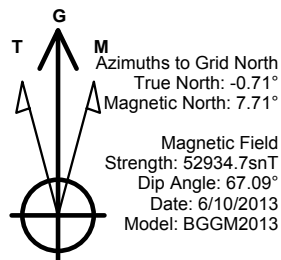


Project: Weld County, CO (NAD 83)  
 Site: Sec. 24-T6N-R63W  
 Well: Wells Ranch PC USX AA23-69-1HN

# Noble Energy - H&P 343

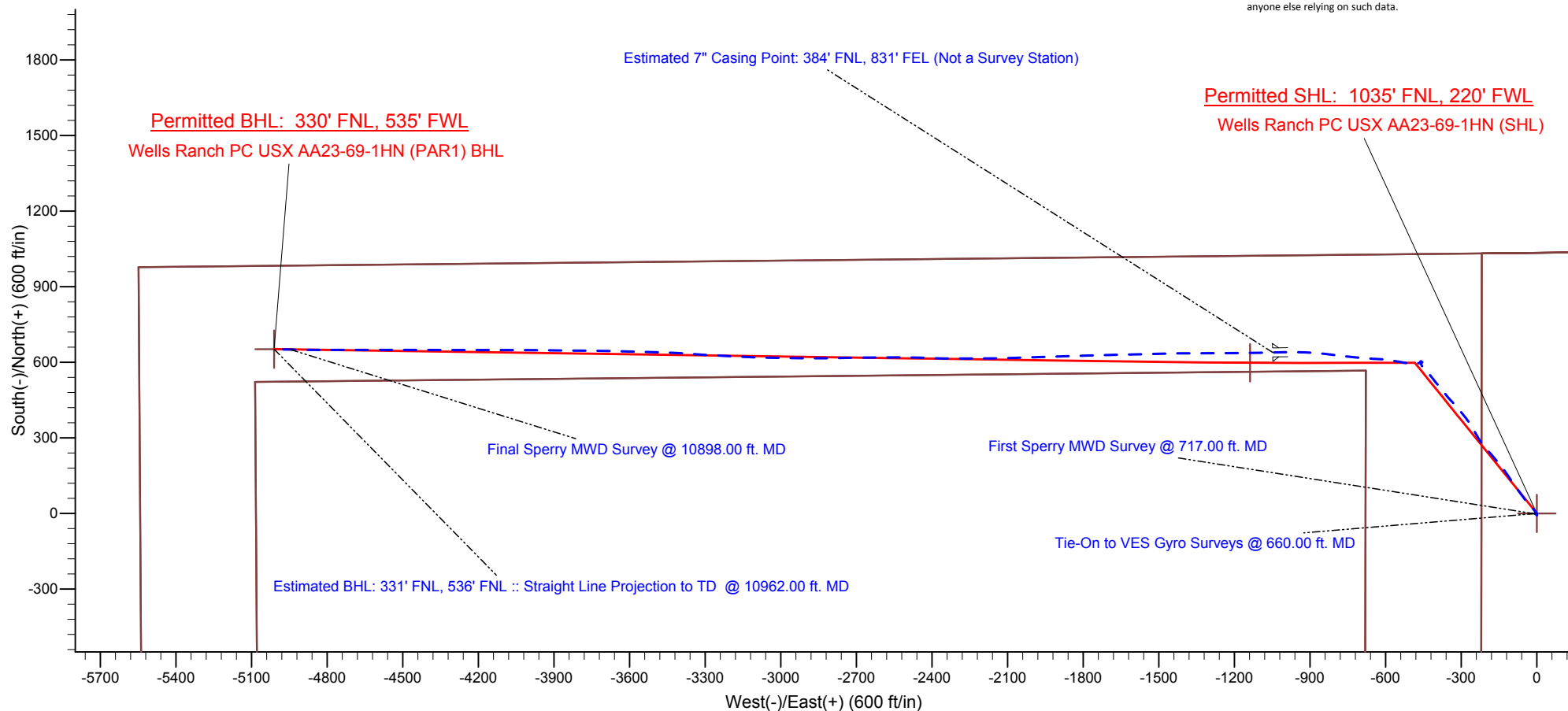
**HALLIBURTON**  
 Sperry Drilling



## LEGEND

- Wells Ranch PC USX AA23-69-1HN
- - Vaughn ESS and Sperry MWD Survey

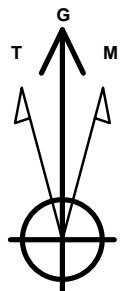
Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the "Wells Ranch PC USX AA23-69-1HN" well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton 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.



Project: Weld County, CO (NAD 83)  
Site: Sec. 24-T6N-R63W  
Well: Wells Ranch PC USX AA23-69-1HN

# Noble Energy

**HALLIBURTON**  
Sperry Drilling



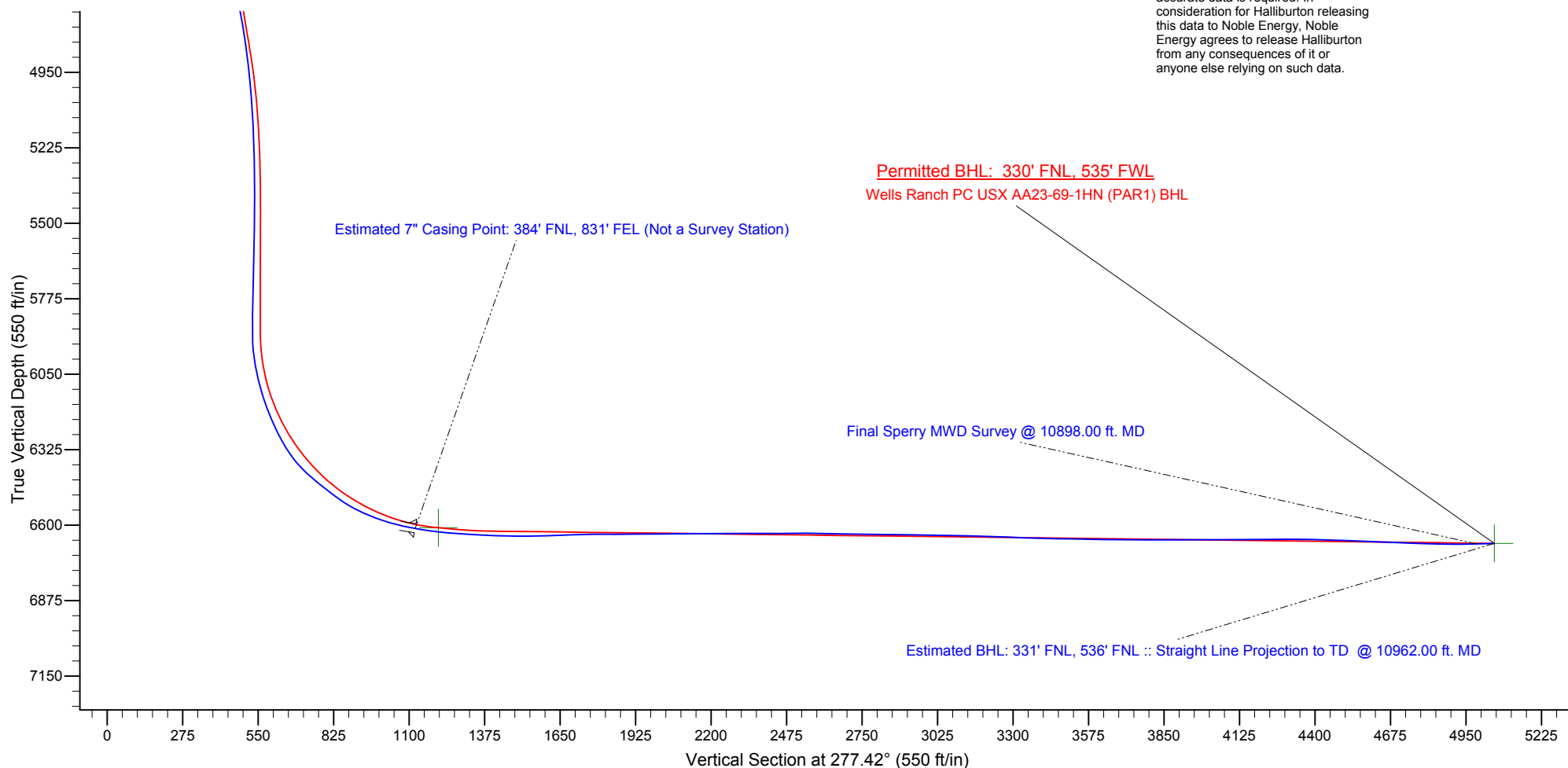
Azimuths to Grid North  
True North:  $-0.71^\circ$   
Magnetic North:  $7.71^\circ$

Magnetic Field  
Strength: 52934.7nT  
Dip Angle:  $67.09^\circ$   
Date: 6/10/2013  
Model: BGGM2013

## LEGEND

- Wells Ranch PC USX AA23-69-1HN
- Vaughn ESS and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the "Wells Ranch PC USX AA23-69-1HN" 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.



# Noble Energy

Weld County, CO (NAD 83)

Sec. 24-T6N-R63W

Wells Ranch PC USX AA23-69-1HN

Design: Vaughn ESS and Sperry MWD Survey

## Sperry Drilling Services

### Final Report

24 July, 2013

Well Coordinates: 1,418,331.30 N, 3,307,788.38 E (40° 28' 35.22" N, 104° 23' 36.96" W)

Ground Level: 4,793.00 ft

Local Coordinate Origin: Centered on Well Wells Ranch PC USX AA23-69-1H

Viewing Datum: RKB 24 ft. @ 4817.00ft (H&P 343)

TVDs to System: N

North Reference: Grid

Unit System: API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 431

**HALLIBURTON**

**Design Report for Wells Ranch PC USX AA23-69-1HN - Vaughn ESS and Sperry MWD Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
379.00	0.80	262.51	378.99	-0.34	-2.62	2.56	0.21
660.00	0.80	262.51	659.96	-0.86	-6.51	6.35	0.00
<b>Tie-On to VES Gyro Surveys @ 660.00 ft. MD</b>							
717.00	0.45	137.68	716.96	-1.07	-6.76	6.56	1.96
<b>First Sperry MWD Survey @ 717.00 ft. MD</b>							
904.00	0.50	126.75	903.95	-2.10	-5.61	5.29	0.06
1,088.00	0.82	122.41	1,087.94	-3.29	-3.85	3.40	0.18
1,181.00	0.75	142.19	1,180.93	-4.13	-2.92	2.36	0.30
1,274.00	0.81	125.42	1,273.92	-4.99	-2.01	1.35	0.25
1,368.00	0.84	135.38	1,367.91	-5.87	-0.98	0.22	0.16
1,460.00	0.85	143.53	1,459.90	-6.89	-0.11	-0.79	0.13
1,555.00	1.76	359.57	1,554.89	-6.00	0.30	-1.07	2.63
1,650.00	4.37	340.07	1,649.75	-1.14	-0.94	0.79	2.92
1,745.00	7.03	322.41	1,744.28	6.87	-5.72	6.56	3.32
1,840.00	8.74	319.11	1,838.38	16.93	-14.00	16.06	1.86
1,935.00	10.86	319.27	1,931.98	29.17	-24.56	28.12	2.23
2,030.00	12.73	318.11	2,024.97	43.75	-37.39	42.72	1.98
2,125.00	12.87	322.77	2,117.62	59.97	-50.78	58.09	1.10
2,220.00	14.49	324.68	2,209.92	78.09	-64.05	73.60	1.77
2,315.00	13.85	324.09	2,302.03	97.00	-77.59	89.46	0.69
2,410.00	12.06	324.35	2,394.61	114.27	-90.05	104.04	1.89
2,505.00	12.63	325.03	2,487.41	130.85	-101.79	117.82	0.62
2,600.00	14.31	325.49	2,579.79	149.03	-114.39	132.67	1.77
2,695.00	13.27	324.80	2,672.05	167.62	-127.33	147.90	1.11
2,790.00	12.14	323.85	2,764.73	184.59	-139.51	162.16	1.21
2,885.00	13.31	319.07	2,857.39	200.92	-152.56	177.22	1.66
2,980.00	13.16	319.35	2,949.87	217.39	-166.77	193.43	0.17
3,075.00	13.09	318.70	3,042.39	233.68	-180.92	209.56	0.17
3,170.00	11.87	319.37	3,135.14	249.17	-194.38	224.91	1.29
3,265.00	9.28	320.73	3,228.52	262.52	-205.59	237.75	2.74
3,360.00	11.45	321.02	3,321.96	275.78	-216.37	250.16	2.28
3,455.00	11.71	328.31	3,415.04	291.32	-227.37	263.07	1.56
3,550.00	14.12	329.49	3,507.63	309.51	-238.32	276.27	2.55
3,645.00	14.82	328.50	3,599.61	329.85	-250.55	291.03	0.78
3,740.00	14.21	330.89	3,691.58	350.40	-262.57	305.60	0.90
3,835.00	15.36	322.88	3,783.44	370.62	-275.84	321.36	2.47
3,930.00	17.68	320.62	3,874.52	391.81	-292.59	340.71	2.53
4,025.00	15.74	320.38	3,965.50	412.88	-309.96	360.65	2.04
4,120.00	15.00	318.38	4,057.10	432.00	-326.34	379.37	0.96
4,215.00	12.51	317.03	4,149.37	448.72	-341.52	396.58	2.64
4,310.00	9.44	317.95	4,242.62	462.04	-353.76	410.43	3.24
4,405.00	9.91	322.32	4,336.27	474.29	-363.97	422.14	0.92
4,500.00	13.33	322.28	4,429.31	489.43	-375.67	435.70	3.60
4,595.00	12.12	320.07	4,521.98	505.74	-388.77	450.79	1.37
4,690.00	11.88	320.93	4,614.90	520.98	-401.34	465.22	0.32
4,785.00	14.15	320.92	4,707.45	537.59	-414.82	480.74	2.39
4,880.00	11.75	317.18	4,800.03	553.70	-428.72	496.60	2.67
4,975.00	8.60	313.82	4,893.53	565.72	-440.42	509.75	3.37
5,070.00	7.90	323.78	4,987.55	575.90	-449.41	519.97	1.67

## Design Report for Wells Ranch PC USX AA23-69-1HN - Vaughn ESS and Sperry MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,165.00	6.31	328.96	5,081.82	585.64	-455.96	527.73	1.80
5,260.00	4.00	337.06	5,176.43	593.17	-459.94	532.65	2.54
5,355.00	2.71	335.69	5,271.26	598.27	-462.16	535.50	1.36
5,450.00	1.08	356.88	5,366.21	601.21	-463.13	536.85	1.84
5,545.00	1.16	48.40	5,461.19	602.74	-462.46	536.38	1.03
5,640.00	1.72	67.03	5,556.16	603.94	-460.43	534.52	0.76
5,735.00	0.79	169.71	5,651.15	603.85	-459.00	533.09	2.15
5,861.00	1.88	123.30	5,777.11	601.86	-457.12	530.97	1.15
5,922.00	2.09	122.51	5,838.08	600.71	-455.34	529.06	0.35
6,017.00	2.73	249.81	5,933.04	599.00	-456.00	529.50	4.56
6,065.00	8.06	259.55	5,980.81	597.99	-460.39	533.72	11.23
6,112.00	11.09	258.21	6,027.15	596.47	-468.06	541.12	6.46
6,160.00	14.03	264.63	6,074.00	594.98	-478.37	551.16	6.77
6,207.00	17.01	271.33	6,119.28	594.61	-490.92	563.55	7.39
6,301.00	22.73	279.07	6,207.66	597.79	-522.63	595.41	6.69
6,396.00	28.59	280.54	6,293.26	604.85	-563.14	636.49	6.20
6,491.00	39.77	275.17	6,371.74	611.77	-615.93	689.73	12.18
6,539.00	47.20	272.31	6,406.55	613.87	-648.86	722.66	16.01
6,586.00	50.06	274.97	6,437.61	616.12	-684.05	757.85	7.42
6,681.00	53.54	276.17	6,496.35	623.39	-758.34	832.45	3.80
6,729.00	58.20	277.33	6,523.28	628.07	-797.78	872.17	9.91
6,776.00	63.65	276.57	6,546.11	633.03	-838.54	913.23	11.68
6,824.00	67.84	273.84	6,565.83	636.98	-882.11	956.94	10.15
6,871.00	71.50	272.30	6,582.15	639.33	-926.11	1,000.88	8.37
6,919.00	75.13	270.31	6,595.93	640.37	-972.07	1,046.59	8.54
6,951.00	78.01	268.75	6,603.36	640.11	-1,003.19	1,077.41	10.17
6,997.00	80.01	268.84	6,612.13	639.17	-1,048.33	1,122.06	4.36
<b>Estimated 7" Casing Point: 384' FNL, 831' FEL (Not a Survey Station)</b>							
7,060.00	82.76	268.97	6,621.57	637.98	-1,110.61	1,183.65	4.36
7,154.00	85.96	269.18	6,630.80	636.47	-1,204.13	1,276.20	3.41
7,249.00	87.26	270.00	6,636.42	635.79	-1,298.96	1,370.15	1.62
7,344.00	88.64	269.75	6,639.82	635.58	-1,393.89	1,464.26	1.48
7,439.00	91.60	268.42	6,639.62	634.07	-1,488.87	1,558.25	3.42
7,534.00	92.00	268.66	6,636.64	631.65	-1,583.79	1,652.06	0.49
7,629.00	90.68	268.54	6,634.41	629.33	-1,678.73	1,745.91	1.40
7,724.00	90.46	268.27	6,633.47	626.68	-1,773.69	1,839.74	0.37
7,819.00	90.46	268.37	6,632.71	623.90	-1,868.65	1,933.54	0.11
7,913.00	90.22	268.14	6,632.15	621.04	-1,962.60	2,026.34	0.35
8,008.00	90.83	267.98	6,631.28	617.82	-2,057.54	2,120.07	0.66
8,103.00	89.88	269.33	6,630.69	615.59	-2,152.51	2,213.96	1.74
8,198.00	90.55	269.68	6,630.33	614.77	-2,247.51	2,308.05	0.80
8,293.00	89.63	270.81	6,630.18	615.18	-2,342.50	2,402.31	1.53
8,387.00	90.86	272.47	6,629.78	617.87	-2,436.46	2,495.82	2.20
8,482.00	88.74	269.76	6,630.11	619.71	-2,531.43	2,590.23	3.62
8,577.00	88.80	269.31	6,632.15	618.94	-2,626.40	2,684.32	0.48
8,672.00	89.14	269.16	6,633.86	617.68	-2,721.38	2,778.33	0.39
8,767.00	89.72	269.22	6,634.81	616.33	-2,816.36	2,872.35	0.61
8,862.00	88.92	270.70	6,635.93	616.27	-2,911.35	2,966.54	1.77
8,957.00	89.45	270.61	6,637.28	617.35	-3,006.34	3,060.87	0.57
9,052.00	87.93	272.42	6,639.46	619.86	-3,101.27	3,155.33	2.49
9,147.00	87.62	272.39	6,643.14	623.85	-3,196.12	3,249.90	0.33

## Design Report for Wells Ranch PC USX AA23-69-1HN - Vaughn ESS and Sperry MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,242.00	88.52	273.78	6,646.34	628.96	-3,290.92	3,344.57	1.74
9,337.00	88.34	273.65	6,648.95	635.11	-3,385.69	3,439.34	0.23
9,432.00	89.35	271.64	6,650.86	639.49	-3,480.56	3,533.98	2.37
9,527.00	89.20	271.22	6,652.06	641.86	-3,575.52	3,628.46	0.47
9,621.00	89.26	271.51	6,653.33	644.10	-3,669.49	3,721.92	0.32
9,716.00	90.06	270.74	6,653.89	645.97	-3,764.46	3,816.35	1.17
9,811.00	90.22	270.47	6,653.66	646.97	-3,859.46	3,910.68	0.33
9,906.00	90.25	270.64	6,653.27	647.89	-3,954.45	4,005.00	0.18
10,001.00	90.06	270.10	6,653.01	648.50	-4,049.45	4,099.28	0.60
10,096.00	90.80	269.64	6,652.30	648.29	-4,144.45	4,193.45	0.92
10,191.00	90.59	270.40	6,651.15	648.32	-4,239.44	4,287.66	0.83
10,286.00	88.21	270.17	6,652.14	648.79	-4,334.43	4,381.91	2.52
10,381.00	88.27	270.06	6,655.06	648.98	-4,429.38	4,476.09	0.13
10,476.00	87.93	269.88	6,658.21	648.93	-4,524.33	4,570.24	0.40
10,571.00	87.16	270.07	6,662.28	648.89	-4,619.24	4,664.35	0.83
10,666.00	88.21	270.31	6,666.12	649.21	-4,714.16	4,758.52	1.13
10,761.00	88.40	269.70	6,668.93	649.22	-4,809.12	4,852.69	0.67
10,856.00	91.17	270.61	6,669.28	649.47	-4,904.11	4,946.91	3.07
10,898.00	91.57	271.04	6,668.28	650.08	-4,946.09	4,988.62	1.40
<b>Final Sperry MWD Survey @ 10898.00 ft. MD</b>							
10,962.00	91.57	271.04	6,666.52	651.24	-5,010.06	5,052.21	0.00
<b>Estimated BHL: 331' FNL, 536' FNL :: Straight Line Projection to TD @ 10962.00 ft. MD</b>							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
660.00	659.96	-0.86	-6.51	Tie-On to VES Gyro Surveys @ 660.00 ft. MD
717.00	716.96	-1.07	-6.76	First Sperry MWD Survey @ 717.00 ft. MD
6,997.00	6,612.13	639.17	-1,048.33	Estimated 7" Casing Point: 384' FNL, 831' FEL (Not a Survey Station)
10,898.00	6,668.28	650.08	-4,946.09	Final Sperry MWD Survey @ 10898.00 ft. MD
10,962.00	6,666.52	651.24	-5,010.06	Estimated BHL: 331' FNL, 536' FNL :: Straight Line Projection to TD @ 10962.00 ft. MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Wells Ranch PC USX AA23-69-1HN (PAR1) BHL	277.42	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
379.00	660.00	Vaughn ESS Surveys	Flexi-Shot
717.00	6,997.00	MWD Surveys	MWD
6,997.00	10,962.00	MWD Surveys	MWD

## Design Report for Wells Ranch PC USX AA23-69-1HN - Vaughn ESS and Sperry MWD Survey

**Casing Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
6,997.00	6,612.13	7" Casing PT	7	8-3/4

**Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
(S24/23)T6NR63W(S)	0.00	0.00	0.00	-3,375.49	-133.19	1,414,955.93	3,307,655.19	40.467190	-104.394230
- actual wellpath misses target center by 3378.12ft at 3.99ft MD (3.99 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-5,057.58	-3,843.50	1,414,487.94	3,302,730.98		
Point 2				-687.01	-3,810.28	1,414,521.16	3,307,101.39		
Point 3				-678.76	567.01	1,418,898.29	3,307,109.64		
Point 4				-5,086.04	522.01	1,418,853.29	3,302,702.52		
Point 5				-5,057.58	-3,843.50	1,414,487.94	3,302,730.98		
(S24/23)T6NR63W(S)	0.00	0.00	0.00	-3,375.49	-133.19	1,414,955.93	3,307,655.19	40.467190	-104.394230
- actual wellpath misses target center by 3378.12ft at 3.99ft MD (3.99 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-5,514.58	-4,305.50	1,414,025.95	3,302,273.99		
Point 2				-225.01	-4,269.28	1,414,062.17	3,307,563.38		
Point 3				5,067.11	-4,213.67	1,414,117.78	3,312,855.31		
Point 4				-225.01	-4,269.28	1,414,062.17	3,307,563.38		
Point 5				-218.76	1,032.01	1,419,363.27	3,307,569.63		
Point 6				5,038.84	1,087.20	1,419,418.46	3,312,827.04		
Point 7				-218.76	1,032.01	1,419,363.27	3,307,569.63		
Point 8				-5,548.69	977.06	1,419,308.33	3,302,239.88		
Point 9				-5,514.58	-4,305.50	1,414,025.95	3,302,273.99		
Wells Ranch PC	0.00	0.00	0.00	0.00	0.00	1,418,331.30	3,307,788.38	40.476450	-104.393600
- actual wellpath hits target center									
- Point									
Wells Ranch PC		0.00	6,666.73	652.10	-5,010.53	1,418,983.38	3,302,778.03	40.478410	-104.411580
- actual wellpath misses target center by 1.01ft at 10962.00ft MD (6666.52 TVD, 651.24 N, -5010.06 E)									
- Point									
Wells Ranch PC		0.00	6,609.67	598.10	-1,138.11	1,418,929.38	3,306,650.31	40.478130	-104.397664
- actual wellpath misses target center by 42.20ft at 7086.84ft MD (6624.74 TVD, 637.51 N, -1137.26 E)									
- Point									

**North Reference Sheet for Sec. 24-T6N-R63W - Wells Ranch PC USX AA23-69-1HN**

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. @ 4817.00ft (H&P 343). Northing and Easting are relative to Wells Ranch PC USX AA23-69-1HN - Slot A1  
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: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996459

Grid Coordinates of Well: 1,418,331.30 ft N, 3,307,788.38 ft E  
Geographical Coordinates of Well: 40° 28' 35.22" N, 104° 23' 36.96" W  
Grid Convergence at Surface is: 0.71°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,962.00ft  
the Bottom Hole Displacement is 5,052.21ft in the Direction of 277.41° (Grid).

Magnetic Convergence at surface is: -7.71° (10 June 2013, , BGGM2013)

