



**Bison Oil Well Cementing
Tail & Lead**

Date: 7/7/2017
 Invoice # 200118
 API# _____
 Foreman: Kirk Kallhoff

Customer: Noble Energy Inc.
 Well Name: wells ranch af 07-645

County: Weld Consultant: john
 State: Colorado Rig Name & Number: H&P 517
 Distance To Location: 25
 Units On Location: 4028/4034
 Time Requested: 830 am
 Time Arrived On Location: 730 am
 Time Left Location: Z / Dep in

Sec: 20
 Twp: 9n
 Range: 58w

WELL DATA	Cement Data
Casing Size (in) : <u>9.625</u> Casing Weight (lb) : <u>36</u> Casing Depth (ft.) : <u>1,907</u> Total Depth (ft) : <u>1952</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> <small>One or the other, cannot have quantity in both</small> 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>bfm 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>146.6</u> H2O Wash Up (bbls) <u>20.0</u> Spacer Ahead Makeup

Casing ID 8.921 Casing Grade J-55 only used

Lead Calculated Results	Tail Calculated Results
HOC of Lead <u>1573.00 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>768.77 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>834.53 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>170.92 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>564.54 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>120.97 bbls</u>	Pressure of cement in annulus
(Sacks Needed) X (Gallons Per Sack) ÷ 42	Hydrostatic Pressure <u>585.23 PSI</u>
Displacement <u>146.56 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>448.12 bbls</u>	Burst PSI: <u>3520.00 psi</u>

X WLP
 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
Well Name

Noble Energy Inc.
wells ranch af 07-645

Date
INVOICE #
LOCATION
FOREMAN

7/7/2017
200118
Weld
Kirk Kallhoff

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DESCRIPTION OF JOB EVENTS

Amount Pumped	Time/Date	Event	Description	Rate	BBLs	Pressure
Lead mixed bbls	120.8	730 am	arived on location			
Lead % Excess	15%	1035 am	rig up			
Lead Sacks	564	1115 am	jsa			
		1156 am	test lines	1	2	1300
		1158 am	test lines	5	30	120
			30 bbls h2o dye in 2nd 10	6	170.9	200
			564 sks 170.9 bbls slury	6	22.6	200
Tail mixed bbls	14	1206 pm	m&p lead cement			
Tail % Excess	0%	1242 pm	m&p tail cement			
Tail Sacks	100	1247 pm	shutdown			
		1251 pm	drop plug		146.6	
Total Sacks	664	1251 pm	displace		146.6	1050
Water Temp	60	122 pm	bump plug	1.5		1050
bbl Returns	30	122 pm	casing test			1050
		137 pm	release psi			0
Notes:		215 pm	rig down			
		230 pm	leave location			
			monitered well no top off			

X WL B
Work Preformed

X WSS
Title

X 7-7-17
Date