



**Bison Oil Well Cementing
Tail & Lead**

Date: 6/25/2018

Invoice # 666330

API# 05-123-45094

Supervisor: Nick Vigil

Customer: Noble Energy Inc.

Well Name: Larson A23-668

Consultant: Dave

County: Weld
State: Colorado

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

Sec: 19
Twp: 6N

Units On Location: 4023/4032
Time Requested: 9:30
Time Arrived On Location: 8:30

Range: 63W

Time Left Location:

WELL DATA	Cement Data
<p>Casing Size (in) : 9.625 Casing Weight (lb) : 36 Casing Depth (ft.) : 1,949 Total Depth (ft) : 1959 Open Hole Diameter (in) : 13.50 Conductor Length (ft) : 80 Conductor ID : 15.25 Shoe Joint Length (ft) : 42 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) 30.0 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 1637.44 ft	Tail Cement Volume In Ann 127.00 cuft
Casing Depth - HOC Tail	(HOC Tail) X (OH Ann)
Volume of Lead Cement 800.27 cuft	Total Volume of Tail Cement 108.77 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 861.32 cuft	HOC Tail 222.56 ft
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
bbls of Lead Cement 176.41 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 582.66 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 124.85 bbls	Pressure of cement in annulus
(Sacks Needed) X (Gallons Per Sack) ÷ 42	Hydrostatic Pressure 585.23 PSI
Displacement 148.11 bbls	
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	Collapse PSI: 2020.00 psi
Total Water Needed: 336.99 bbls	Burst PSI: 3520.00 psi

X Authorization To Proceed



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

Customer: Noble Energy Inc.
Well Name: Larson A23-668

Date: 6/25/2018
INVOICE #: 666330
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	176.4	8:30	Arrive On Location			
Lead % Excess	15%	8:35	Well Site Assessment			
Lead Sacks	583	14:00	Rig Up Equipment			
		14:30	JSA			
		14:55	Test Lines			
Tail mixed bbls	22.6	14:58	Spacer Ahead			
Tail % Excess	0%	15:04	Lead Cement			
Tail Sacks	100	15:33	Tail Cement			
		15:38	Shut Down			
Total Sacks	683	15:39	Drop Plug			
Water Temp	60	15:40	Displace			
bbl Returns	30	16:13	Bump Plug			
Notes:		16:17	Casing Test			
		16:32	Check Floats			
		16:45	End Job			
		17:00	Rig Down Equipment			
		17:15	Crew Left Location			

X *[Signature]*
Signature

X CO-MAN
Title

X 6-25-18
Date

SERIES 2000

— PSI — Barrels / Minute — Lbs / Gallon

