

Project: Weld County, CO (NAD 83)
Site: Sec. 25-T6N-R63W - NW/SW (Wells Ranch AA26 PAD)
Well: Wells Ranch AA26-65HN
Wellbore: Plan A
Design: Final Surveys

Noble Energy



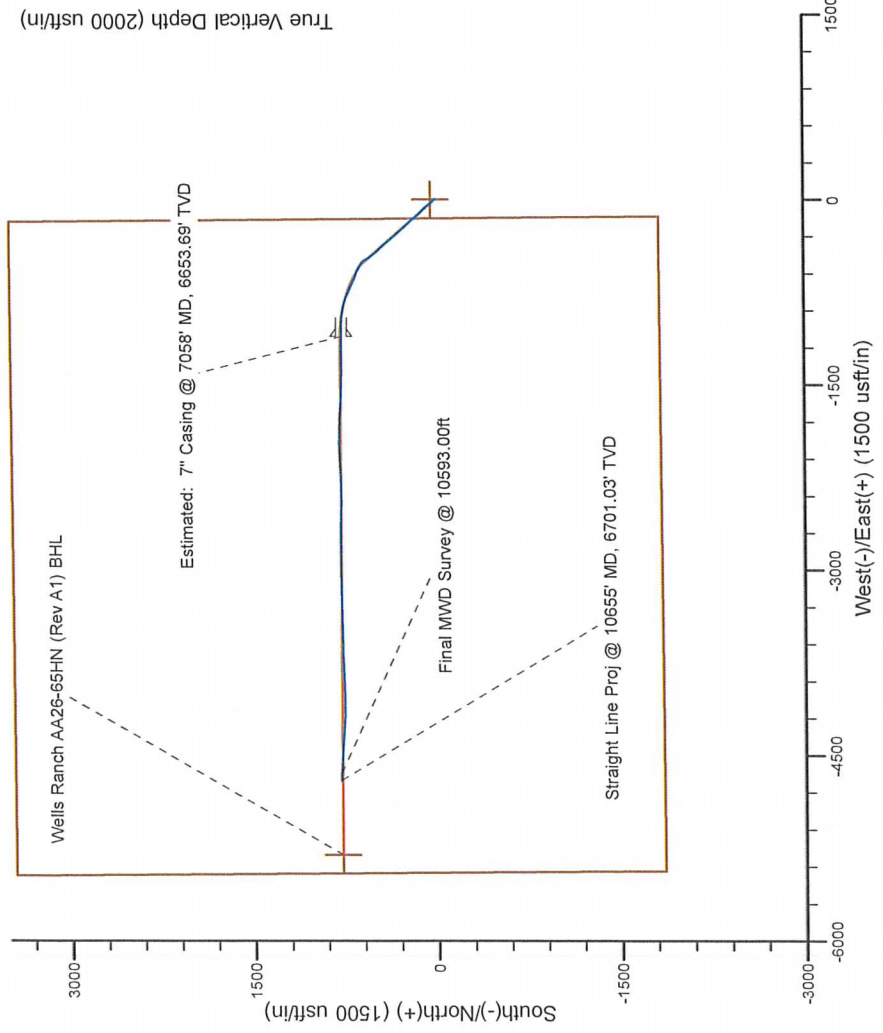
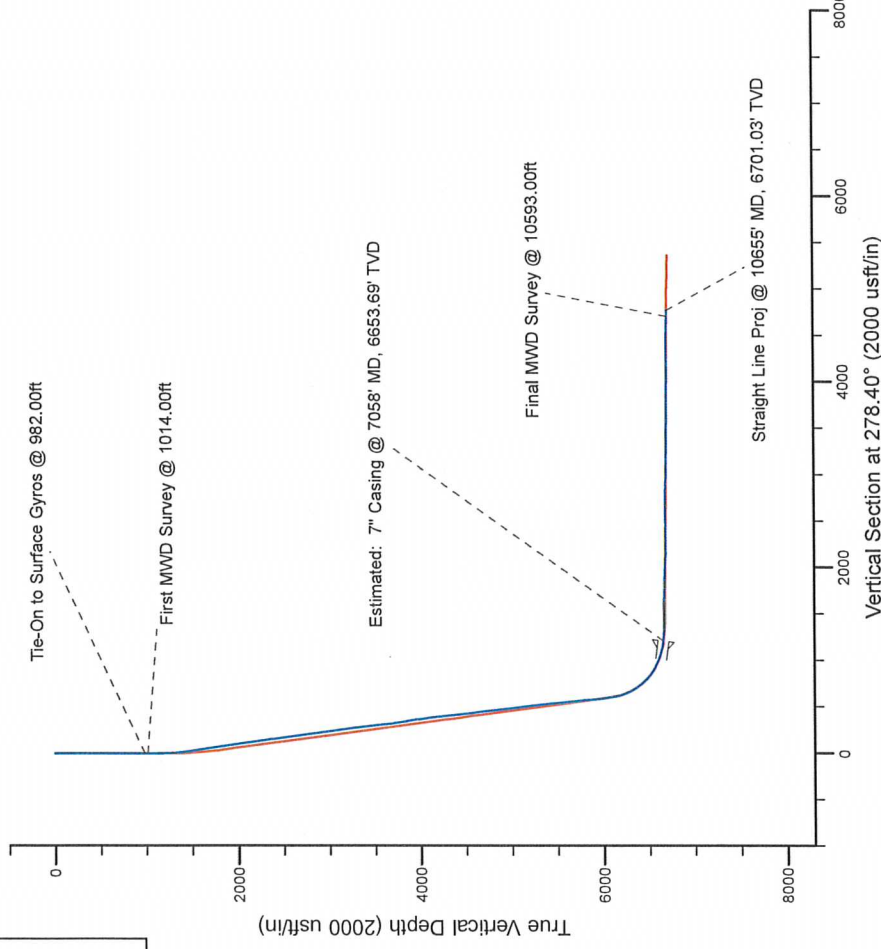
Platted SHL: 1824' FSL, 153' FWL
Platted Lat/Long: 40.45516° N, 104.39410° W
Location: Sec. 25-T6N-R63W

7" Casing: ~2608.23' FSL, ~948.74' FEL
Lat/Long: 40° 27' 26.373 N, 104° 23' 52.962 W
State Planes - CO Northern: 1,411,349.48' N, 3,306,638.48' E
Location: Sec. 26-T6N-R63W

BHL: ~2648.73' FNL, ~751.46' FWL
Lat/Long: 40° 27' 26.993 N, 104° 24' 59.437 W
State Planes - CO Northern: 1,411,367.82' N, 3,303,045.51' E
Location: Sec. 26-T6N-R63W

LEGEND

- Wells Ranch AA26-65HN, Plan A, Rev A1 V0
- Final Surveys



WELL DETAILS: Wells Ranch AA26-65HN

Ground Level: 4791.00
RKB 24 ft. @ 4815.00usft (H&P 322)

Created By: Fred Hartmann
Created On: 10/24/2013

Noble Energy

Weld County, CO (NAD 83)

Sec. 25-T6N-R63W - NW/SW (Wells Ranch AA26 PAD)

Wells Ranch AA26-65HN - A2

Design: Final Surveys

Sperry Drilling Services

Final Survey Report

24 October, 2013

Well Coordinates: 1,410,574.17 N, 3,307,746.01 E (40° 27' 18.58" N, 104° 23' 38.76" W)

Ground Level: 4,791.00 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 Wells Ranch AA26-65HN - Slot A2

RKB 24 ft. @ 4815.00usft (H&P 322)

N

Grid

API - US Survey Feet - Custom

HALLIBURTON

Design Report for Wells Ranch AA26-65HN - Final 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	0.50	92.70	250.00	-0.05	1.09	-1.09	0.20
500.00	0.40	56.10	499.99	0.38	2.90	-2.82	0.12
750.00	0.30	129.80	749.99	0.45	4.13	-4.02	0.17
982.00	0.20	229.50	981.98	-0.20	4.29	-4.27	0.17
Tie-On to Surface Gyros @ 982.00ft							
1,014.00	0.83	304.92	1,013.98	-0.10	4.06	-4.03	2.51
First MWD Survey @ 1014.00ft							
1,107.00	1.58	302.44	1,106.96	0.97	2.42	-2.25	0.81
1,200.00	1.44	331.64	1,199.93	2.69	0.79	-0.38	0.83
1,293.00	4.30	315.82	1,292.81	6.22	-2.20	3.08	3.16
1,386.00	7.77	312.57	1,385.28	12.97	-9.26	11.06	3.75
1,479.00	11.16	316.31	1,477.00	23.73	-20.11	23.36	3.70
1,575.00	11.71	321.01	1,571.09	38.02	-32.66	37.87	1.13
1,670.00	12.22	323.51	1,664.03	53.60	-44.70	52.06	0.77
1,764.00	11.29	322.46	1,756.06	68.90	-56.23	65.69	1.02
1,859.00	10.11	323.03	1,849.40	82.93	-66.91	78.31	1.25
1,953.00	11.36	314.05	1,941.76	95.96	-78.52	91.70	2.22
2,048.00	10.62	313.81	2,035.02	108.53	-91.57	106.44	0.78
2,143.00	9.43	309.75	2,128.57	119.56	-103.87	120.22	1.46
2,238.00	9.79	314.60	2,222.24	130.21	-115.60	133.39	0.93
2,332.00	10.21	322.74	2,314.82	142.45	-126.34	145.80	1.57
2,427.00	9.09	321.11	2,408.47	155.00	-136.15	157.33	1.21
2,522.00	10.30	321.79	2,502.11	167.51	-146.11	169.02	1.28
2,617.00	9.54	321.73	2,595.69	180.37	-156.24	180.92	0.80
2,712.00	10.02	318.23	2,689.31	192.71	-166.62	193.00	0.80
2,807.00	9.80	314.89	2,782.89	204.58	-177.86	205.84	0.65
2,902.00	10.42	318.14	2,876.42	216.69	-189.32	218.95	0.89
2,997.00	11.16	317.91	2,969.74	229.91	-201.21	232.65	0.78
3,092.00	10.51	316.61	3,063.04	243.03	-213.33	246.55	0.73
3,186.00	8.74	317.70	3,155.72	254.54	-224.02	258.81	1.89
3,281.00	8.83	317.10	3,249.60	265.22	-233.85	270.09	0.14
3,376.00	8.18	314.17	3,343.56	275.27	-243.66	281.27	0.82
3,471.00	8.31	315.36	3,437.58	284.86	-253.33	292.24	0.23
3,565.00	8.79	324.19	3,530.54	295.52	-262.30	302.67	1.49
3,660.00	9.52	321.90	3,624.33	307.59	-271.40	313.43	0.86
3,755.00	11.09	321.83	3,717.79	320.96	-281.89	325.77	1.65
3,850.00	12.08	320.02	3,810.85	335.76	-293.93	339.84	1.11
3,945.00	11.75	317.26	3,903.81	350.48	-306.88	354.80	0.69
4,039.00	10.03	316.20	3,996.11	363.42	-319.04	368.72	1.84
4,134.00	9.81	322.31	4,089.69	375.79	-329.72	381.09	1.13
4,229.00	8.79	322.28	4,183.44	387.94	-339.10	392.15	1.07
4,324.00	7.70	319.89	4,277.46	398.55	-347.65	402.15	1.20
4,419.00	8.17	319.99	4,371.55	408.59	-356.09	411.97	0.49
4,513.00	8.03	318.13	4,464.61	418.59	-364.76	422.02	0.32
4,608.00	8.90	319.15	4,558.58	429.09	-374.00	432.69	0.93
4,703.00	9.17	315.11	4,652.40	440.01	-384.15	444.32	0.73
4,798.00	9.78	315.58	4,746.10	451.14	-395.14	456.82	0.65
4,893.00	7.58	315.96	4,840.01	461.41	-405.14	468.22	2.32
4,988.00	8.33	316.40	4,934.09	470.90	-414.24	478.61	0.79

Design Report for Wells Ranch AA26-65HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,083.00	9.66	320.55	5,027.92	482.03	-424.05	489.94	1.56
5,178.00	9.90	320.11	5,121.54	494.46	-434.36	501.95	0.26
5,273.00	8.21	316.76	5,215.36	505.66	-444.24	513.36	1.86
5,368.00	8.43	327.49	5,309.36	516.48	-452.63	523.24	1.65
5,463.00	7.83	324.15	5,403.41	527.60	-460.16	532.32	0.80
5,558.00	8.10	325.10	5,497.49	538.33	-467.78	541.43	0.32
5,653.00	9.55	326.83	5,591.37	550.42	-475.92	551.25	1.55
5,748.00	7.53	327.72	5,685.31	562.28	-483.56	560.53	2.13
5,843.00	7.37	331.20	5,779.51	572.88	-489.82	568.28	0.50
5,938.00	7.11	326.81	5,873.75	583.14	-495.97	575.86	0.64
6,050.00	9.18	315.32	5,984.62	595.29	-506.05	587.61	2.34
6,107.00	9.25	308.19	6,040.89	601.36	-512.85	595.22	2.01
6,120.00	9.63	306.58	6,053.71	602.65	-514.54	597.09	3.56
6,167.00	11.28	307.47	6,099.93	607.79	-521.35	604.57	3.53
6,215.00	15.74	304.10	6,146.59	614.30	-530.47	614.54	9.43
6,262.00	19.24	303.01	6,191.41	622.10	-542.25	627.33	7.48
6,310.00	22.21	298.79	6,236.30	630.78	-556.83	643.03	6.92
6,357.00	25.45	294.17	6,279.29	639.19	-573.84	661.08	7.95
6,404.00	30.56	290.58	6,320.78	647.53	-594.25	682.50	11.44
6,451.00	35.13	288.73	6,360.26	656.08	-618.26	707.49	9.95
6,499.00	38.74	291.46	6,398.62	666.01	-645.33	735.72	8.26
6,546.00	43.02	295.62	6,434.15	678.34	-673.49	765.38	10.79
6,594.00	46.55	297.55	6,468.22	693.48	-703.71	797.49	7.88
6,641.00	50.90	296.09	6,499.22	709.40	-735.23	831.00	9.54
6,689.00	55.61	292.79	6,527.93	725.27	-770.24	867.96	11.25
6,736.00	60.56	288.38	6,552.78	739.25	-807.58	906.94	13.20
6,784.00	63.96	283.77	6,575.13	750.98	-848.39	949.02	11.06
6,831.00	66.55	280.77	6,594.80	760.04	-890.09	991.60	8.00
6,879.00	69.73	276.94	6,612.68	766.88	-934.09	1,036.13	9.94
6,926.00	73.10	273.94	6,627.66	771.09	-978.43	1,080.61	9.38
6,974.00	77.40	271.79	6,639.88	773.40	-1,024.78	1,126.79	9.95
7,011.00	80.47	271.51	6,646.98	774.45	-1,061.07	1,162.85	8.33
7,058.00	83.10	270.69	6,653.69	775.34	-1,107.58	1,208.98	5.86
Estimated: 7" Casing @ 7058' MD, 6653.69' TVD							
7,143.00	87.87	269.24	6,660.38	775.29	-1,192.28	1,292.78	5.86
7,237.00	90.83	269.23	6,661.44	774.03	-1,286.26	1,385.56	3.15
7,332.00	89.57	269.69	6,661.11	773.14	-1,381.25	1,479.40	1.41
7,427.00	90.40	271.68	6,661.14	774.27	-1,476.24	1,573.54	2.27
7,522.00	88.18	272.46	6,662.31	777.70	-1,571.16	1,667.94	2.48
7,617.00	87.10	273.80	6,666.23	782.89	-1,665.94	1,762.46	1.81
7,712.00	89.44	274.04	6,669.09	789.38	-1,760.67	1,857.12	2.48
7,807.00	87.66	272.30	6,671.50	794.63	-1,855.48	1,951.68	2.62
7,902.00	85.80	269.68	6,676.92	796.27	-1,950.30	2,045.72	3.38
7,997.00	87.60	267.52	6,682.39	793.95	-2,045.11	2,139.17	2.96
8,091.00	90.28	267.15	6,684.12	789.58	-2,138.98	2,231.40	2.88
8,186.00	91.36	267.42	6,682.77	785.08	-2,233.86	2,324.61	1.17
8,281.00	91.51	268.46	6,680.39	781.67	-2,328.77	2,418.00	1.11
8,376.00	91.26	270.04	6,678.09	780.43	-2,423.73	2,511.76	1.68
8,470.00	90.31	272.16	6,676.80	782.23	-2,517.70	2,604.98	2.47
8,565.00	89.48	271.58	6,676.98	785.33	-2,612.65	2,699.36	1.07
8,660.00	87.66	271.11	6,679.35	787.56	-2,707.59	2,793.61	1.98

Design Report for Wells Ranch AA26-65HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,755.00	86.95	269.39	6,683.81	787.97	-2,802.48	2,887.54	1.96
8,850.00	90.06	269.80	6,686.29	787.30	-2,897.43	2,981.37	3.30
8,945.00	87.94	268.74	6,687.95	786.09	-2,992.40	3,075.15	2.49
9,040.00	88.15	268.52	6,691.19	783.82	-3,087.32	3,168.72	0.32
9,134.00	90.74	269.33	6,692.10	782.06	-3,181.29	3,261.42	2.89
9,230.00	88.09	268.55	6,693.08	780.28	-3,277.26	3,356.10	2.88
9,324.00	90.65	269.81	6,694.12	778.94	-3,371.23	3,448.87	3.04
9,419.00	88.33	268.66	6,694.96	777.67	-3,466.21	3,542.64	2.73
9,514.00	89.26	268.56	6,696.96	775.37	-3,561.16	3,636.24	0.98
9,609.00	90.00	268.45	6,697.57	772.89	-3,656.13	3,729.82	0.79
9,704.00	89.63	267.46	6,697.88	769.50	-3,751.06	3,823.25	1.11
9,799.00	89.72	267.43	6,698.42	765.26	-3,845.97	3,916.51	0.10
9,894.00	89.91	268.25	6,698.72	761.68	-3,940.90	4,009.90	0.89
9,989.00	88.77	268.92	6,699.82	759.34	-4,035.86	4,103.50	1.39
10,084.00	89.82	271.07	6,700.99	759.33	-4,130.85	4,197.47	2.52
10,178.00	92.28	273.03	6,699.26	762.69	-4,224.76	4,290.86	3.35
10,273.00	90.77	274.44	6,696.74	768.88	-4,319.52	4,385.51	2.17
10,368.00	88.49	273.90	6,697.35	775.78	-4,414.26	4,480.24	2.47
10,463.00	89.66	273.47	6,698.88	781.89	-4,509.05	4,574.90	1.31
10,558.00	88.92	273.41	6,700.06	787.59	-4,603.87	4,669.54	0.78
10,593.00	89.54	273.64	6,700.53	789.74	-4,638.80	4,704.41	1.89
Final MWD Survey @ 10593.00ft							
10,655.00	89.54	273.64	6,701.03	793.68	-4,700.67	4,766.19	0.00
Straight Line Proj @ 10655' MD, 6701.03' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
982.00	981.98	-0.20	4.29	Tie-On to Surface Gyros @ 982.00ft
1,014.00	1,013.98	-0.10	4.06	First MWD Survey @ 1014.00ft
10,593.00	6,700.53	789.74	-4,638.80	Final MWD Survey @ 10593.00ft
10,655.00	6,701.03	793.68	-4,700.67	Straight Line Proj @ 10655' MD, 6701.03' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Wells Ranch AA26-65HN (Rev A1) BHL	278.40	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
250.00	982.00	Surface Gyros	Flexi-Shot
1,014.00	7,011.00	MWD Surveys - Vert/Build	MWD+IFR1+MS_WY
7,143.00	10,593.00	MWD Surveys - Lateral	MWD+IFR1+MS+sag

Design Report for Wells Ranch AA26-65HN - Final Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,058.00	6,653.69	Estimated: 7" Casing @ 7058' MD, 6653.69' TVD	7	8-3/4

Wellbore Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
NW/SW (Wells Ranch	0.00	0.00	0.00	36.43	-0.45	1,410,610.60	3,307,745.56	40° 27' 18.936 N	104° 23' 38.760 W
- actual wellpath misses target center by 36.43usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-1,896.14	-5,431.73	1,408,714.53	3,302,314.03	
Point 2				0.00	-1,863.48	-135.41	1,408,747.19	3,307,610.16	
Point 3				0.00	3,451.71	-182.19	1,414,062.18	3,307,563.38	
Point 4				0.00	3,415.48	-5,471.76	1,414,025.95	3,302,274.00	
NW/SW (Wells Ranch	0.00	0.00	0.00	36.43	-0.45	1,410,610.60	3,307,745.56	40° 27' 18.936 N	104° 23' 38.760 W
- actual wellpath misses target center by 36.43usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-1,403.48	324.59	1,409,207.17	3,308,070.14	
Point 2				0.00	-1,337.18	4,678.23	1,409,273.47	3,312,423.62	
Point 3				0.00	3,047.32	4,649.94	1,413,657.81	3,312,395.33	
Point 4				0.00	2,990.21	277.81	1,413,600.70	3,308,023.36	
NW/SW (Wells Ranch	0.00	0.00	0.00	36.43	-0.45	1,410,610.60	3,307,745.56	40° 27' 18.936 N	104° 23' 38.760 W
- actual wellpath misses target center by 36.43usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-1,863.48	-135.41	1,408,747.19	3,307,610.16	
Point 2				0.00	-1,797.18	5,138.23	1,408,813.48	3,312,883.60	
Point 3				0.00	3,507.32	5,109.94	1,414,117.79	3,312,855.31	
Point 4				0.00	3,451.71	-182.19	1,414,062.18	3,307,563.38	
Wells Ranch AA26-65I	0.00	0.00	0.00	0.00	0.00	1,410,574.17	3,307,746.01	40° 27' 18.576 N	104° 23' 38.760 W
- actual wellpath hits target center									
- Point									
NW/SW (Wells Ranch	0.00	0.00	0.00	36.43	-0.45	1,410,610.60	3,307,745.56	40° 27' 18.936 N	104° 23' 38.760 W
- actual wellpath misses target center by 36.43usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-1,436.14	-4,971.73	1,409,174.51	3,302,774.01	
Point 2				0.00	-1,403.48	-595.41	1,409,207.17	3,307,150.17	
Point 3				0.00	2,990.21	-642.19	1,413,600.70	3,307,103.40	
Point 4				0.00	2,958.48	-5,008.01	1,413,568.97	3,302,737.74	
Wells Ranch AA26-65I	0.00	0.00	6,657.55	783.35	-1,125.00	1,411,357.49	3,306,621.05	40° 27' 26.454 N	104° 23' 53.186 W
- actual wellpath misses target center by 8.07usft at 7075.68usft MD (6655.66 TVD, 775.51 N, -1125.14 E)									
- Point									
Wells Ranch AA26-65I	0.00	0.00	6,711.14	783.35	-5,303.15	1,411,357.49	3,302,443.06	40° 27' 26.964 N	104° 24' 47.232 W
- actual wellpath misses target center by 602.65usft at 10655.00usft MD (6701.03 TVD, 793.68 N, -4700.67 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	2.10 °/100usft	Maximum Dogleg over Survey:	13.20 °/100usft at 6,736.00 usft
Net Tortousity applicable to Plans:	1.19 °/100usft	Directional Difficulty Index:	6.253

Audit Info

North Reference Sheet for Sec. 25-T6N-R63W - NW/SW (Wells Ranch AA26 PAD) - Wells Ranch AA26-65HN

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

Vertical Depths are relative to RKB 24 ft. @ 4815.00usft (H&P 322). Northing and Easting are relative to Wells Ranch AA26-65HN - Slot A2

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° 30' 0.000 W°, Longitude Origin: 0° 0' 0.000 E°, Latitude Origin: 40° 47' 0.000 N°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996319

Grid Coordinates of Well: 1,410,574.17 usft N, 3,307,746.01 usft E

Geographical Coordinates of Well: 40° 27' 18.58" N, 104° 23' 38.76" W

Grid Convergence at Surface is: 0.71°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,655.00usft the Bottom Hole Displacement is 4,767.21usft in the Direction of 279.58° (Grid).

Magnetic Convergence at surface is: -7.68° (22 September 2013, , BGGM2013)

