



**Bison Oil Well Cementing
Tail & Lead**

Date: 11/4/2019
 Invoice # 900433
 AFE # 206518
 Foreman: Corey Barras

Customer: Noble Energy Inc.
 Well Name: Wells State Ranch AA32-770

County: Weld Consultant: Tommie
 State: Colorado Rig Name & Number: H&P 517
 Distance To Location: 23
 Units On Location: 4028/3103-4039/3213-4032/3212
 Time Requested: 1900
 Time Arrived On Location: 1805
 Time Left Location: 1200

Sec: 5
 Twp: 5N
 Range: 63W

WELL DATA	Cement Data
Casing Size (in) : <u>9.625</u> Casing Weight (lb) : <u>36</u> Casing Depth (ft.) : <u>1,919</u> Total Depth (ft) : <u>1959</u> Open Hole Diameter (in) : <u>13.50</u> Conductor Length (ft) : <u>80</u> Conductor ID : <u>15.25</u> Shoe Joint Length (ft) : <u>42</u> Landing Joint (ft) : <u>0</u> Sacks of Tail Requested <u>100</u> HOC Tail (ft): <u>0</u> One or the other, cannot have quantity in both Max Rate: <u>8</u> Max Pressure: <u>1500</u>	Lead Cement Name: Cement Density (lb/gal) : <u>13.5</u> Cement Yield (cuft) : <u>1.7</u> Gallons Per Sack <u>9.00</u> % Excess <u>10%</u> Tail 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>30BBL WATER DYE IN 2ND 10</u>

Casing ID 8.921 Casing Grade J-55 only used

Lead Calculated Results	Tail Calculated Results
HOC of Lead <u>1616.44 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>790.00 cuft</u>	Total Volume of Tail Cement <u>108.77 Cuft</u>
HOC of Lead X Open Hole Ann	(HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)
Volume of Conductor <u>61.05 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>851.05 cuft</u>	HOC Tail <u>222.56 ft</u>
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
bbls of Lead Cement <u>166.73 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>550.68 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>118.00 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) - (Shoe Length)	Collapse PSI: <u>2020.00 psi</u>
Total Water Needed: <u>327.12 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.



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

Customer Well Name: **Noble Energy Inc.**
Wells State Ranch AA32-770

Date: **11/4/2019**
INVOICE #: **900433**
LOCATION: **Weld**
FOREMAN: **Corey Barras**

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DESCRIPTION OF JOB EVENTS

	Time/Date	Event	Description	Rate	BBLs	Pressure
Lead mixed bbls	118	1805	ARRIVE ON LOCATION			
Lead % Excess	10%	1930	MIRU			
Lead Sacks	551	2030	PRE JOB SAFETY MEETING			
		2130	PRESSURE TEST LINES			1500
		2132	bbls ahead			
			WATER SUPPLIED RIG W/DYE IN 2ND 10	7	30	160
Tail mixed bbls	14	2140	LEAD CEMENT	7	166.7	190
Tail % Excess	0%	2212	TAIL CEMENT	4	22.6	90
Tail Sacks	100	2222	SHUT DOWN			
		2223	DROP PLUG			
Total Sacks	650	2224	DISPLACEMENT			
			Rig DISPLACE	8	70	360
Water Temp	62	2258	BUMP PLUG			
bbl Returns	24	2315	CHECK FLOATS			
			Casing Test for 15 Min @ 1000 Psi (Lift 610)	3	145	1000
		2315	FLOATS HELD/ WATCH FOR FALL BACK			
		2330	RIG DOWN			
Notes:		1200	LEAVE LOCATION			
			monitered well no top off			

[Signature]

Work Performed _____

Title _____ X

Date _____ X

Wells Ranch State AA32-770

