



**Bison Oil Well Cementing  
Tail & Lead**

Date: 4/1/2017  
 Invoice # 666104  
 API# 05-123-43917  
 Foreman: Nick Vigil

Customer: Noble Energy Inc.  
 Well Name: Wells Ranch State AA33-725

County: Weld Consultant: Woodie  
 State: Colorado Rig Name & Number: H&P 517  
 Distance To Location: 18 Miles  
 Units On Location: 4023/4032  
 Time Requested: 1:00  
 Time Arrived On Location: 12:30  
 Time Left Location: 5:45

WELL DATA	Cement Data
Casing Size (in) : <u>9.625</u> Casing Weight (lb) : <u>36</u> Casing Depth (ft.) : <u>1,913</u> Total Depth (ft) : <u>1923</u> Open Hole Diameter (in) : <u>13.50</u> Conductor Length (ft) : <u>80</u> Conductor ID : <u>15.25</u> Shoe Joint Length (ft) : <u>44</u> Landing Joint (ft) :  Sacks of Tail Requested <u>100</u> HOC Tail (ft): <u>0</u>	<b>Lead</b> Cement Name: 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>  <b>Tail</b> Cement Name: 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>  <b>Fluid Ahead (bbls)</b> <u>50.0</u> <b>H2O Wash Up (bbls)</b> <u>20.0</u>  <b>Spacer Ahead Makeup</b> Dye in 2nd 10 bbl
One or the other, cannot have quantity in both  Max Rate: <u>8</u> Max Pressure: <u>2000</u>	

Lead Calculated Results	Tail Calculated Results
<b>HOC of Lead</b> <u>1607.22 ft</u>	<b>Tail Cement Volume In Ann</b> <u>127.00 cuft</u>
Casing Depth - HOC Tail	(HOC Tail) X (OH Ann)
<b>Volume of Lead Cement</b> <u>785.50 cuft</u>	<b>Total Volume of Tail Cement</b> <u>107.90 Cuft</u>
HOC of Lead X Open Hole Ann	(HOC Tail X OH Ann) - ( Shoe Length X Shoe Joint Ann)
<b>Volume of Conductor</b> <u>61.05 cuft</u>	<b>bbls of Tail Cement</b> <u>22.62 bbls</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)
<b>Total Volume of Lead Cement</b> <u>846.55 cuft</u>	<b>HOC Tail</b> <u>220.78 ft</u>
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
<b>bbls of Lead Cement</b> <u>173.39 bbls</u>	<b>Sacks of Tail Cement</b> <u>100.00 sk</u>
(Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess)	(Total Volume of Tail Cement) ÷ (Cement Yield)
<b>Sacks of Lead Cement</b> <u>572.66 sk</u>	<b>bbls of Tail Mix Water</b> <u>14.02 bbls</u>
(Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	(Sacks of Tail Cement X Gallons Per Sack) ÷ 42
<b>bbls of Lead Mix Water</b> <u>122.71 bbls</u>	<b>Pressure of cement in annulus</b>
(Sacks Needed) X (Gallons Per Sack) ÷ 42	<b>Hydrostatic Pressure</b> <u>585.23 PSI</u>
<b>Displacement</b> <u>144.86 bbls</u>	<b>Collapse PSI:</b> <u>2020.00 psi</u>
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	<b>Burst PSI:</b> <u>3520.00 psi</u>
<b>Total Water Needed:</b> <u>351.60 bbls</u>	

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.



**Bison Oil Well Cementing  
Two Cement Surface Pipe**

Customer: Noble Energy Inc.  
Well Name: Wells Ranch State AA33-725

Date: 4/1/2017  
INVOICE #: 666104  
LOCATION: Weld  
FOREMAN: Nick Vigil

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**DESCRIPTION OF JOB EVENTS**

Amount Pumped	Time/Date	Event	Description	Rate	BBLs	Pressure
Lead mixed bbls	173.3	13:00	Arrive On Location			
Lead % Excess	15%	13:05	Well Site Assessment			
Lead Sacks	573	15:40	Rig Up Equipment			
		16:00	JSA			
		16:40	Test Lines			
Tail mixed bbls	22.6	16:42	Spacer Ahead	7.6	50	150
Tail % Excess	0%	16:48	Lead Cement	13.5 ppg	173.5	190
Tail Sacks	100	17:15	Tail Cement	15.2 ppg	22.6	210
		17:20	Shut Down			
Total Sacks	673	17:21	Drop Plug			
Water Temp	50	17:24	Displace			
bbl Returns	37	17:50	Bump Plug			
		17:50	Casing Test			
Notes:		18:06	Check Floats			
		18:10	End Job			
		19:15	Rig Down			
		19:45	Crew Left Location			

X   
Signature

X Wellsite Supervisor  
Title

X 4/1/17  
Date