

Project: Weld County, CO (NAD 83)  
Site: Sec. 20-T6N-R62W (Wells Ranch AE PAD)  
Well: Wells Ranch USX AE20-62-1HN  
Wellbore: Plan A  
Design: Final Surveys

# Noble Energy



Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Wells Ranch AE20-62-1HN 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.

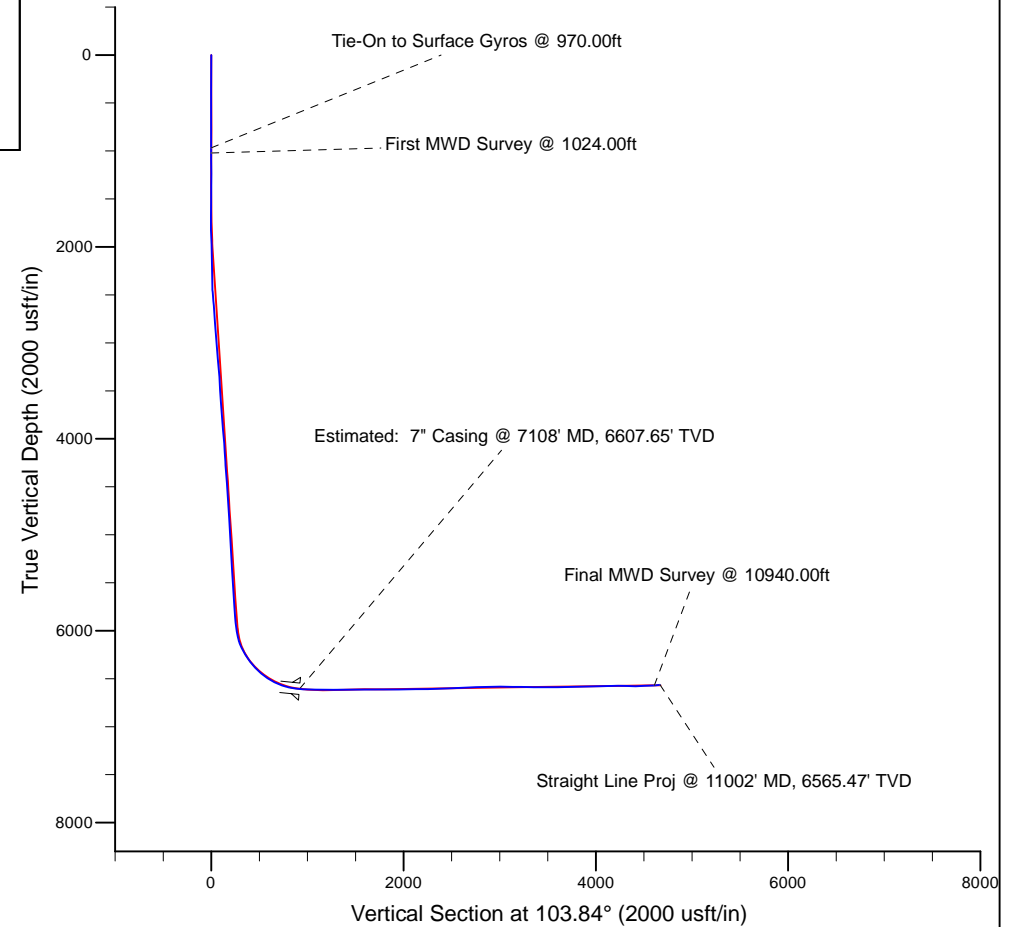
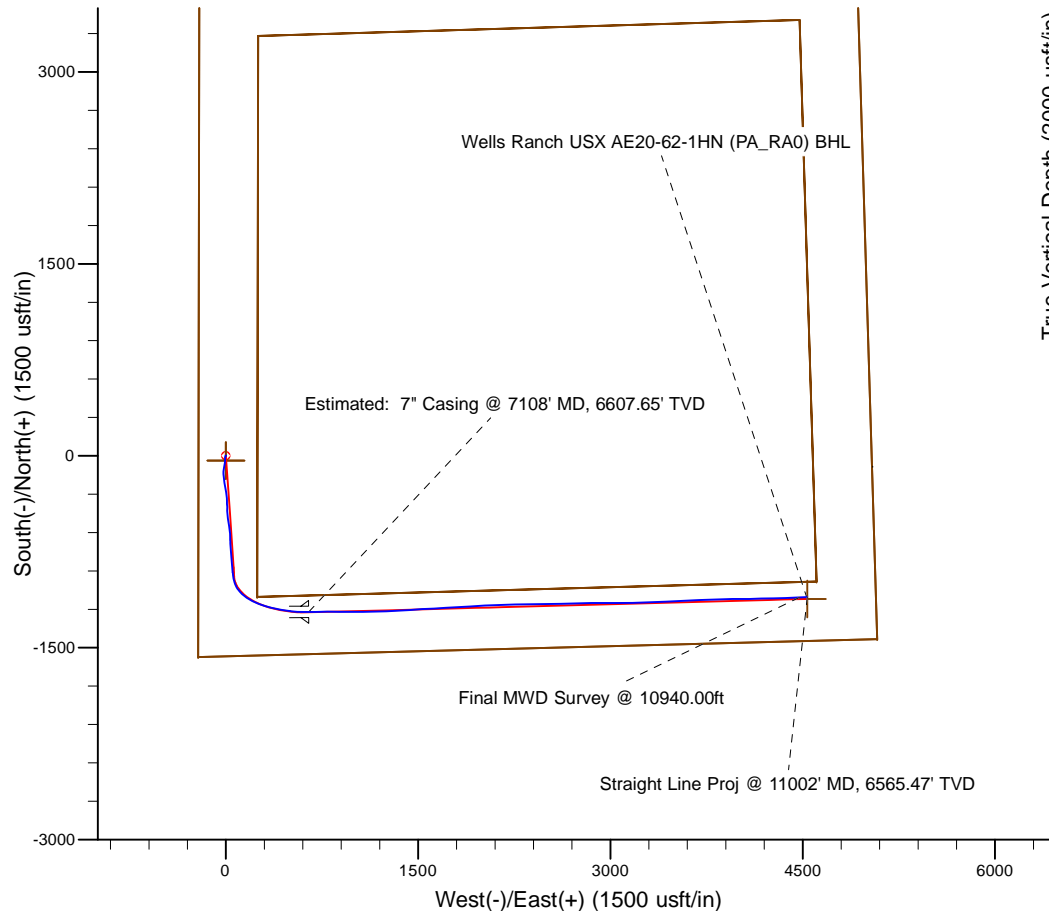
Platted SHL: 1568' FSL, 215' FWL  
Platted Lat/Long: 40.46927° N, 104.3553° W  
Location: Sec. 20-T6N-R62W

7" Casing: ~328.99' FSL, ~861.91' FWL  
Lat/Long: 40° 27' 57.226 N, 104° 21' 11.030 W  
State Planes - CO Northern: 1,414,630.08' N, 3,319,114.17' E  
Location: Sec. 20-T6N-R62W

BHL: ~342.09' FSL, ~534.13' FEL  
Lat/Long: 40° 27' 57.884 N, 104° 20' 20.688 W  
State Planes - CO Northern: 1,414,747.30' N, 3,323,003.83' E  
Location: Sec. 20-T6N-R62W

## LEGEND

- Wells Ranch USX AE20-62-1HN, Plan A, Rev A0 V0
- Final Surveys



WELL DETAILS: Wells Ranch USX AE20-62-1HN

Ground Level: 4785.00  
RKB 24 ft. @ 4809.00usft (H&P 343)

Created By: Fred Hartmann  
Created On: 10/23/2013

# Noble Energy

Weld County, CO (NAD 83)

Sec. 20-T6N-R62W (Wells Ranch AE PAD)

Wells Ranch USX AE20-62-1HN - A2

Design: Final Surveys

## Sperry Drilling Services

### Final Survey Report

23 October, 2013

Well Coordinates: 1,415,850.95 N, 3,318,467.86 E (40° 28' 09.37" N, 104° 21' 19.19" W)

Ground Level: 4,785.00 usft

Local Coordinate Origin:

Centered on Well Wells Ranch USX AE20-62-1HN - Slot A2

Viewing Datum:

RKB 24 ft. @ 4809.00usft (H&P 343)

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 USX AE20-62-1HN - 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
370.00	0.20	293.64	370.00	0.26	-0.59	-0.64	0.05
647.00	0.50	12.64	646.99	1.63	-0.77	-1.14	0.18
970.00	0.20	33.74	969.99	3.48	-0.15	-0.98	0.10
<b>Tie-On to Surface Gyros @ 970.00ft</b>							
1,024.00	0.22	178.24	1,023.99	3.45	-0.09	-0.92	0.74
<b>First MWD Survey @ 1024.00ft</b>							
1,086.00	0.46	73.26	1,085.99	3.40	0.15	-0.67	0.90
1,179.00	0.52	137.95	1,178.98	3.20	0.79	0.00	0.57
1,271.00	0.19	351.75	1,270.98	3.04	1.05	0.29	0.75
1,364.00	0.04	114.18	1,363.98	3.18	1.05	0.26	0.23
1,457.00	0.28	294.91	1,456.98	3.26	0.88	0.07	0.34
1,550.00	2.23	217.29	1,549.96	1.92	-0.42	-0.87	2.35
1,641.00	3.65	211.35	1,640.84	-1.97	-3.00	-2.45	1.59
1,733.00	5.11	193.24	1,732.57	-8.46	-5.47	-3.28	2.17
1,826.00	7.15	184.72	1,825.04	-18.26	-6.89	-2.32	2.40
1,918.00	8.02	176.01	1,916.23	-30.37	-6.92	0.55	1.56
2,012.00	10.25	181.73	2,009.04	-45.27	-6.71	4.31	2.56
2,105.00	12.41	191.91	2,100.23	-63.32	-9.02	6.39	3.16
2,295.00	11.95	190.58	2,285.95	-102.63	-16.85	8.20	0.28
2,390.00	11.80	185.39	2,378.92	-121.97	-19.57	10.18	1.13
2,485.00	13.11	172.64	2,471.70	-142.33	-19.10	15.51	3.20
2,580.00	12.76	173.67	2,564.29	-163.45	-16.56	23.02	0.44
2,674.00	11.03	171.71	2,656.27	-182.66	-14.12	29.99	1.89
2,864.00	10.71	172.39	2,842.86	-218.15	-9.16	43.30	0.18
2,959.00	12.40	173.16	2,935.93	-237.03	-6.78	50.13	1.79
3,054.00	11.65	170.37	3,028.85	-256.61	-3.96	57.55	1.00
3,149.00	9.90	168.18	3,122.17	-274.06	-0.68	64.91	1.89
3,244.00	11.72	166.95	3,215.48	-291.46	3.17	72.81	1.93
3,529.00	13.46	182.05	3,493.69	-352.83	8.52	92.69	1.30
3,624.00	14.16	176.38	3,585.95	-375.47	8.86	98.44	1.60
3,719.00	14.43	178.29	3,678.01	-398.90	9.95	105.10	0.57
3,814.00	15.90	179.40	3,769.70	-423.75	10.44	111.52	1.58
3,909.00	16.55	176.63	3,860.91	-450.27	11.37	118.77	1.06
4,004.00	13.90	172.76	3,952.57	-475.10	13.60	126.88	2.99
4,099.00	11.37	171.03	4,045.27	-495.67	16.50	134.62	2.69
4,194.00	8.81	172.06	4,138.79	-512.13	18.96	140.95	2.70
4,289.00	9.10	175.06	4,232.63	-526.82	20.62	146.07	0.58
4,384.00	10.74	168.39	4,326.21	-542.98	23.05	152.29	2.11
4,479.00	11.04	170.29	4,419.50	-560.61	26.36	159.73	0.49
4,574.00	11.01	172.77	4,512.75	-578.58	29.04	166.63	0.50
4,668.00	11.39	174.88	4,604.96	-596.73	30.99	172.87	0.59
4,763.00	13.28	178.34	4,697.76	-616.98	32.15	178.84	2.14
4,858.00	11.80	176.83	4,790.49	-637.59	33.00	184.60	1.60
4,953.00	11.87	180.28	4,883.47	-657.06	33.49	189.73	0.75
5,048.00	12.96	176.19	4,976.25	-677.46	34.15	195.25	1.47
5,143.00	10.70	174.37	5,069.23	-696.86	35.72	201.42	2.41
5,238.00	8.61	175.11	5,162.88	-712.73	37.20	206.65	2.20
5,333.00	9.27	180.67	5,256.73	-727.47	37.71	210.67	1.14
5,428.00	10.71	177.45	5,350.28	-743.94	38.02	214.91	1.63

## Design Report for Wells Ranch USX AE20-62-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,523.00	12.25	173.44	5,443.38	-762.77	39.56	220.92	1.82
5,618.00	12.12	171.56	5,536.24	-782.65	42.18	228.21	0.44
5,713.00	11.37	176.41	5,629.25	-801.86	44.23	234.80	1.30
5,828.00	11.60	178.09	5,741.95	-824.73	45.32	241.33	0.35
5,900.00	10.82	175.19	5,812.58	-838.70	46.13	245.46	1.34
5,948.00	11.54	172.28	5,859.67	-847.94	47.15	248.67	1.91
5,995.00	16.38	174.40	5,905.27	-859.20	48.43	252.60	10.35
6,043.00	21.77	174.92	5,950.61	-874.82	49.88	257.75	11.23
6,090.00	25.26	175.47	5,993.70	-893.50	51.44	263.73	7.44
6,138.00	29.27	174.21	6,036.36	-915.40	53.44	270.91	8.44
6,185.00	32.78	172.01	6,076.63	-939.43	56.37	279.50	7.85
6,233.00	36.09	168.23	6,116.22	-966.15	61.06	290.45	8.21
6,280.00	38.04	161.66	6,153.74	-993.46	68.44	304.16	9.39
6,328.00	38.03	152.38	6,191.58	-1,020.62	79.96	321.84	11.90
6,375.00	37.67	144.08	6,228.71	-1,045.10	95.11	342.40	10.86
6,423.00	37.96	136.86	6,266.65	-1,067.76	113.81	365.99	9.24
6,470.00	38.25	130.41	6,303.65	-1,087.75	134.79	391.13	8.49
6,518.00	39.95	124.09	6,340.91	-1,106.03	158.87	418.89	9.02
6,565.00	42.80	120.78	6,376.18	-1,122.66	185.10	448.33	7.64
6,613.00	46.14	115.95	6,410.44	-1,138.59	214.68	480.87	9.90
6,660.00	49.24	112.14	6,442.08	-1,152.71	246.42	515.07	8.91
6,708.00	53.17	108.51	6,472.16	-1,165.67	281.50	552.22	10.09
6,755.00	57.30	105.88	6,498.95	-1,177.06	318.37	590.76	9.92
6,803.00	61.42	103.88	6,523.41	-1,187.65	358.28	632.04	9.30
6,849.00	65.65	101.34	6,543.91	-1,196.62	398.46	673.19	10.44
6,897.00	68.70	99.79	6,562.53	-1,204.72	441.94	717.35	7.02
6,944.00	72.54	97.74	6,578.12	-1,211.47	485.75	761.50	9.15
6,992.00	77.79	95.48	6,590.41	-1,216.80	531.82	807.51	11.85
7,065.00	82.63	90.87	6,602.83	-1,220.76	603.61	878.16	9.09
7,108.00	84.50	89.56	6,607.65	-1,220.92	646.34	919.69	5.29
<b>Estimated: 7" Casing @ 7108' MD, 6607.65' TVD</b>							
7,161.00	86.80	87.96	6,611.67	-1,219.77	699.17	970.71	5.29
7,253.00	88.92	89.82	6,615.11	-1,217.99	791.07	1,059.52	3.06
7,346.00	89.35	90.33	6,616.51	-1,218.12	884.06	1,149.84	0.72
7,439.00	90.96	91.56	6,616.26	-1,219.65	977.05	1,240.49	2.18
7,531.00	89.44	88.40	6,615.94	-1,219.62	1,069.03	1,329.79	3.81
7,624.00	91.02	89.29	6,615.56	-1,217.74	1,162.01	1,419.62	1.95
7,718.00	89.44	86.38	6,615.19	-1,214.19	1,255.93	1,509.96	3.52
7,810.00	91.11	87.37	6,614.74	-1,209.18	1,347.78	1,597.95	2.11
7,902.00	89.63	86.08	6,614.15	-1,203.92	1,439.63	1,685.87	2.13
7,993.00	90.62	87.00	6,613.95	-1,198.43	1,530.46	1,772.75	1.49
8,086.00	90.34	85.79	6,613.17	-1,192.58	1,623.27	1,861.46	1.34
8,179.00	90.12	87.04	6,612.80	-1,186.77	1,716.09	1,950.19	1.36
8,272.00	91.60	87.70	6,611.40	-1,182.50	1,808.97	2,039.36	1.74
8,366.00	90.52	85.84	6,609.66	-1,177.20	1,902.80	2,129.20	2.29
8,461.00	89.78	85.35	6,609.42	-1,169.91	1,997.52	2,219.42	0.93
8,556.00	91.33	88.65	6,608.49	-1,164.94	2,092.37	2,310.33	3.84
8,650.00	93.27	89.21	6,604.72	-1,163.18	2,186.27	2,401.08	2.15
8,745.00	93.30	89.02	6,599.28	-1,161.72	2,281.11	2,492.81	0.20
8,840.00	92.16	89.32	6,594.75	-1,160.34	2,375.99	2,584.60	1.24
8,935.00	90.89	88.22	6,592.23	-1,158.30	2,470.93	2,676.30	1.77

## Design Report for Wells Ranch USX AE20-62-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,030.00	92.75	88.65	6,589.21	-1,155.71	2,565.84	2,767.83	2.01
9,125.00	92.07	88.78	6,585.21	-1,153.58	2,660.73	2,859.46	0.73
9,219.00	88.86	88.22	6,584.45	-1,151.12	2,754.68	2,950.10	3.47
9,314.00	89.07	90.38	6,586.17	-1,149.96	2,849.66	3,042.03	2.28
9,409.00	90.37	89.79	6,586.63	-1,150.10	2,944.65	3,134.30	1.50
9,504.00	89.01	89.89	6,587.15	-1,149.84	3,039.65	3,226.47	1.44
9,599.00	89.54	88.80	6,588.35	-1,148.75	3,134.63	3,318.44	1.28
9,694.00	89.94	88.62	6,588.78	-1,146.61	3,229.61	3,410.14	0.46
9,789.00	90.28	87.90	6,588.60	-1,143.73	3,324.56	3,501.65	0.84
9,884.00	90.34	87.83	6,588.08	-1,140.19	3,419.49	3,592.98	0.10
9,979.00	90.37	87.27	6,587.49	-1,136.13	3,514.41	3,684.16	0.59
10,074.00	90.62	86.19	6,586.67	-1,130.71	3,609.25	3,774.95	1.17
10,169.00	91.45	87.44	6,584.96	-1,125.43	3,704.08	3,865.77	1.58
10,264.00	92.50	88.67	6,581.68	-1,122.21	3,798.97	3,957.13	1.70
10,359.00	91.88	89.09	6,578.05	-1,120.35	3,893.88	4,048.84	0.79
10,453.00	91.64	90.25	6,575.17	-1,119.81	3,987.83	4,139.93	1.26
10,548.00	88.27	88.15	6,575.24	-1,118.49	4,082.80	4,231.83	4.18
10,643.00	88.80	88.82	6,577.67	-1,115.98	4,177.74	4,323.41	0.90
10,738.00	90.65	88.52	6,578.12	-1,113.77	4,272.71	4,415.09	1.97
10,833.00	91.94	88.24	6,575.98	-1,111.09	4,367.64	4,506.62	1.39
10,940.00	94.32	87.14	6,570.14	-1,106.78	4,474.39	4,609.24	2.45
<b>Final MWD Survey @ 10940.00ft</b>							
11,002.00	94.32	87.14	6,565.47	-1,103.70	4,536.13	4,668.45	0.00
<b>Straight Line Proj @ 11002' MD, 6565.47' TVD</b>							

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
970.00	969.99	3.48	-0.15	Tie-On to Surface Gyros @ 970.00ft
1,024.00	1,023.99	3.45	-0.09	First MWD Survey @ 1024.00ft
10,940.00	6,570.14	-1,106.78	4,474.39	Final MWD Survey @ 10940.00ft
11,002.00	6,565.47	-1,103.70	4,536.13	Straight Line Proj @ 11002' MD, 6565.47' TVD

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Wells Ranch USX AE20-62-1HN (PA_RA0) BHL	103.84	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
370.00	970.00	Vaughn ESS Survey	Flexi-Shot
1,024.00	7,065.00	Sperry MWD Survey - Vert/Build	MWD
7,161.00	10,940.00	Sperry MWD Surveys - Lateral	MWD

## Design Report for Wells Ranch USX AE20-62-1HN - Final Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,108.00	6,607.65	Estimated: 7" Casing @ 7108' MD, 6607.65' 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
Wells Ranch AE (SL) F	0.00	0.00	0.00	-36.43	0.47	1,415,814.53	3,318,468.33	40° 28' 9.012 N	104° 21' 19.188 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	-1,536.69	-216.70	1,414,277.89	3,318,251.63		
Point 2			0.00	-1,394.93	5,079.85	1,414,419.65	3,323,547.99		
Point 3			0.00	3,915.17	4,921.18	1,419,729.56	3,323,389.33		
Point 4			0.00	3,764.67	-207.18	1,419,579.06	3,318,261.15		
Point 5			0.00	-1,536.69	-216.70	1,414,277.89	3,318,251.63		
Wells Ranch USX AE2	0.00	0.00	0.00	0.00	0.00	1,415,850.95	3,318,467.86	40° 28' 9.372 N	104° 21' 19.188 W
- actual wellpath hits target center									
- Point									
Wells Ranch AE (SB) F	0.00	0.00	0.00	-36.43	0.47	1,415,814.53	3,318,468.33	40° 28' 9.012 N	104° 21' 19.188 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	-1,064.69	243.30	1,414,749.87	3,318,711.62		
Point 2			0.00	-945.93	4,607.35	1,414,868.63	3,323,075.51		
Point 3			0.00	3,443.17	4,474.83	1,419,257.57	3,322,942.99		
Point 4			0.00	3,319.17	251.02	1,419,133.58	3,318,719.34		
Point 5			0.00	-1,064.69	243.30	1,414,749.87	3,318,711.62		
Wells Ranch USX AE2	0.00	0.00	6,568.76	-1,117.86	4,536.35	1,414,733.13	3,323,004.05	40° 27' 57.744 N	104° 20' 20.688 W
- actual wellpath misses target center by 14.53usft at 11001.27usft MD (6565.52 TVD, -1103.73 N, 4535.40 E)									
- Point									
Wells Ranch USX AE2	0.00	0.01	6,607.85	-1,223.00	660.00	1,414,628.00	3,319,127.83	40° 27' 57.204 N	104° 21' 10.854 W
- actual wellpath misses target center by 2.47usft at 7121.59usft MD (6608.88 TVD, -1220.76 N, 659.87 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	2.24 °/100usft	Maximum Dogleg over Survey:	11.90 °/100usft at 6,328.00 usft
Net Tortousity applicable to Plans:	1.13 °/100usft	Directional Difficulty Index:	6.357

Audit Info

North Reference Sheet for Sec. 20-T6N-R62W (Wells Ranch AE PAD) - Wells Ranch USX AE20-62-1HN -

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. @ 4809.00usft (H&P 343). Northing and Easting are relative to Wells Ranch USX AE20-62-1HN - 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: 0.99996410

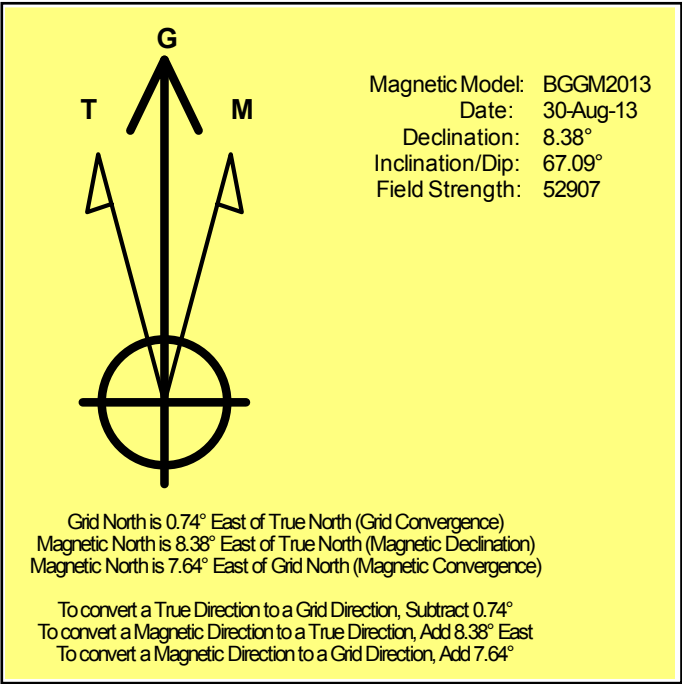
Grid Coordinates of Well: 1,415,850.95 usft N, 3,318,467.86 usft E

Geographical Coordinates of Well: 40° 28' 09.37" N, 104° 21' 19.19" W

Grid Convergence at Surface is: 0.74°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,002.00usft the Bottom Hole Displacement is 4,668.47usft in the Direction of 103.68° (Grid).

Magnetic Convergence at surface is: -7.64° (30 August 2013, , BGGM2013)



# Noble Energy

Weld County, CO (NAD 83)

Sec. 20-T6N-R62W (Wells Ranch AE PAD)

Wells Ranch USX AE20-62-1HN - A2

Design: Final Surveys

## Sperry Drilling Services

### Geodetic Report

23 October, 2013

Well Coordinates: 1,415,850.95 N, 3,318,467.86 E (40° 28' 09.37" N, 104° 21' 19.19" W)

Ground Level: 4,785.00 usft

Local Coordinate Origin:

Centered on Well Wells Ranch USX AE20-62-1HN - Slot A2

Viewing Datum:

RKB 24 ft. @ 4809.00usft (H&P 343)

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 USX AE20-62-1HN - Final Surveys

Measured			Vertical		Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth (usft)	Inclination (°)	Azimuth (°)	Depth (usft)		+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00		0.00	0.00	40° 28' 9.372 N	104° 21' 19.188 W	1,415,850.95	3,318,467.86
370.00	0.20	293.64	370.00		0.26	-0.59	40° 28' 9.375 N	104° 21' 19.196 W	1,415,851.21	3,318,467.26
647.00	0.50	12.64	646.99		1.63	-0.77	40° 28' 9.388 N	104° 21' 19.198 W	1,415,852.59	3,318,467.09
970.00	0.20	33.74	969.99		3.48	-0.15	40° 28' 9.406 N	104° 21' 19.189 W	1,415,854.43	3,318,467.71
1,024.00	0.22	178.24	1,023.99		3.45	-0.09	40° 28' 9.406 N	104° 21' 19.189 W	1,415,854.41	3,318,467.76
1,086.00	0.46	73.26	1,085.99		3.40	0.15	40° 28' 9.406 N	104° 21' 19.185 W	1,415,854.36	3,318,468.00
1,179.00	0.52	137.95	1,178.98		3.20	0.79	40° 28' 9.403 N	104° 21' 19.177 W	1,415,854.15	3,318,468.64
1,271.00	0.19	351.75	1,270.98		3.04	1.05	40° 28' 9.402 N	104° 21' 19.174 W	1,415,853.99	3,318,468.90
1,364.00	0.04	114.18	1,363.98		3.18	1.05	40° 28' 9.403 N	104° 21' 19.174 W	1,415,854.13	3,318,468.91
1,457.00	0.28	294.91	1,456.98		3.26	0.88	40° 28' 9.404 N	104° 21' 19.176 W	1,415,854.22	3,318,468.73
1,550.00	2.23	217.29	1,549.96		1.92	-0.42	40° 28' 9.391 N	104° 21' 19.193 W	1,415,852.87	3,318,467.43
1,641.00	3.65	211.35	1,640.84		-1.97	-3.00	40° 28' 9.353 N	104° 21' 19.227 W	1,415,848.99	3,318,464.85
1,733.00	5.11	193.24	1,732.57		-8.46	-5.47	40° 28' 9.289 N	104° 21' 19.260 W	1,415,842.50	3,318,462.39
1,826.00	7.15	184.72	1,825.04		-18.26	-6.89	40° 28' 9.192 N	104° 21' 19.280 W	1,415,832.70	3,318,460.96
1,918.00	8.02	176.01	1,916.23		-30.37	-6.92	40° 28' 9.073 N	104° 21' 19.283 W	1,415,820.59	3,318,460.94
2,012.00	10.25	181.73	2,009.04		-45.27	-6.71	40° 28' 8.926 N	104° 21' 19.282 W	1,415,805.69	3,318,461.14
2,105.00	12.41	191.91	2,100.23		-63.32	-9.02	40° 28' 8.747 N	104° 21' 19.315 W	1,415,787.64	3,318,458.83
2,295.00	11.95	190.58	2,285.95		-102.63	-16.85	40° 28' 8.360 N	104° 21' 19.423 W	1,415,748.32	3,318,451.01
2,390.00	11.80	185.39	2,378.92		-121.97	-19.57	40° 28' 8.169 N	104° 21' 19.462 W	1,415,728.99	3,318,448.29
2,485.00	13.11	172.64	2,471.70		-142.33	-19.10	40° 28' 7.968 N	104° 21' 19.459 W	1,415,708.63	3,318,448.76
2,580.00	12.76	173.67	2,564.29		-163.45	-16.56	40° 28' 7.759 N	104° 21' 19.430 W	1,415,687.51	3,318,451.29
2,674.00	11.03	171.71	2,656.27		-182.66	-14.12	40° 28' 7.569 N	104° 21' 19.401 W	1,415,668.30	3,318,453.73
2,864.00	10.71	172.39	2,842.86		-218.15	-9.16	40° 28' 7.218 N	104° 21' 19.343 W	1,415,632.81	3,318,458.69
2,959.00	12.40	173.16	2,935.93		-237.03	-6.78	40° 28' 7.031 N	104° 21' 19.315 W	1,415,613.94	3,318,461.08
3,054.00	11.65	170.37	3,028.85		-256.61	-3.96	40° 28' 6.837 N	104° 21' 19.282 W	1,415,594.35	3,318,463.90
3,149.00	9.90	168.18	3,122.17		-274.06	-0.68	40° 28' 6.664 N	104° 21' 19.243 W	1,415,576.90	3,318,467.17
3,244.00	11.72	166.95	3,215.48		-291.46	3.17	40° 28' 6.492 N	104° 21' 19.196 W	1,415,559.51	3,318,471.02
3,529.00	13.46	182.05	3,493.69		-352.83	8.52	40° 28' 5.885 N	104° 21' 19.137 W	1,415,498.14	3,318,476.38
3,624.00	14.16	176.38	3,585.95		-375.47	8.86	40° 28' 5.661 N	104° 21' 19.136 W	1,415,475.50	3,318,476.71
3,719.00	14.43	178.29	3,678.01		-398.90	9.95	40° 28' 5.429 N	104° 21' 19.126 W	1,415,452.07	3,318,477.80
3,814.00	15.90	179.40	3,769.70		-423.75	10.44	40° 28' 5.184 N	104° 21' 19.124 W	1,415,427.22	3,318,478.29
3,909.00	16.55	176.63	3,860.91		-450.27	11.37	40° 28' 4.922 N	104° 21' 19.116 W	1,415,400.70	3,318,479.22
4,004.00	13.90	172.76	3,952.57		-475.10	13.60	40° 28' 4.676 N	104° 21' 19.091 W	1,415,375.87	3,318,481.46
4,099.00	11.37	171.03	4,045.27		-495.67	16.50	40° 28' 4.472 N	104° 21' 19.057 W	1,415,355.30	3,318,484.35
4,194.00	8.81	172.06	4,138.79		-512.13	18.96	40° 28' 4.309 N	104° 21' 19.028 W	1,415,338.84	3,318,486.82
4,289.00	9.10	175.06	4,232.63		-526.82	20.62	40° 28' 4.164 N	104° 21' 19.009 W	1,415,324.15	3,318,488.47
4,384.00	10.74	168.39	4,326.21		-542.98	23.05	40° 28' 4.004 N	104° 21' 18.981 W	1,415,308.00	3,318,490.90
4,479.00	11.04	170.29	4,419.50		-560.61	26.36	40° 28' 3.829 N	104° 21' 18.941 W	1,415,290.36	3,318,494.22
4,574.00	11.01	172.77	4,512.75		-578.58	29.04	40° 28' 3.652 N	104° 21' 18.909 W	1,415,272.40	3,318,496.89
4,668.00	11.39	174.88	4,604.96		-596.73	30.99	40° 28' 3.472 N	104° 21' 18.887 W	1,415,254.25	3,318,498.85
4,763.00	13.28	178.34	4,697.76		-616.98	32.15	40° 28' 3.272 N	104° 21' 18.875 W	1,415,234.00	3,318,500.00
4,858.00	11.80	176.83	4,790.49		-637.59	33.00	40° 28' 3.068 N	104° 21' 18.868 W	1,415,213.39	3,318,500.86

## Design Report for Wells Ranch USX AE20-62-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
4,953.00	11.87	180.28	4,883.47	-657.06	33.49	40° 28' 2.876 N	104° 21' 18.864 W	1,415,193.92	3,318,501.35
5,048.00	12.96	176.19	4,976.25	-677.46	34.15	40° 28' 2.674 N	104° 21' 18.859 W	1,415,173.52	3,318,502.01
5,143.00	10.70	174.37	5,069.23	-696.86	35.72	40° 28' 2.482 N	104° 21' 18.842 W	1,415,154.12	3,318,503.58
5,238.00	8.61	175.11	5,162.88	-712.73	37.20	40° 28' 2.325 N	104° 21' 18.826 W	1,415,138.25	3,318,505.05
5,333.00	9.27	180.67	5,256.73	-727.47	37.71	40° 28' 2.179 N	104° 21' 18.822 W	1,415,123.52	3,318,505.57
5,428.00	10.71	177.45	5,350.28	-743.94	38.02	40° 28' 2.017 N	104° 21' 18.820 W	1,415,107.05	3,318,505.87
5,523.00	12.25	173.44	5,443.38	-762.77	39.56	40° 28' 1.830 N	104° 21' 18.804 W	1,415,088.21	3,318,507.41
5,618.00	12.12	171.56	5,536.24	-782.65	42.18	40° 28' 1.633 N	104° 21' 18.773 W	1,415,068.34	3,318,510.03
5,713.00	11.37	176.41	5,629.25	-801.86	44.23	40° 28' 1.443 N	104° 21' 18.750 W	1,415,049.13	3,318,512.08
5,828.00	11.60	178.09	5,741.95	-824.73	45.32	40° 28' 1.217 N	104° 21' 18.739 W	1,415,026.26	3,318,513.17
5,900.00	10.82	175.19	5,812.58	-838.70	46.13	40° 28' 1.079 N	104° 21' 18.731 W	1,415,012.29	3,318,513.98
5,948.00	11.54	172.28	5,859.67	-847.94	47.15	40° 28' 0.988 N	104° 21' 18.720 W	1,415,003.04	3,318,515.01
5,995.00	16.38	174.40	5,905.27	-859.20	48.43	40° 28' 0.876 N	104° 21' 18.705 W	1,414,991.78	3,318,516.28
6,043.00	21.77	174.92	5,950.61	-874.82	49.88	40° 28' 0.722 N	104° 21' 18.689 W	1,414,976.17	3,318,517.73
6,090.00	25.26	175.47	5,993.70	-893.50	51.44	40° 28' 0.537 N	104° 21' 18.672 W	1,414,957.48	3,318,519.30
6,138.00	29.27	174.21	6,036.36	-915.40	53.44	40° 28' 0.320 N	104° 21' 18.650 W	1,414,935.59	3,318,521.29
6,185.00	32.78	172.01	6,076.63	-939.43	56.37	40° 28' 0.082 N	104° 21' 18.616 W	1,414,911.55	3,318,524.22
6,233.00	36.09	168.23	6,116.22	-966.15	61.06	40° 27' 59.818 N	104° 21' 18.559 W	1,414,884.84	3,318,528.91
6,280.00	38.04	161.66	6,153.74	-993.46	68.44	40° 27' 59.547 N	104° 21' 18.468 W	1,414,857.53	3,318,536.30
6,328.00	38.03	152.38	6,191.58	-1,020.62	79.96	40° 27' 59.277 N	104° 21' 18.324 W	1,414,830.37	3,318,547.81
6,375.00	37.67	144.08	6,228.71	-1,045.10	95.11	40° 27' 59.034 N	104° 21' 18.132 W	1,414,805.89	3,318,562.96
6,423.00	37.96	136.86	6,266.65	-1,067.76	113.81	40° 27' 58.807 N	104° 21' 17.894 W	1,414,783.23	3,318,581.67
6,470.00	38.25	130.41	6,303.65	-1,087.75	134.79	40° 27' 58.607 N	104° 21' 17.626 W	1,414,763.25	3,318,602.64
6,518.00	39.95	124.09	6,340.91	-1,106.03	158.87	40° 27' 58.423 N	104° 21' 17.317 W	1,414,744.97	3,318,626.72
6,565.00	42.80	120.78	6,376.18	-1,122.66	185.10	40° 27' 58.256 N	104° 21' 16.981 W	1,414,728.34	3,318,652.94
6,613.00	46.14	115.95	6,410.44	-1,138.59	214.68	40° 27' 58.095 N	104° 21' 16.601 W	1,414,712.41	3,318,682.53
6,660.00	49.24	112.14	6,442.08	-1,152.71	246.42	40° 27' 57.951 N	104° 21' 16.193 W	1,414,698.28	3,318,714.27
6,708.00	53.17	108.51	6,472.16	-1,165.67	281.50	40° 27' 57.818 N	104° 21' 15.741 W	1,414,685.32	3,318,749.34
6,755.00	57.30	105.88	6,498.95	-1,177.06	318.37	40° 27' 57.701 N	104° 21' 15.266 W	1,414,673.94	3,318,786.22
6,803.00	61.42	103.88	6,523.41	-1,187.65	358.28	40° 27' 57.591 N	104° 21' 14.751 W	1,414,663.35	3,318,826.12
6,849.00	65.65	101.34	6,543.91	-1,196.62	398.46	40° 27' 57.498 N	104° 21' 14.233 W	1,414,654.38	3,318,866.30
6,897.00	68.70	99.79	6,562.53	-1,204.72	441.94	40° 27' 57.412 N	104° 21' 13.672 W	1,414,646.28	3,318,909.78
6,944.00	72.54	97.74	6,578.12	-1,211.47	485.75	40° 27' 57.340 N	104° 21' 13.106 W	1,414,639.53	3,318,953.59
6,992.00	77.79	95.48	6,590.41	-1,216.80	531.82	40° 27' 57.281 N	104° 21' 12.511 W	1,414,634.20	3,318,999.66
7,065.00	82.63	90.87	6,602.83	-1,220.76	603.61	40° 27' 57.233 N	104° 21' 11.583 W	1,414,630.24	3,319,071.44
7,108.00	84.50	89.56	6,607.65	-1,220.92	646.34	40° 27' 57.226 N	104° 21' 11.030 W	1,414,630.08	3,319,114.17
7,161.00	86.80	87.96	6,611.67	-1,219.77	699.17	40° 27' 57.230 N	104° 21' 10.347 W	1,414,631.23	3,319,167.00
7,253.00	88.92	89.82	6,615.11	-1,217.99	791.07	40° 27' 57.236 N	104° 21' 9.157 W	1,414,633.01	3,319,258.90
7,346.00	89.35	90.33	6,616.51	-1,218.12	884.06	40° 27' 57.223 N	104° 21' 7.954 W	1,414,632.88	3,319,351.89
7,439.00	90.96	91.56	6,616.26	-1,219.65	977.05	40° 27' 57.196 N	104° 21' 6.752 W	1,414,631.35	3,319,444.87
7,531.00	89.44	88.40	6,615.94	-1,219.62	1,069.03	40° 27' 57.185 N	104° 21' 5.562 W	1,414,631.38	3,319,536.85
7,624.00	91.02	89.29	6,615.56	-1,217.74	1,162.01	40° 27' 57.191 N	104° 21' 4.359 W	1,414,633.26	3,319,629.82

## Design Report for Wells Ranch USX AE20-62-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
7,718.00	89.44	86.38	6,615.19	-1,214.19	1,255.93	40° 27' 57.214 N	104° 21' 3.143 W	1,414,636.81	3,319,723.74
7,810.00	91.11	87.37	6,614.74	-1,209.18	1,347.78	40° 27' 57.252 N	104° 21' 1.954 W	1,414,641.82	3,319,815.59
7,902.00	89.63	86.08	6,614.15	-1,203.92	1,439.63	40° 27' 57.292 N	104° 21' 0.765 W	1,414,647.08	3,319,907.43
7,993.00	90.62	87.00	6,613.95	-1,198.43	1,530.46	40° 27' 57.335 N	104° 20' 59.589 W	1,414,652.57	3,319,998.26
8,086.00	90.34	85.79	6,613.17	-1,192.58	1,623.27	40° 27' 57.381 N	104° 20' 58.387 W	1,414,658.42	3,320,091.07
8,179.00	90.12	87.04	6,612.80	-1,186.77	1,716.09	40° 27' 57.426 N	104° 20' 57.185 W	1,414,664.23	3,320,183.88
8,272.00	91.60	87.70	6,611.40	-1,182.50	1,808.97	40° 27' 57.457 N	104° 20' 55.983 W	1,414,668.50	3,320,276.76
8,366.00	90.52	85.84	6,609.66	-1,177.20	1,902.80	40° 27' 57.497 N	104° 20' 54.768 W	1,414,673.79	3,320,370.59
8,461.00	89.78	85.35	6,609.42	-1,169.91	1,997.52	40° 27' 57.557 N	104° 20' 53.542 W	1,414,681.09	3,320,465.31
8,556.00	91.33	88.65	6,608.49	-1,164.94	2,092.37	40° 27' 57.594 N	104° 20' 52.314 W	1,414,686.06	3,320,560.15
8,650.00	93.27	89.21	6,604.72	-1,163.18	2,186.27	40° 27' 57.599 N	104° 20' 51.099 W	1,414,687.81	3,320,654.05
8,745.00	93.30	89.02	6,599.28	-1,161.72	2,281.11	40° 27' 57.601 N	104° 20' 49.871 W	1,414,689.28	3,320,748.88
8,840.00	92.16	89.32	6,594.75	-1,160.34	2,375.99	40° 27' 57.603 N	104° 20' 48.644 W	1,414,690.65	3,320,843.76
8,935.00	90.89	88.22	6,592.23	-1,158.30	2,470.93	40° 27' 57.611 N	104° 20' 47.415 W	1,414,692.69	3,320,938.69
9,030.00	92.75	88.65	6,589.21	-1,155.71	2,565.84	40° 27' 57.624 N	104° 20' 46.187 W	1,414,695.29	3,321,033.60
9,125.00	92.07	88.78	6,585.21	-1,153.58	2,660.73	40° 27' 57.633 N	104° 20' 44.959 W	1,414,697.41	3,321,128.49
9,219.00	88.86	88.22	6,584.45	-1,151.12	2,754.68	40° 27' 57.645 N	104° 20' 43.743 W	1,414,699.87	3,321,222.44
9,314.00	89.07	90.38	6,586.17	-1,149.96	2,849.66	40° 27' 57.644 N	104° 20' 42.514 W	1,414,701.03	3,321,317.41
9,409.00	90.37	89.79	6,586.63	-1,150.10	2,944.65	40° 27' 57.631 N	104° 20' 41.285 W	1,414,700.89	3,321,412.40
9,504.00	89.01	89.89	6,587.15	-1,149.84	3,039.65	40° 27' 57.621 N	104° 20' 40.056 W	1,414,701.16	3,321,507.39
9,599.00	89.54	88.80	6,588.35	-1,148.75	3,134.63	40° 27' 57.620 N	104° 20' 38.827 W	1,414,702.24	3,321,602.38
9,694.00	89.94	88.62	6,588.78	-1,146.61	3,229.61	40° 27' 57.629 N	104° 20' 37.598 W	1,414,704.38	3,321,697.35
9,789.00	90.28	87.90	6,588.60	-1,143.73	3,324.56	40° 27' 57.645 N	104° 20' 36.369 W	1,414,707.27	3,321,792.30
9,884.00	90.34	87.83	6,588.08	-1,140.19	3,419.49	40° 27' 57.668 N	104° 20' 35.141 W	1,414,710.81	3,321,887.23
9,979.00	90.37	87.27	6,587.49	-1,136.13	3,514.41	40° 27' 57.695 N	104° 20' 33.912 W	1,414,714.87	3,321,982.13
10,074.00	90.62	86.19	6,586.67	-1,130.71	3,609.25	40° 27' 57.737 N	104° 20' 32.684 W	1,414,720.29	3,322,076.97
10,169.00	91.45	87.44	6,584.96	-1,125.43	3,704.08	40° 27' 57.777 N	104° 20' 31.456 W	1,414,725.56	3,322,171.80
10,264.00	92.50	88.67	6,581.68	-1,122.21	3,798.97	40° 27' 57.796 N	104° 20' 30.228 W	1,414,728.79	3,322,266.69
10,359.00	91.88	89.09	6,578.05	-1,120.35	3,893.88	40° 27' 57.802 N	104° 20' 29.000 W	1,414,730.64	3,322,361.59
10,453.00	91.64	90.25	6,575.17	-1,119.81	3,987.83	40° 27' 57.796 N	104° 20' 27.785 W	1,414,731.18	3,322,455.54
10,548.00	88.27	88.15	6,575.24	-1,118.49	4,082.80	40° 27' 57.796 N	104° 20' 26.556 W	1,414,732.51	3,322,550.51
10,643.00	88.80	88.82	6,577.67	-1,115.98	4,177.74	40° 27' 57.809 N	104° 20' 25.327 W	1,414,735.02	3,322,645.44
10,738.00	90.65	88.52	6,578.12	-1,113.77	4,272.71	40° 27' 57.818 N	104° 20' 24.098 W	1,414,737.22	3,322,740.41
10,833.00	91.94	88.24	6,575.98	-1,111.09	4,367.64	40° 27' 57.833 N	104° 20' 22.869 W	1,414,739.91	3,322,835.34
10,940.00	94.32	87.14	6,570.14	-1,106.78	4,474.39	40° 27' 57.861 N	104° 20' 21.488 W	1,414,744.21	3,322,942.08
11,002.00	94.32	87.14	6,565.47	-1,103.70	4,536.13	40° 27' 57.884 N	104° 20' 20.688 W	1,414,747.30	3,323,003.83

## Design Report for Wells Ranch USX AE20-62-1HN - Final Surveys

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
970.00	969.99	3.48	-0.15	Tie-On to Surface Gyros @ 970.00ft
1,024.00	1,023.99	3.45	-0.09	First MWD Survey @ 1024.00ft
10,940.00	6,570.14	-1,106.78	4,474.39	Final MWD Survey @ 10940.00ft
11,002.00	6,565.47	-1,103.70	4,536.13	Straight Line Proj @ 11002' MD, 6565.47' TVD

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Wells Ranch USX AE20-62-1HN (PA_RA0) BHL	103.84	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
370.00	970.00	Vaughn ESS Survey	Flexi-Shot
1,024.00	7,065.00	Sperry MWD Survey - Vert/Build	MWD
7,161.00	10,940.00	Sperry MWD Surveys - Lateral	MWD

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,108.00	6,607.65	Estimated: 7" Casing @ 7108' MD, 6607.65' TVD	7	8-3/4

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Design Report for Wells Ranch USX AE20-62-1HN - Final Surveys

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***Design Targets***

Shape	Target Name	TVD ( )	Northing ( )	Easting ( )	+N/-S	+E/-W	Created	Updated
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**Directional Difficulty Index**

Average Dogleg over Survey:	2.24 °/100usft	Maximum Dogleg over Survey:	11.90 °/100usft at 6,328.00 usft
Net Tortousity applicable to Plans:	1.13 °/100usft	Directional Difficulty Index:	6.357

**Audit Info**

**North Reference Sheet for Sec. 20-T6N-R62W (Wells Ranch AE PAD) - Wells Ranch USX AE20-62-1HN -**

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. @ 4809.00usft (H&P 343). Northing and Easting are relative to Wells Ranch USX AE20-62-1HN - 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: 0.99996410

Grid Coordinates of Well: 1,415,850.95 usft N, 3,318,467.86 usft E

Geographical Coordinates of Well: 40° 28' 09.37" N, 104° 21' 19.19" W

Grid Convergence at Surface is: 0.74°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,002.00usft

the Bottom Hole Displacement is 4,668.47usft in the Direction of 103.68° (Grid).

Magnetic Convergence at surface is: -7.64° (30 August 2013, , BGGM2013)

