



Noble Energy Inc.

Weld County, CO

Sec 9, T9N, R58W

Rohn State LD10-66HN

Wellbore #1

Design: Wellbore #1 FINAL

DDC Survey Report

08 October, 2014



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Rohn State LD10-66HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4759.0usft (H&P #326)
Site:	Sec 9, T9N, R58W	MD Reference:	WELL @ 4759.0usft (H&P #326)
Well:	Rohn State LD10-66HN	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	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 LD10-66HN					
Well Position	+N/-S	0.0 usft	Northing:	1,526,975.83 usft	Latitude:	40° 46' 6.312 N
	+E/-W	0.0 usft	Easting:	3,453,933.01 usft	Longitude:	103° 51' 40.104 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,729.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/8/2014	7.95	67.37	53,065

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	91.51	

Survey Program	Date	10/8/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
270.0	1,200.0	SURFACE (Wellbore #1)	Flexi-Shot	VES Flexi-Shot Tool	
1,306.0	6,066.0	MWD Survey - Vert/Build (Wellbore #1)	MWD default	MWD - Standard	
6,154.0	9,544.0	MWD Survey - 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	
270.0	0.60	228.99	270.0	-0.9	-1.1	-1.0	0.22	0.22	0.00	
635.0	0.70	228.99	635.0	-3.6	-4.2	-4.1	0.03	0.03	0.00	
920.0	0.60	228.99	920.0	-5.8	-6.6	-6.5	0.04	-0.04	0.00	
1,200.0	0.60	293.99	1,199.9	-6.1	-9.1	-8.9	0.23	0.00	23.21	
TIE IN @ 1200' MD / 1200' TVD / END OF SUR HOLE / BEGIN INT HOLE										
1,200.1	0.60	293.99	1,200.0	-6.1	-9.1	-8.9	0.00	0.00	0.00	
1,306.0	3.62	118.87	1,305.9	-7.5	-6.7	-6.5	3.98	2.85	-165.36	
1,399.0	5.94	104.54	1,398.6	-10.1	0.6	0.8	2.79	2.49	-15.41	

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Well:	Rohn State LD10-66HN	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)
1,491.0	8.92	104.96	1,489.8	-13.2	12.1	12.4	3.24	3.24	0.46
1,583.0	10.23	97.62	1,580.5	-16.1	27.1	27.5	1.94	1.42	-7.98
1,676.0	12.87	96.98	1,671.6	-18.5	45.5	46.0	2.84	2.84	-0.69
1,769.0	14.12	91.77	1,762.0	-20.1	67.2	67.7	1.87	1.34	-5.60
1,862.0	16.41	104.05	1,851.8	-23.6	91.3	91.8	4.25	2.46	13.20
1,955.0	18.72	100.71	1,940.4	-29.6	118.7	119.4	2.71	2.48	-3.59
2,047.0	18.47	99.45	2,027.6	-34.7	147.5	148.4	0.51	-0.27	-1.37
2,141.0	17.54	106.25	2,117.0	-41.1	175.8	176.9	2.44	-0.99	7.23
2,233.0	17.40	104.59	2,204.8	-48.5	202.5	203.7	0.56	-0.15	-1.80
2,327.0	17.05	102.81	2,294.6	-55.1	229.5	230.9	0.67	-0.37	-1.89
2,420.0	16.43	101.06	2,383.6	-60.6	255.7	257.2	0.86	-0.67	-1.88
2,511.0	19.50	110.60	2,470.2	-68.4	282.6	284.3	4.66	3.37	10.48
2,603.0	19.75	108.23	2,556.9	-78.7	311.7	313.7	0.91	0.27	-2.58
CROSSED LEASELINE @ 2666.3' MD / 2616.5' TVD									
2,666.3	19.43	107.47	2,616.5	-85.2	331.9	334.0	0.65	-0.51	-1.21
2,696.0	19.28	107.10	2,644.5	-88.1	341.3	343.5	0.65	-0.50	-1.23
2,791.0	18.81	105.85	2,734.3	-96.9	371.0	373.4	0.66	-0.49	-1.32
2,885.0	17.91	104.20	2,823.5	-104.6	399.6	402.2	1.11	-0.96	-1.76
2,979.0	16.76	102.96	2,913.3	-111.2	426.8	429.6	1.28	-1.22	-1.32
3,073.0	15.67	100.52	3,003.5	-116.5	452.5	455.4	1.37	-1.16	-2.60
3,168.0	18.21	117.55	3,094.5	-125.8	478.3	481.5	5.84	2.67	17.93
3,262.0	18.47	115.27	3,183.7	-138.9	504.8	508.3	0.81	0.28	-2.43
3,357.0	18.07	114.64	3,273.9	-151.5	531.8	535.6	0.47	-0.42	-0.66
3,451.0	18.40	112.18	3,363.2	-163.2	558.8	562.9	0.89	0.35	-2.62
3,545.0	18.64	109.78	3,452.3	-173.8	586.7	591.0	0.85	0.26	-2.55
3,640.0	15.38	101.09	3,543.1	-181.4	613.3	617.9	4.34	-3.43	-9.15
3,735.0	14.79	101.26	3,634.9	-186.2	637.6	642.3	0.62	-0.62	0.18
3,829.0	14.16	99.91	3,725.9	-190.5	660.7	665.5	0.76	-0.67	-1.44
3,924.0	13.29	99.59	3,818.2	-194.3	682.9	687.8	0.92	-0.92	-0.34
4,018.0	12.38	98.42	3,909.8	-197.6	703.5	708.5	1.01	-0.97	-1.24
4,113.0	16.61	100.39	4,001.8	-201.6	727.0	732.0	4.48	4.45	2.07
4,207.0	18.39	102.07	4,091.4	-207.1	754.7	759.9	1.97	1.89	1.79
4,302.0	17.58	100.72	4,181.8	-212.9	783.4	788.8	0.96	-0.85	-1.42
4,396.0	16.90	98.58	4,271.6	-217.6	810.9	816.3	0.99	-0.72	-2.28
4,490.0	14.80	104.14	4,362.0	-222.5	836.0	841.6	2.75	-2.23	5.91
4,585.0	9.93	114.16	4,454.8	-228.9	855.3	861.0	5.58	-5.13	10.55
4,679.0	6.31	101.96	4,547.8	-233.2	867.7	873.6	4.24	-3.85	-12.98
4,774.0	3.12	97.39	4,642.5	-234.7	875.4	881.3	3.38	-3.36	-4.81
4,868.0	0.82	152.98	4,736.4	-235.6	878.3	884.2	2.92	-2.45	59.14
4,963.0	0.85	141.96	4,831.4	-236.7	879.0	884.9	0.17	0.03	-11.60
5,058.0	0.95	118.56	4,926.4	-237.7	880.1	886.1	0.40	0.11	-24.63
5,153.0	13.86	83.95	5,020.4	-236.9	892.2	898.1	13.78	13.59	-36.43
5,247.0	15.86	70.03	5,111.3	-231.3	915.5	921.2	4.34	2.13	-14.81

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Well:	Rohn State LD10-66HN	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)
CROSSED 600' HARDLINE @ 5320.7' MD / 5181.8' TVD									
5,320.7	17.81	71.18	5,181.8	-224.2	935.6	941.2	2.69	2.65	1.57
5,341.0	18.35	71.46	5,201.1	-222.2	941.6	947.1	2.69	2.65	1.36
5,436.0	22.40	80.31	5,290.2	-214.4	973.6	978.9	5.35	4.26	9.32
5,531.0	34.38	86.51	5,373.6	-209.7	1,018.4	1,023.6	12.97	12.61	6.53
5,625.0	47.57	87.02	5,444.5	-206.2	1,079.8	1,084.9	14.04	14.03	0.54
5,719.0	53.63	87.74	5,504.1	-202.9	1,152.3	1,157.3	6.47	6.45	0.77
5,814.0	64.10	92.25	5,553.2	-203.1	1,233.5	1,238.4	11.74	11.02	4.75
5,909.0	68.66	96.52	5,591.2	-209.8	1,320.2	1,325.3	6.32	4.80	4.49
6,004.0	72.65	94.26	5,622.7	-218.2	1,409.5	1,414.7	4.76	4.20	-2.38
6,066.0	74.34	92.73	5,640.3	-221.8	1,468.8	1,474.1	3.61	2.73	-2.47
7" CASING POINT @ 6122' MD / 5653.2' TVD / END OF INT HOLE / BEGIN LATERAL									
6,122.0	79.01	90.48	5,653.2	-223.4	1,523.2	1,528.6	9.21	8.34	-4.02
6,154.0	81.69	89.23	5,658.6	-223.3	1,554.8	1,560.1	9.21	8.37	-3.91
6,246.0	85.50	90.30	5,668.8	-222.9	1,646.2	1,651.5	4.30	4.14	1.16
6,340.0	89.61	91.25	5,672.8	-224.2	1,740.1	1,745.4	4.49	4.37	1.01
6,435.0	91.83	89.50	5,671.7	-224.8	1,835.1	1,840.3	2.98	2.34	-1.84
6,530.0	92.32	88.79	5,668.2	-223.4	1,930.0	1,935.2	0.91	0.52	-0.75
6,624.0	92.56	88.78	5,664.2	-221.4	2,023.9	2,029.0	0.26	0.26	-0.01
6,719.0	90.52	88.28	5,661.7	-218.9	2,118.8	2,123.8	2.21	-2.15	-0.53
6,813.0	90.84	88.16	5,660.5	-216.0	2,212.7	2,217.7	0.36	0.34	-0.13
6,907.0	90.73	87.79	5,659.3	-212.7	2,306.7	2,311.5	0.41	-0.12	-0.39
7,002.0	90.92	87.61	5,657.9	-208.9	2,401.6	2,406.3	0.28	0.20	-0.19
7,096.0	91.08	88.81	5,656.2	-206.0	2,495.5	2,500.1	1.29	0.17	1.28
7,190.0	91.75	87.48	5,653.9	-202.9	2,589.5	2,593.9	1.58	0.71	-1.41
7,285.0	89.94	87.72	5,652.5	-198.9	2,684.4	2,688.7	1.92	-1.91	0.25
7,380.0	90.81	87.67	5,651.9	-195.1	2,779.3	2,783.5	0.92	0.92	-0.05
7,475.0	88.99	88.46	5,652.1	-191.9	2,874.2	2,878.3	2.09	-1.92	0.83
7,569.0	89.31	88.23	5,653.5	-189.2	2,968.2	2,972.1	0.42	0.34	-0.24
7,663.0	89.66	87.99	5,654.3	-186.1	3,062.1	3,066.0	0.45	0.37	-0.26
7,758.0	90.32	87.07	5,654.3	-182.0	3,157.0	3,160.7	1.19	0.69	-0.97
7,852.0	88.91	90.58	5,655.0	-180.1	3,251.0	3,254.6	4.02	-1.50	3.73
7,946.0	89.16	90.61	5,656.5	-181.1	3,345.0	3,348.6	0.27	0.27	0.03
8,041.0	89.52	89.95	5,657.6	-181.5	3,440.0	3,443.5	0.79	0.38	-0.69
8,135.0	90.00	89.78	5,658.0	-181.3	3,534.0	3,537.5	0.54	0.51	-0.18
8,229.0	88.76	89.85	5,659.0	-181.0	3,627.9	3,631.5	1.32	-1.32	0.07
8,323.0	89.11	89.65	5,660.8	-180.6	3,721.9	3,725.4	0.43	0.37	-0.21
8,417.0	89.09	89.98	5,662.3	-180.3	3,815.9	3,819.3	0.35	-0.02	0.35
8,512.0	89.13	89.10	5,663.7	-179.5	3,910.9	3,914.3	0.93	0.04	-0.93
8,606.0	89.24	88.89	5,665.1	-177.9	4,004.9	4,008.2	0.25	0.12	-0.22
8,701.0	88.60	89.09	5,666.9	-176.2	4,099.8	4,103.1	0.71	-0.67	0.21
8,795.0	87.69	88.29	5,669.9	-174.0	4,193.8	4,196.9	1.29	-0.97	-0.85
8,890.0	87.45	87.64	5,673.9	-170.7	4,288.6	4,291.6	0.73	-0.25	-0.68
8,985.0	87.97	88.40	5,677.7	-167.4	4,383.5	4,386.4	0.97	0.55	0.80

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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)	
9,079.0	91.45	88.61	5,678.2	-164.9	4,477.4	4,480.2	3.71	3.70	0.22	
9,174.0	93.76	84.98	5,673.9	-159.6	4,572.2	4,574.8	4.53	2.43	-3.82	
9,269.0	90.83	84.96	5,670.1	-151.3	4,666.7	4,669.1	3.08	-3.08	-0.02	
9,363.0	88.61	85.12	5,670.6	-143.2	4,760.4	4,762.5	2.37	-2.36	0.17	
9,458.0	88.47	83.80	5,673.0	-134.0	4,854.9	4,856.7	1.40	-0.15	-1.39	
9,482.0	87.86	84.86	5,673.7	-131.7	4,878.8	4,880.5	5.09	-2.54	4.42	
TD @ 9544' MD / 5676.1' TVD - PIBHL Rohn State LD10-66HN D#3 - PBHL Rohn State LD10-66HN D#2 - PBHL Rohn State LD10-66HN										
9,544.0	87.86	84.86	5,676.1	-126.1	4,940.5	4,942.1	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,200.1	1,200.0	-6.1	-9.1	TIE IN @ 1200' MD / 1200' TVD / END OF SUR HOLE / BEGIN INT HOLE	
2,666.3	2,616.5	-85.2	331.9	CROSSED LEASELINE @ 2666.3' MD / 2616.5' TVD	
5,320.7	5,181.8	-224.2	935.6	CROSSED 600' HARDLINE @ 5320.7' MD / 5181.8' TVD	
6,122.0	5,653.2	-223.4	1,523.2	7" CASING PONT @ 6122' MD / 5653.2' TVD / END OF INT HOLE / BEGIN L/	
9,544.0	5,676.1	-126.1	4,940.5	TD @ 9544' MD / 5676.1' TVD	

Checked By: _____ Approved By: _____ Date: _____



Survey Certification Sheet

Noble Energy Inc
Company

RM-141014
Job Number

11/314
Date

Sec9,T9N,R58W
Lease

Rohn State LD10-66HN
Well Name

Weld, CO
County & State

API: 05-123-37631

Surveyed from a depth of: 1200' to 9544' MD (DDC Certified Survey Data)

Type of Survey: MWD

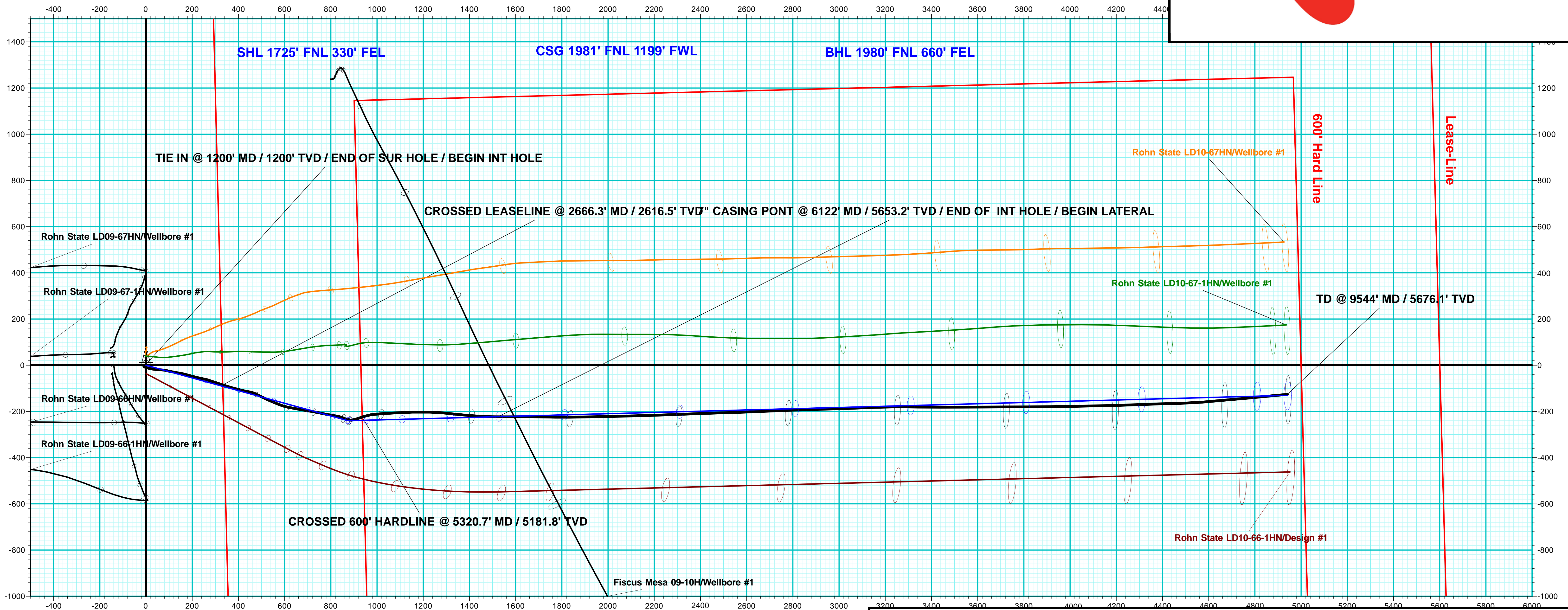
Directional Supervisor/Surveyor: Chris Abbott

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@directionaldriller
s.com, c=US
Date: 2014.11.03 16:29:01 -06'00'

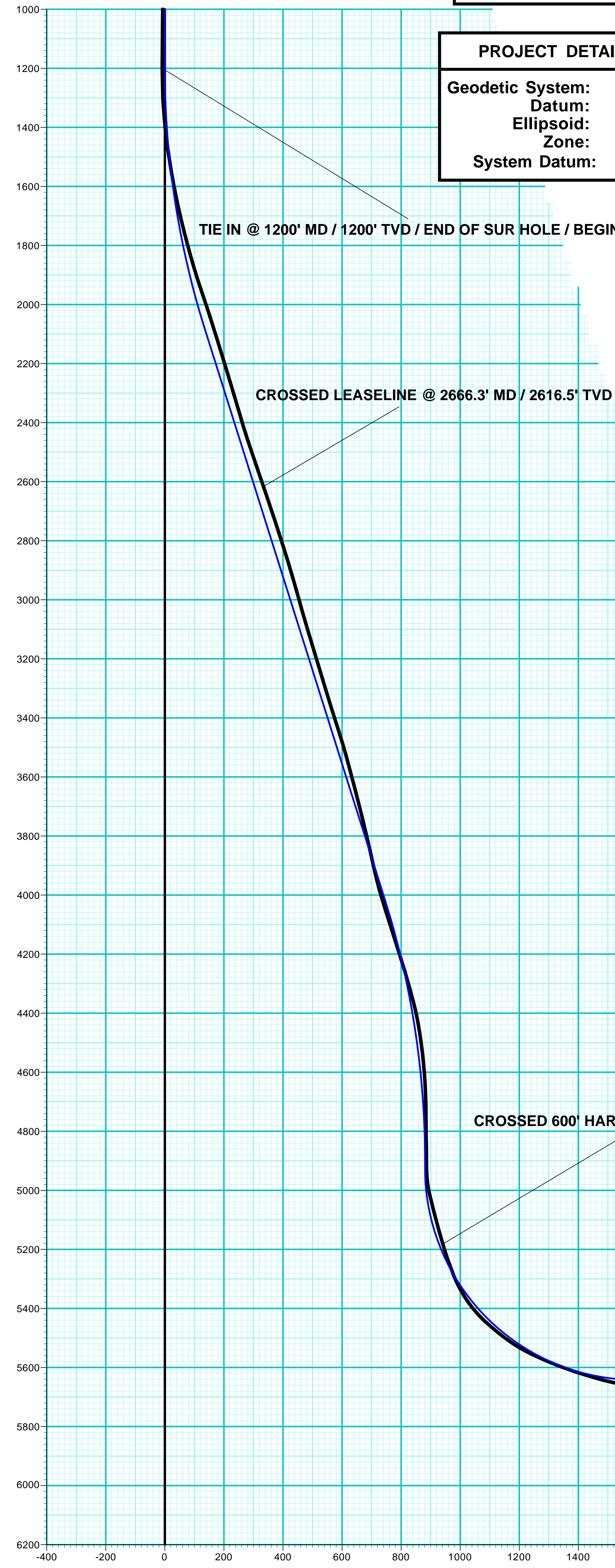
Company Name: Noble Energy Inc.
Rohn State LD10-66HN
Weld County, CO
Rig: H&P #326
Created By: Jerry Arsenault
Date: 10/8/2014

Rohn State LD10-66HN
Weld County, CO
Q140859 & RM-141014
Design #3



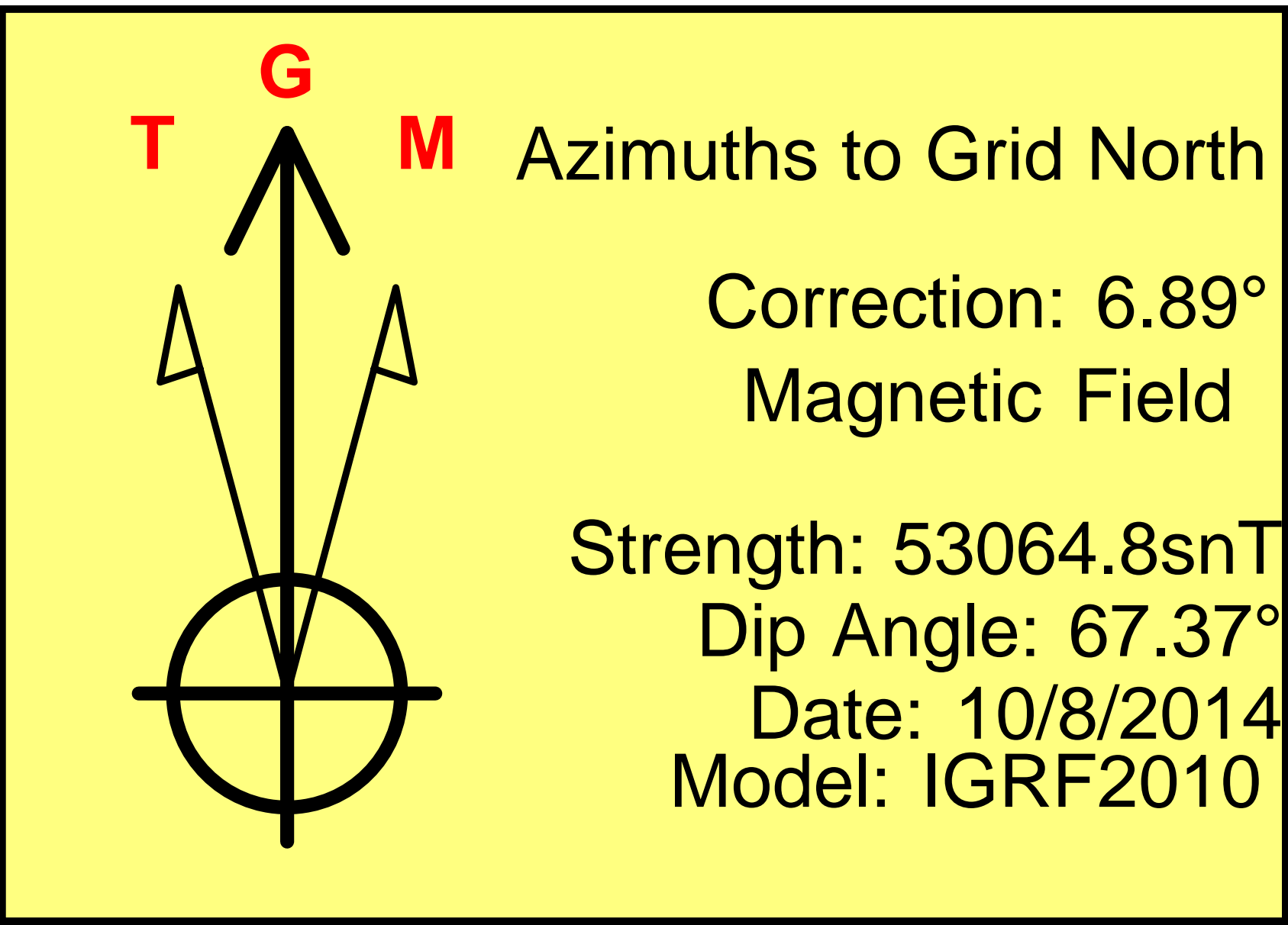
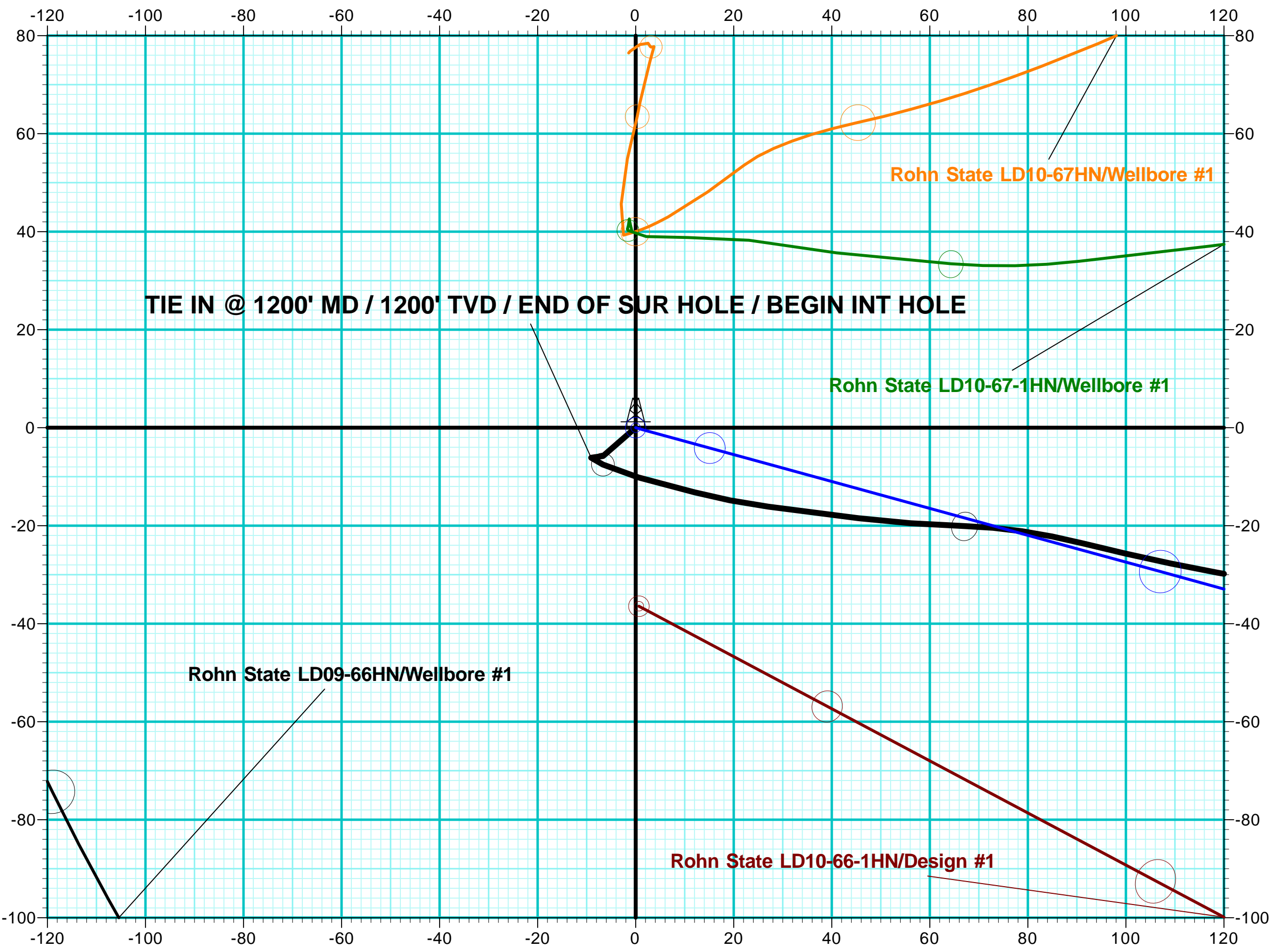
WELL DETAILS: Rohn State LD10-66HN						
		Ground Level:	4729.0			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1526975.83	3453933.02	40° 46' 6.312 N	103° 51' 40.104 W	

DESIGN TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude
PBHL Rohn State LD10-66HN D#3	5671.5	-130.4	4942.2	1526845.43	3458875.22	40° 46' 4.116 N
- plan hits target center						
Longitude 103° 50' 35.915 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	
1200.0	1200.1	0.60	293.99	-6.1	-9.1	-8.9	11.7	TIE IN @ 1200' MD / 1200' TVD / END OF SUR HOLE / BEGIN INT HOLE	
2616.5	2666.3	19.43	107.47	-85.2	331.9	334.0	364.2	CROSSED LEASELINE @ 2666.3' MD / 2616.5' TVD	
5181.8	5320.7	17.81	71.18	-224.2	935.6	941.2	995.1	CROSSED 600' HARDLINE @ 5320.7' MD / 5181.8' TVD	
5653.2	6122.0	79.01	90.48	-223.4	1523.2	1528.6	1585.4	7" CASING POINT @ 6122' MD / 5653.2' TVD / END OF INT HOLE / BEGIN LATERAL	
5676.1	9544.0	87.86	84.86	-126.1	4940.5	4942.1	5005.1	TD @ 9544' MD / 5676.1' TVD	



Vertical Section at 91.51° (200 usft/in)