



Noble Energy Inc.

Weld County, CO

Sec 9, T9N, R58W

Rohn State LD10-67-1HN

Wellbore #1

Design: Wellbore #1 FINAL

DDC Survey Report

02 October, 2014



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Rohn State LD10-67-1HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4760.0usft (H&P #326)
Site:	Sec 9, T9N, R58W	MD Reference:	WELL @ 4760.0usft (H&P #326)
Well:	Rohn State LD10-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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
From:	Map	Easting:	3,453,841.03 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	40° 45' 35.850 N
		Longitude:	103° 51' 42.040 W
		Grid Convergence:	1.06 °

Well	Rohn State LD10-67-1HN		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	40° 46' 6.708 N
		Longitude:	103° 51' 40.104 W
		Ground Level:	4,730.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/23/2014	7.95	67.37	53,069

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	88.18	

Survey Program	Date	10/2/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
357.0	1,192.0	Surface Surveys (Wellbore #1)	Flexi-Shot	VES Flexi-Shot Tool	
1,306.0	6,224.0	MWD Surveys Vert / Build (Wellbore #1)	MWD default	MWD - Standard	
6,312.0	9,682.0	MWD Surveys - Lateral (Wellbore #1)	MWD+IFR1+MS_WY Fixed:v2:Rockies, crustal dec + 3-axis correction		

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	
357.0	0.60	346.99	357.0	1.8	-0.4	-0.4	0.17	0.17	0.00	
636.0	0.30	163.89	636.0	2.5	-0.5	-0.5	0.32	-0.11	63.41	
915.0	0.30	212.29	915.0	1.2	-0.7	-0.7	0.09	0.00	17.35	
TIE IN @ 1192' MD / 1192' TVD END OF SURFACE HOLE / BEGIN INT HOLE										
1,192.0	0.10	126.69	1,192.0	0.5	-0.9	-0.9	0.11	-0.07	-30.90	
1,306.0	0.23	175.39	1,306.0	0.2	-0.8	-0.8	0.16	0.11	42.72	
1,399.0	4.78	105.73	1,398.9	-1.1	2.9	2.9	5.06	4.89	-74.90	
1,491.0	6.16	80.22	1,490.5	-1.3	11.5	11.4	3.00	1.50	-27.73	

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Well:	Rohn State LD10-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)
1,583.0	9.55	100.52	1,581.6	-1.8	23.8	23.8	4.71	3.68	22.07
1,676.0	12.89	96.49	1,672.8	-4.4	41.7	41.6	3.69	3.59	-4.33
1,769.0	16.30	94.64	1,762.8	-6.6	65.1	64.8	3.70	3.67	-1.99
1,862.0	16.63	83.20	1,852.0	-6.1	91.3	91.1	3.50	0.35	-12.30
1,955.0	16.97	83.50	1,941.0	-3.0	118.0	117.8	0.38	0.37	0.32
2,047.0	17.03	81.80	2,029.0	0.4	144.7	144.6	0.54	0.07	-1.85
2,141.0	16.65	79.88	2,119.0	4.8	171.5	171.6	0.72	-0.40	-2.04
2,233.0	16.35	75.95	2,207.2	10.2	197.1	197.3	1.26	-0.33	-4.27
2,327.0	15.13	83.09	2,297.7	14.9	222.1	222.5	2.43	-1.30	7.60
2,420.0	15.23	80.87	2,387.4	18.3	246.2	246.7	0.63	0.11	-2.39
2,511.0	16.16	93.86	2,475.1	19.4	270.7	271.1	3.99	1.02	14.27
2,603.0	16.17	92.07	2,563.4	18.0	296.2	296.7	0.54	0.01	-1.95
2,696.0	15.97	90.39	2,652.8	17.5	322.0	322.4	0.54	-0.22	-1.81
CROSSED LEASE LINE @ 2724.1' MD / 2679.8' TVD									
2,724.1	15.94	89.85	2,679.8	17.5	329.7	330.1	0.54	-0.09	-1.93
2,790.0	15.89	88.57	2,743.2	17.7	347.8	348.2	0.54	-0.08	-1.94
2,885.0	15.77	87.16	2,834.6	18.7	373.7	374.1	0.42	-0.13	-1.48
2,979.0	15.50	86.13	2,925.1	20.2	398.9	399.4	0.41	-0.29	-1.10
3,073.0	16.43	94.20	3,015.5	20.0	424.7	425.2	2.56	0.99	8.59
3,167.0	16.67	92.19	3,105.6	18.6	451.5	451.8	0.66	0.26	-2.14
3,262.0	16.95	91.94	3,196.6	17.6	478.9	479.2	0.30	0.29	-0.26
3,357.0	17.53	90.32	3,287.3	17.0	507.1	507.4	0.79	0.61	-1.71
3,451.0	17.84	89.86	3,376.8	17.0	535.6	535.9	0.36	0.33	-0.49
3,545.0	18.43	89.26	3,466.2	17.2	564.9	565.1	0.66	0.63	-0.64
3,640.0	16.27	82.85	3,556.9	19.0	593.1	593.4	3.03	-2.27	-6.75
3,735.0	16.31	82.43	3,648.0	22.5	619.5	619.9	0.13	0.04	-0.44
3,829.0	15.73	80.66	3,738.4	26.3	645.2	645.7	0.81	-0.62	-1.88
3,924.0	15.10	78.56	3,830.0	30.8	670.0	670.7	0.89	-0.66	-2.21
4,018.0	16.52	82.38	3,920.4	35.0	695.3	696.0	1.87	1.51	4.06
4,113.0	15.89	80.77	4,011.6	38.9	721.5	722.4	0.81	-0.66	-1.69
4,207.0	16.26	84.73	4,102.0	42.2	747.3	748.3	1.23	0.39	4.21
4,302.0	15.77	83.61	4,193.3	44.8	773.4	774.4	0.61	-0.52	-1.18
4,396.0	13.95	89.69	4,284.1	46.3	797.4	798.5	2.55	-1.94	6.47
4,490.0	13.34	87.71	4,375.5	46.8	819.6	820.7	0.82	-0.65	-2.11
4,585.0	8.12	86.66	4,468.8	47.6	837.2	838.3	5.50	-5.49	-1.11
4,679.0	7.41	84.71	4,561.9	48.6	849.9	851.0	0.81	-0.76	-2.07
4,774.0	3.01	94.74	4,656.5	48.9	858.5	859.6	4.71	-4.63	10.56
4,868.0	2.75	89.84	4,750.4	48.7	863.2	864.3	0.38	-0.28	-5.21
4,963.0	3.66	92.24	4,845.2	48.6	868.5	869.6	0.97	0.96	2.53
5,058.0	3.46	235.11	4,940.2	46.9	869.2	870.2	7.10	-0.21	150.39
5,152.0	2.77	225.96	5,034.0	43.7	865.2	866.2	0.90	-0.73	-9.73
5,247.0	5.74	94.83	5,128.9	41.7	868.3	869.2	8.26	3.13	-138.03
5,341.0	18.78	76.08	5,220.6	44.9	887.8	888.8	14.33	13.87	-19.95

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Well:	Rohn State LD10-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)
5,436.0	21.46	76.23	5,309.8	52.7	919.5	920.7	2.82	2.82	0.16
CROSSED 600' HARD LINE @ 5462.3' MD / 5334.2' TVD									
5,462.3	21.49	78.94	5,334.2	54.8	928.9	930.2	3.77	0.10	10.31
5,531.0	21.76	85.94	5,398.1	58.1	954.0	955.3	3.77	0.40	10.19
5,625.0	25.60	91.42	5,484.2	58.9	991.7	993.0	4.70	4.09	5.83
5,719.0	36.72	92.52	5,564.5	57.1	1,040.2	1,041.5	11.84	11.83	1.17
5,814.0	51.24	93.44	5,632.7	53.6	1,105.9	1,107.0	15.30	15.28	0.97
5,909.0	65.71	92.01	5,682.2	49.9	1,186.6	1,187.6	15.28	15.23	-1.51
6,004.0	65.41	90.22	5,721.5	48.2	1,273.0	1,273.9	1.74	-0.32	-1.88
6,099.0	75.16	85.92	5,753.6	51.3	1,362.3	1,363.2	11.11	10.26	-4.53
6,193.0	81.98	85.22	5,772.2	58.4	1,454.1	1,455.2	7.29	7.26	-0.74
6,224.0	82.28	84.62	5,776.4	61.1	1,484.7	1,485.9	2.15	0.97	-1.94
7" CASING POINT @ 6280' MD / 5783.4' TVD END OF INT HOLE / BEGIN LATERAL									
6,280.0	83.41	85.23	5,783.4	66.0	1,540.0	1,541.3	2.29	2.02	1.08
6,312.0	84.06	85.57	5,786.9	68.6	1,571.7	1,573.1	2.29	2.02	1.08
6,342.0	84.06	85.44	5,790.0	70.9	1,601.5	1,602.9	0.43	0.00	-0.43
6,435.0	85.77	85.10	5,798.2	78.6	1,693.8	1,695.4	1.87	1.84	-0.37
6,530.0	89.23	85.66	5,802.4	86.2	1,788.4	1,790.2	3.69	3.64	0.59
6,624.0	89.61	87.17	5,803.3	92.1	1,882.2	1,884.2	1.66	0.40	1.61
6,719.0	90.04	90.45	5,803.6	94.1	1,977.1	1,979.1	3.48	0.45	3.45
6,813.0	89.52	90.21	5,804.0	93.5	2,071.1	2,073.1	0.61	-0.55	-0.26
6,907.0	88.80	89.78	5,805.4	93.5	2,165.1	2,167.0	0.89	-0.77	-0.46
7,002.0	90.41	90.79	5,806.0	93.1	2,260.1	2,261.9	2.00	1.69	1.06
7,096.0	90.67	94.82	5,805.1	88.5	2,354.0	2,355.6	4.30	0.28	4.29
7,190.0	90.94	92.83	5,803.8	82.2	2,447.8	2,449.1	2.14	0.29	-2.12
7,285.0	90.99	92.41	5,802.2	77.8	2,542.7	2,543.8	0.45	0.05	-0.44
7,380.0	90.06	89.84	5,801.3	76.0	2,637.6	2,638.7	2.88	-0.98	-2.71
7,474.0	89.23	90.12	5,801.9	76.0	2,731.6	2,732.7	0.93	-0.88	0.30
7,569.0	89.78	90.10	5,802.7	75.8	2,826.6	2,827.6	0.58	0.58	-0.02
7,663.0	90.35	87.48	5,802.6	77.8	2,920.6	2,921.6	2.85	0.61	-2.79
7,758.0	89.52	86.55	5,802.7	82.8	3,015.5	3,016.6	1.31	-0.87	-0.98
7,852.0	91.38	86.76	5,802.0	88.2	3,109.3	3,110.5	1.99	1.98	0.22
7,946.0	89.52	85.38	5,801.3	94.7	3,203.1	3,204.4	2.46	-1.98	-1.47
8,040.0	91.89	86.80	5,800.1	101.1	3,296.8	3,298.4	2.94	2.52	1.51
8,135.0	92.49	87.11	5,796.5	106.1	3,391.6	3,393.3	0.71	0.63	0.33
8,229.0	92.36	86.50	5,792.5	111.4	3,485.4	3,487.2	0.66	-0.14	-0.65
8,323.0	92.01	85.88	5,788.9	117.6	3,579.1	3,581.0	0.76	-0.37	-0.66
8,417.0	91.29	85.33	5,786.2	124.8	3,672.8	3,674.9	0.96	-0.77	-0.59
8,512.0	91.92	87.74	5,783.6	130.6	3,767.6	3,769.8	2.62	0.66	2.54
8,606.0	92.27	88.44	5,780.1	133.7	3,861.5	3,863.8	0.83	0.37	0.74
8,701.0	91.85	90.11	5,776.7	134.9	3,956.4	3,958.7	1.81	-0.44	1.76
8,795.0	91.96	89.28	5,773.6	135.4	4,050.3	4,052.6	0.89	0.12	-0.88
8,890.0	91.06	91.57	5,771.1	134.7	4,145.3	4,147.5	2.59	-0.95	2.41
8,985.0	90.11	92.33	5,770.1	131.5	4,240.2	4,242.3	1.28	-1.00	0.80

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Well:	Rohn State LD10-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)	
9,079.0	90.43	92.46	5,769.7	127.5	4,334.1	4,336.0	0.37	0.34	0.14	
9,174.0	88.91	91.90	5,770.2	123.9	4,429.1	4,430.8	1.71	-1.60	-0.59	
9,268.0	88.01	91.35	5,772.7	121.2	4,523.0	4,524.6	1.12	-0.96	-0.59	
9,363.0	89.16	88.97	5,775.1	121.0	4,618.0	4,619.5	2.78	1.21	-2.51	
9,457.0	90.31	87.80	5,775.5	123.6	4,711.9	4,713.5	1.75	1.22	-1.24	
9,552.0	89.97	87.36	5,775.3	127.6	4,806.8	4,808.5	0.59	-0.36	-0.46	
9,620.0	90.01	86.85	5,775.3	131.1	4,874.7	4,876.5	0.75	0.06	-0.75	
TD @ 9682' MD / 5775.3' TVD - PBHL Rohn State LD10-67-1HN - PBHL Rohn State LD10-67-1HN D#2										
9,682.0	90.01	86.85	5,775.3	134.5	4,936.7	4,938.4	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,192.0	1,192.0	0.5	-0.9	TIE IN @ 1192' MD / 1192' TVD END OF SURFACE HOLE / BEGIN INT HOLE	
2,724.1	2,679.8	17.5	329.7	CROSSED LEASE LINE @ 2724.1' MD / 2679.8' TVD	
5,462.3	5,334.2	54.8	928.9	CROSSED 600' HARD LINE @ 5462.3' MD / 5334.2' TVD	
6,280.0	5,783.4	66.0	1,540.0	7" CASING POINT @ 6280' MD / 5783.4' TVD END OF INT HOLE / BEGIN LA1	
9,682.0	5,775.3	134.5	4,936.7	TD @ 9682' MD / 5775.3' TVD	

Checked By: _____ Approved By: _____ Date: _____



Survey Certification Sheet

Noble Energy Inc
Company

RM-140982
Job Number

11/3/14
Date

Sec9,T9N,R58W
Lease

Rohn State LD10-67-1HN
Well Name

Weld, CO
County & State

API: 05-123-37630

Surveyed from a depth of: 1192' to 9682' MD (DDC Certified Survey Data)

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.

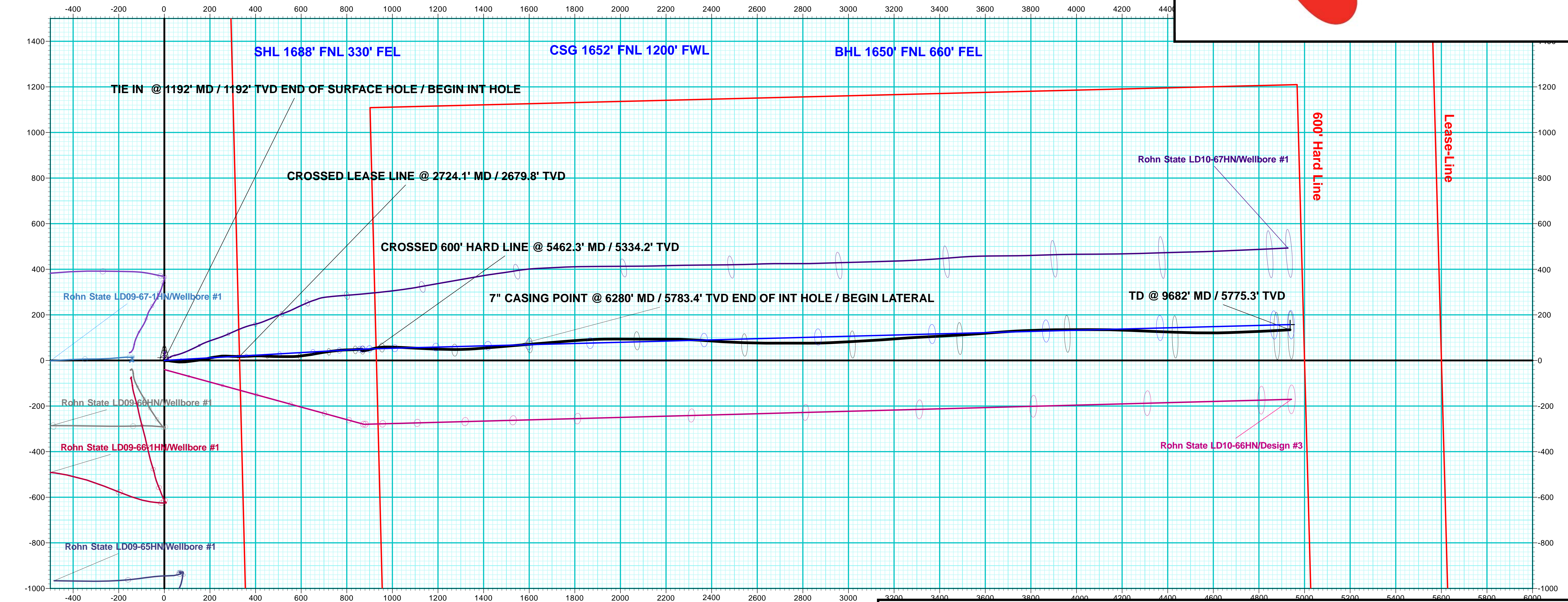
Mike Baldwin
Gulf Coast District Manager

Mike Baldwin

Digitally signed by Mike Baldwin
DN: cn=Mike Baldwin, o=Directional Drilling
Company, ou,
email=mike.baldwin@directionaldrillers.com
, c=US
Date: 2014.11.03 16:25:32 -06'00'

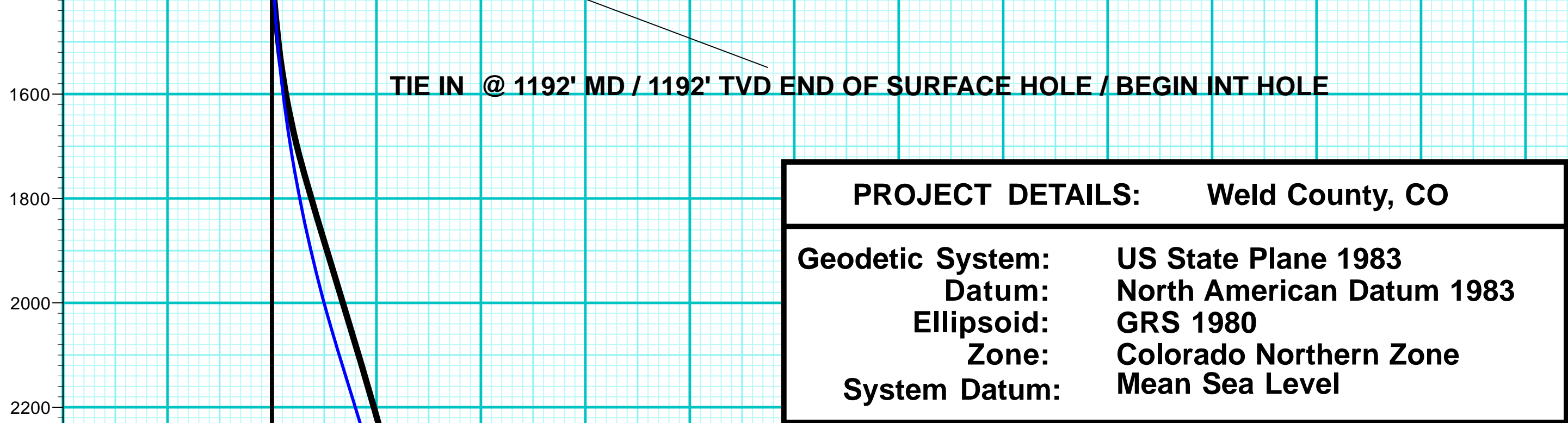
Company Name: Noble Energy Inc.
Rohn State LD10-67-1HN
Weld County, CO
Rig: H&P #326
Created By: Kris Ray
Date: 10/3/2014

Rohn State LD10-67-1HN
Weld County, CO
Q140860 & RM-140982
Design #3



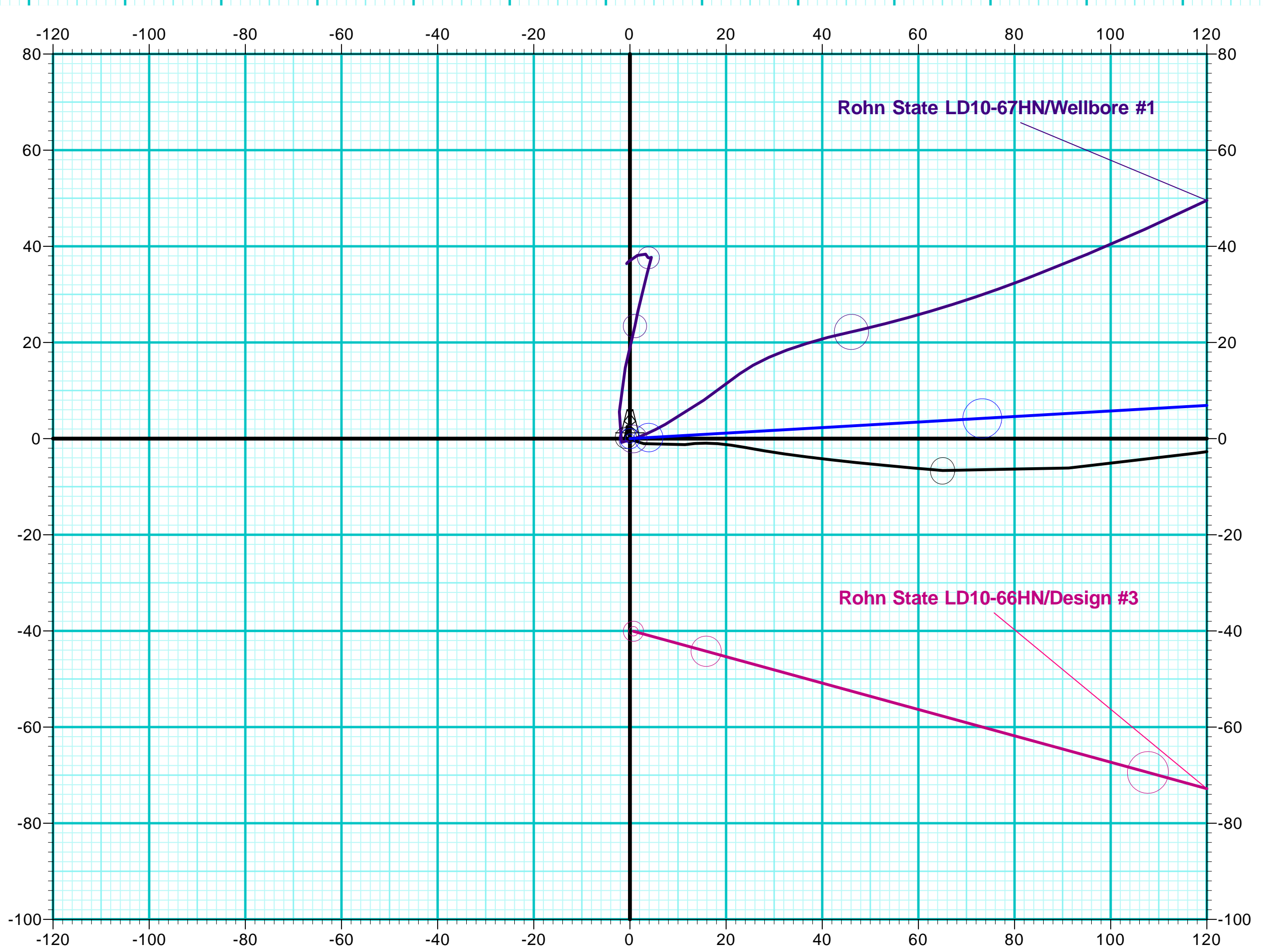
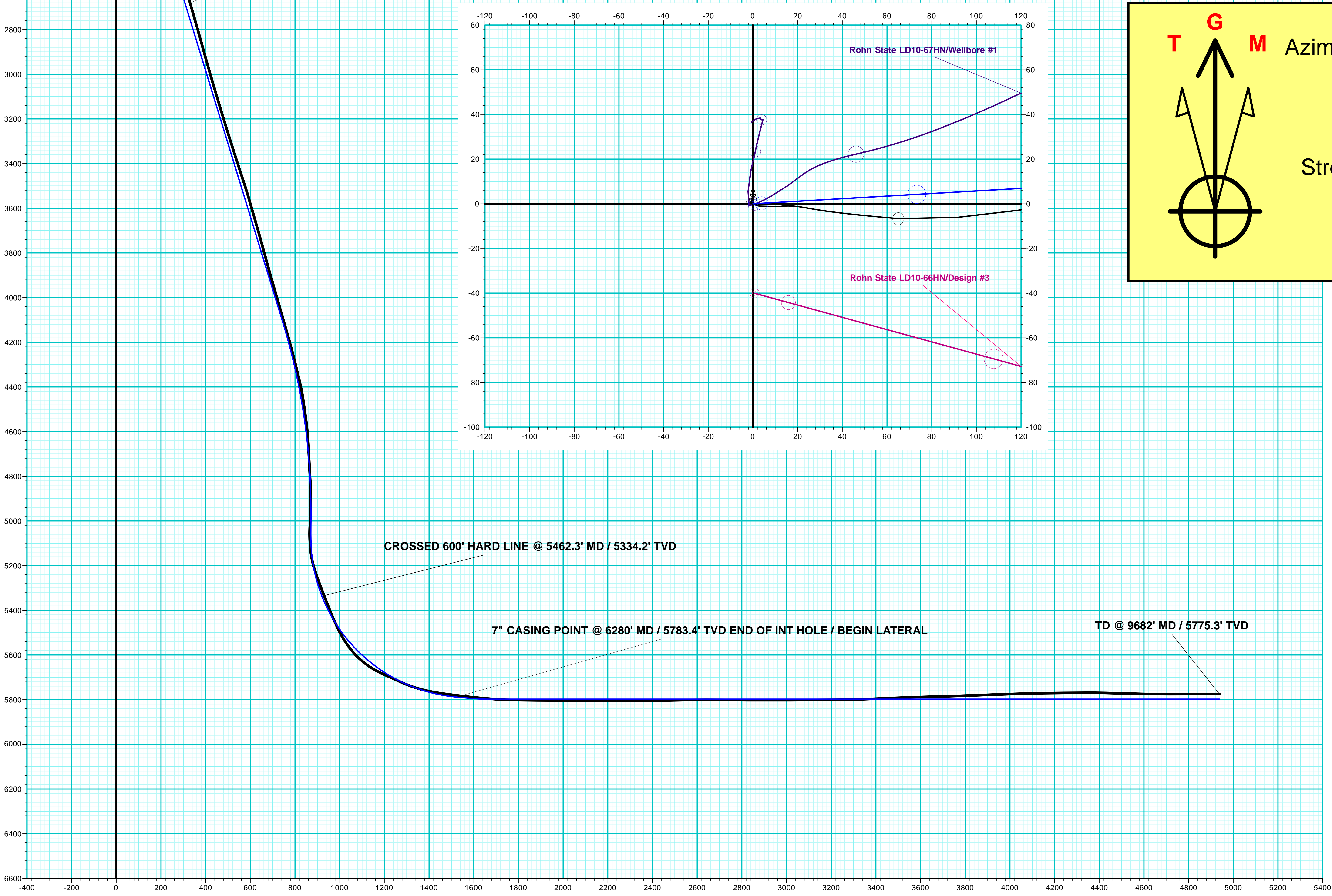
WELL DETAILS: Rohn State LD10-67-1HN						
		Ground Level: 4730.0				
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1527015.90	3453932.28	40° 46' 6.708 N	103° 51' 40.104 W	

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL Rohn State LD10-67-1HN D#2 - plan hits target center	5798.0	157.3	4936.8	1527173.20	3458869.08	40° 46' 7.356 N	103° 50' 35.916 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

ANNOTATIONS									
TVD	MD	Inc	Azi	+N/-S	+E/-W	Vsect	Departure	Annotation	
1192.0	1192.0	0.10	126.69	0.5	-0.9	-0.9	6.5	TIE IN @ 1192' MD / 1192' TVD END OF SURFACE HOLE / BEGIN INT HOLE	
2679.8	2724.1	15.94	89.85	17.5	329.7	330.1	340.8	CROSSED LEASE LINE @ 2724.1' MD / 2679.8' TVD	
5334.2	5462.3	21.49	78.94	54.8	928.9	930.2	962.4	CROSSED 600' HARD LINE @ 5462.3' MD / 5334.2' TVD	
5783.4	6280.0	83.41	85.23	66.0	1540.0	1541.3	1574.7	7\"/>	
5775.3	9682.0	90.01	86.85	134.5	4936.7	4938.4	4975.2	TD @ 9682' MD / 5775.3' TVD	



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Azimuths to Grid North

Correction: 6.89°
Magnetic Field

Strength: 53069.3snT
Dip Angle: 67.37°
Date: 9/23/2014
Model: IGRF2010

Vertical Section at 88.18° (200 usf/in)