



Bison Oil Well Cementing Single Cement Surface Pipe

Date: 8/16/2015
 Invoice # 80432
 API# 05-123-41904
 Foreman: Calvin Reimers

Customer: Anadarko Petroleum Corporation
Well Name: Powers 13N-22HZ

County: Weld
 State: Colorado
 Sec: 22
 Twp: 2N
 Range: 65W

Consultant: Bryan / Hayden
 Rig Name & Number: Noble 2
 Distance To Location: 40 Miles
 Units On Location: 4023-3104/4034-3203
 Time Requested: 1000pm
 Time Arrived On Location: 815pm
 Time Left Location: 1:45 pm

WELL DATA	Cement Data
Casing Size OD (in) : <u>9.625</u>	Cement Name: <u>BFN III</u>
Casing Weight (lb) : <u>36.00</u>	Cement Density (lb/gal) : <u>14.2</u>
Casing Depth (ft.) : <u>1,861</u>	Cement Yield (cuft) : <u>1.49</u>
Total Depth (ft) : <u>1877</u>	Gallons Per Sack: <u>7.48</u>
Open Hole Diameter (in.) : <u>13.50</u>	% Excess: <u>15%</u>
Conductor Length (ft) : <u>60</u>	Displacement Fluid lb/gal: <u>8.3</u>
Conductor ID : <u>15.5</u>	BBL to Pit: <u>25</u>
Shoe Joint Length (ft) : <u>43</u>	Fluid Ahead (bbls): <u>30.0</u>
Landing Joint (ft) : <u>10</u>	H2O Wash Up (bbls): <u>15.0</u>
Max Rate: <u>6</u>	Spacer Ahead Makeup
Max Pressure: <u>1750</u>	<u>30 bbls With Dye in 2nd 10 bbls</u>

Calculated Results	Pressure of cement in annulus
Displacement: <u>141.30 bbls</u> (Casing ID Squared) X (.0009714) X (Casing Depth + Landing Joint - Shoe Joint)	Hydrostatic Pressure: <u>1372.62 PSI</u>
cuft of Shoe <u>18.63</u> cuft (Casing ID Squared) X (.005454) X (Shoe Joint ft)	Pressure of the fluids inside casing
cuft of Conductor <u>48.30</u> cuft (Conductor Width Squared) -(Casing Size OD Squared) X (.005454) X (Conductor Length ft)	Displacement: <u>783.78 psi</u>
cuft of Casing <u>1012.05</u> cuft (Open Hole Squared)-(Casing Size Squared) X (.005454) X (Casing Depth - Conductor Length)	Shoe Joint: <u>31.66 psi</u>
Total Slurry Volume <u>1078.99</u> cuft (cuft of Shoe) + (cuft of Conductor) + (cuft of Casing)	Total <u>815.45 psi</u>
bbls of Slurry <u>192.17</u> bbls (Total Slurry Volume) X (.1781)	Differential Pressure: <u>557.18 psi</u>
Sacks Needed <u>724</u> sk (Total Slurry Volume) ÷ (Cement Yield) X (% Excess Cement)	Collapse PSI: <u>2020.00 psi</u>
Mix Water <u>128.97</u> bbls (Sacks Needed) X (Gallons Per Sack) ÷ 42	Burst PSI: <u>3520.00 psi</u>
	Total Water Needed: <u>315.27 bbls</u>

X Hayden St
 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.

SERIES 2000

