

Noble Energy

Weld County, CO (NAD 83)

Sec. 4-T6N-R63W (NCLP AA04-13-B PAD)

NCLP AA07-69HNA

901286745

Plan A

05-123-39160

Design: Field Surveys

Sperry Drilling Services

Final Survey Report

13 July, 2014

Surface UWI : 901286745

Well Coordinates: 1,430,421.18 N, 3,291,714.70 E (40° 30' 36.61" N, 104° 27' 03.10" W)

Ground Level: 4,708.00 usft

Local Coordinate Origin:

Centered on Well NCLP AA07-69HNA

Viewing Datum:

RKB=24ft @ 4732.00usft (H&P 322)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

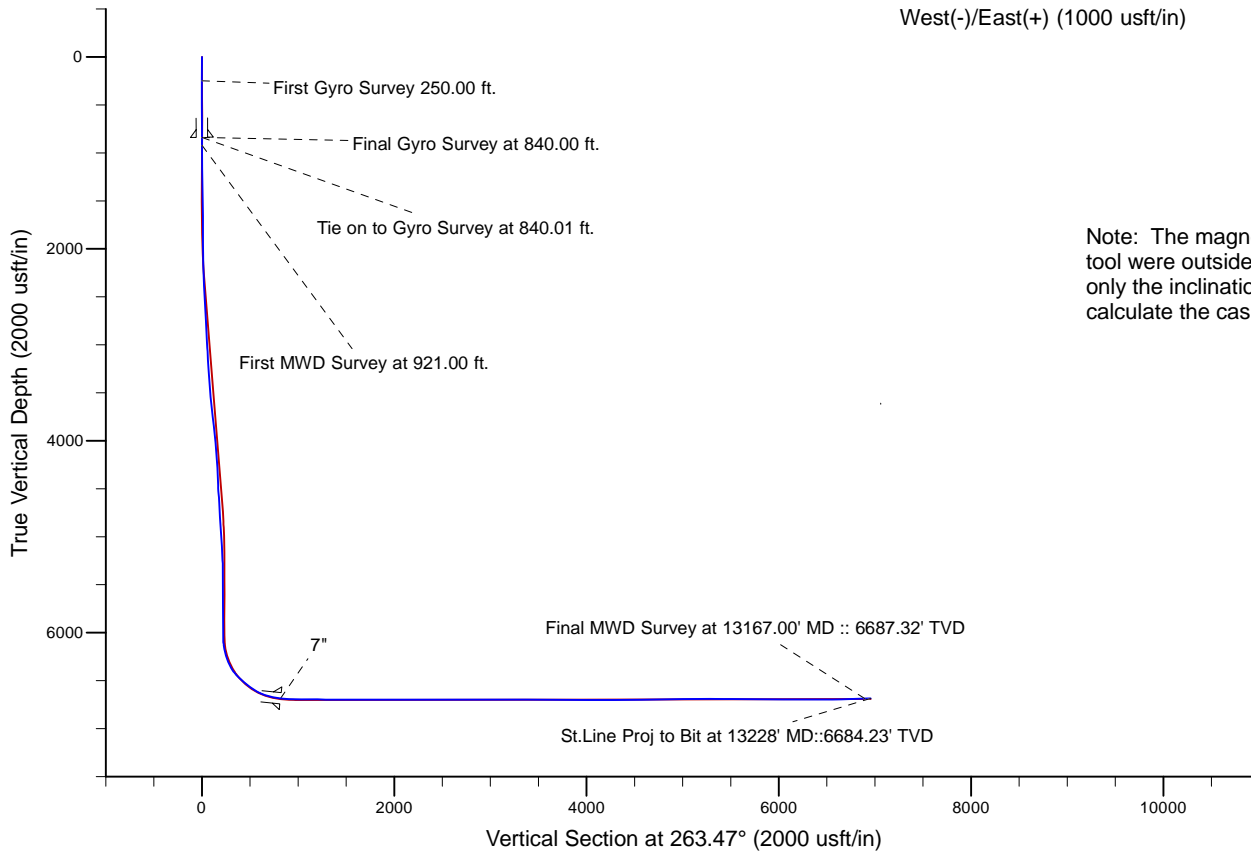
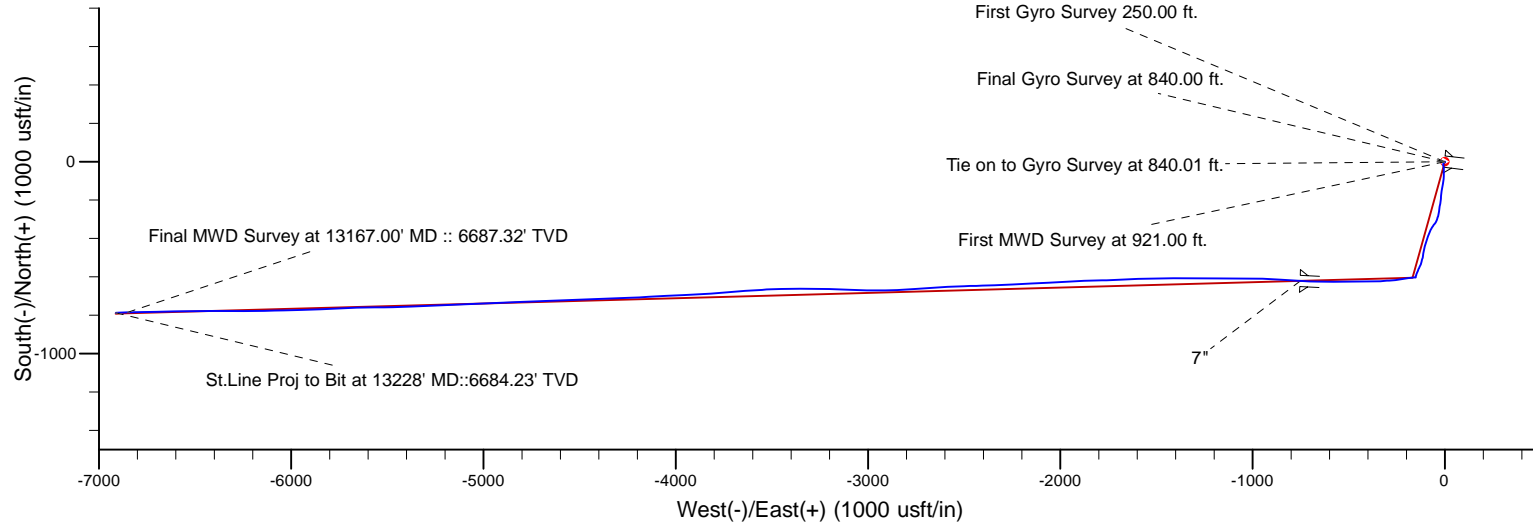
Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 4-T6N-R63W (NCLP AA04-13-B PAD)
 Well: NCLP AA07-69HNA
 Wellbore: Plan A
 Design: Field Surveys

Noble Energy



Note: The magnetic measurements from the gyro tool were outside the acceptance range; therefore, only the inclination values have been used to calculate the casing and BHL footages.

WELL DETAILS: NCLP AA07-69HNA	
Ground Level:	4708.00
RKB=24ft @ 4732.00usft (H&P 322)	
Created By:	Tatiana Gomez
Created On:	12:28, June 30 2014

Design Report for NCLP AA07-69HNA - Field 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
250.00	0.20	68.25	250.00	0.16	0.41	-0.42	0.08
First Gyro Survey 250.00 ft.							
500.00	0.20	38.25	500.00	0.67	1.08	-1.15	0.04
750.00	0.70	257.45	749.99	0.68	-0.14	0.06	0.35
840.00	0.50	276.45	839.99	0.60	-1.07	0.99	0.31
Final Gyro Survey at 840.00 ft. - 9 5/8"							
840.01	0.50	276.45	840.00	0.60	-1.07	0.99	0.00
Tie on to Gyro Survey at 840.01 ft.							
921.00	0.15	252.65	920.99	0.61	-1.52	1.44	0.45
First MWD Survey at 921.00 ft.							
1,014.00	0.44	255.22	1,013.99	0.48	-1.98	1.91	0.31
1,107.00	0.35	246.09	1,106.98	0.28	-2.59	2.54	0.12
1,200.00	1.92	201.03	1,199.96	-1.29	-3.40	3.53	1.82
1,293.00	1.90	202.88	1,292.91	-4.17	-4.56	5.01	0.07
1,386.00	2.09	203.65	1,385.85	-7.14	-5.84	6.62	0.21
1,479.00	1.80	204.96	1,478.80	-10.02	-7.14	8.23	0.32
1,573.00	1.86	207.01	1,572.75	-12.72	-8.45	9.85	0.09
1,668.00	3.50	169.91	1,667.65	-16.95	-8.65	10.52	2.43
1,763.00	5.34	164.44	1,762.37	-24.06	-6.95	9.64	1.98
1,857.00	6.60	180.22	1,855.86	-33.68	-5.80	9.59	2.19
1,952.00	8.09	180.02	1,950.08	-45.82	-5.82	11.00	1.57
2,047.00	8.61	177.71	2,044.07	-59.61	-5.54	12.29	0.65
2,142.00	9.21	181.99	2,137.93	-74.32	-5.52	13.94	0.94
2,237.00	9.10	181.67	2,231.72	-89.42	-6.00	16.14	0.13
2,331.00	10.22	191.02	2,324.39	-105.04	-7.82	19.71	2.05
2,426.00	10.58	193.18	2,417.83	-121.80	-11.42	25.19	0.56
2,521.00	11.03	189.53	2,511.14	-139.26	-14.91	30.65	0.86
2,615.00	11.02	185.06	2,603.41	-157.08	-17.19	34.94	0.91
2,710.00	11.21	184.09	2,696.63	-175.33	-18.65	38.47	0.28
2,804.00	10.97	186.47	2,788.87	-193.33	-20.31	42.16	0.55
2,899.00	11.86	188.66	2,881.99	-211.96	-22.80	46.76	1.04
2,994.00	14.05	190.43	2,974.57	-232.96	-26.35	52.68	2.34
3,088.00	11.90	186.76	3,066.17	-253.81	-29.56	58.24	2.45
3,183.00	11.67	189.66	3,159.16	-273.01	-32.33	63.17	0.67
3,278.00	9.42	203.64	3,252.57	-289.61	-37.06	69.75	3.57
3,373.00	7.95	192.56	3,346.48	-303.14	-41.60	75.81	2.34
3,468.00	7.52	213.88	3,440.64	-314.72	-46.50	81.99	3.04
3,563.00	7.38	220.23	3,534.84	-324.54	-53.91	90.47	0.88
3,658.00	9.21	212.87	3,628.84	-335.58	-61.97	99.74	2.22
3,752.00	10.74	209.00	3,721.42	-349.56	-70.30	109.60	1.78
3,847.00	12.26	202.00	3,814.52	-366.66	-78.37	119.57	2.17
3,942.00	13.88	203.47	3,907.05	-386.46	-86.69	130.08	1.74
4,037.00	13.44	198.32	3,999.37	-407.40	-94.70	140.42	1.36
4,132.00	12.44	193.04	4,091.96	-427.85	-100.48	148.49	1.63
4,226.00	9.96	197.43	4,184.16	-445.47	-105.20	155.18	2.79
4,321.00	9.28	191.77	4,277.83	-460.81	-109.22	160.92	1.23
4,416.00	8.85	182.93	4,371.64	-475.60	-111.16	164.53	1.53
4,511.00	9.24	191.13	4,465.47	-490.39	-113.01	168.04	1.42
4,606.00	11.27	198.22	4,558.95	-506.69	-117.38	174.24	2.51

Design Report for NCLP AA07-69HNA - Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,700.00	9.68	188.59	4,651.39	-523.23	-121.43	180.15	2.51
4,795.00	7.50	207.98	4,745.33	-536.61	-125.54	185.75	3.78
4,889.00	5.99	203.02	4,838.68	-546.54	-130.33	191.65	1.72
4,984.00	6.36	206.98	4,933.13	-555.79	-134.66	196.99	0.59
5,079.00	7.78	203.30	5,027.41	-566.39	-139.59	203.10	1.57
5,174.00	6.77	202.90	5,121.64	-577.45	-144.31	209.05	1.06
5,268.00	6.17	198.30	5,215.04	-587.35	-148.05	213.89	0.84
5,363.00	3.51	187.58	5,309.70	-595.08	-150.04	216.75	2.95
5,458.00	1.73	180.13	5,404.59	-599.40	-150.43	217.62	1.90
5,552.00	0.94	206.07	5,498.57	-601.51	-150.77	218.20	1.04
5,647.00	0.90	208.30	5,593.56	-602.87	-151.47	219.05	0.06
5,742.00	0.34	237.57	5,688.55	-603.68	-152.06	219.73	0.66
5,837.00	0.31	337.80	5,783.55	-603.59	-152.39	220.05	0.53
5,999.00	0.14	287.15	5,945.55	-603.13	-152.75	220.35	0.15
6,116.00	1.27	284.68	6,062.54	-602.76	-154.14	221.69	0.97
6,163.00	6.15	272.28	6,109.43	-602.52	-157.16	224.66	10.46
6,211.00	9.86	265.04	6,156.95	-602.78	-163.83	231.32	7.99
6,258.00	14.19	260.66	6,202.91	-604.06	-173.52	241.10	9.41
6,305.00	17.14	261.71	6,248.16	-605.99	-186.06	253.78	6.31
6,352.00	20.76	260.98	6,292.60	-608.30	-201.15	269.03	7.72
6,400.00	25.85	260.88	6,336.67	-611.29	-219.90	287.99	10.60
6,447.00	31.72	262.65	6,377.85	-614.50	-242.29	310.60	12.62
6,495.00	38.59	264.91	6,417.07	-617.45	-269.75	338.22	14.56
6,542.00	43.54	266.24	6,452.50	-619.81	-300.52	369.06	10.69
6,590.00	47.21	266.01	6,486.21	-622.12	-334.60	403.18	7.65
6,637.00	49.69	270.06	6,517.39	-623.30	-369.74	438.22	8.33
6,685.00	52.34	270.11	6,547.58	-623.25	-407.04	475.28	5.52
6,732.00	54.10	268.77	6,575.72	-623.62	-444.68	512.72	4.39
6,780.00	58.12	268.14	6,602.48	-624.70	-484.50	552.41	8.45
6,827.00	64.17	269.09	6,625.16	-625.68	-525.64	593.39	12.99
6,875.00	69.17	270.09	6,644.16	-625.99	-569.70	637.19	10.59
6,922.00	72.83	270.76	6,659.46	-625.66	-614.13	681.30	7.90
6,970.00	77.36	271.45	6,671.80	-624.76	-660.49	727.26	9.54
7,015.00	82.83	272.24	6,679.54	-623.33	-704.78	771.10	12.28
7,063.00	84.30	272.86	6,684.92	-621.21	-752.43	818.20	3.33
7"							
7,166.00	87.47	274.17	6,692.30	-614.91	-854.96	919.34	3.33
7,259.00	88.80	272.78	6,695.33	-609.28	-947.73	1,010.87	2.07
7,352.00	89.57	268.54	6,696.65	-608.21	-1,040.69	1,103.11	4.63
7,445.00	90.03	270.90	6,696.98	-608.67	-1,133.68	1,195.55	2.59
7,538.00	88.64	270.70	6,698.06	-607.37	-1,226.67	1,287.78	1.51
7,630.00	90.49	270.80	6,698.76	-606.16	-1,318.65	1,379.04	2.01
7,722.00	89.23	269.20	6,698.98	-606.16	-1,410.65	1,470.43	2.21
7,815.00	88.86	268.48	6,700.53	-608.05	-1,503.61	1,563.01	0.87
7,908.00	90.55	268.24	6,701.01	-610.71	-1,596.57	1,655.67	1.84
8,001.00	89.29	266.90	6,701.14	-614.65	-1,689.48	1,748.43	1.98
8,094.00	90.96	269.41	6,700.94	-617.64	-1,782.43	1,841.10	3.24
8,187.00	90.62	266.91	6,699.65	-620.63	-1,875.36	1,933.78	2.71
8,279.00	90.59	267.02	6,698.68	-625.50	-1,967.23	2,025.60	0.12
8,372.00	89.20	266.90	6,698.85	-630.43	-2,060.09	2,118.43	1.50
8,465.00	89.75	267.66	6,699.71	-634.84	-2,152.98	2,211.22	1.01

Design Report for NCLP AA07-69HNA - Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,559.00	89.26	267.06	6,700.52	-639.17	-2,246.88	2,304.99	0.82
8,654.00	89.63	267.50	6,701.44	-643.68	-2,341.77	2,399.78	0.61
8,749.00	92.01	269.26	6,700.08	-646.37	-2,436.71	2,494.41	3.12
8,844.00	90.86	266.95	6,697.70	-649.51	-2,531.62	2,589.06	2.72
8,939.00	91.17	266.50	6,696.02	-654.93	-2,626.45	2,683.89	0.58
9,033.00	90.09	266.74	6,694.98	-660.48	-2,720.28	2,777.74	1.18
9,129.00	89.14	266.14	6,695.63	-666.44	-2,816.09	2,873.61	1.17
9,224.00	90.22	268.64	6,696.16	-670.76	-2,910.98	2,968.38	2.87
9,319.00	89.81	272.23	6,696.13	-670.04	-3,005.96	3,062.66	3.80
9,414.00	88.58	272.41	6,697.47	-666.20	-3,100.87	3,156.52	1.31
9,509.00	89.17	271.04	6,699.33	-663.34	-3,195.81	3,250.51	1.57
9,603.00	89.32	270.74	6,700.57	-661.88	-3,289.79	3,343.72	0.36
9,698.00	89.11	269.22	6,701.87	-661.91	-3,384.78	3,438.10	1.62
9,793.00	91.26	268.36	6,701.57	-663.92	-3,479.75	3,532.68	2.44
9,888.00	88.86	266.03	6,701.47	-668.56	-3,574.62	3,627.46	3.52
9,982.00	89.97	265.54	6,702.43	-675.47	-3,668.36	3,721.38	1.29
10,077.00	89.51	265.78	6,702.86	-682.66	-3,763.09	3,816.31	0.55
10,172.00	89.75	266.39	6,703.47	-689.15	-3,857.86	3,911.21	0.69
10,267.00	90.89	267.66	6,702.94	-694.08	-3,952.73	4,006.02	1.80
10,362.00	90.09	267.11	6,702.13	-698.41	-4,047.63	4,100.80	1.02
10,457.00	89.32	266.62	6,702.62	-703.61	-4,142.48	4,195.63	0.96
10,552.00	90.31	267.98	6,702.92	-708.08	-4,237.37	4,290.41	1.77
10,647.00	90.68	267.96	6,702.10	-711.45	-4,332.31	4,385.11	0.39
10,742.00	91.85	267.82	6,700.01	-714.94	-4,427.22	4,479.81	1.24
10,836.00	90.68	267.42	6,697.93	-718.85	-4,521.11	4,573.53	1.32
10,932.00	90.09	266.98	6,697.29	-723.54	-4,617.00	4,669.33	0.77
11,026.00	90.09	267.63	6,697.14	-727.96	-4,710.89	4,763.12	0.69
11,121.00	91.20	267.93	6,696.07	-731.64	-4,805.81	4,857.84	1.21
11,216.00	91.24	268.30	6,694.05	-734.76	-4,900.74	4,952.51	0.39
11,311.00	91.60	268.29	6,691.69	-737.59	-4,995.67	5,047.14	0.38
11,406.00	90.31	267.06	6,690.11	-741.44	-5,090.57	5,141.87	1.88
11,500.00	89.35	267.00	6,690.39	-746.31	-5,184.45	5,235.69	1.02
11,595.00	89.91	267.62	6,691.00	-750.77	-5,279.34	5,330.47	0.88
11,690.00	88.64	268.17	6,692.20	-754.26	-5,374.26	5,425.18	1.46
11,785.00	90.22	268.41	6,693.15	-757.09	-5,469.21	5,519.83	1.68
11,880.00	90.31	269.45	6,692.71	-758.87	-5,564.20	5,614.40	1.10
11,975.00	89.20	268.01	6,693.12	-760.97	-5,659.17	5,708.99	1.91
12,070.00	88.49	267.56	6,695.03	-764.64	-5,754.08	5,803.71	0.88
12,165.00	90.74	267.92	6,695.67	-768.39	-5,848.99	5,898.43	2.40
12,260.00	90.40	268.21	6,694.72	-771.60	-5,943.94	5,993.12	0.47
12,355.00	89.38	268.19	6,694.91	-774.58	-6,038.89	6,087.80	1.07
12,450.00	89.54	269.50	6,695.80	-776.49	-6,133.86	6,182.37	1.39
12,545.00	89.10	269.89	6,696.93	-777.00	-6,228.85	6,276.81	0.62
12,639.00	89.23	269.80	6,698.30	-777.25	-6,322.84	6,370.22	0.17
12,735.00	90.19	269.66	6,698.78	-777.71	-6,418.84	6,465.64	1.01
12,830.00	91.26	269.56	6,697.58	-778.35	-6,513.83	6,560.09	1.13
12,924.00	91.23	268.98	6,695.54	-779.55	-6,607.80	6,653.58	0.62
13,019.00	91.76	269.17	6,693.06	-781.08	-6,702.75	6,748.10	0.59
13,114.00	92.28	268.29	6,689.71	-783.19	-6,797.67	6,842.64	1.08
13,167.00	92.90	268.44	6,687.32	-784.70	-6,850.59	6,895.39	1.20

Final MWD Survey at 13167.00' MD :: 6687.32' TVD

Design Report for NCLP AA07-69HNA - Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
13,228.00	92.90	268.44	6,684.23	-786.36	-6,911.49	6,956.08	0.00
St.Line Proj to Bit at 13228' MD::6684.23' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
250.00	250.00	0.16	0.41	First Gyro Survey 250.00 ft.
840.00	839.99	0.60	-1.07	Final Gyro Survey at 840.00 ft.
840.01	840.00	0.60	-1.07	Tie on to Gyro Survey at 840.01 ft.
921.00	920.99	0.61	-1.52	First MWD Survey at 921.00 ft.
13,167.00	6,687.32	-784.70	-6,850.59	Final MWD Survey at 13167.00' MD :: 6687.32' TVD
13,228.00	6,684.23	-786.36	-6,911.49	St.Line Proj to Bit at 13228' MD::6684.23' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	NCLP AA07-69HNA_BHL	263.47	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
250.00	840.00	Surface Gyros	Flexi-Shot
921.00	7,015.00	MWD Surveys - Intermediate	MWD+IFR1+MS_WY
7,166.00	13,167.00	MWD Surveys - Production	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
840.00	839.99	9 5/8"	9-5/8	13-3/4
7,063.00	6,684.92	7"	7	8-3/4

Design Report for NCLP AA07-69HNA - Field Surveys

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 AA07-69HNA_4	0.00	0.00	0.00	0.01	0.00	1,430,421.19	3,291,714.70	40.510170	-104.450860
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	4,212.69	-615.40	1,434,633.74	3,291,099.32	
Point 2				0.00	-602.26	-553.01	1,429,818.95	3,291,161.71	
Point 3				0.00	-5,433.90	-362.46	1,424,987.47	3,291,352.25	
Point 4				0.00	-602.26	-553.01	1,429,818.95	3,291,161.71	
Point 5				0.00	4,212.69	-615.40	1,434,633.74	3,291,099.32	
NCLP AA07-69HNA_S	0.00	0.00	0.00	0.01	0.00	1,430,421.19	3,291,714.70	40.510170	-104.450860
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	4,442.12	-10,595.64	1,434,863.17	3,281,119.41	
Point 2				0.00	-905.76	-10,537.44	1,429,515.46	3,281,177.61	
Point 3				0.00	-6,158.95	-10,483.09	1,424,262.45	3,281,231.95	
Point 4				0.00	-6,056.14	-5,349.56	1,424,365.25	3,286,365.31	
Point 5				0.00	-744.43	-5,383.44	1,429,676.79	3,286,331.44	
Point 6				0.00	-905.76	-10,537.44	1,429,515.46	3,281,177.61	
Point 7				0.00	-744.43	-5,383.44	1,429,676.79	3,286,331.44	
Point 8				0.00	4,552.35	-5,450.51	1,434,973.39	3,286,264.37	
Point 9				0.00	4,442.12	-10,595.64	1,434,863.17	3,281,119.41	
Point 10				0.00	4,552.35	-5,450.51	1,434,973.39	3,286,264.37	
Point 11				0.00	4,672.70	-155.38	1,435,093.74	3,291,559.32	
Point 12				0.00	4,732.76	5,182.16	1,435,153.80	3,296,896.69	
Point 13				0.00	-491.72	5,200.59	1,429,929.49	3,296,915.12	
Point 14				0.00	-602.26	-92.99	1,429,818.95	3,291,621.71	
Point 15				0.00	4,672.70	-155.38	1,435,093.74	3,291,559.32	
Point 16				0.00	-602.26	-92.99	1,429,818.95	3,291,621.71	
Point 17				0.00	-744.43	-5,383.44	1,429,676.79	3,286,331.44	
Point 18				0.00	-6,056.14	-5,349.56	1,424,365.25	3,286,365.31	
Point 19				0.00	-5,893.92	97.55	1,424,527.47	3,291,812.25	
Point 20				0.00	-602.26	-92.99	1,429,818.95	3,291,621.71	
Point 21				0.00	-491.72	5,200.59	1,429,929.49	3,296,915.12	
Point 22				0.00	4,732.76	5,182.16	1,435,153.80	3,296,896.69	
Point 23				0.00	4,672.70	-155.38	1,435,093.74	3,291,559.32	
Point 24				0.00	4,552.35	-5,450.51	1,434,973.39	3,286,264.37	
Point 25				0.00	4,442.12	-10,595.64	1,434,863.17	3,281,119.41	
NCLP AA07-69HNA_S	0.00	0.00	0.00	0.01	0.00	1,430,421.19	3,291,714.70	40.510170	-104.450860
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
NCLP AA07-69HNA_B	0.00	0.00	6,692.86	-791.28	-6,912.41	1,429,629.93	3,284,802.52	40.508220	-104.475750
- actual wellpath misses target center by 9.97usft at 13228.00usft MD (6684.23 TVD, -786.36 N, -6911.49 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.89 °/100usft	Maximum Dogleg over Survey:	14.56 °/100usft at 6,495.00 usft
Net Tortousity applicable to Plans:	1.02 °/100usft	Directional Difficulty Index:	6.562

Audit Info

North Reference Sheet for Sec. 4-T6N-R63W (NCLP AA04-13-B PAD) - NCLP AA07-69HNA - 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=24ft @ 4732.00usft (H&P 322). Northing and Easting are relative to NCLP AA07-69HNA

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: 0.99996707

Grid Coordinates of Well: 1,430,421.18 usft N, 3,291,714.70 usft E

Geographical Coordinates of Well: 40° 30' 36.61" N, 104° 27' 03.10" W

Grid Convergence at Surface is: 0.68°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,228.00usft the Bottom Hole Displacement is 6,956.08usft in the Direction of 263.51° (Grid).

Magnetic Convergence at surface is: -7.67° (27 May 2014, , BGGM2013)

