



## **Noble Energy Inc.**

Weld County, CO  
Sec 29, T9N, R59W, 6th PM  
Rico LC29-72-1HNA

Wellbore #1

Design: Wellbore #1 **FINAL**

## **DDC Survey Report**

11 July, 2014



<b>Company:</b>	Noble Energy Inc.	<b>Local Co-ordinate Reference:</b>	Well Rico LC29-72-1HNA
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 4895.0usft (H&P #326)
<b>Site:</b>	Sec 29, T9N, R59W, 6th PM	<b>MD Reference:</b>	WELL @ 4895.0usft (H&P #326)
<b>Well:</b>	Rico LC29-72-1HNA	<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

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

Site		Sec 29, T9N, R59W, 6th PM			
Site Position:		Northing:	1,506,859.55 usft	Latitude:	40° 42' 53.970 N
From:	Map	Easting:	3,417,411.39 usft	Longitude:	103° 59' 39.130 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.97 °

Well		Rico LC29-72-1HNA				
Well Position	+N/-S	0.0 usft	Northing:	1,506,938.66 usft	Latitude:	40° 42' 54.828 N
	+E/-W	0.0 usft	Easting:	3,416,956.12 usft	Longitude:	103° 59' 45.024 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,865.0 usft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	6/20/2014	8.06	67.32	53,055

<b>Design</b>	Wellbore #1				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	7.17	

<b>Survey Program</b>	<b>Date</b>	7/11/2014			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
280.0	621.0	GYRO (Wellbore #1)	Flexi-Shot	VES Flexi-Shot Tool	
723.0	6,463.0	MWD Surveys - Vert/Build (Wellbore #1)	MWD default	MWD - Standard	
6,618.0	10,200.0	MWD Survey - Lateral (Wellbore #1)	MWD default	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
280.0	0.40	42.49	280.0	0.7	0.7	0.8	0.14	0.14	0.00	
<b>TIE IN @ 621' MD / 621' TVD END OF SUR HOLE / BEGIN INT HOLE</b>										
621.0	0.60	78.49	621.0	2.0	3.2	2.3	0.11	0.06	10.56	
723.0	0.53	322.71	723.0	2.4	3.5	2.8	0.94	-0.07	-113.53	
814.0	0.44	353.64	814.0	3.1	3.2	3.5	0.30	-0.10	33.99	
907.0	0.62	340.81	907.0	3.9	3.0	4.3	0.23	0.19	-13.80	
1,000.0	0.44	1.55	1,000.0	4.8	2.8	5.1	0.28	-0.19	22.30	
1,093.0	0.35	348.72	1,093.0	5.4	2.8	5.7	0.14	-0.10	-13.80	

<b>Company:</b>	Noble Energy Inc.	<b>Local Co-ordinate Reference:</b>	Well Rico LC29-72-1HNA
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 4895.0usft (H&P #326)
<b>Site:</b>	Sec 29, T9N, R59W, 6th PM	<b>MD Reference:</b>	WELL @ 4895.0usft (H&P #326)
<b>Well:</b>	Rico LC29-72-1HNA	<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)
1,186.0	1.76	103.77	1,186.0	5.4	4.1	5.8	2.08	1.52	123.71
1,280.0	4.13	109.04	1,279.8	3.9	8.7	5.0	2.54	2.52	5.61
1,372.0	6.42	106.85	1,371.4	1.3	16.7	3.4	2.50	2.49	-2.38
1,465.0	8.97	109.48	1,463.6	-2.6	28.6	1.0	2.77	2.74	2.83
1,558.0	11.34	112.73	1,555.1	-8.5	43.8	-3.0	2.62	2.55	3.49
1,650.0	13.10	110.98	1,645.0	-15.8	61.9	-7.9	1.95	1.91	-1.90
1,744.0	14.51	107.29	1,736.3	-23.1	83.1	-12.5	1.77	1.50	-3.93
1,836.0	13.28	105.18	1,825.6	-29.3	104.3	-16.0	1.45	-1.34	-2.29
1,928.0	13.98	105.70	1,915.0	-35.1	125.2	-19.2	0.77	0.76	0.57
2,023.0	14.77	108.78	2,007.1	-42.1	147.7	-23.3	1.16	0.83	3.24
2,117.0	14.42	111.77	2,098.0	-50.3	169.9	-28.7	0.88	-0.37	3.18
2,211.0	15.04	116.69	2,188.9	-60.1	191.7	-35.7	1.48	0.66	5.23
2,306.0	14.51	116.87	2,280.8	-71.0	213.3	-43.8	0.56	-0.56	0.19
2,400.0	14.42	112.47	2,371.8	-80.8	234.6	-50.9	1.17	-0.10	-4.68
2,495.0	15.56	113.44	2,463.6	-90.4	257.3	-57.6	1.23	1.20	1.02
2,589.0	14.33	114.32	2,554.4	-100.2	279.4	-64.5	1.33	-1.31	0.94
2,684.0	15.74	113.79	2,646.2	-110.2	301.9	-71.7	1.49	1.48	-0.56
2,778.0	15.48	113.44	2,736.7	-120.4	325.1	-78.8	0.29	-0.28	-0.37
2,873.0	15.30	113.17	2,828.3	-130.3	348.3	-85.8	0.20	-0.19	-0.28
2,967.0	14.68	112.47	2,919.1	-139.8	370.7	-92.4	0.69	-0.66	-0.74
3,061.0	14.42	110.98	3,010.1	-148.5	392.6	-98.3	0.48	-0.28	-1.59
3,156.0	13.72	108.34	3,102.2	-156.3	414.3	-103.4	1.00	-0.74	-2.78
3,250.0	12.05	103.95	3,193.8	-162.2	434.5	-106.7	2.06	-1.78	-4.67
3,345.0	10.38	102.98	3,287.0	-166.5	452.4	-108.7	1.77	-1.76	-1.02
3,440.0	11.52	108.34	3,380.3	-171.4	469.8	-111.4	1.61	1.20	5.64
3,534.0	12.05	107.37	3,472.3	-177.3	488.0	-115.0	0.60	0.56	-1.03
3,629.0	13.01	107.11	3,565.1	-183.4	507.7	-118.6	1.01	1.01	-0.27
3,723.0	11.43	107.64	3,656.9	-189.3	526.7	-122.1	1.69	-1.68	0.56
3,818.0	9.58	104.30	3,750.3	-194.1	543.3	-124.8	2.05	-1.95	-3.52
3,913.0	7.21	100.08	3,844.3	-197.1	556.9	-126.1	2.58	-2.49	-4.44
4,007.0	5.36	100.08	3,937.7	-198.9	567.0	-126.6	1.97	-1.97	0.00
4,102.0	4.13	108.52	4,032.4	-200.8	574.6	-127.5	1.49	-1.29	8.88
4,196.0	3.69	104.56	4,126.2	-202.6	580.8	-128.5	0.55	-0.47	-4.21
4,291.0	3.52	99.90	4,221.0	-203.9	586.6	-129.1	0.36	-0.18	-4.91
4,385.0	3.78	96.12	4,314.8	-204.7	592.5	-129.2	0.38	0.28	-4.02
4,479.0	3.78	89.71	4,408.6	-205.0	598.7	-128.7	0.45	0.00	-6.82
4,574.0	2.99	88.21	4,503.4	-204.9	604.3	-127.9	0.84	-0.83	-1.58
4,669.0	2.90	81.62	4,598.3	-204.5	609.2	-126.9	0.37	-0.09	-6.94
4,763.0	2.46	76.79	4,692.2	-203.7	613.5	-125.5	0.53	-0.47	-5.14
4,857.0	2.11	75.56	4,786.1	-202.8	617.1	-124.2	0.38	-0.37	-1.31
4,952.0	1.76	70.90	4,881.1	-201.9	620.2	-122.9	0.40	-0.37	-4.91
5,046.0	1.06	59.56	4,975.1	-201.0	622.3	-121.7	0.80	-0.74	-12.06
5,141.0	0.79	68.61	5,070.0	-200.3	623.7	-120.9	0.32	-0.28	9.53

<b>Company:</b>	Noble Energy Inc.	<b>Local Co-ordinate Reference:</b>	Well Rico LC29-72-1HNA
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 4895.0usft (H&P #326)
<b>Site:</b>	Sec 29, T9N, R59W, 6th PM	<b>MD Reference:</b>	WELL @ 4895.0usft (H&P #326)
<b>Well:</b>	Rico LC29-72-1HNA	<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)	
5,235.0	2.02	119.68	5,164.0	-200.9	625.7	-121.2	1.75	1.31	54.33	
5,330.0	1.49	113.35	5,259.0	-202.2	628.3	-122.2	0.59	-0.56	-6.66	
5,424.0	0.62	357.25	5,353.0	-202.2	629.4	-122.0	1.97	-0.93	-123.51	
5,518.0	15.30	341.51	5,445.8	-189.8	625.4	-110.3	15.64	15.62	-16.74	
5,613.0	21.72	355.84	5,535.9	-160.4	620.2	-81.7	8.24	6.76	15.08	
5,707.0	28.14	351.09	5,621.1	-121.1	615.5	-43.3	7.15	6.83	-5.05	
5,802.0	35.35	351.88	5,701.8	-71.7	608.1	4.8	7.60	7.59	0.83	
5,896.0	42.82	356.37	5,774.8	-12.8	602.2	62.5	8.49	7.95	4.78	
5,991.0	50.47	358.74	5,839.9	56.2	599.4	130.5	8.25	8.05	2.49	
6,086.0	58.04	358.48	5,895.4	133.2	597.5	206.7	7.97	7.97	-0.27	
6,180.0	58.30	356.10	5,945.0	213.0	593.7	285.4	2.17	0.28	-2.53	
6,274.0	70.08	358.13	5,985.8	297.3	589.5	368.6	12.68	12.53	2.16	
6,369.0	77.29	2.08	6,012.5	388.4	589.8	459.0	8.57	7.59	4.16	
6,463.0	77.56	1.11	6,033.0	480.1	592.3	550.3	1.05	0.29	-1.03	
7" CASING POINT @ 6523' MD / 6044.2' TVD END OF INT HOLE / BEIGIN LATERAL										
6,523.0	80.89	1.28	6,044.2	539.1	593.5	608.9	5.56	5.55	0.29	
6,618.0	86.17	1.55	6,054.9	633.4	595.9	702.8	5.56	5.55	0.28	
6,713.0	87.49	1.64	6,060.1	728.2	598.5	797.2	1.39	1.39	0.09	
6,808.0	88.90	1.46	6,063.1	823.1	601.1	891.7	1.50	1.48	-0.19	
6,903.0	88.81	1.46	6,065.0	918.1	603.5	986.2	0.09	-0.09	0.00	
6,997.0	89.78	0.85	6,066.2	1,012.1	605.4	1,079.7	1.22	1.03	-0.65	
7,092.0	90.92	359.62	6,065.6	1,107.0	605.8	1,174.0	1.77	1.20	-1.29	
7,187.0	90.92	359.88	6,064.1	1,202.0	605.4	1,268.2	0.27	0.00	0.27	
7,281.0	91.28	359.44	6,062.3	1,296.0	604.8	1,361.4	0.60	0.38	-0.47	
7,376.0	90.84	359.53	6,060.5	1,391.0	604.0	1,455.5	0.47	-0.46	0.09	
7,471.0	90.66	358.65	6,059.3	1,486.0	602.5	1,549.5	0.95	-0.19	-0.93	
7,565.0	90.04	358.39	6,058.7	1,579.9	600.0	1,642.5	0.72	-0.66	-0.28	
7,660.0	90.13	358.21	6,058.6	1,674.9	597.2	1,736.3	0.21	0.09	-0.19	
7,754.0	90.04	358.13	6,058.4	1,768.8	594.2	1,829.2	0.13	-0.10	-0.09	
7,849.0	90.22	358.21	6,058.2	1,863.8	591.2	1,923.0	0.21	0.19	0.08	
7,943.0	89.96	358.13	6,058.1	1,957.8	588.2	2,015.8	0.29	-0.28	-0.09	
8,038.0	89.96	358.21	6,058.1	2,052.7	585.1	2,109.7	0.08	0.00	0.08	
8,132.0	89.96	358.48	6,058.2	2,146.7	582.4	2,202.6	0.29	0.00	0.29	
8,226.0	90.13	358.48	6,058.1	2,240.6	579.9	2,295.5	0.18	0.18	0.00	
8,321.0	89.96	358.83	6,058.0	2,335.6	577.7	2,389.4	0.41	-0.18	0.37	
8,415.0	89.96	358.65	6,058.1	2,429.6	575.6	2,482.4	0.19	0.00	-0.19	
8,510.0	89.96	359.00	6,058.2	2,524.6	573.7	2,576.4	0.37	0.00	0.37	
8,605.0	90.22	359.36	6,058.0	2,619.6	572.3	2,670.5	0.47	0.27	0.38	
8,699.0	90.31	359.80	6,057.6	2,713.5	571.6	2,763.7	0.48	0.10	0.47	
8,794.0	90.48	359.62	6,056.9	2,808.5	571.2	2,857.9	0.26	0.18	-0.19	
8,888.0	90.40	359.88	6,056.2	2,902.5	570.7	2,951.1	0.29	-0.09	0.28	
8,983.0	90.66	359.88	6,055.3	2,997.5	570.5	3,045.3	0.27	0.27	0.00	
9,077.0	90.66	359.97	6,054.2	3,091.5	570.4	3,138.5	0.10	0.00	0.10	
9,172.0	89.25	359.27	6,054.3	3,186.5	569.8	3,232.7	1.66	-1.48	-0.74	

<b>Company:</b>	Noble Energy Inc.	<b>Local Co-ordinate Reference:</b>	Well Rico LC29-72-1HNA
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 4895.0usft (H&P #326)
<b>Site:</b>	Sec 29, T9N, R59W, 6th PM	<b>MD Reference:</b>	WELL @ 4895.0usft (H&P #326)
<b>Well:</b>	Rico LC29-72-1HNA	<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)	
9,267.0	89.34	359.44	6,055.5	3,281.5	568.7	3,326.8	0.20	0.09	0.18	
9,361.0	89.34	359.53	6,056.6	3,375.5	567.9	3,420.0	0.10	0.00	0.10	
9,456.0	89.43	359.62	6,057.6	3,470.5	567.2	3,514.1	0.13	0.09	0.09	
9,551.0	89.43	359.88	6,058.5	3,565.5	566.8	3,608.3	0.27	0.00	0.27	
9,645.0	89.43	359.88	6,059.5	3,659.5	566.6	3,701.6	0.00	0.00	0.00	
9,740.0	90.04	0.32	6,059.9	3,754.5	566.7	3,795.9	0.79	0.64	0.46	
9,835.0	90.04	0.23	6,059.8	3,849.5	567.2	3,890.2	0.09	0.00	-0.09	
9,929.0	90.04	359.18	6,059.8	3,943.5	566.7	3,983.4	1.12	0.00	-1.12	
10,024.0	90.22	359.36	6,059.6	4,038.5	565.5	4,077.5	0.27	0.19	0.19	
10,118.0	90.48	359.27	6,059.0	4,132.5	564.4	4,170.6	0.29	0.28	-0.10	
10,145.0	90.48	359.44	6,058.8	4,159.5	564.1	4,197.3	0.63	0.00	0.63	
TD WELL @ 10200' / 6058.3' TVD										
10,200.0	90.48	359.44	6,058.3	4,214.5	563.5	4,251.8	0.00	0.00	0.00	

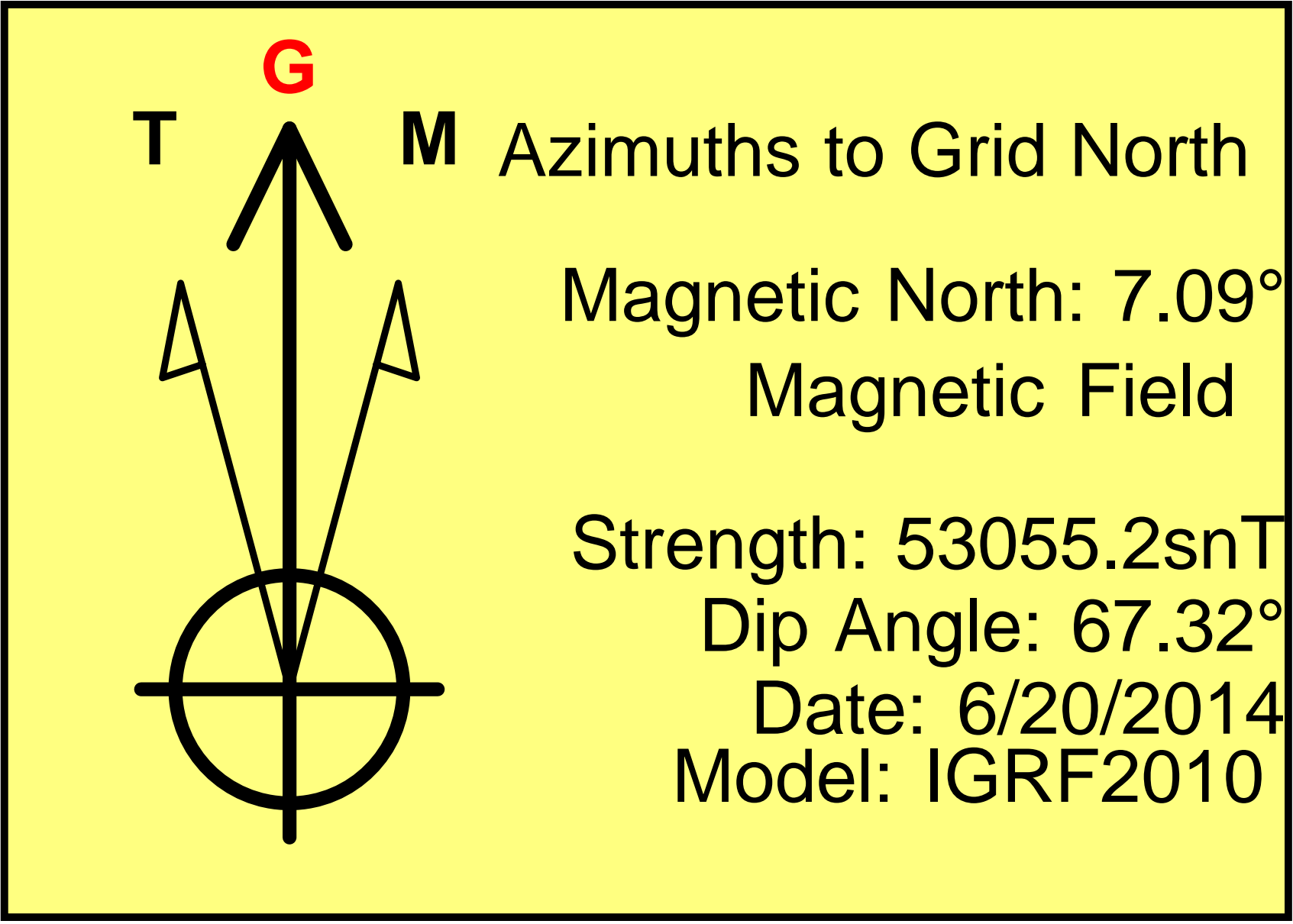
Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
621.0	621.0	2.0	3.2	TIE IN @ 621' MD / 621' TVD END OF SUR HOLE / BEGIN INT HOLE	
6,523.0	6,044.2	539.1	593.5	7" CASING POINT @ 6523' MD / 6044.2' TVD END OF INT HOLE / BEIGIN LA	
10,200.0	6,058.3	4,214.5	563.5	TD WELL @ 10200' / 6058.3' TVD	

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



Company Name: Noble Energy Inc.  
Rico LC29-72-1HNA  
Weld County, CO  
Rig: H&P #326  
Created By: Kris Ray  
Date: 07/11/2014

Rico LC29-72-1HNA  
Weld County, CO  
Q140458 & RM-140592  
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	

WELL DETAILS:		Rico LC29-72-1HNA
+N/-S	+E/-W	Ground Level: 4865.0
0.0	0.0	Northing 1506938.86 Easting 3416956.12 Latitude 40° 42' 54.828 N Longitude 103° 59' 45.024 W

ANNOTATIONS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation	
621.0	0.60	78.49	621.0	2.0	3.2	2.3	4.0	TIE IN @ 621' MD / 621' TVD END OF SUR HOLE / BEGIN INT HOLE	
6523.0	80.89	1.28	6044.2	539.1	593.5	688.9	1419.7	7" CASING POINT @ 6523' MD / 6044.2' TVD END OF INT HOLE / BEGIN LATERAL	
10200.0	90.48	359.44	6058.3	4214.5	563.5	4251.8	5095.3	TD @ 10200' MD / 6058.3' TVD	

DESIGN TARGET DETAILS									
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude		
PBHL Rico LC29-72-1HNA - plan hits target center	6060.0	4214.0	530.1	1511152.62	3417486.17	40° 43' 36.372 N	103° 59' 37.212 W		

