

**Bison Oil Well Cementing  
Tail & Lead**

Date: 3/23/2019  
 Invoice # 300274  
 API# 05-123-48573  
 Foreman: JASON KELEHER

Customer: Noble Energy Inc.  
 Well Name: VOGLER STATE D21-740

County: Weld  
 State: Colorado  
 Sec: 21  
 Twp: 3N  
 Range: 64W

Consultant: JOHN  
 Rig Name & Number: H&P 517  
 Distance To Location: 22  
 Units On Location: -3103,4033-3201,4044-3213  
 Time Requested: 800  
 Time Arrived On Location: 600  
 Time Left Location: 1400

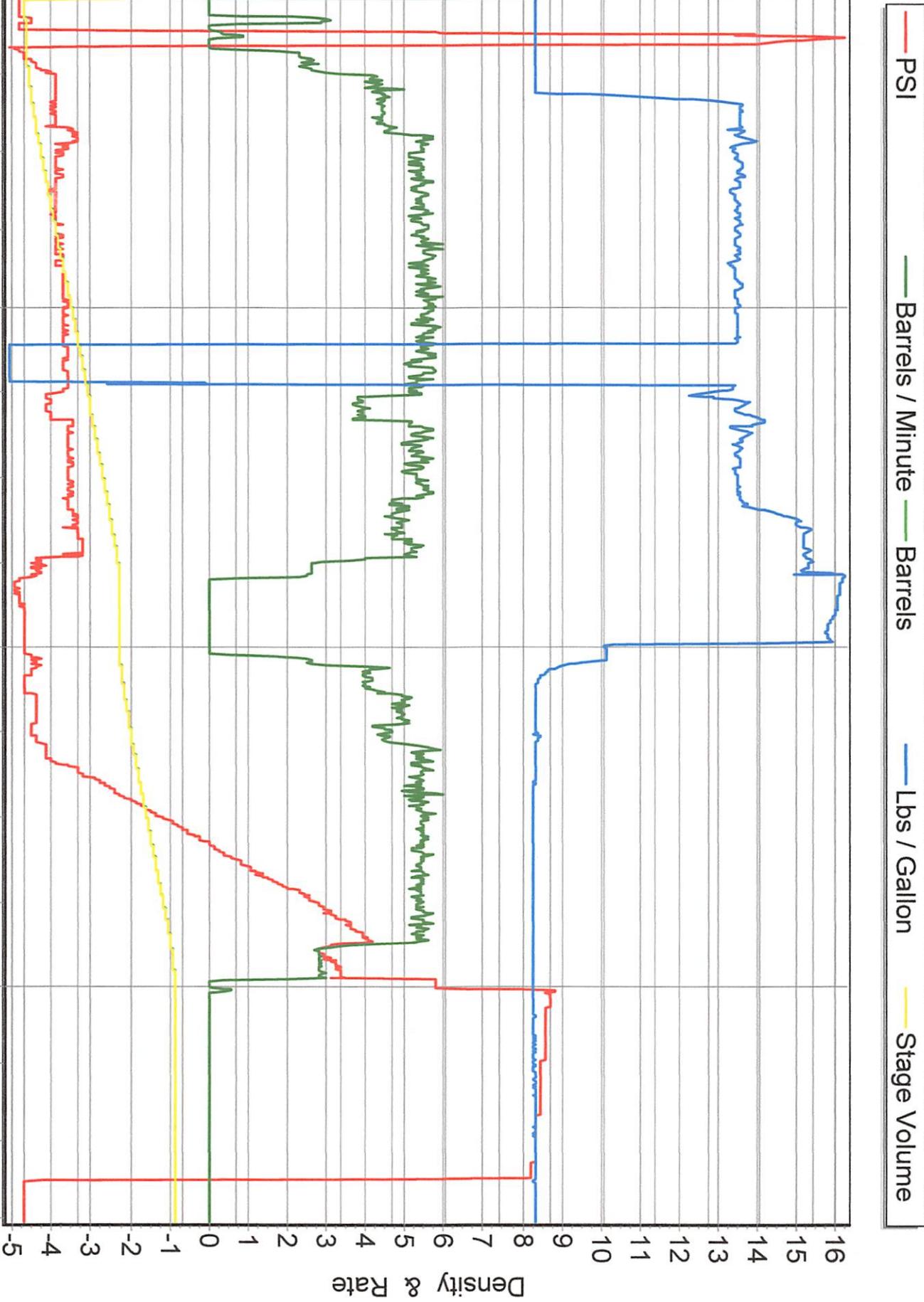
WELL DATA	Cement Data
Casing Size (in) : <u>9.625</u> Casing Weight (lb) : <u>36</u> Casing Depth (ft.) : <u>1,931</u> Total Depth (ft) : <u>1941</u> Open Hole Diameter (in) : <u>13.50</u> Conductor Length (ft) : <u>80</u> Conductor ID : <u>15.5</u> Shoe Joint Length (ft) : <u>46</u> Landing Joint (ft) : <u>4</u>  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>30.0</u> <b>H2O Wash Up (bbls)</b> <u>20.0</u>  <b>Spacer Ahead Makeup</b> <u>30 BBL WATER DYE IN 2ND 10</u>
One or the other, cannot have quantity in both  Max Rate: <u>8</u> Max Pressure: <u>1500</u>	

Lead Calculated Results	Tail Calculated Results
<b>HOC of Lead</b> <u>1712.41 ft</u>	<b>Tail Cement Volume In Ann</b> <u>106.68 cuft</u>
Casing Depth - HOC Tail	(HOC Tail) X (OH Ann)
<b>Volume of Lead Cement</b> <u>910.10 cuft</u>	<b>Total Volume of Tail Cement</b> <u>127.00 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>64.00 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>974.10 cuft</u>	<b>HOC Tail</b> <u>218.39 ft</u>
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
<b>bbls of Lead Cement</b> <u>173.40 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>573.00 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>122.70 bbls</u>	<b>Pressure of cement in annulus</b>
(Sacks Needed) X (Gallons Per Sack) ÷ 42	<b>Hydrostatic Pressure</b> <u>520.00 PSI</u>
<b>Displacement</b> <u>143.30 bbls</u>	
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	<b>Collapse PSI:</b> <u>2020.00 psi</u>
<b>Total Water Needed:</b> <u>310.00 bbls</u>	<b>Burst PSI:</b> <u>3520.00 psi</u>

Authorization To Proceed



# VOGLER STATE D21-740 SURFACE



Pressure & Total Volume

Density & Rate

3/23/2019 10:19:11 AM 3/23/2019 11:26:55 AM 3/23/2019 11:54:08 AM 3/23/2019 12:21:06 PM