



Noble Energy Inc.

Weld County, CO
Sec 16, T9N, R58W, 6th PM
Timbro State LD16-67-1HN

Wellbore #1

Design: Wellbore #1 **FINAL**

DDC Survey Report

18 November, 2013



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Timbro State LD16-67-1HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4785.0usft (H&P #326)
Site:	Sec 16, T9N, R58W, 6th PM	MD Reference:	WELL @ 4785.0usft (H&P #326)
Well:	Timbro State LD16-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		Sec 16, T9N, R58W, 6th PM			
Site Position:		Northing:	1,519,245.91 usft	Latitude:	40° 44' 49.884 N
From:	Lat/Long	Easting:	3,454,267.11 usft	Longitude:	103° 51' 37.620 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.06 °

Well		Timbro State LD16-67-1HN				
Well Position	+N/-S	0.0 usft	Northing:	1,521,622.79 usft	Latitude:	40° 45' 13.392 N
	+E/-W	0.0 usft	Easting:	3,454,126.17 usft	Longitude:	103° 51' 38.880 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,755.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/11/2013	8.08	67.40	53,163

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	270.59	

Survey Program	Date	11/18/2013			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
277.0	1,201.0	GYRO (Wellbore #1)	Good_gyro	Good Gyro	
1,301.0	9,947.0	MWD (Wellbore #1)	MWD default	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
277.0	0.40	72.40	277.0	0.3	0.9	-0.9	0.14	0.14	0.00	
554.0	0.50	67.20	554.0	1.1	3.0	-2.9	0.04	0.04	-1.88	
832.0	0.30	86.00	832.0	1.6	4.8	-4.8	0.09	-0.07	6.76	
TIE IN @ 1201' MD / 1201' TVD										
1,201.0	0.40	250.10	1,201.0	1.2	4.6	-4.5	0.19	0.03	44.47	
1,301.0	0.10	209.00	1,301.0	1.0	4.2	-4.2	0.33	-0.30	-41.10	
1,394.0	0.20	181.60	1,394.0	0.8	4.1	-4.1	0.13	0.11	-29.46	
1,487.0	0.10	189.50	1,487.0	0.5	4.1	-4.1	0.11	-0.11	8.49	
1,579.0	0.20	214.60	1,579.0	0.3	4.0	-4.0	0.13	0.11	27.28	

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Well:	Timbro State LD16-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,672.0	0.10	168.20	1,672.0	0.1	3.9	-3.9	0.16	-0.11	-49.89
1,765.0	2.50	77.30	1,764.9	0.5	5.9	-5.9	2.69	2.58	-97.74
1,858.0	4.20	69.60	1,857.8	2.1	11.1	-11.1	1.89	1.83	-8.28
1,949.0	5.70	68.00	1,948.4	5.0	18.4	-18.4	1.66	1.65	-1.76
2,042.0	6.70	78.40	2,040.9	7.8	28.0	-27.9	1.61	1.08	11.18
2,135.0	8.40	75.40	2,133.1	10.6	39.9	-39.8	1.88	1.83	-3.23
2,228.0	9.50	72.80	2,225.0	14.6	53.8	-53.7	1.26	1.18	-2.80
2,320.0	11.10	65.20	2,315.5	20.5	69.1	-68.9	2.28	1.74	-8.26
2,413.0	12.40	70.60	2,406.5	27.6	86.7	-86.4	1.83	1.40	5.81
2,507.0	13.40	65.00	2,498.2	35.6	106.0	-105.7	1.70	1.06	-5.96
2,599.0	14.30	57.60	2,587.5	46.2	125.3	-124.8	2.16	0.98	-8.04
2,692.0	14.50	57.10	2,677.6	58.6	144.8	-144.2	0.25	0.22	-0.54
2,787.0	13.80	55.20	2,769.7	71.6	164.1	-163.3	0.88	-0.74	-2.00
2,881.0	12.10	52.50	2,861.3	84.0	181.1	-180.2	1.92	-1.81	-2.87
2,976.0	9.40	54.10	2,954.6	94.6	195.3	-194.3	2.86	-2.84	1.68
3,070.0	7.20	66.10	3,047.6	101.5	206.9	-205.8	2.97	-2.34	12.77
3,164.0	7.00	65.20	3,140.9	106.2	217.5	-216.4	0.24	-0.21	-0.96
3,259.0	7.20	64.50	3,235.2	111.2	228.1	-226.9	0.23	0.21	-0.74
3,354.0	5.80	58.00	3,329.6	116.3	237.5	-236.3	1.66	-1.47	-6.84
3,448.0	4.50	56.20	3,423.2	120.9	244.6	-243.4	1.39	-1.38	-1.91
3,543.0	3.60	81.70	3,518.0	123.4	250.7	-249.4	2.10	-0.95	26.84
3,637.0	2.90	81.90	3,611.8	124.2	256.0	-254.7	0.74	-0.74	0.21
3,732.0	0.90	122.80	3,706.8	124.1	259.0	-257.7	2.42	-2.11	43.05
3,826.0	1.50	122.10	3,800.7	123.1	260.6	-259.3	0.64	0.64	-0.74
3,921.0	1.10	56.60	3,895.7	122.9	262.4	-261.2	1.52	-0.42	-68.95
4,016.0	0.30	247.30	3,990.7	123.3	263.0	-261.7	1.47	-0.84	-178.21
4,110.0	0.20	78.90	4,084.7	123.2	262.9	-261.6	0.53	-0.11	-179.15
4,204.0	0.40	69.40	4,178.7	123.4	263.4	-262.1	0.22	0.21	-10.11
4,299.0	0.30	142.20	4,273.7	123.3	263.8	-262.6	0.45	-0.11	76.63
4,393.0	0.70	158.70	4,367.7	122.6	264.2	-262.9	0.45	0.43	17.55
4,488.0	1.10	219.70	4,462.7	121.3	263.8	-262.6	1.03	0.42	64.21
4,583.0	1.10	243.10	4,557.7	120.2	262.4	-261.2	0.47	0.00	24.63
4,677.0	0.30	253.10	4,651.7	119.7	261.4	-260.1	0.86	-0.85	10.64
4,772.0	0.20	46.70	4,746.7	119.8	261.3	-260.0	0.51	-0.11	161.68
4,867.0	0.70	25.60	4,841.7	120.4	261.6	-260.4	0.55	0.53	-22.21
4,961.0	0.90	44.60	4,935.7	121.5	262.4	-261.1	0.35	0.21	20.21
5,056.0	9.80	268.00	5,030.2	121.7	254.8	-253.6	11.02	9.37	-143.79
5,150.0	20.60	268.90	5,120.8	121.1	230.2	-229.0	11.49	11.49	0.96
5,245.0	28.00	265.20	5,207.3	118.9	191.2	-190.0	7.95	7.79	-3.89
5,340.0	27.60	264.90	5,291.4	115.1	147.1	-145.9	0.45	-0.42	-0.32
5,435.0	37.70	271.90	5,371.3	114.1	96.0	-94.8	11.33	10.63	7.37
5,529.0	44.80	270.90	5,441.9	115.6	34.1	-32.9	7.59	7.55	-1.06
5,623.0	50.70	268.20	5,505.1	115.0	-35.5	36.6	6.63	6.28	-2.87

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,718.0	58.70	265.60	5,559.9	110.7	-112.8	113.9	8.71	8.42	-2.74
5,812.0	66.90	264.40	5,602.9	103.4	-196.0	197.1	8.80	8.72	-1.28
5,907.0	68.20	265.60	5,639.2	95.7	-283.5	284.4	1.80	1.37	1.26
CROSSED HARDLINE @ 5939' MD / 5650' TVD									
5,939.0	72.24	266.44	5,650.0	93.6	-313.5	314.4	12.86	12.62	2.63
6,002.0	80.20	268.00	5,665.0	90.7	-374.6	375.5	12.86	12.64	2.47
6,033.0	85.40	269.60	5,668.9	90.0	-405.3	406.2	17.54	16.77	5.16
6,138.0	86.20	270.70	5,676.5	90.3	-510.0	510.9	1.29	0.76	1.05
6,230.0	87.90	271.60	5,681.3	92.2	-601.9	602.8	2.09	1.85	0.98
6,324.0	87.60	270.90	5,685.0	94.2	-695.8	696.7	0.81	-0.32	-0.74
6,417.0	89.30	272.10	5,687.5	96.6	-788.7	789.7	2.24	1.83	1.29
6,509.0	90.50	271.00	5,687.7	99.1	-880.7	881.6	1.77	1.30	-1.20
6,604.0	90.20	270.30	5,687.1	100.2	-975.7	976.6	0.80	-0.32	-0.74
6,699.0	90.30	270.00	5,686.7	100.5	-1,070.7	1,071.6	0.33	0.11	-0.32
6,794.0	90.20	269.50	5,686.2	100.0	-1,165.7	1,166.6	0.54	-0.11	-0.53
6,888.0	89.50	268.60	5,686.5	98.5	-1,259.6	1,260.6	1.21	-0.74	-0.96
6,983.0	89.50	268.20	5,687.3	95.8	-1,354.6	1,355.5	0.42	0.00	-0.42
7,078.0	88.60	267.90	5,688.9	92.6	-1,449.5	1,450.4	1.00	-0.95	-0.32
7,172.0	91.10	270.50	5,689.1	91.3	-1,543.5	1,544.4	3.84	2.66	2.77
7,267.0	91.10	269.30	5,687.3	91.1	-1,638.5	1,639.3	1.26	0.00	-1.26
7,362.0	91.00	268.90	5,685.6	89.6	-1,733.5	1,734.3	0.43	-0.11	-0.42
7,456.0	90.80	267.90	5,684.1	87.0	-1,827.4	1,828.2	1.08	-0.21	-1.06
7,551.0	90.80	267.70	5,682.8	83.4	-1,922.3	1,923.1	0.21	0.00	-0.21
7,645.0	89.20	269.80	5,682.8	81.3	-2,016.3	2,017.0	2.81	-1.70	2.23
7,740.0	89.90	269.30	5,683.5	80.6	-2,111.3	2,112.0	0.91	0.74	-0.53
7,834.0	90.40	268.60	5,683.3	78.8	-2,205.3	2,206.0	0.92	0.53	-0.74
7,929.0	88.40	269.50	5,684.3	77.3	-2,300.3	2,300.9	2.31	-2.11	0.95
8,023.0	90.00	270.70	5,685.6	77.4	-2,394.2	2,394.9	2.13	1.70	1.28
8,118.0	90.00	270.00	5,685.6	78.0	-2,489.2	2,489.9	0.74	0.00	-0.74
8,213.0	89.50	268.60	5,686.0	76.9	-2,584.2	2,584.9	1.56	-0.53	-1.47
8,307.0	90.40	268.90	5,686.1	74.8	-2,678.2	2,678.8	1.01	0.96	0.32
8,402.0	90.80	268.40	5,685.1	72.6	-2,773.2	2,773.8	0.67	0.42	-0.53
8,497.0	91.40	268.00	5,683.3	69.6	-2,868.1	2,868.7	0.76	0.63	-0.42
8,591.0	88.60	268.80	5,683.3	67.0	-2,962.1	2,962.6	3.10	-2.98	0.85
8,686.0	88.60	268.20	5,685.6	64.5	-3,057.0	3,057.5	0.63	0.00	-0.63
8,780.0	88.50	269.80	5,688.0	62.8	-3,151.0	3,151.4	1.70	-0.11	1.70
8,874.0	91.40	271.70	5,688.0	64.1	-3,244.9	3,245.4	3.69	3.09	2.02
8,969.0	90.90	270.70	5,686.1	66.1	-3,339.9	3,340.4	1.18	-0.53	-1.05
9,063.0	91.10	270.00	5,684.5	66.6	-3,433.9	3,434.4	0.77	0.21	-0.74
9,158.0	91.40	269.50	5,682.4	66.2	-3,528.8	3,529.3	0.61	0.32	-0.53
9,252.0	91.70	268.60	5,679.9	64.7	-3,622.8	3,623.3	1.01	0.32	-0.96
9,347.0	89.80	270.70	5,678.6	64.1	-3,717.8	3,718.2	2.98	-2.00	2.21
9,442.0	88.80	270.50	5,679.8	65.1	-3,812.8	3,813.2	1.07	-1.05	-0.21
9,537.0	88.20	269.80	5,682.3	65.3	-3,907.7	3,908.2	0.97	-0.63	-0.74

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,631.0	87.70	269.50	5,685.6	64.7	-4,001.7	4,002.1	0.62	-0.53	-0.32
9,726.0	88.70	268.00	5,688.6	62.7	-4,096.6	4,097.0	1.90	1.05	-1.58
9,821.0	88.60	268.20	5,690.9	59.5	-4,191.5	4,191.9	0.24	-0.11	0.21
9,883.0	89.60	268.40	5,691.8	57.7	-4,253.5	4,253.8	1.64	1.61	0.32
TD @ 9947' MD / 5692.3' TVD									
9,947.0	89.60	268.40	5,692.3	55.9	-4,317.5	4,317.8	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,201.0	1,201.0	1.2	4.6	TIE IN @ 1201' MD / 1201' TVD
5,939.0	5,650.0	93.6	-313.5	CROSSED HARDLINE @ 5939' MD / 5650' TVD
9,947.0	5,692.3	55.9	-4,317.5	TD @ 9947' MD / 5692.3' TVD

Checked By: _____	Approved By: _____	Date: _____
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Survey Certification Sheet

Noble Energy Inc
Company

RM-13875
Job Number

11/18/13
Date

Sec16,T9N,R58W,6th PM
Lease

Timbro State LD 16-67-1HN
Well Name

Weld, CO
County & State

API: 05-123-37490

Surveyed from a depth of: 1201 feet to 9947 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Bob Kubistek

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Digitally signed by Larry Wright
DN: cn=Larry Wright, o=The
Directional Drilling Company,
ou=GM of Guidance Services,
email=larryw@directionaldrillers.
com, c=US
Date: 2013.11.21 12:24:13 -06'00'

Larry Wright
MWD General Manager

Company Name: Noble Energy Inc.
Timbro State LD16-67-1HN
Weld County, CO
Rig: H&P #326
Created By: TIFFANI MIZELL
Date: 11/18/2013



WELL DETAILS: Timbro State LD16-67-1HN					
Ground Level: 4755.0					
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1521622.78	3454126.18	40° 45' 13.392 N	103° 51' 38.880 W

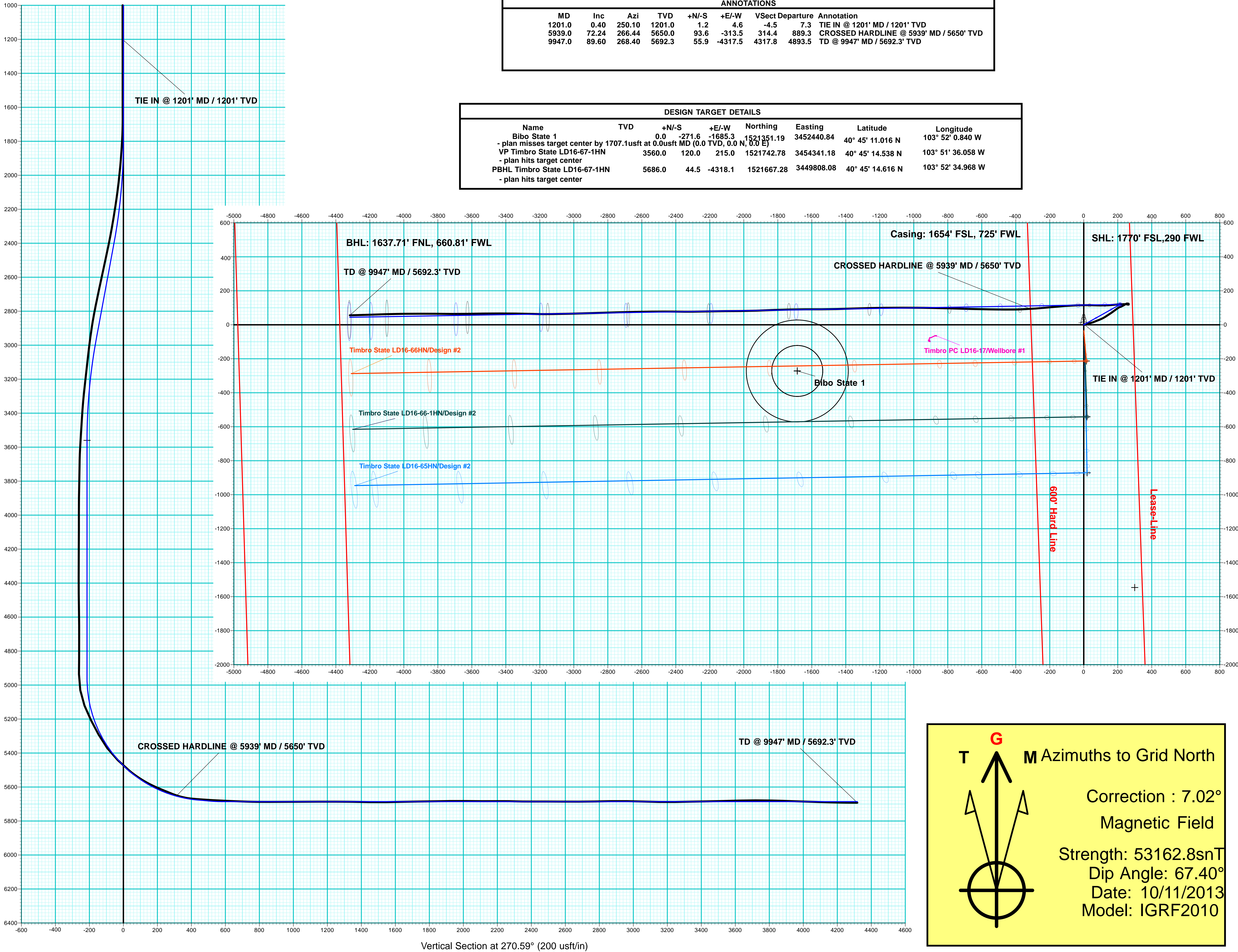
PROJECT DETAILS: Weld County, CO	
Geodetic System:	US State Plane 1983
Datum:	North American Datum 1983
Ellipsoid:	GRS 1980
Zone:	Colorado Northern Zone
System Datum:	Mean Sea Level



Timbro State LD16-67-1HN
Weld County, CO
Q130884 & RM-13875
Design #1

ANNOTATIONS							
MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect Departure	Annotation
1201.0	0.40	250.10	1201.0	1.2	4.6	-4.5	7.3 TIE IN @ 1201' MD / 1201' TVD
5939.0	72.24	266.44	5650.0	93.6	-313.5	314.4	889.3 CROSSED HARDLINE @ 5939' MD / 5650' TVD
9947.0	89.60	268.40	5692.3	55.9	-4317.5	4317.8	4893.5 TD @ 9947' MD / 5692.3' TVD

DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Bibo State 1	0.0	-271.6	-1685.3	1521351.19	3452440.84	40° 45' 11.016 N	103° 52' 0.840 W
- plan misses target center by 1707.1usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E)							
VP Timbro State LD16-67-1HN	3560.0	120.0	215.0	1521742.78	3454341.18	40° 45' 14.538 N	103° 51' 36.058 W
- plan hits target center							
PBHL Timbro State LD16-67-1HN	5686.0	44.5	-4318.1	1521667.28	3449808.08	40° 45' 14.616 N	103° 52' 34.968 W
- plan hits target center							



T

G

M Azimuths to Grid North

Correction : 7.02°

Magnetic Field

Strength: 53162.8snT

Dip Angle: 67.40°

Date: 10/11/2013

Model: IGRF2010