



**Bison Oil Well Cementing
Tail & Lead**

Date: 3/3/2017

Invoice #: 666084

API#: 05-123-42980

Foreman: Nick Vigil

Customer: Noble Energy Inc.

Well Name: Hazzard Federal LC22-735

County: Weld	Consultant: Dave
State: Colorado	Rig Name & Number: H&P 524
Sec: 22	Distance To Location: 56 miles
Twp: 9N	Units On Location: 4023/4030/4032
Range: 59W	Time Requested: 14:30
	Time Arrived On Location: 14:15
	Time Left Location: 21:00

WELL DATA	Cement Data
Casing Size (in) : 9.625 Casing Weight (lb) : 36 Casing Depth (ft.) : 1,929 Total Depth (ft) : 1939 Open Hole Diameter (in) : 13.50 Conductor Length (ft) : 80 Conductor ID : 15.25 Shoe Joint Length (ft) : 48 Landing Joint (ft) : 5 Sacks of Tail Requested : 100 HOC Tail (ft): 0 <small>One or the other, cannot have quantity in both</small> Max Rate: 8 Max Pressure: 2000	Lead Cement Name: Cement Density (lb/gal) : 13.5 Cement Yield (cuft) : 1.7 Gallons Per Sack : 9.00 % Excess : 15% Tail Cement Name: Cement Density (lb/gal) : 15.2 Cement Yield (cuft) : 1.27 Gallons Per Sack: 5.89 % Excess: 0% Fluid Ahead (bbls) : 50.0 H2O Wash Up (bbls) : 20.0 Spacer Ahead Makeup Dye in 2nd 10 bbl

Casing ID 8.921 Casing Grade J-55 only used

Lead Calculated Results	Tail Calculated Results
HOC of Lead 1626.77 ft	Tail Cement Volume In Ann 127.00 cuft
Casing Depth - HOC Tail	(HOC Tail) X (OH Ann)
Volume of Lead Cement 795.05 cuft	Total Volume of Tail Cement 106.17 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 856.10 cuft	HOC Tail 217.23 ft
(cuft of Lead Cement) + (Cuft of Conductor)	(Tail Cement Volume) ÷ (OH Ann)
bbls of Lead Cement 175.34 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 579.13 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 124.10 bbls	Pressure of cement in annulus
(Sacks Needed) X (Gallons Per Sack) ÷ 42	Hydrostatic Pressure 585.23 PSI
Displacement 145.79 bbls	
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	Collapse PSI: 2020.00 psi
Total Water Needed: 353.91 bbls	Burst PSI: 3520.00 psi

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.

