



**Bison Oil Well Cementing
Tail & Lead**

Date: 5/10/2018

Invoice # 666308

API# 05-123-45512

Supervisor: Nick Vigil

Customer: Noble Energy Inc.

Well Name: Larson A23-651

Consultant: Charles

County: Weld
State: Colorado

Rig Name & Number: H&P 321
Distance To Location: 15 miles

Sec: 19
Twp: 6N
Range: 63W

Units On Location: 4023/4032
Time Requested: 12:30
Time Arrived On Location: 12:00
Time Left Location:

WELL DATA	Cement Data
<p>Casing Size (in) : 9.625 Casing Weight (lb) : 36 Casing Depth (ft.) : 1,969 Total Depth (ft) : 1979 Open Hole Diameter (in) : 13.50 Conductor Length (ft) : 80 Conductor ID : 15.25 Shoe Joint Length (ft) : 45 Landing Joint (ft) :</p> <p>Sacks of Tail Requested 100 HOC Tail (ft): 0</p> <p>One or the other, cannot have quantity in both</p> <p>Max Rate: 8 Max Pressure: 2000</p>	<p>Lead Cement Name: Cement Density (lb/gal) : 13.5 Cement Yield (cuft) : 1.7 Gallons Per Sack 9.00 % Excess 15%</p> <p>Tail Cement Name: Cement Density (lb/gal) : 15.2 Cement Yield (cuft) : 1.27 Gallons Per Sack: 5.89 % Excess: 0%</p> <p>Fluid Ahead (bbls) 50.0 H2O Wash Up (bbls) 20.0</p> <p>Spacer Ahead Makeup Dye in second 10 bbl</p>

Casing ID 8.921 Casing Grade J-55 only used

Lead Calculated Results	Tail Calculated Results
HOC of Lead 1660.11 ft	Tail Cement Volume In Ann 127.00 cuft
Casing Depth - HOC Tail	(HOC Tail) X (OH Ann)
Volume of Lead Cement 811.34 cuft	Total Volume of Tail Cement 107.47 Cuft
HOC of Lead X Open Hole Ann	(HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)
Volume of Conductor 61.05 cuft	bbls of Tail Cement 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)
Total Volume of Lead Cement 872.39 cuft	HOC Tail 219.89 ft
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
bbls of Lead Cement 178.68 bbls	Sacks of Tail Cement 100.00 sk
(Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess)	(Total Volume of Tail Cement) ÷ (Cement Yield)
Sacks of Lead Cement 590.15 sk	bbls of Tail Mix Water 14.02 bbls
(Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	(Sacks of Tail Cement X Gallons Per Sack) ÷ 42
bbls of Lead Mix Water 126.46 bbls	Pressure of cement in annulus
(Sacks Needed) X (Gallons Per Sack) ÷ 42	Hydrostatic Pressure 585.23 PSI
Displacement 149.42 bbls	
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	Collapse PSI: 2020.00 psi
Total Water Needed: 359.91 bbls	Burst PSI: 3520.00 psi

Charles Collier
Authorization To Proceed

Larson A23-651

— PSI — Barrels / Minute — Barrels — Lbs / Gallon

