



## **Noble Energy Inc.**

Weld County, CO

Sec 9, T9N, R58W

Rohn State LD09-69-1HN

Wellbore #1

Design: Wellbore #1 **FINAL**

## **DDC Survey Report**

16 September, 2013



<b>Company:</b>	Noble Energy Inc.	<b>Local Co-ordinate Reference:</b>	Well Rohn State LD09-69-1HN
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 4770.0usft (H&P 326)
<b>Site:</b>	Sec 9, T9N, R58W	<b>MD Reference:</b>	WELL @ 4770.0usft (H&P 326)
<b>Well:</b>	Rohn State LD09-69-1HN	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	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 9, T9N, R58W			
Site Position:		Northing:	1,523,890.74 usft	Latitude:	40° 45' 35.850 N
From:	Map	Easting:	3,453,841.03 usft	Longitude:	103° 51' 42.040 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.06 °

Well	Rohn State LD09-69-1HN					
Well Position	+N-S	0.0 usft	Northing:	1,527,839.93 usft	Latitude:	40° 46' 14.880 N
	+E-W	0.0 usft	Easting:	3,453,761.90 usft	Longitude:	103° 51' 42.120 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,740.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/28/2013	8.10	67.42	53,184

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	276.21	

Survey Program		Date	9/16/2013		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
289.0	1,234.0	GYRO (Wellbore #1)	Good_gyro	Good Gyro	
1,308.0	9,697.0	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
289.0	0.60	105.00	289.0	-0.4	1.5	-1.5	0.21	0.21	0.00
667.0	0.00	243.80	667.0	-0.9	3.4	-3.5	0.16	-0.16	0.00
951.0	0.50	58.00	951.0	-0.2	4.4	-4.4	0.18	0.18	0.00
TIE IN @ 1234' MD / 1234' TVD									
1,234.0	0.50	58.00	1,234.0	1.1	6.5	-6.4	0.00	0.00	0.00
1,308.0	0.30	308.50	1,308.0	1.4	6.6	-6.5	0.90	-0.27	-147.97
1,400.0	0.40	276.00	1,400.0	1.5	6.1	-5.9	0.24	0.11	-35.33
1,493.0	0.50	326.10	1,493.0	1.9	5.6	-5.3	0.42	0.11	53.87
1,587.0	2.40	8.30	1,586.9	4.2	5.6	-5.2	2.19	2.02	44.89

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<b>Site:</b>	Sec 9, T9N, R58W	<b>MD Reference:</b>	WELL @ 4770.0usft (H&P 326)
<b>Well:</b>	Rohn State LD09-69-1HN	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	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)
1,680.0	4.10	20.90	1,679.8	9.2	7.1	-6.1	1.97	1.83	13.55
1,772.0	5.90	11.80	1,771.4	16.9	9.2	-7.4	2.13	1.96	-9.89
1,865.0	7.80	15.60	1,863.8	27.7	11.9	-8.9	2.10	2.04	4.09
1,957.0	9.10	10.00	1,954.8	40.9	14.9	-10.4	1.67	1.41	-6.09
2,050.0	11.30	13.20	2,046.3	57.0	18.2	-12.0	2.44	2.37	3.44
2,143.0	13.30	17.40	2,137.2	76.1	23.5	-15.1	2.35	2.15	4.52
2,235.0	14.50	17.90	2,226.5	97.1	30.2	-19.5	1.31	1.30	0.54
2,327.0	13.30	17.80	2,315.8	118.2	37.0	-24.0	1.30	-1.30	-0.11
2,419.0	14.20	11.30	2,405.1	139.3	42.4	-27.1	1.94	0.98	-7.07
2,511.0	14.10	11.80	2,494.3	161.3	46.9	-29.2	0.17	-0.11	0.54
2,604.0	13.80	10.20	2,584.6	183.3	51.2	-31.1	0.53	-0.32	-1.72
2,697.0	14.80	12.30	2,674.7	205.9	55.7	-33.1	1.21	1.08	2.26
2,790.0	13.90	12.50	2,764.8	228.4	60.7	-35.6	0.97	-0.97	0.22
2,885.0	12.10	9.10	2,857.4	249.4	64.7	-37.3	2.06	-1.89	-3.58
2,979.0	12.70	17.80	2,949.2	268.9	69.4	-39.9	2.09	0.64	9.26
3,074.0	13.60	16.90	3,041.7	289.5	75.9	-44.1	0.97	0.95	-0.95
3,169.0	14.70	15.30	3,133.8	311.9	82.3	-48.1	1.23	1.16	-1.68
3,263.0	15.40	14.60	3,224.6	335.4	88.6	-51.8	0.77	0.74	-0.74
3,358.0	15.70	14.10	3,316.1	360.1	94.9	-55.4	0.35	0.32	-0.53
3,453.0	15.90	20.00	3,407.5	384.8	102.5	-60.2	1.70	0.21	6.21
3,547.0	15.70	24.40	3,498.0	408.5	112.1	-67.3	1.29	-0.21	4.68
3,642.0	13.50	25.50	3,589.9	430.2	122.2	-75.0	2.33	-2.32	1.16
3,736.0	12.10	28.00	3,681.6	448.8	131.6	-82.2	1.60	-1.49	2.66
3,831.0	9.10	28.50	3,774.9	464.2	139.8	-88.8	3.16	-3.16	0.53
3,925.0	7.40	33.10	3,868.0	475.8	146.7	-94.3	1.94	-1.81	4.89
4,020.0	5.80	29.70	3,962.3	485.1	152.4	-99.0	1.73	-1.68	-3.58
4,115.0	5.10	30.10	4,056.9	492.9	156.9	-102.7	0.74	-0.74	0.42
4,210.0	4.00	22.70	4,151.6	499.6	160.3	-105.3	1.31	-1.16	-7.79
4,305.0	3.00	31.10	4,246.4	504.8	162.9	-107.3	1.18	-1.05	8.84
4,399.0	1.90	39.40	4,340.3	508.1	165.1	-109.2	1.23	-1.17	8.83
4,494.0	2.00	21.30	4,435.3	510.9	166.7	-110.5	0.65	0.11	-19.05
4,589.0	2.40	9.70	4,530.2	514.4	167.7	-111.0	0.63	0.42	-12.21
4,684.0	2.50	359.10	4,625.1	518.4	168.0	-110.9	0.49	0.11	-11.16
4,778.0	2.30	336.10	4,719.0	522.2	167.2	-109.7	1.04	-0.21	-24.47
4,873.0	2.20	324.00	4,814.0	525.4	165.3	-107.5	0.51	-0.11	-12.74
4,909.0	2.00	318.70	4,849.9	526.5	164.5	-106.6	0.77	-0.56	-14.72
4,968.0	2.20	306.00	4,908.9	527.9	162.9	-104.8	0.86	0.34	-21.53
5,062.0	6.90	282.00	5,002.6	530.1	155.9	-97.6	5.29	5.00	-25.53
5,157.0	14.00	270.00	5,096.0	531.3	138.8	-80.5	7.78	7.47	-12.63
5,252.0	19.70	267.70	5,186.8	530.7	111.3	-53.2	6.04	6.00	-2.42
5,347.0	28.50	266.30	5,273.5	528.6	72.6	-15.0	9.28	9.26	-1.47
5,441.0	34.60	271.80	5,353.6	528.0	23.5	33.8	7.17	6.49	5.85
5,536.0	43.30	276.00	5,427.4	532.2	-36.0	93.3	9.57	9.16	4.42

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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)
5,630.0	52.70	273.50	5,490.2	537.9	-105.5	163.1	10.19	10.00	-2.66
5,725.0	57.30	271.20	5,544.7	541.0	-183.2	240.7	5.23	4.84	-2.42
5,820.0	65.00	272.50	5,590.5	543.8	-266.3	323.6	8.19	8.11	1.37
5,914.0	70.30	275.80	5,626.3	550.1	-353.0	410.4	6.51	5.64	3.51
6,009.0	70.00	273.20	5,658.5	557.1	-442.1	499.7	2.59	-0.32	-2.74
6,063.0	74.40	271.80	5,675.0	559.3	-493.4	551.0	8.51	8.15	-2.59
6,104.0	79.40	270.40	5,684.3	560.1	-533.3	590.8	12.64	12.20	-3.41
6,203.0	88.70	268.60	5,694.6	559.2	-631.7	688.5	9.57	9.39	-1.82
6,256.0	88.80	268.80	5,695.7	558.0	-684.7	741.0	0.42	0.19	0.38
6,351.0	90.80	270.20	5,696.0	557.2	-779.7	835.4	2.57	2.11	1.47
6,445.0	90.70	270.50	5,694.8	557.8	-873.6	928.9	0.34	-0.11	0.32
6,537.0	90.40	269.50	5,693.9	557.8	-965.6	1,020.3	1.13	-0.33	-1.09
6,632.0	90.40	269.10	5,693.3	556.6	-1,060.6	1,114.6	0.42	0.00	-0.42
6,726.0	90.20	269.00	5,692.8	555.1	-1,154.6	1,207.9	0.24	-0.21	-0.11
6,821.0	90.50	269.10	5,692.2	553.5	-1,249.6	1,302.1	0.33	0.32	0.11
6,915.0	88.60	267.70	5,692.9	550.9	-1,343.6	1,395.3	2.51	-2.02	-1.49
7,010.0	88.90	268.30	5,695.0	547.5	-1,438.5	1,489.3	0.71	0.32	0.63
7,105.0	88.80	267.90	5,696.9	544.4	-1,533.4	1,583.3	0.43	-0.11	-0.42
7,199.0	88.30	267.50	5,699.3	540.6	-1,627.3	1,676.2	0.68	-0.53	-0.43
7,294.0	90.40	267.50	5,700.4	536.5	-1,722.2	1,770.1	2.21	2.21	0.00
7,388.0	90.40	267.50	5,699.7	532.4	-1,816.1	1,863.0	0.00	0.00	0.00
7,482.0	90.60	267.20	5,698.9	528.0	-1,910.0	1,955.9	0.38	0.21	-0.32
7,576.0	89.60	266.70	5,698.7	523.0	-2,003.9	2,048.7	1.19	-1.06	-0.53
7,671.0	89.30	266.30	5,699.6	517.2	-2,098.7	2,142.3	0.53	-0.32	-0.42
7,765.0	88.90	266.50	5,701.1	511.3	-2,192.5	2,234.9	0.48	-0.43	0.21
7,860.0	88.90	265.40	5,702.9	504.6	-2,287.2	2,328.4	1.16	0.00	-1.16
7,955.0	90.70	267.90	5,703.3	499.1	-2,382.1	2,422.1	3.24	1.89	2.63
8,049.0	91.70	270.00	5,701.3	497.3	-2,476.0	2,515.3	2.47	1.06	2.23
8,144.0	92.30	269.50	5,698.0	496.9	-2,571.0	2,609.6	0.82	0.63	-0.53
8,239.0	90.10	270.90	5,696.0	497.3	-2,665.9	2,704.1	2.74	-2.32	1.47
8,333.0	89.40	270.90	5,696.4	498.7	-2,759.9	2,797.7	0.74	-0.74	0.00
8,428.0	87.80	269.10	5,698.7	498.7	-2,854.9	2,892.1	2.53	-1.68	-1.89
8,522.0	86.30	267.50	5,703.6	496.0	-2,948.7	2,985.1	2.33	-1.60	-1.70
8,617.0	89.30	272.10	5,707.2	495.6	-3,043.6	3,079.4	5.78	3.16	4.84
8,711.0	90.00	271.90	5,707.8	498.9	-3,137.5	3,173.1	0.77	0.74	-0.21
8,806.0	90.40	273.50	5,707.5	503.4	-3,232.4	3,267.9	1.74	0.42	1.68
8,900.0	90.80	275.50	5,706.5	510.8	-3,326.1	3,361.9	2.17	0.43	2.13
8,995.0	87.50	268.60	5,707.9	514.2	-3,421.0	3,456.5	8.05	-3.47	-7.26
9,089.0	86.30	267.40	5,713.0	510.9	-3,514.8	3,549.4	1.80	-1.28	-1.28
9,184.0	86.70	266.00	5,718.8	505.4	-3,609.5	3,642.9	1.53	0.42	-1.47
9,278.0	86.60	264.60	5,724.3	497.7	-3,703.0	3,735.1	1.49	-0.11	-1.49
9,373.0	90.20	264.60	5,726.9	488.8	-3,797.5	3,828.1	3.79	3.79	0.00
9,468.0	92.20	266.50	5,724.9	481.4	-3,892.2	3,921.4	2.90	2.11	2.00

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<b>Site:</b>	Sec 9, T9N, R58W	<b>MD Reference:</b>	WELL @ 4770.0usft (H&P 326)
<b>Well:</b>	Rohn State LD09-69-1HN	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	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)	
9,562.0	92.80	266.10	5,720.8	475.4	-3,985.9	4,013.9	0.77	0.64	-0.43	
9,634.0	93.00	266.10	5,717.2	470.5	-4,057.6	4,084.7	0.28	0.28	0.00	
TD @ 9697' MD / 5713.9' TVD										
9,697.0	93.00	266.10	5,713.9	466.2	-4,120.4	4,146.7	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,234.0	1,234.0	1.1	6.5	TIE IN @ 1234' MD / 1234' TVD	
9,697.0	5,713.9	466.2	-4,120.4	TD @ 9697' MD / 5713.9' TVD	

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_



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## Survey Certification Sheet

Noble Energy, INC  
Company

RM-13706  
Job Number

9/27/13  
Date

Sec9, T9N, R58W  
Lease

Rohn State LD 09-69-1HN  
Well Name

Weld, CO  
County & State

API: 05-123-37547

Surveyed from a depth of: 1234 feet to 9697 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: 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.c  
om, c=US  
Date: 2013.10.04 11:00:53 -05'00'

Larry Wright  
MWD General Manager



Company Name: Noble Energy Inc.  
Rohn State LD09-69-1HN  
Weld County, CO  
Rig: H&P 326  
Created By: TIFFANI MIZELL  
Date: 9/16/2013

Rohn State LD09-69-1HN  
Weld County, CO  
**Q130751 & RM-13706**  
Design #1



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

DESIGN TARGET DETAILS

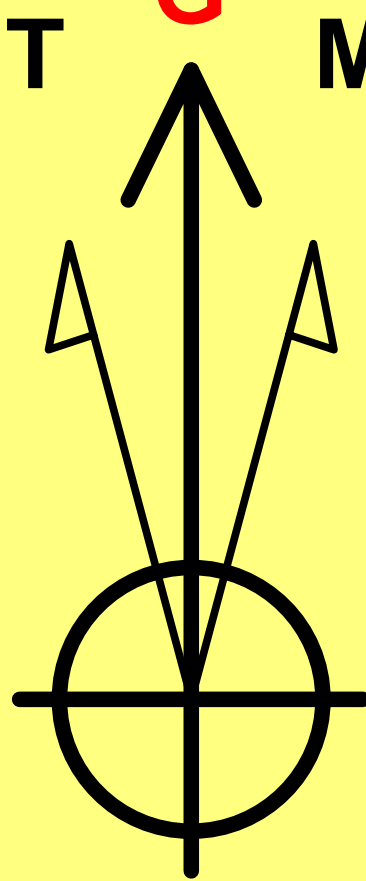
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL Rohn State LD09-69-1HN	5718.2	448.9	-4122.2	1528288.84	3449639.74	40° 46' 20.064 N	103° 52' 35.580 W
- plan hits target center							

WELL DETAILS: Rohn State LD09-69-1HN

+N/-S	+E/-W	Ground Level:	Northing	Easting	Latitude	Longitude
0.0	0.0	4740.0	1527839.92	3453761.91	40° 46' 14.880 N	103° 51' 42.120 W

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
1234.0	0.50	58.00	1234.0	1.1	6.5	-6.4	7.2	TIE IN @ 1234' MD / 1234' TVD
9697.0	93.00	266.10	5713.9	466.2	-4120.4	4146.7	4854.5	TD @ 9697' MD / 5713.9' TVD



Azimuths to Grid North

Magnetic North: 7.04°

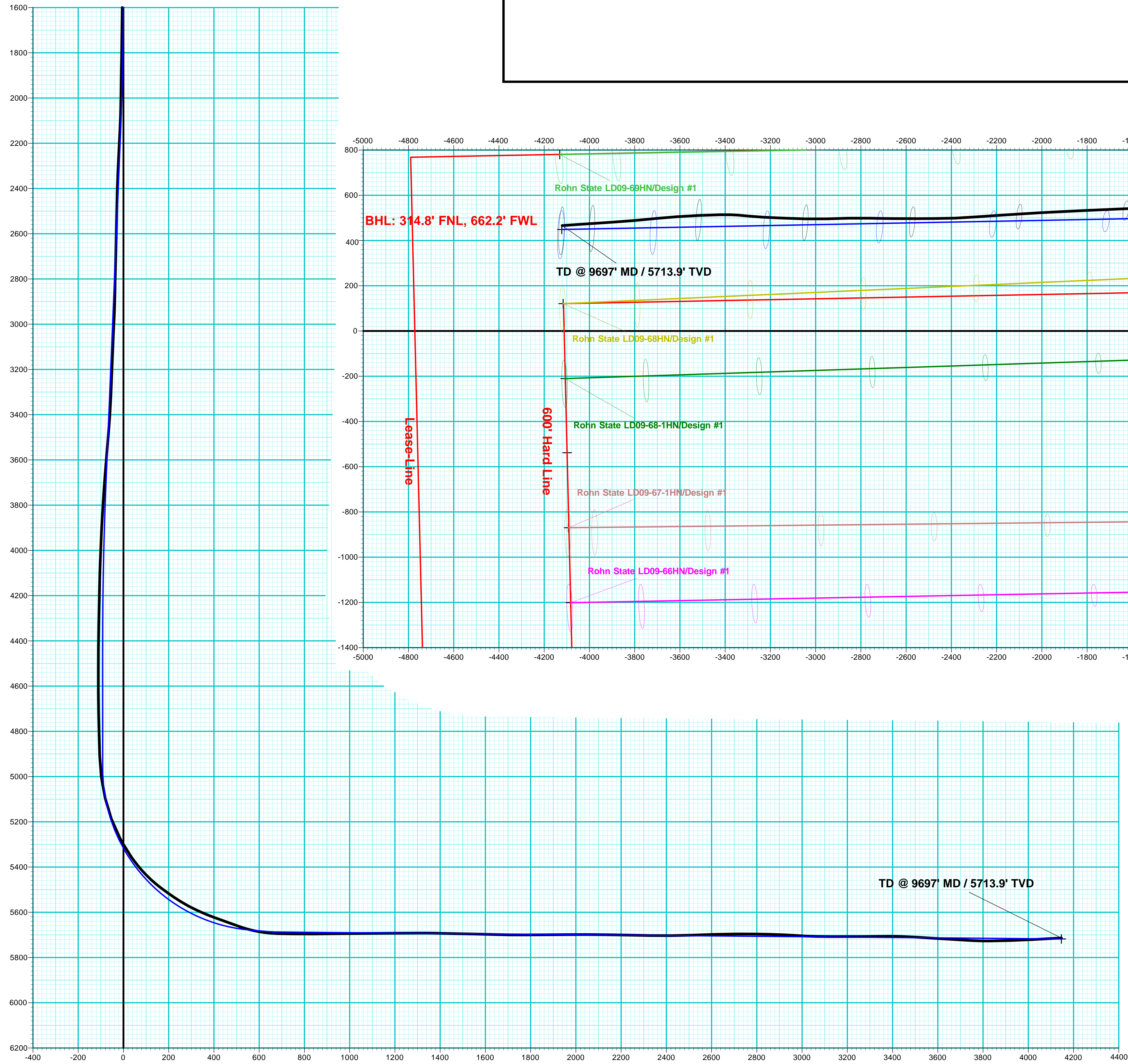
Magnetic Field

Strength: 53184.4snT

Dip Angle: 67.42°

Date: 8/28/2013

Model: IGRF2010



Vertical Section at 276.21° (200 usf/in)

