

# Noble Energy

Weld County, CO (NAD 83)

Sec. 4-T6N-R63W (NCLP AA04-04/05-B)

NCLP AA06-69-1HNA

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Final Report

14 January, 2015

Well Coordinates: 1,434,399.13 N, 3,291,667.63 E (40° 31' 15.92" N, 104° 27' 03.10" W)

Ground Level: 4,711.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well NCLP AA06-69-1HNA

RKB=30ft @ 4741.00usft (H&P 321)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

Project: Weld County, CO (NAD 83)  
 Site: Sec. 4-T6N-R63W (NCLP AA04-04/05-B)  
 Well: NCLP AA06-69-1HNA  
 Wellbore: Plan A  
 Design: Actual Surveys



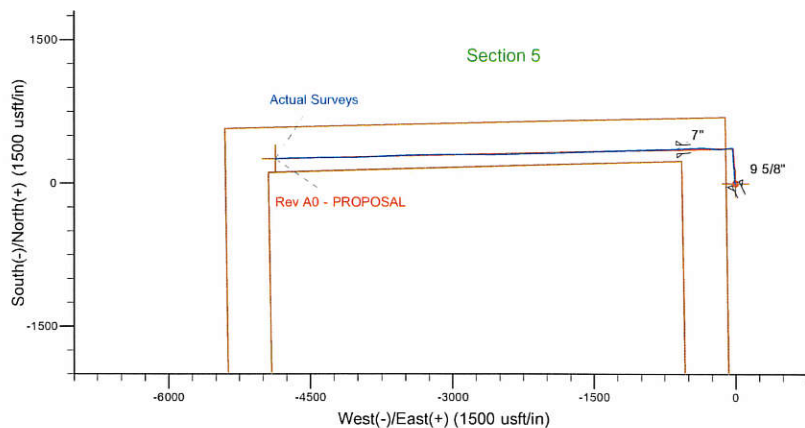
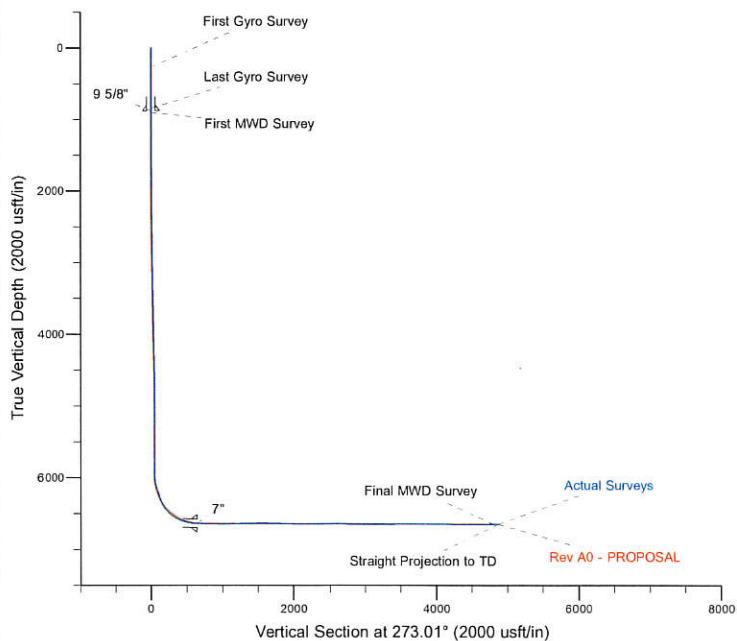
**HALLIBURTON**

Sperry Drilling

Platted SHL: 698' FNL, 100' FWL  
 Platted Lat/Long: 40.52109N, 104.45086W  
 Location: Sec. 4-T6N-R63W

~7" Casing: 323' FNL, 504' FEL  
 Lat/Long: 40.522096 N, 104.453081W  
 State Planes - CO Northern: 1434758.38 N, 3291045.91E  
 Sec. 5-T6N-R63W

Platted BHL: 330' FNL, 535' FWL  
 Platted Lat/Long: 40.521950 N, 104.468350 W  
 State Planes - CO Northern: 1434655.38N, 3286801.88E  
 Location: Sec. 5-T6N-R63W



#### LEGEND

- + NCLP AA06-69-1HNA, Plan A, Rev A0 - PROPOSAL V0
- + Actual Surveys

WELL DETAILS: NCLP AA06-69-1HNA

Ground Level: 4711.00  
 RKB=30ft @ 4741.00usft (H&P 321)

Created By: Gordy Roth  
 Created On: 1/14/2015

## Design Report for NCLP AA06-69-1HNA - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
270.00	0.10	13.87	270.00	0.23	0.06	-0.04	0.04
<b>First Gyro Survey</b>							
550.00	0.30	12.97	550.00	1.18	0.28	-0.22	0.07
844.00	1.00	331.47	843.98	4.18	-0.77	0.99	0.27
<b>Last Gyro Survey</b>							
905.00	0.78	335.78	904.97	5.03	-1.20	1.46	0.38
<b>First MWD Survey</b>							
996.00	0.83	334.25	995.96	6.19	-1.74	2.06	0.06
1,089.00	0.96	354.46	1,088.95	7.57	-2.11	2.50	0.36
1,182.00	0.98	221.65	1,181.95	7.75	-2.71	3.11	1.91
1,273.00	2.29	66.32	1,272.93	7.90	-1.56	1.97	3.52
1,365.00	0.98	306.55	1,364.90	9.11	-0.51	0.99	3.16
1,456.00	0.92	278.65	1,455.89	9.68	-1.86	2.36	0.51
1,549.00	1.40	66.12	1,548.88	10.25	-1.56	2.09	2.40
1,641.00	0.56	296.31	1,640.87	10.91	-0.93	1.50	1.97
1,736.00	0.60	289.34	1,735.87	11.28	-1.82	2.41	0.09
1,830.00	0.71	282.37	1,829.86	11.57	-2.85	3.46	0.14
1,925.00	0.85	292.10	1,924.85	11.96	-4.08	4.70	0.20
2,020.00	0.79	286.42	2,019.84	12.41	-5.36	6.00	0.11
2,115.00	0.78	300.96	2,114.84	12.93	-6.54	7.21	0.21
2,209.00	0.68	292.22	2,208.83	13.47	-7.61	8.31	0.16
2,304.00	0.62	274.89	2,303.82	13.72	-8.64	9.35	0.22
2,399.00	2.16	349.00	2,398.80	15.52	-9.50	10.30	2.19
2,493.00	3.90	355.76	2,492.66	20.45	-10.07	11.13	1.89
2,588.00	5.54	359.50	2,587.34	28.26	-10.35	11.82	1.76
2,683.00	5.48	358.46	2,681.90	37.38	-10.51	12.46	0.12
2,778.00	6.91	1.11	2,776.34	47.63	-10.52	13.01	1.53
2,873.00	8.23	359.05	2,870.51	60.14	-10.52	13.67	1.42
2,967.00	10.11	356.44	2,963.30	75.10	-11.15	15.08	2.05
3,062.00	10.35	356.43	3,056.79	91.94	-12.20	17.02	0.25
3,157.00	9.33	358.79	3,150.40	108.16	-12.89	18.56	1.15
3,251.00	8.01	1.53	3,243.32	122.33	-12.88	19.29	1.47
3,346.00	7.09	2.76	3,337.50	134.80	-12.42	19.49	0.98
3,441.00	7.81	349.52	3,431.70	147.00	-13.31	21.02	1.95
3,536.00	8.73	354.50	3,525.71	160.53	-15.17	23.60	1.23
3,631.00	9.23	355.22	3,619.55	175.30	-16.50	25.70	0.54
3,725.00	9.81	354.88	3,712.25	190.78	-17.84	27.85	0.62
3,820.00	10.49	356.07	3,805.77	207.47	-19.16	30.04	0.75
3,915.00	10.92	355.65	3,899.11	225.07	-20.43	32.24	0.46
4,010.00	10.25	353.04	3,992.50	242.44	-22.14	34.86	0.87
4,105.00	9.01	351.58	4,086.16	258.18	-24.25	37.80	1.33
4,199.00	8.19	354.45	4,179.10	272.13	-25.98	40.25	0.98
4,294.00	7.83	2.80	4,273.17	285.33	-26.32	41.29	1.28
4,389.00	7.84	0.84	4,367.29	298.27	-25.91	41.56	0.28
4,484.00	7.75	359.80	4,461.41	311.16	-25.83	42.16	0.18
4,579.00	7.23	356.56	4,555.60	323.53	-26.22	43.19	0.70
4,674.00	6.59	349.81	4,649.91	334.86	-27.54	45.11	1.09
4,769.00	6.01	357.91	4,744.34	345.20	-28.68	46.80	1.12
4,863.00	4.81	359.29	4,837.92	354.06	-28.91	47.49	1.28

## Design Report for NCLP AA06-69-1HNA - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,958.00	3.21	8.07	4,932.68	360.67	-28.59	47.52	1.80
5,053.00	1.53	27.70	5,027.60	364.43	-27.63	46.75	1.94
5,148.00	0.57	70.94	5,122.58	365.71	-26.59	45.78	1.24
5,243.00	0.66	99.70	5,217.58	365.77	-25.60	44.80	0.33
5,337.00	0.65	92.59	5,311.57	365.65	-24.54	43.73	0.09
5,432.00	0.13	16.30	5,406.57	365.73	-23.97	43.17	0.67
5,526.00	0.53	11.33	5,500.57	366.26	-23.85	43.08	0.43
5,621.00	0.74	354.81	5,595.56	367.30	-23.82	43.11	0.29
5,717.00	0.75	338.43	5,691.55	368.50	-24.11	43.46	0.22
5,811.00	0.74	310.23	5,785.55	369.47	-24.80	44.19	0.39
5,906.00	0.89	296.94	5,880.54	370.20	-25.92	45.36	0.25
5,974.00	0.73	293.96	5,948.53	370.61	-26.79	46.25	0.24
6,001.00	0.66	291.60	5,975.53	370.74	-27.09	46.55	0.28
6,096.00	11.53	271.60	6,069.85	371.21	-37.12	56.59	11.49
6,191.00	18.07	265.79	6,161.66	370.39	-61.33	80.73	7.05
6,285.00	19.69	263.38	6,250.60	367.49	-91.61	110.81	1.91
6,333.00	18.61	259.79	6,295.94	365.20	-107.18	126.24	3.33
6,380.00	21.69	260.76	6,340.06	362.48	-123.13	142.03	6.59
6,428.00	29.06	263.33	6,383.40	359.70	-143.50	162.22	15.52
6,475.00	36.84	271.43	6,422.83	358.72	-168.97	187.60	18.99
6,523.00	41.80	275.37	6,459.96	360.58	-199.31	217.99	11.56
6,569.00	46.90	276.06	6,492.84	363.79	-231.29	250.10	11.14
6,617.00	51.88	276.07	6,524.07	367.64	-267.52	286.48	10.38
6,664.00	58.31	271.22	6,550.96	370.02	-305.95	324.98	16.08
6,712.00	63.30	269.81	6,574.37	370.39	-347.83	366.83	10.71
6,759.00	68.78	267.78	6,593.45	369.47	-390.75	409.64	12.31
6,807.00	72.56	267.41	6,609.34	367.57	-436.00	454.73	7.91
6,854.00	76.75	267.94	6,621.77	365.73	-481.28	499.84	8.98
6,902.00	80.28	267.93	6,631.33	364.03	-528.28	546.69	7.35
6,952.00	86.45	266.70	6,637.10	361.71	-577.86	596.09	12.58
7,034.00	89.66	267.11	6,639.89	357.28	-659.69	677.56	3.95
7,081.00	89.20	267.80	6,640.35	355.20	-706.64	724.34	1.76
7,176.00	88.64	268.65	6,642.14	352.25	-801.57	818.99	1.07
7,271.00	88.46	268.37	6,644.55	349.78	-896.51	913.66	0.35
7,366.00	88.98	268.04	6,646.67	346.81	-991.44	1,008.31	0.65
7,461.00	91.45	268.52	6,646.31	343.96	-1,086.39	1,102.97	2.65
7,556.00	91.91	268.19	6,643.53	341.23	-1,181.31	1,197.62	0.60
7,650.00	91.26	267.99	6,640.93	338.10	-1,275.22	1,291.24	0.72
7,745.00	90.40	268.12	6,639.55	334.88	-1,370.15	1,385.87	0.92
7,840.00	91.57	267.74	6,637.92	331.44	-1,465.08	1,480.48	1.29
7,935.00	90.99	268.60	6,635.80	328.41	-1,560.00	1,575.11	1.09
8,030.00	88.24	268.31	6,636.44	325.85	-1,654.96	1,669.80	2.91
8,125.00	87.60	267.05	6,639.88	322.01	-1,749.81	1,764.33	1.49
8,220.00	88.30	267.54	6,643.28	317.53	-1,844.65	1,858.79	0.90
8,314.00	89.11	269.22	6,645.41	314.87	-1,938.58	1,952.46	1.98
8,409.00	89.54	269.02	6,646.53	313.41	-2,033.56	2,047.23	0.50
8,504.00	90.80	269.33	6,646.24	312.04	-2,128.55	2,142.02	1.37
8,598.00	90.86	267.58	6,644.88	309.51	-2,222.50	2,235.70	1.86
8,693.00	89.63	267.79	6,644.48	305.67	-2,317.42	2,330.29	1.31
8,787.00	89.32	267.84	6,645.34	302.09	-2,411.35	2,423.90	0.33
8,882.00	89.32	268.50	6,646.46	299.06	-2,506.29	2,518.55	0.69



## Design Report for NCLP AA06-69-1HNA - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,977.00	89.48	270.86	6,647.46	298.53	-2,601.28	2,613.38	2.49
9,071.00	88.67	270.35	6,648.98	299.52	-2,695.26	2,707.28	1.02
9,166.00	90.62	270.70	6,649.57	300.39	-2,790.25	2,802.19	2.09
9,261.00	90.12	270.42	6,648.95	301.32	-2,885.24	2,897.10	0.60
9,356.00	89.20	270.53	6,649.52	302.10	-2,980.24	2,992.00	0.98
9,451.00	90.12	269.42	6,650.08	302.06	-3,075.23	3,086.86	1.52
9,546.00	90.77	268.99	6,649.34	300.75	-3,170.22	3,181.65	0.82
9,641.00	91.67	268.99	6,647.32	299.07	-3,265.18	3,276.39	0.95
9,735.00	90.77	268.64	6,645.32	297.13	-3,359.14	3,370.12	1.03
9,830.00	89.41	267.35	6,645.17	293.80	-3,454.08	3,464.75	1.97
9,925.00	90.03	267.31	6,645.63	289.38	-3,548.97	3,559.28	0.65
10,020.00	88.98	267.86	6,646.45	285.38	-3,643.89	3,653.85	1.25
10,114.00	89.29	267.49	6,647.87	281.56	-3,737.80	3,747.43	0.51
10,209.00	89.69	267.17	6,648.72	277.14	-3,832.69	3,841.96	0.54
10,304.00	89.54	268.56	6,649.36	273.60	-3,927.62	3,936.57	1.47
10,399.00	90.00	269.40	6,649.74	271.91	-4,022.60	4,031.34	1.01
10,494.00	90.71	269.48	6,649.15	270.98	-4,117.60	4,126.15	0.75
10,589.00	89.78	269.87	6,648.74	270.44	-4,212.59	4,220.98	1.06
10,683.00	89.38	269.45	6,649.43	269.88	-4,306.59	4,314.82	0.62
10,778.00	89.51	269.31	6,650.35	268.85	-4,401.58	4,409.63	0.20
10,873.00	88.95	268.70	6,651.63	267.20	-4,496.55	4,504.38	0.87
10,968.00	90.15	268.52	6,652.38	264.90	-4,591.52	4,599.10	1.28
11,062.00	91.05	268.54	6,651.39	262.49	-4,685.48	4,692.80	0.96
11,157.00	91.60	268.43	6,649.19	259.98	-4,780.42	4,787.48	0.59
11,177.00	91.63	268.40	6,648.63	259.43	-4,800.41	4,807.41	0.21
<b>Final MWD Survey</b>							
11,242.00	91.63	268.40	6,646.78	257.61	-4,865.36	4,872.17	0.00
<b>Straight Projection to TD - St. Line Proj. to Bit @ 11242' MD</b>							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
270.00	270.00	0.23	0.06	First Gyro Survey
844.00	843.98	4.18	-0.77	Last Gyro Survey
905.00	904.97	5.03	-1.20	First MWD Survey
11,177.00	6,648.63	259.43	-4,800.41	Final MWD Survey
11,242.00	6,646.78	257.61	-4,865.36	Straight Projection to TD
11,242.00	6,646.78	257.61	-4,865.36	St. Line Proj. to Bit @ 11242' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	NCLP AA06-69-1HNA_BHL	273.01	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
270.00	844.00	Surface Gyros	Flexi-Shot
905.00	6,952.00	MWD Surveys-Intermediate	MWD+IFR1+MS_WY

## Design Report for NCLP AA06-69-1HNA - Actual Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
7,034.00	11,242.00	MWD- Production	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
879.00	878.97	9 5/8"	9-5/8	13-3/4
6,996.00	6,639.17	7"	7	8-3/4

Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
NCLP AA06-69-1HNA_ - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,434,399.14	3,291,667.63	40.521090	-104.450860
Point 1				0.00	574.27	-5,403.44	1,434,973.39	3,286,264.37	
Point 2				0.00	-4,722.50	-5,336.36	1,429,676.79	3,286,331.44	
Point 3				0.00	-4,580.33	-45.92	1,429,818.95	3,291,621.71	
Point 4				0.00	694.63	-108.32	1,435,093.74	3,291,559.32	
Point 5				0.00	574.27	-5,403.44	1,434,973.39	3,286,264.37	
NCLP AA06-69-1HNA_ - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,434,399.14	3,291,667.63	40.521090	-104.450860
Point 1				0.00	114.26	-4,943.42	1,434,513.39	3,286,724.37	
Point 2				0.00	-4,262.48	-4,876.35	1,430,136.79	3,286,791.44	
Point 3				0.00	-4,120.32	-505.94	1,430,278.95	3,291,161.71	
Point 4				0.00	234.61	-568.33	1,434,633.74	3,291,099.32	
Point 5				0.00	114.26	-4,943.42	1,434,513.39	3,286,724.37	
NCLP AA06-69-1HNA_ - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,434,399.14	3,291,667.63	40.521090	-104.450860
NCLP AA06-69-1HNA_ - actual wellpath misses target center by 2.26usft at 11242.00usft MD (6646.78 TVD, 257.61 N, -4865.36 E) - Point	0.00	0.00	6,648.50	256.26	-4,865.91	1,434,655.38	3,286,801.88	40.521950	-104.468350

Directional Difficulty Index

Average Dogleg over Survey:	1.71 °/100usft	Maximum Dogleg over Survey:	18.99 °/100usft at 6,475.00 usft
Net Tortousity applicable to Plans:	0.75 °/100usft	Directional Difficulty Index:	6.231

Audit Info

**North Reference Sheet for Sec. 4-T6N-R63W (NCLP AA04-04/05-B) - NCLP  
AA06-69-1HNA - Plan A**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to RKB=30ft @ 4741.00usft (H&P 321). Northing and Easting are relative to NCLP AA06-69-1HNA

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996795

Grid Coordinates of Well: 1,434,399.13 usft N, 3,291,667.63 usft E

Geographical Coordinates of Well: 40° 31' 15.92" N, 104° 27' 03.10" W

Grid Convergence at Surface is: 0.68°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,242.00usft  
the Bottom Hole Displacement is 4,872.17usft in the Direction of 273.03° (Grid).

Magnetic Convergence at surface is: -7.66° (21 June 2014, , BGGM2013)

