(Sacks Needed) X (Gallons Per Sack) ÷ 42	<b>Hydrostatic Pressure</b> 585.23 PSI
<b>Displacement</b> 145.09 bbls	<b>Collapse PSI:</b> 2020.00 psi
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	<b>Burst PSI:</b> 3520.00 psi
<b>Total Water Needed:</b> 352.59 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.

