



Bison Oil Well Cementing Tail & Lead

Date: 6/16/2019

Invoice # 200462

API# _____

Foreman: Kirk Kallhoff

Customer: Noble Energy Inc.
Well Name: guttersen state d23-721

County: Weld
State: Colorado

Sec: 23
Twp: 3N
Range: 64W

Consultant: phn
Rig Name & Number: H&P 517
Distance To Location: 25
Units On Location: 4047/4033
Time Requested: 600 am
Time Arrived On Location: 430 am
Time Left Location: 11:00 am

WELL DATA	Cement Data
Casing Size (in) : <u>9.625</u> Casing Weight (lb) : <u>36</u> Casing Depth (ft.) : <u>1,921</u> Total Depth (ft) : <u>1966</u> Open Hole Diameter (in) : <u>13.50</u> Conductor Length (ft) : <u>110</u> Conductor ID : <u>15.6</u> Shoe Joint Length (ft) : <u>47</u> Landing Joint (ft) : <u>3</u> Sacks of Tail Requested : <u>100</u> HOC Tail (ft): <u>0</u> <small>One or the other, cannot have quantity in both</small> Max Rate: <u>8</u> Max Pressure: <u>2500</u>	Lead Cement Name: <u>BFN III</u> Cement Density (lb/gal) : <u>13.5</u> Cement Yield (cuft) : <u>1.68</u> Gallons Per Sack : <u>8.90</u> % Excess : <u>10%</u> Tail Type III 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> Fluid Ahead (bbls) : <u>30.0</u> H2O Wash Up (bbls) : <u>20.0</u> Spacer Ahead Makeup <u>30 BBL ahead with Die in 2nd 10</u>

Lead Calculated Results	Tail Calculated Results
HOC of Lead : <u>1589.88 ft</u>	Tail Cement Volume In Ann : <u>127.00 cuft</u>
Casing Depth - HOC Tail	(HOC Tail) X (OH Ann)
Volume of Lead Cement : <u>777.02 cuft</u>	Total Volume of Tail Cement : <u>106.60 Cuft</u>
HOC of Lead X Open Hole Ann	(HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)
Volume of Conductor : <u>90.42 cuft</u>	bbls of Tail Cement : <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)
Total Volume of Lead Cement : <u>867.45 cuft</u>	HOC Tail : <u>218.12 ft</u>
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
bbls of Lead Cement : <u>169.94 bbls</u>	Sacks of Tail Cement : <u>100.00 sk</u>
(Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess)	(Total Volume of Tail Cement) ÷ (Cement Yield)
Sacks of Lead Cement : <u>567.97 sk</u>	bbls of Tail Mix Water : <u>14.02 bbls</u>
(Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	Sacks of Tail Cement X Gallons Per Sack ÷ 42
bbls of Lead Mix Water : <u>120.36 bbls</u>	Pressure of cement in annulus
(Sacks Needed) X (Gallons Per Sack) ÷ 42	Hydrostatic Pressure : <u>585.23 PSI</u>
Displacement : <u>145.09 bbls</u>	
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	Collapse PSI: <u>2020.00 psi</u>
Total Water Needed: <u>329.47 bbls</u>	Burst PSI: <u>3520.00 psi</u>



 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.

SERIES 2000

