

**Bison Oil Well Cementing  
Tail & Lead**

Date: 8/9/2019

Invoice # 200494

API#

Foreman: Kirk Kallhoff

Customer: Noble Energy Inc.

Well Name: slw ranch state bb 07-615

County: Weld

State: Colorado

Sec: 7

Twp: 5N

Range: 63W

Consultant: john

Rig Name & Number: H&P 517

Distance To Location: 20

Units On Location: 4047/4033/4027

Time Requested: 600 am

Time Arrived On Location: 400 am

Time Left Location:

WELL DATA	Cement Data
<p>Casing Size (in) : 9.625</p> <p>Casing Weight (lb) : 36</p> <p>Casing Depth (ft.) : 1,891</p> <p>Total Depth (ft) : 1936</p> <p>Open Hole Diameter (in) : 13.50</p> <p>Conductor Length (ft) : 110</p> <p>Conductor ID : 15.5</p> <p>Shoe Joint Length (ft) : 41</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: 8</p> <p>Max Pressure: 2500</p>	<p><b>Lead</b></p> <p>Cement Name: BFN III</p> <p>Cement Density (lb/gal) : 13.5</p> <p>Cement Yield (cuft) : 1.68</p> <p>Gallons Per Sack : 8.90</p> <p>% Excess : 10%</p> <p><b>Tail Type III</b></p> <p>Cement Name:</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) : 30.0</p> <p>H2O Wash Up (bbls) : 20.0</p> <p><b>Spacer Ahead Makeup</b></p> <p>30 BBL ahead with Die in 2nd 10</p>

Casing ID 8.921 Casing Grade J-55 only used

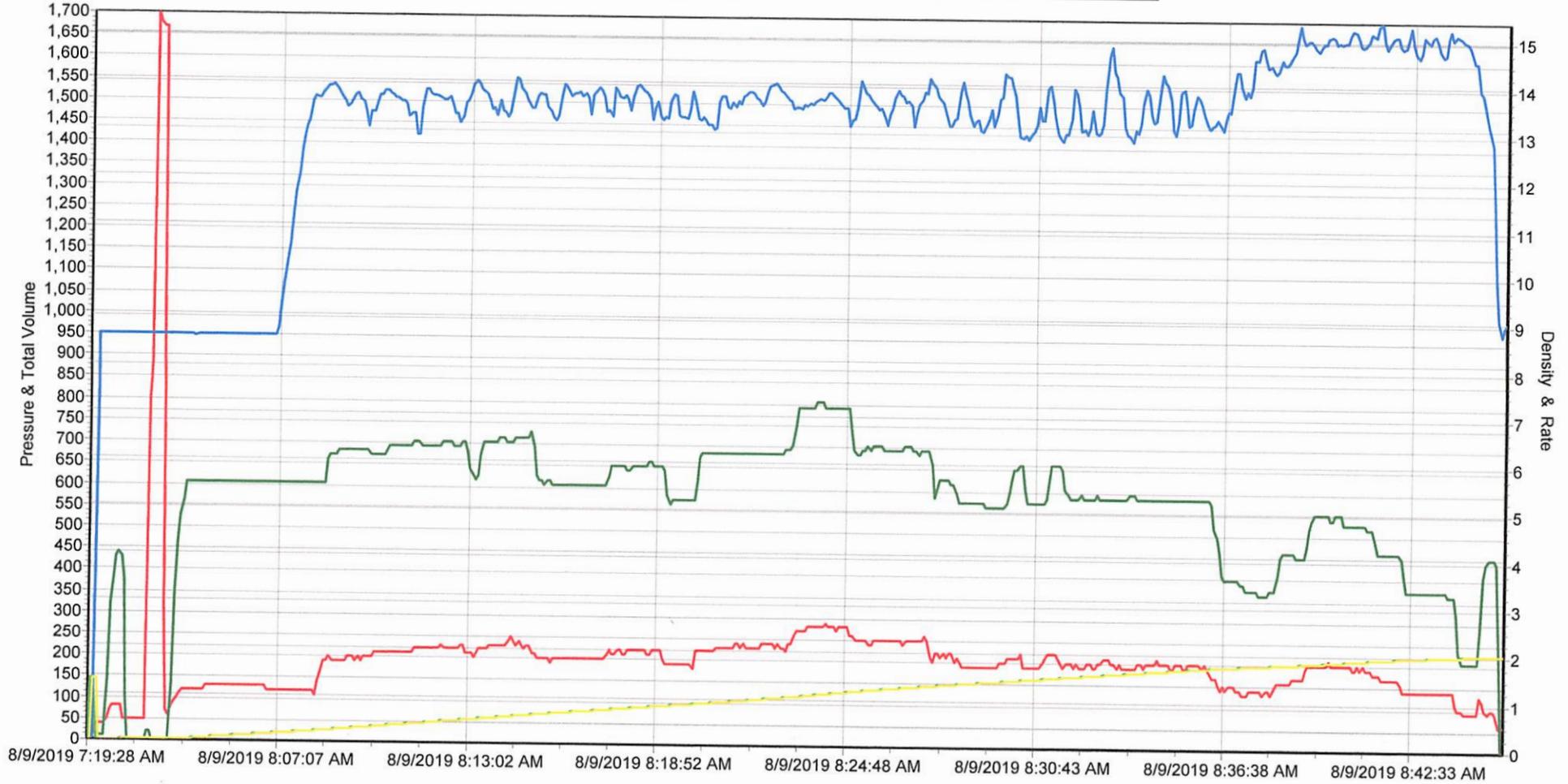
Lead Calculated Results	Tail Calculated Results
<b>HOC of Lead</b> 1522.56 ft	<b>Tail Cement Volume In Ann</b> 127.00 cuft
Casing Depth - HOC Tail	(HOC Tail) X (OH Ann)
<b>Volume of Lead Cement</b> 744.12 cuft	<b>Total Volume of Tail Cement</b> 109.20 Cuft
HOC of Lead X Open Hole Ann	(HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)
<b>Volume of Conductor</b> 88.56 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> 832.67 cuft	<b>HOC Tail</b> 223.44 ft
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
<b>bbls of Lead Cement</b> 163.13 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> 545.20 sk	<b>bbls of Tail Mix Water</b> 14.02 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> 115.53 bbls	Pressure of cement in annulus
(Sacks Needed) X (Gallons Per Sack) ÷ 42	<b>Hydrostatic Pressure</b> 585.23 PSI
<b>Displacement</b> 145.71 bbls	
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	<b>Collapse PSI:</b> 2020.00 psi
<b>Total Water Needed:</b> 325.27 bbls	<b>Burst PSI:</b> 3520.00 psi

X Authorization To Proceed



### SERIES 2000

— PSI — Barrels / Minute — Barrels — Lbs / Gallon — Stage Volume



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