

Project: Weld County, CO (NAD 83)
Site: Sec. 25-T6N-R63W - NW/SW (Wells Ranch AA26 PAD)
Well: Wells Ranch AA26-64-1HC
Wellbore: Plan B
Design: Final Surveys

Noble Energy



Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Wells Ranch AE20-63-1HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.

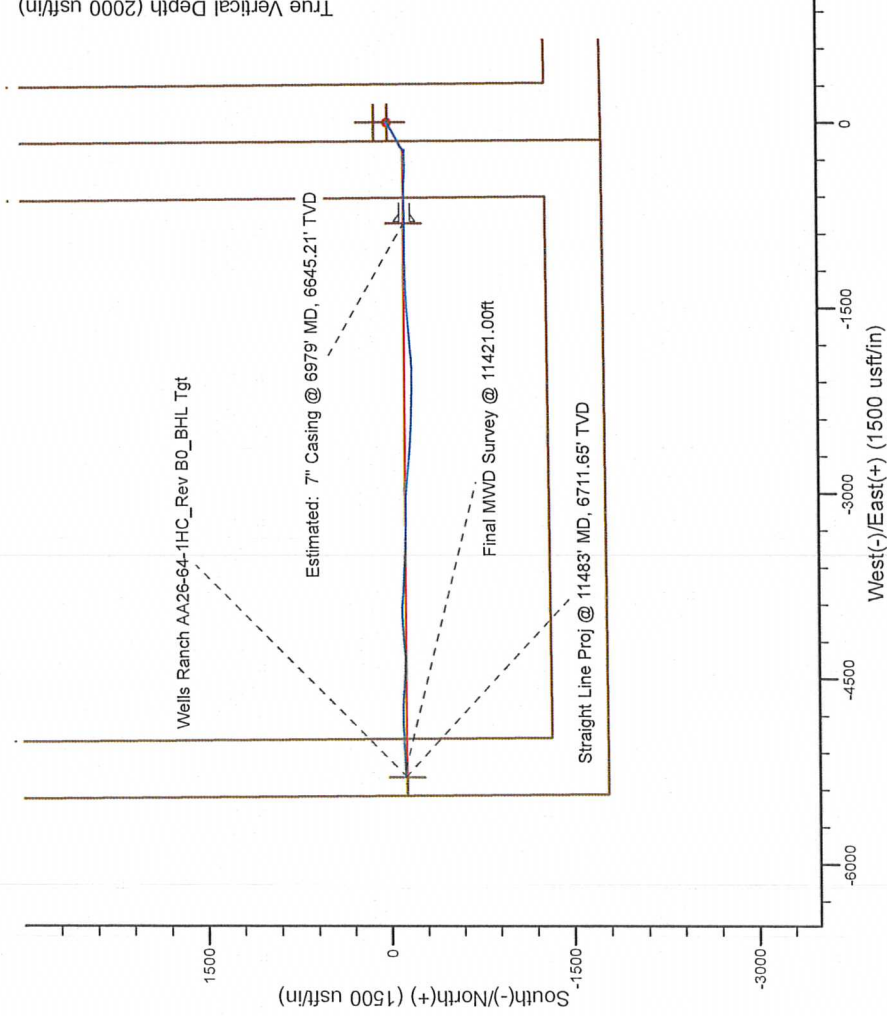
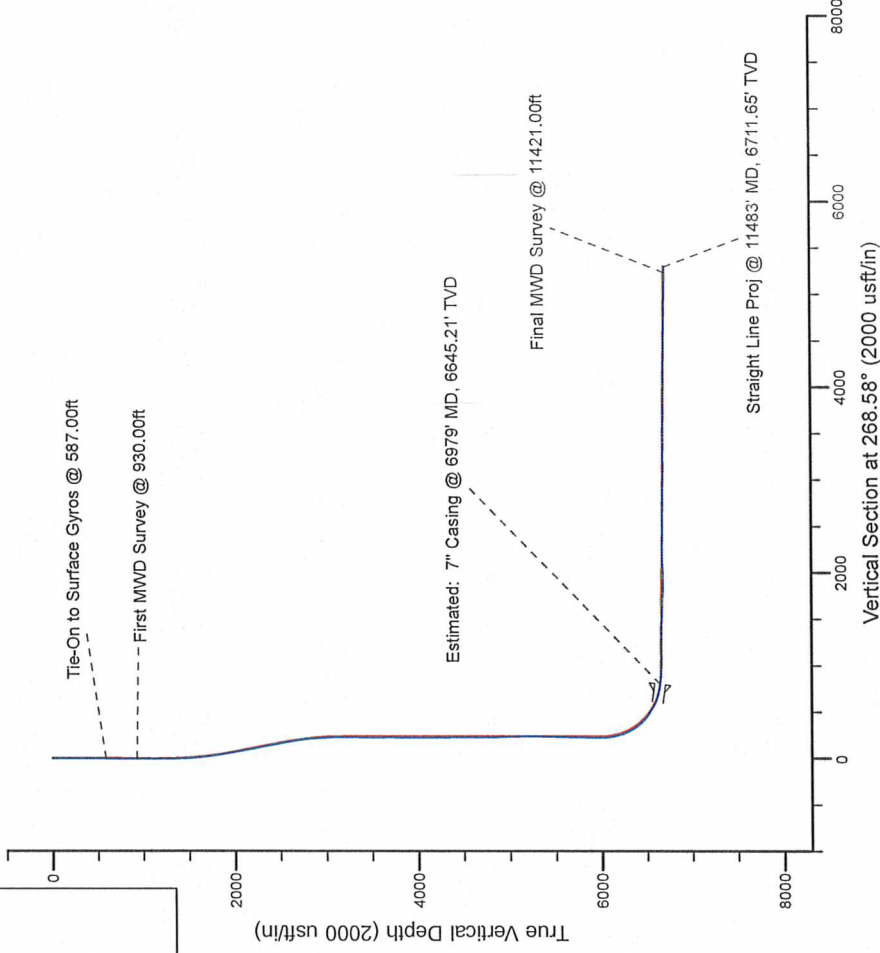
Platted SHL: 1749' FSL, 153' FWL
Platted Lat/Long: 40.45495° N, 104.39410° W
Location: Sec. 25-T6N-R63W

7" Casing: ~1618.55' FSL, ~649.74' FEL
Lat/Long: 40° 27' 16.575" N, 104° 23' 49.140" W
State Planes - CO Northern: 1,410,361.88' N, 3,306,946.19' E
Location: Sec. 26-T6N-R63W

BHL: ~1667.13' FSL, ~149.66' FWL
Lat/Long: 40° 27' 17.329" N, 104° 24' 47.282" W
State Planes - CO Northern: 1,410,382.54' N, 3,302,451.12' E
Location: Sec. 26-T6N-R63W

LEGEND

- Wells Ranch AA26-64-1HC, Plan B, Rev B1 Proposal V0
- Final Surveys



WELL DETAILS: Wells Ranch AA26-64-1HC

Ground Level: 4790.00
RKB 24 ft. @ 4814.00usft (H&P 322)

Design: Final Surveys (Wells Ranch AA26-64-1HC/Plan B)

Created By: Fred Hartmann Date: 10/15/2013

Noble Energy

Weld County, CO (NAD 83)

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

Wells Ranch AA26-64-1HC - A4

Design: Final Surveys

Sperry Drilling Services

Final Survey Report

15 October, 2013

Well Coordinates: 1,410,497.67 N, 3,307,746.97 E (40° 27' 17.82" N, 104° 23' 38.76" W)

Ground Level: 4,790.00 usft

Local Coordinate Origin:

Centered on Well Wells Ranch AA26-64-1HC - Slot A4

Viewing Datum:

RKB 24 ft. @ 4814.00usft (H&P 322)

TVDs to System:

N

North Reference:

Grid

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

HALLIBURTON

Design Report for Wells Ranch AA26-64-1HC - 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
300.00	0.50	57.80	300.00	0.70	1.11	-1.12	0.17
587.00	0.60	30.30	586.98	2.66	2.93	-2.99	0.10
Tie-On to Surface Gyros @ 587.00ft							
930.00	0.20	82.70	929.98	4.29	4.43	-4.53	0.15
First MWD Survey @ 930.00ft							
1,014.00	0.31	39.89	1,013.97	4.48	4.72	-4.83	0.25
1,107.00	0.28	269.74	1,106.97	4.67	4.65	-4.76	0.58
1,200.00	0.25	276.75	1,199.97	4.70	4.22	-4.34	0.05
1,293.00	0.19	242.85	1,292.97	4.65	3.88	-4.00	0.15
1,387.00	1.89	235.26	1,386.95	3.70	2.47	-2.56	1.81
1,480.00	3.98	237.33	1,479.83	1.08	-1.51	1.48	2.25
1,575.00	5.61	236.64	1,574.49	-3.25	-8.16	8.24	1.72
1,670.00	6.99	247.64	1,668.92	-8.01	-17.39	17.58	1.92
1,764.00	8.93	240.48	1,762.01	-13.78	-29.03	29.36	2.31
1,859.00	10.72	244.07	1,855.61	-21.28	-43.39	43.90	1.99
1,954.00	11.53	239.74	1,948.83	-29.92	-59.54	60.26	1.22
2,049.00	12.27	237.64	2,041.79	-40.11	-76.26	77.23	0.90
2,144.00	10.96	236.49	2,134.84	-50.50	-92.32	93.54	1.40
2,239.00	11.72	238.09	2,227.99	-60.59	-108.04	109.51	0.87
2,333.00	12.72	243.19	2,319.86	-70.30	-125.38	127.08	1.56
2,428.00	12.62	245.05	2,412.54	-79.40	-144.13	146.05	0.44
2,523.00	12.23	242.50	2,505.32	-88.42	-162.46	164.60	0.71
2,618.00	11.65	241.44	2,598.26	-97.65	-179.81	182.17	0.65
2,713.00	10.57	238.04	2,691.48	-106.85	-195.63	198.21	1.33
2,807.00	7.93	231.45	2,784.26	-115.46	-208.02	210.81	3.02
2,903.00	5.90	228.78	2,879.55	-122.84	-216.91	219.88	2.14
2,998.00	3.79	219.72	2,974.21	-128.47	-222.59	225.70	2.36
3,093.00	1.63	211.02	3,069.10	-132.04	-225.29	228.49	2.31
3,187.00	0.46	118.52	3,163.08	-133.37	-225.65	228.88	1.82
3,282.00	0.93	157.69	3,258.08	-134.26	-225.02	228.28	0.68
3,377.00	1.05	177.51	3,353.06	-135.85	-224.69	227.98	0.38
3,472.00	1.49	175.07	3,448.04	-137.95	-224.55	227.89	0.47
3,567.00	1.34	169.87	3,543.01	-140.27	-224.25	227.65	0.21
3,661.00	0.74	17.04	3,637.00	-140.77	-223.88	227.29	2.16
3,756.00	0.92	51.69	3,731.99	-139.71	-223.10	226.49	0.55
3,851.00	0.99	28.72	3,826.98	-138.52	-222.11	225.46	0.41
3,946.00	0.82	14.41	3,921.97	-137.14	-221.54	224.87	0.30
4,040.00	0.34	318.24	4,015.96	-136.28	-221.56	224.86	0.74
4,135.00	0.69	263.60	4,110.96	-136.14	-222.32	225.62	0.60
4,230.00	0.36	290.72	4,205.96	-136.09	-223.16	226.46	0.43
4,325.00	0.90	212.28	4,300.95	-136.62	-223.84	227.15	0.95
4,420.00	1.42	186.10	4,395.93	-138.42	-224.36	227.72	0.77
4,514.00	1.59	197.68	4,489.90	-140.82	-224.88	228.30	0.37
4,609.00	0.54	268.44	4,584.89	-142.09	-225.73	229.18	1.58
4,704.00	0.55	273.93	4,679.88	-142.07	-226.63	230.08	0.06
4,799.00	0.72	0.60	4,774.88	-141.44	-227.08	230.51	0.93
4,894.00	1.60	319.90	4,869.86	-139.83	-227.93	231.32	1.21
4,989.00	1.85	300.89	4,964.82	-138.03	-230.10	233.45	0.65
5,084.00	1.53	283.14	5,059.78	-136.95	-232.65	235.97	0.64

Design Report for Wells Ranch AA26-64-1HC - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,179.00	0.40	270.93	5,154.76	-136.66	-234.22	237.53	1.20
5,274.00	0.18	193.07	5,249.76	-136.80	-234.58	237.90	0.42
5,369.00	0.83	87.27	5,344.76	-136.91	-233.93	237.25	0.94
5,464.00	1.63	92.20	5,439.73	-136.93	-231.89	235.21	0.85
5,559.00	1.20	96.99	5,534.70	-137.10	-229.56	232.88	0.47
5,654.00	0.73	97.29	5,629.69	-137.30	-227.97	231.30	0.49
5,749.00	1.09	77.36	5,724.68	-137.18	-226.49	229.81	0.50
5,844.00	1.73	117.43	5,819.65	-137.64	-224.33	227.67	1.20
5,920.00	0.96	99.74	5,895.63	-138.28	-222.69	226.04	1.14
6,027.00	0.57	61.59	6,002.62	-138.18	-221.33	224.69	0.58
6,074.00	3.92	289.23	6,049.59	-137.54	-222.65	225.98	9.20
6,121.00	8.60	274.23	6,096.30	-136.75	-227.67	230.98	10.46
6,169.00	12.61	270.36	6,143.47	-136.45	-236.49	239.80	8.48
6,216.00	16.14	270.52	6,188.99	-136.36	-248.16	251.46	7.51
6,263.00	19.51	269.03	6,233.73	-136.43	-262.54	265.84	7.24
6,311.00	23.04	266.13	6,278.45	-137.20	-279.94	283.24	7.67
6,358.00	27.59	265.20	6,320.93	-138.74	-299.97	303.31	9.72
6,406.00	32.75	265.94	6,362.41	-140.59	-324.01	327.39	10.78
6,453.00	37.80	268.82	6,400.77	-141.78	-351.11	354.51	11.31
6,501.00	42.15	272.38	6,437.55	-141.42	-381.93	385.31	10.24
6,548.00	46.92	273.49	6,471.04	-139.72	-414.84	418.17	10.28
6,596.00	51.52	273.77	6,502.39	-137.41	-451.10	454.36	9.59
6,643.00	55.69	274.15	6,530.27	-134.80	-488.84	492.02	8.90
6,691.00	59.76	272.73	6,555.89	-132.38	-529.34	532.45	8.84
6,738.00	63.52	269.88	6,578.22	-131.45	-570.67	573.75	9.62
6,786.00	67.64	267.91	6,598.06	-132.31	-614.36	617.44	9.36
6,833.00	71.68	267.69	6,614.39	-134.00	-658.38	661.50	8.61
6,881.00	75.74	268.87	6,627.86	-135.38	-704.43	707.56	8.78
6,933.00	80.65	269.71	6,638.49	-136.00	-755.31	758.44	9.57
6,979.00	82.55	270.30	6,645.21	-136.00	-800.81	803.93	4.31
Estimated: 7" Casing @ 6979' MD, 6645.21' TVD							
7,046.00	85.31	271.15	6,652.30	-135.16	-867.42	870.50	4.31
7,141.00	88.18	269.81	6,657.69	-134.36	-962.25	965.28	3.33
7,236.00	88.33	269.09	6,660.59	-135.27	-1,057.20	1,060.23	0.77
7,331.00	92.65	268.74	6,659.77	-137.07	-1,152.16	1,155.20	4.56
7,426.00	90.03	268.91	6,657.55	-139.02	-1,247.11	1,250.16	2.76
7,521.00	87.94	268.30	6,659.23	-141.33	-1,342.06	1,345.14	2.29
7,616.00	86.86	266.48	6,663.54	-145.65	-1,436.86	1,440.02	2.23
7,711.00	87.62	266.54	6,668.12	-151.43	-1,531.57	1,534.85	0.80
7,806.00	87.53	265.76	6,672.14	-157.80	-1,626.27	1,629.68	0.83
7,901.00	86.33	264.71	6,677.23	-165.68	-1,720.80	1,724.37	1.68
7,995.00	88.52	264.55	6,681.45	-174.47	-1,814.29	1,818.05	2.34
8,090.00	88.95	266.04	6,683.55	-182.26	-1,908.94	1,912.87	1.63
8,185.00	93.03	267.54	6,681.91	-187.58	-2,003.76	2,007.78	4.58
8,280.00	93.18	271.15	6,676.76	-188.66	-2,098.60	2,102.62	3.80
8,374.00	91.26	271.88	6,673.12	-186.18	-2,192.49	2,196.42	2.18
8,469.00	88.67	271.96	6,673.17	-183.00	-2,287.43	2,291.25	2.73
8,564.00	89.08	271.41	6,675.04	-180.20	-2,382.37	2,386.10	0.72
8,659.00	89.54	272.33	6,676.18	-177.10	-2,477.31	2,480.93	1.08
8,754.00	89.78	273.53	6,676.75	-172.25	-2,572.18	2,575.65	1.29
8,849.00	89.44	274.34	6,677.39	-165.73	-2,666.95	2,670.24	0.92

Design Report for Wells Ranch AA26-64-1HC - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,944.00	89.41	275.15	6,678.35	-157.87	-2,761.62	2,764.68	0.85
9,038.00	89.38	276.61	6,679.34	-148.24	-2,855.12	2,857.91	1.55
9,133.00	87.53	274.95	6,681.90	-138.68	-2,949.59	2,952.12	2.62
9,228.00	87.56	272.25	6,685.97	-132.72	-3,044.31	3,046.66	2.84
9,323.00	90.77	268.24	6,687.36	-132.31	-3,139.27	3,141.58	5.41
9,418.00	92.34	269.89	6,684.78	-133.86	-3,234.21	3,236.54	2.40
9,513.00	89.51	270.73	6,683.25	-133.35	-3,329.19	3,331.47	3.11
9,608.00	89.44	273.97	6,684.12	-129.45	-3,424.09	3,426.25	3.41
9,703.00	87.78	274.21	6,686.42	-122.68	-3,518.82	3,520.78	1.77
9,798.00	90.34	271.83	6,687.98	-117.68	-3,613.66	3,615.47	3.68
9,893.00	89.88	272.86	6,687.80	-113.79	-3,708.58	3,710.26	1.19
9,988.00	90.77	273.83	6,687.26	-108.25	-3,803.41	3,804.93	1.39
10,082.00	88.71	273.85	6,687.68	-101.95	-3,897.20	3,898.53	2.19
10,177.00	87.56	269.39	6,690.78	-99.27	-3,992.08	3,993.32	4.85
10,272.00	88.55	266.00	6,694.00	-103.09	-4,086.94	4,088.24	3.72
10,367.00	90.09	264.65	6,695.13	-110.83	-4,181.61	4,183.07	2.16
10,461.00	89.45	266.56	6,695.51	-118.03	-4,275.33	4,276.94	2.14
10,556.00	89.97	270.84	6,695.99	-120.19	-4,370.28	4,371.92	4.54
10,651.00	89.07	271.21	6,696.78	-118.49	-4,465.26	4,466.82	1.02
10,746.00	89.66	275.13	6,697.84	-113.24	-4,560.09	4,561.50	4.17
10,841.00	87.75	274.94	6,699.98	-104.90	-4,654.69	4,655.87	2.02
10,936.00	86.64	270.70	6,704.64	-100.23	-4,749.44	4,750.47	4.61
11,031.00	88.61	267.70	6,708.57	-101.56	-4,844.34	4,845.37	3.78
11,126.00	90.49	267.32	6,709.32	-105.69	-4,939.24	4,940.34	2.02
11,221.00	89.63	268.09	6,709.22	-109.49	-5,034.16	5,035.33	1.22
11,316.00	89.07	267.51	6,710.30	-113.14	-5,129.08	5,130.31	0.85
11,421.00	89.75	270.14	6,711.38	-115.29	-5,234.05	5,235.30	2.59
Final MWD Survey @ 11421.00ft							
11,483.00	89.75	270.14	6,711.65	-115.14	-5,296.05	5,297.27	0.00
Straight Line Proj @ 11483' MD, 6711.65' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
587.00	586.98	2.66	2.93	Tie-On to Surface Gyros @ 587.00ft
930.00	929.98	4.29	4.43	First MWD Survey @ 930.00ft
11,421.00	6,711.38	-115.29	-5,234.05	Final MWD Survey @ 11421.00ft
11,483.00	6,711.65	-115.14	-5,296.05	Straight Line Proj @ 11483' MD, 6711.65' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Wells Ranch AA26-64-1HC_Rev B0_BHL Tgt	268.58	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
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Design Report for Wells Ranch AA26-64-1HC - Final Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
300.00	587.00	Surface Gyros	Flexi-Shot
930.00	6,933.00	MWD Surveys - Vert/Build	MWD+IFR1+MS_WY
7,046.00	11,421.00	MWD Surveys - Lateral	MWD+IFR1+MS+sag

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
6,979.00	6,645.21	Estimated: 7" Casing @ 6979' MD, 6645.21' TVD	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
NW/SW (Wells Ranch	0.00	0.00	-1.00	112.93	-1.41	1,410,610.60	3,307,745.56	40° 27' 18.936 N	104° 23' 38.760 W
- actual wellpath misses target center by 112.94usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			-1.00	-1,896.14	-5,431.73	1,408,714.53	3,302,314.03		
Point 2			-1.00	-1,863.48	-135.41	1,408,747.19	3,307,610.16		
Point 3			-1.00	3,451.71	-182.19	1,414,062.18	3,307,563.38		
Point 4			-1.00	3,415.48	-5,471.76	1,414,025.95	3,302,274.00		
NW/SW (Wells Ranch	0.00	0.00	-1.00	112.93	-1.41	1,410,610.60	3,307,745.56	40° 27' 18.936 N	104° 23' 38.760 W
- actual wellpath misses target center by 112.94usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			-1.00	-1,403.48	324.59	1,409,207.17	3,308,070.14		
Point 2			-1.00	-1,337.18	4,678.23	1,409,273.47	3,312,423.62		
Point 3			-1.00	3,047.32	4,649.94	1,413,657.81	3,312,395.33		
Point 4			-1.00	2,990.21	277.81	1,413,600.70	3,308,023.36		
NW/SW (Wells Ranch	0.00	0.00	-1.00	112.93	-1.41	1,410,610.60	3,307,745.56	40° 27' 18.936 N	104° 23' 38.760 W
- actual wellpath misses target center by 112.94usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			-1.00	-1,863.48	-135.41	1,408,747.19	3,307,610.16		
Point 2			-1.00	-1,797.18	5,138.23	1,408,813.48	3,312,883.60		
Point 3			-1.00	3,507.32	5,109.94	1,414,117.79	3,312,855.31		
Point 4			-1.00	3,451.71	-182.19	1,414,062.18	3,307,563.38		
NW/SW (Wells Ranch	0.00	0.00	-1.00	112.93	-1.41	1,410,610.60	3,307,745.56	40° 27' 18.936 N	104° 23' 38.760 W
- actual wellpath misses target center by 112.94usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			-1.00	-1,436.14	-4,971.73	1,409,174.51	3,302,774.01		
Point 2			-1.00	-1,403.48	-595.41	1,409,207.17	3,307,150.17		
Point 3			-1.00	2,990.21	-642.19	1,413,600.70	3,307,103.40		
Point 4			-1.00	2,958.48	-5,008.01	1,413,568.97	3,302,737.74		
Wells Ranch AA26-64-	0.00	0.00	6,705.48	-131.08	-5,297.53	1,410,366.59	3,302,449.64	40° 27' 17.172 N	104° 24' 47.304 W
- actual wellpath misses target center by 17.16usft at 11483.00usft MD (6711.65 TVD, -115.14 N, -5296.05 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	2.18 °/100usft	Maximum Dogleg over Survey:	11.31 °/100usft at 6,453.00 usft
Net Tortosity applicable to Plans:	1.19 °/100usft	Directional Difficulty Index:	6.364

Audit Info

**North Reference Sheet for Sec. 25-T6N-R63W - NW/SW (Wells Ranch AA26 PAD) -
Wells Ranch AA26-64-1HC -**

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. @ 4814.00usft (H&P 322). Northing and Easting are relative to Wells Ranch AA26-64-1HC - Slot A4

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: 0.99996318

Grid Coordinates of Well: 1,410,497.67 usft N, 3,307,746.97 usft E

Geographical Coordinates of Well: 40° 27' 17.82" N, 104° 23' 38.76" W

Grid Convergence at Surface is: 0.71°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,483.00usft
the Bottom Hole Displacement is 5,297.30usft in the Direction of 268.75° (Grid).

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

