



# Bison Oil Well Cementing Single Cement Surface Pipe

Date: 9/3/2016  
 Invoice #: 80525  
 API#: 05-123-43294  
 Foreman: Matthew Rosales

**Customer:** Noble Energy Inc.  
**Well Name:** Harper LD21-662

County: Weld  
 State: Colorado  
 Sec: SWSW  
 Twp: 136N  
 Range: 64W

Consultant: Sanchez  
 Rig Name & Number: H&P 517  
 Distance To Location: 60  
 Units On Location: 3106  
 Time Requested: 11:30am  
 Time Arrived On Location: 10:00am  
 Time Left Location:

WELL DATA	Cement Data
Casing Size OD (in) : 9.625	Cement Name: BFN III
Casing Weight (lb) : 36.00	Cement Density (lb/gal) : 14.2
Casing Depth (ft.) : 1,938	Cement Yield (cuft) : 1.49
Total Depth (ft) : 1948	Gallons Per Sack: 7.48
Open Hole Diameter (in.) : 13.50	% Excess: 15%
Conductor Length (ft) : 80	Displacement Fluid lb/gal: 8.3
Conductor ID : 15.25	Fluid Ahead (bbls): 50.0
Shoe Joint Length (ft) : 41	H2O Wash Up (bbls): 20.0
Landing Joint (ft) : 3	Spacer Ahead Makeup 40H2O, 10Dye
Max Rate: 8	
Max Pressure: 1700	

Calculated Results	Pressure of cement in annulus
<b>cuft of Shoe</b> 20.00 cuft (Casing ID Squared) X (.005454) X (Shoe Joint ft)	<b>Displacement:</b> 146.60 bbls (Casing ID Squared) X (.0009714) X (Casing Depth + Landing Joint - Shoe Joint)
<b>cuft of Conductor</b> 61.05 cuft (Conductor Width Squared) - (Casing Size OD Squared) X (.005454) X (Conductor Length ft)	<b>Hydrostatic Pressure:</b> 1429.66 PSI
<b>cuft of Casing</b> 892.00 cuft (Open Hole Squared) - (Casing Size Squared) X (.005454) X (Casing Depth - Conductor Length)	<b>Pressure of the fluids inside casing</b>
<b>Total Slurry Volume</b> 1104.00 cuft (cuft of Shoe) + (cuft of Conductor) + (cuft of Casing)	<b>Displacement:</b> 817.95 psi
<b>bbls of Slurry</b> 197.00 bbls (Total Slurry Volume) X (.1781)	<b>Shoe Joint:</b> 30.25 psi
<b>Sacks Needed</b> 742 sk (Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	<b>Total</b> 848.20 psi
<b>Mix Water</b> 132.00 bbls (Sacks Needed) X (Gallons Per Sack) ÷ 42	<b>Differential Pressure:</b> 581.47 psi
	<b>Collapse PSI:</b> 2020.00 psi
	<b>Burst PSI:</b> 3520.00 psi
	<b>Total Water Needed:</b> 300.00 bbls

X 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.

