Bison Oil Well Cementing
Tail & Lead

Date:	6/19/2019
Invoice #	200464
API#	
Foreman:	Kirk Kallhoff

Customer: Noble Energy Inc.
Well Name: stars federal ld 17-770

County: Weld		Consultant:	jim
State: Colorado		Rig Name & Number:	H&P 321
		Distance To Location:	70
Sec: 5		Units On Location:	4047/4024/4023
Twp: 9n		Time Requested:	200 am
		Time Arrived On Location:	1130 pm
Range: 58w		Time Left Location:	2:00 am

WELL DATA

Casing Size (in) :	9.625
Casing Weight (lb) :	36
Casing Depth (ft.) :	1,884
Total Depth (ft) :	1929
Open Hole Diameter (in) :	13.50
Conductor Length (ft) :	110
Conductor ID :	15.15
Shoe Joint Length (ft) :	47
Landing Joint (ft) :	4
Sacks of Tail Requested	100
HOC Tail (ft):	0

One or the other, cannot have quantity in both

Max Rate:	8
Max Pressure:	2500

Casing ID	8.921	Casing Grade	J-55 only used

Cement Data

Lead

Cement Name:	BFN III
Cement Density (lb/gal) :	13.5
Cement Yield (cuft) :	1.68
Gallons Per Sack :	8.90
% Excess	10%

Tail	Type III
Cement Name:	
Cement Density (lb/gal) :	15.2
Cement Yield (cuft) :	1.27
Gallons Per Sack:	5.80
% Excess:	0%

Fluid Ahead (bbls)	30.0
H20 Wash Up (bbls)	20.0

Spacer Ahead Makeup
30 BBL ahed with Die in 2nd 10

Lead Calculated Results

HOC of Lead — 1551.88 ft
Casing Depth - HOC Tail

Volume of Lead Cement — 758.45 cuft
HOC of Lead X Open Hole Ann

Volume of Conductor — 82.12 cuft
(Conductor ID Squared) -(Casing Size OD Squared) X (.005454) X (Conductor Length ft)

Total Volume of Lead Cement — 840.57 cuft
(cuft of Lead Cement) + (Cuft of Conductor)

bbls of Lead Cement — 164.68 bbls
(Total cuft of Lead Cement) X (.1781) X (1+%Lead Excess)

Sacks of Lead Cement — 550.37 sk
(Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)

bbls of Lead Mix Water — 116.63 bbls
(Sacks Needed) X (Gallons Per Sack) ÷ 42

Displacement — 142.31 bbls
(Casing ID Squared) X (.0009714) X (Casing Depth) + (Landing Joint) - (Shoe Length)

Total Water Needed: — 322.75 bbls

Tail Calculated Results

Tail Cement Volume In Ann — 127.00 cuft
(HOC Tail) X (OH Ann)

Total Volume of Tail Cement — 106.60 Cuft
(HOC Tail X OH Ann) - (Shoe Length X Shoe Joint Ann)

bbls of Tail Cement — 22.62 bbls
(HOC of Tail) X (OH Ann) + (Cement Yield) X (Shoe Joint Ann) X (.1781) X (% Excess)

HOC Tail — 218.12 ft
(Tail Cement Volume) ÷ (OH Ann)

Sacks of Tail Cement — 100.00 sk
(Total Volume of Tail Cement) ÷ (Cement Yield)

bbls of Tail Mix Water — 13.81 bbls
(Sacks of Tail Cement X Gallons Per Sack) ÷ 42

Pressure of cement in annulus

Hydrostatic Pressure — 585.23 PSI

Collapse PSI: — 2020.00 psi
Burst PSI: — 3520.00 psi

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.

Bison Oil Well Cementing
Two Cement Surface Pipe

Date	6/19/2019
INVOICE #	200464
LOCATION	Weld
FOREMAN	Kirk Kallhoff

Customer: **Noble Energy Inc.**
Well Name: **stars federal ld 17-770**

Treatment Report Page 2

Amount Pumped		Time	Event	Description		Rate	BBLs	Pressure
Lead mixed bbls	116.6	1130 pm	ARRIVE ON LOCATION	ASSESS LOCATION				
Lead % Excess	10%	310 am	JSA	Bison/SPOT EQUIPMENT IN				
Lead Sacks	550	345 am	JSA	Bison and Rig Crew				
		418 am	PRESSURE TEST	PRESSURE TEST TO 1000 PSI				1000
		419 am	SPACER AHEAD	WATER S. .		6	30	200
Tail mixed bbls	13.81	424 am	LEAD CEMENT	CEMENT MIXED AT 13.5 PPC PG.	550 sks	6	164.6	220
Tail % Excess	0%	455 am	TAIL CEMENT	CEMENT MIXED AT 15.2 PPC PG.	100 sks	6	22.6	300
Tail Sacks	100	503 am	SHUT DOWN					
		507 am	DROP PLUG					
Total Sacks	650	508 am	DISPLACEMENT	bison to DISPLACE		6	142.2	350
Water Temp	60	536 am	Bump Plug	(630 PSI)		1	142.2	780
bbl Returns	35	538 am	Casing TEST	Held for 15 Min.				1030
		553 am	Check Floats	FLOATS I held .5 BBL Back				
Notes:		630 am	RIG DOWN	PRE RIG DOWN MEETING				
Montered well for		700 am	Leave Location					
30 Min. No top out								
Needed								

X _(signature)_
Work Preformed

X CO MAN
Title

X 6-19-19
Date

SERIES 2000

Pressure & Total Volume

Density & Rate

PSI — Barrels / Minute — Barrels — Lbs / Gallon — Stage Volume