Bison Oil Well Cementing
Tail & Lead

Date: 1/3/2017
Invoice # 900027
API# 05-123-42940
Foreman: JASON

Customer: Noble Energy Inc.
Well Name: EARP FEDERAL LC23-745

County: Weld
State: Colorado
Sec: 11
Twp: 9N
Range: 59W

Consultant: JW
Rig Name & Number: H&P 524
Distance To Location: 67
Units On Location: 3
Time Requested: 2200
Time Arrived On Location: 2030
Time Left Location: 630

WELL DATA

Casing Size (in) :	9.625
Casing Weight (lb) :	36
Casing Depth (ft.) :	1,902
Total Depth (ft) :	1941
Open Hole Diameter (in) :	13.50
Conductor Length (ft) :	80
Conductor ID :	15.25
Shoe Joint Length (ft) :	45
Landing Joint (ft) :	34
Sacks of Tail Requested	100
HOC Tail (ft):	0

One or the other, cannot have quantity in both

Max Rate: 8
Max Pressure: 1500

Cement Data

Lead

Cement Name:	
Cement Density (lb/gal) :	13.5
Cement Yield (cuft) :	1.68
Gallons Per Sack	8.90
% Excess	15%

Tail

Cement Name:	
Cement Density (lb/gal) :	15.2
Cement Yield (cuft) :	1.27
Gallons Per Sack:	5.80
% Excess:	0%
Fluid Ahead (bbls)	50.0
H20 Wash Up (bbls)	20.0

Spacer Ahead Makeup
50 BBL WATER W/DYE IN 2ND 10

Casing ID 8.921 Casing Grade J-55 only used

Lead Calculated Results

HOC of Lead Casing Depth - HOC Tail	1567.88 ft
Volume of Lead Cement HOC of Lead X Open Hole Ann	766.27 cuft
Volume of Conductor (Conductor ID Squared) -(Casing Size OD Squared) X (.005454) X (Conductor Length ft)	61.05 cuft
Total Volume of Lead Cement (cuft of Lead Cement) + (Cuft of Conductor)	827.32 cuft
bbls of Lead Cement (Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess)	169.45 bbls
Sacks of Lead Cement (Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	566.32 sk
bbls of Lead Mix Water (Sacks Needed) X (Gallons Per Sack) ÷ 42	120.01 bbls
Displacement (Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)	146.16 bbls
Total Water Needed:	349.98 bbls

Tail Calculated Results

Tail Cement Volume In Ann (HOC Tail) X (OH Ann)	127.00 cuft
Total Volume of Tail Cement (HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)	107.48 Cuft
bbls of Tail Cement (HOC of Tail) X (OH Ann) + (Cement Yield) X (Shoe Joint Ann) X (.1781) X (% Excess)	22.62 bbls
HOC Tail (Tail Cement Volume) ÷ (OH Ann)	219.91 ft
Sacks of Tail Cement (Total Volume of Tail Cement) ÷ (Cement Yield)	100.00 sk
bbls of Tail Mix Water (Sacks of Tail Cement X Gallons Per Sack) ÷ 42	13.81 bbls
Pressure of cement in annulus	
Hydrostatic Pressure	585.23 PSI
Collapse PSI:	2020.00 psi
Burst PSI:	3520.00 psi

X JW Irwin
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	EARP FEDERAL LC23-745

Date	1/3/2017
INVOICE #	900027
LOCATION	Weld
FOREMAN	JASON

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DESCRIPTION OF JOB EVENTS

Amount Pumped		Time/Date	Event	Description	Rate	BBLs	Pressure
Lead mixed bbls	120.2	2030	ARRIVE ON LOCATION	ASSESS LOCATION	0.5	2	1500
Lead % Excess	15%	130	MIRU	SPOT EQUIPMENT IN			
Lead Sacks	567	215	JSA	COVER JOB, EMERGENCIES			
		329	PRESSURE TEST	PRESSURE TEST TO 1500 PSI			1500
		332	SPACER AHEAD	WATER SUPPLIED BY RIG, DYE IN 2ND 10	5	50	100
Tail mixed bbls	13.8	344	LEAD CEMENT	CEMENT MIXED AT 13.5 PPG 567 SKS	7	169.4	220
Tail % Excess	0%	415	TAIL CEMENT	CEMENT MIXED AT 15.2 PPG 100 SKS	7	22.6	210
Tail Sacks	100	420	SHUT DOWN				
		427	DROP PLUG	PLUG PRELOADED			
Total Sacks	667	427	DISPLACEMENT	RIG DISPLACE	3	146	530
Water Temp	42	447	BUMP PLUG				1510
bbl Returns	44	448	CASING TEST	PRESSURE UP 1500 PSI DONE BY RIG FOR 30 MIN.			1510
		518	CHECK FLOATS	FLOATS HELD 2.75 BBL BACK			1546
Notes:		525	RIG DOWN	PRE RIG DOWN MEETING			
MONITORED WELL							
NO TOP OFF							

x JW Irwin
Customer Signature

x WSJ
Title

x 1/4/17
Date