



**Bison Oil Well Cementing
Tail & Lead**

Date: 6/12/2017
 Invoice # 200104
 API# _____
 Foreman: Kirk Kallhoff

Customer: Noble Energy Inc.
 Well Name: constitution federal lc 21-655

County: Weld Consultant: tim
 State: Colorado Rig Name & Number: H&P 524
 Distance To Location: 67
 Units On Location: 4028/4034
 Time Requested: 930 pm
 Time Arrived On Location: 900 pm
 Range: 58w Time Left Location: 2:00pm

WELL DATA	Cement Data
Casing Size (in) : <u>9.625</u> Casing Weight (lb) : <u>36</u> Casing Depth (ft.) : <u>1,897</u> Total Depth (ft) : <u>1942</u> Open Hole Diameter (in) : <u>13.50</u> Conductor Length (ft) : <u>80</u> Conductor ID : <u>15.6</u> Shoe Joint Length (ft) : <u>46</u> Landing Joint (ft) : <u>35</u> Sacks of Tail Requested <u>100</u> HOC Tail (ft): <u>0</u> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> One or the other, cannot have quantity in both </div> Max Rate: Max Pressure:	Lead Cement Name: <u>fn3 gel calcium</u> 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> Tail Cement Name: <u>bfn 3</u> 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>145.8</u> H2O Wash Up (bbls) <u>20.0</u> Spacer Ahead Makeup

Lead Calculated Results	Tail Calculated Results
HOC of Lead <u>1563.00 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>763.88 cuft</u>	Total Volume of Tail Cement <u>107.03 Cuft</u>
HOC of Lead X Open Hole Ann	(HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)
Volume of Conductor <u>65.76 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>829.64 cuft</u>	HOC Tail <u>219.00 ft</u>
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
bbls of Lead Cement <u>169.92 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>561.23 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>120.26 bbls</u>	Pressure of cement in annulus
(Sacks Needed) X (Gallons Per Sack) ÷ 42	Hydrostatic Pressure <u>585.23 PSI</u>
Displacement <u>145.79 bbls</u>	Collapse PSI: <u>2020.00 psi</u>
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	Burst PSI: <u>3520.00 psi</u>
Total Water Needed: <u>445.86 bbls</u>	

X [Signature]
 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.



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

Customer: Noble Energy Inc.
Well Name: constitution federal lc 21-655

Date: 6/12/2017
INVOICE #: 200104
LOCATION: Weld
FOREMAN: Kirk Kallhoff

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DESCRIPTION OF JOB EVENTS

Amount Pumped	Time/Date	Event	Description	Rate	BBLs	Pressure
Lead mixed bbls	120.2	900 pm	arived on location			
Lead % Excess	15%	1035 pm	rig up			
Lead Sacks	561	1110 pm	jsa			
		1144 pm	test lines		2	1300
		1146 pm	bbls ahead		30	120
			test lines to 1300 psi	1		
			30 bbls h2o dye in 2nd 10	5		
Tail mixed bbls	14	1151 pm	m&p lead cement	6	169.9	200
Tail % Excess	0%	1222 am	m&p tail cement	6	22.6	200
Tail Sacks	100	1226 am	shutdown			
		1232 am	drop plug			
Total Sacks	661	1232 am	displace		145.8	
			rig to displace 145.8 bbls OBM			
Water Temp	60	101 am	bump plug	1.5	145.8	1030
bbl Returns	50	101 am	casing test			1030
		116 am	release psi			0
Notes:		145 am	rig down			
		200 am	leave location			
			monitered well no top off			

X _____
Work Preformed

X *Kirk Kallhoff*
Title

X 6-13-17
Date