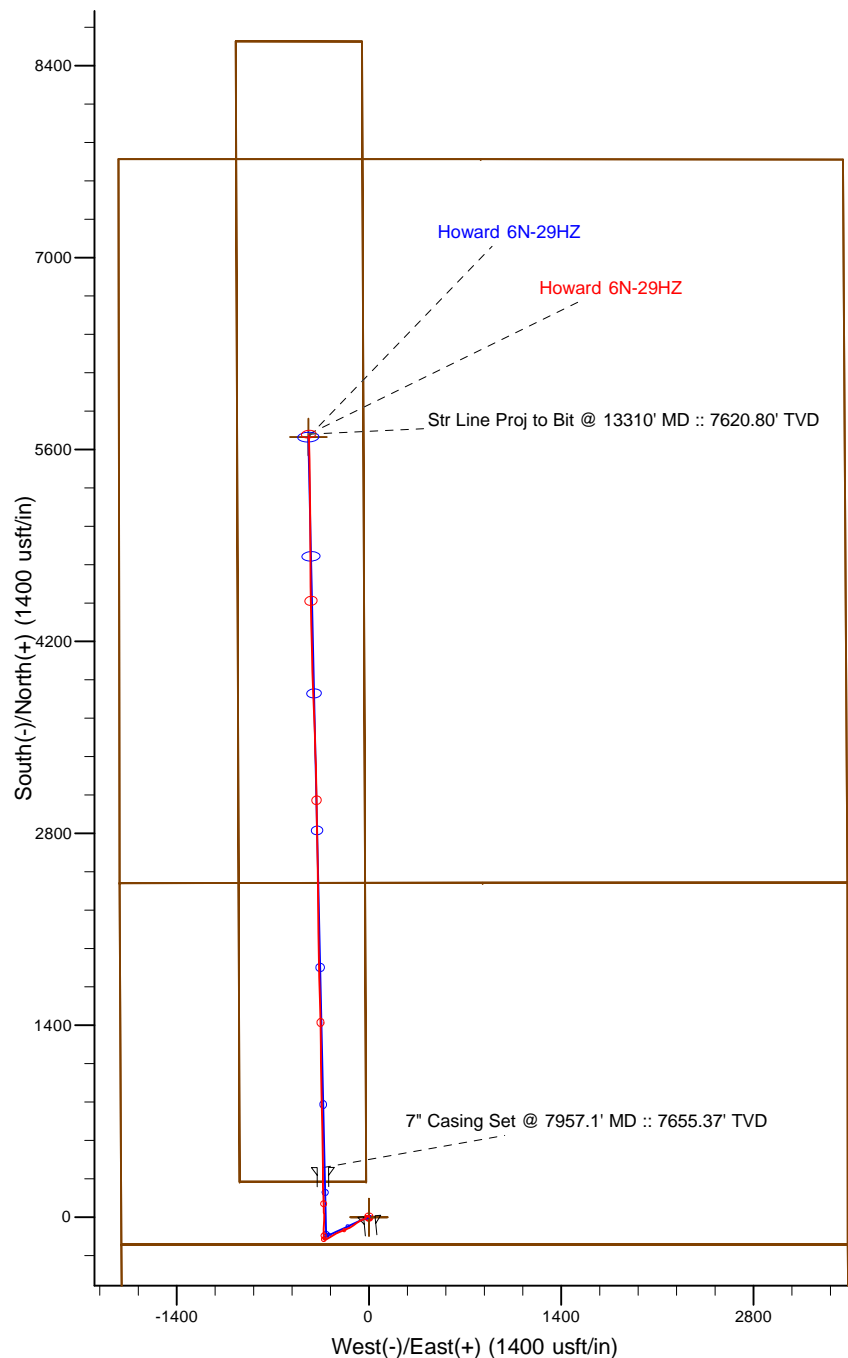
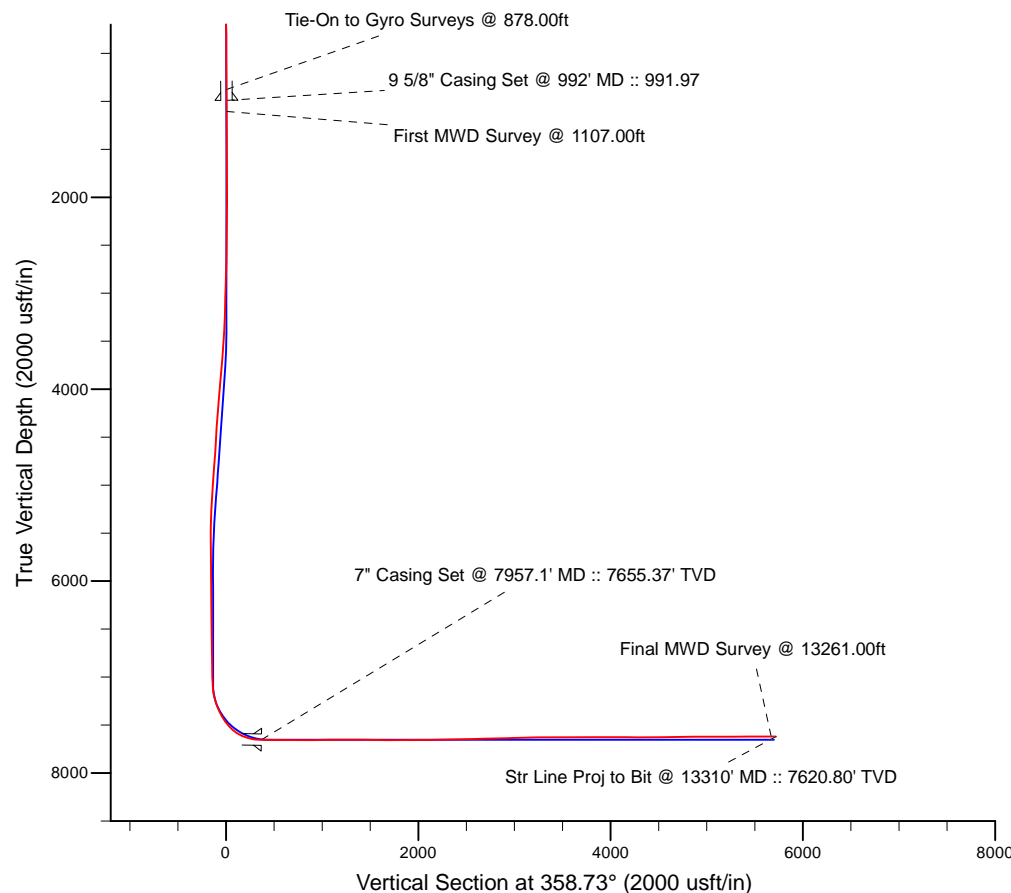


Project: Weld County, CO (NAD 83)  
 Site: Sec. 32-T1N-R67W  
 Well: Howard 6N-29HZ  
 Wellbore: Plan B  
 Design: Actual Field Surveys



LEGEND

- Howard 6N-29HZ, Plan B, Rev B0 V0
- Actual Field Surveys



7" Casing: ~2077.87' FNL, ~1471.03' FWL  
 Lat/Long: 40.009128 N, -104.918497 E  
 State Planes - CO Northern: 1,246,706.12' N, 3,162,887.26' E  
 Location: Sec. 32-T1N-R67W

BHL: ~2006.92' FNL, ~1388.13' FWL  
 Lat/Long: 40.023818 N, -104.918867 E  
 State Planes - CO Northern: 1,252,056.35' N, 3,162,748.50' E  
 Location: Sec. 29-T1N-R67W

WELL DETAILS: Howard 6N-29HZ	
Ground Level:	5049.00
RKB = 16' @ 5065.00usft (Xtreme 22)	
Design: Actual Field Surveys (Howard 6N-29HZ/Plan B)	
Created By: Clint Eshelman	Date: 9/10/2014
Reviewed: _____	Date: _____

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 32-T1N-R67W

Howard 6N-29HZ

## Plan B

Design: Actual Field Surveys

## Sperry Drilling Services

## Standard Report

10 September, 2014

Well Coordinates: 1,246,347.21 N, 3,163,224.85 E (40° 00' 29.29" N, 104° 55' 02.28" W)

Ground Level: 5,049.00 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 Howard 6N-29HZ

RKB = 16' @ 5065.00usft (Xtreme 22)

N

True

API - US Survey Feet - Custom

**HALLIBURTON**

**Design Report for Howard 6N-29HZ - Actual 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
16.00	0.00	0.00	16.00	0.00	0.00	0.00	0.00
116.00	0.63	43.96	116.00	0.40	0.38	0.39	0.63
216.00	0.60	23.00	215.99	1.27	0.97	1.25	0.23
316.00	0.50	33.82	315.99	2.12	1.42	2.09	0.14
416.00	0.49	43.51	415.98	2.79	1.95	2.75	0.08
516.00	0.38	33.00	515.98	3.38	2.43	3.32	0.14
616.00	0.32	3.27	615.98	3.94	2.62	3.88	0.19
716.00	0.23	5.78	715.98	4.41	2.66	4.35	0.09
816.00	0.44	355.28	815.98	5.00	2.65	4.94	0.22
878.00	0.48	1.61	877.97	5.49	2.64	5.43	0.10
<b>Tie-On to Gyro Surveys @ 878.00ft</b>							
992.00	0.56	354.53	991.97	6.52	2.60	6.46	0.09
<b>9 5/8" Casing Set @ 992' MD :: 991.97</b>							
1,107.00	0.64	349.18	1,106.96	7.71	2.42	7.65	0.09
<b>First MWD Survey @ 1107.00ft</b>							
1,202.00	0.50	342.63	1,201.96	8.63	2.20	8.57	0.16
1,297.00	1.00	257.90	1,296.95	8.85	1.27	8.82	1.13
1,487.00	1.35	282.34	1,486.91	8.98	-2.54	9.03	0.32
1,673.00	1.07	254.58	1,672.87	8.98	-6.36	9.12	0.34
1,856.00	0.88	286.12	1,855.85	8.92	-9.35	9.13	0.31
2,039.00	1.22	285.94	2,038.82	9.85	-12.58	10.12	0.19
2,222.00	1.33	263.65	2,221.77	10.15	-16.56	10.51	0.28
2,405.00	0.89	187.60	2,404.75	8.50	-18.86	8.92	0.77
2,588.00	1.18	166.63	2,587.72	5.26	-18.61	5.67	0.26
2,772.00	1.49	185.95	2,771.67	1.04	-18.42	1.45	0.29
2,955.00	2.26	215.60	2,954.57	-4.26	-20.77	-3.80	0.66
3,138.00	3.26	250.45	3,137.37	-8.94	-27.77	-8.32	1.04
3,321.00	5.72	240.00	3,319.80	-15.24	-40.58	-14.34	1.41
3,491.00	8.78	246.21	3,488.42	-24.71	-59.79	-23.38	1.86
3,661.00	9.29	236.55	3,656.32	-37.51	-83.11	-35.66	0.94
3,832.00	9.59	232.43	3,825.01	-53.80	-105.92	-51.44	0.43
4,003.00	9.41	242.39	3,993.67	-68.97	-129.60	-66.08	0.97
4,173.00	9.13	239.14	4,161.45	-82.33	-153.49	-78.91	0.35
4,345.00	10.64	251.43	4,330.91	-94.39	-180.26	-90.37	1.50
4,516.00	10.14	247.70	4,499.11	-105.13	-209.15	-100.46	0.49
4,687.00	8.97	241.44	4,667.74	-117.21	-234.79	-111.98	0.91
4,859.00	8.13	239.22	4,837.83	-129.85	-257.02	-124.12	0.52
5,030.00	8.04	237.62	5,007.13	-142.44	-277.50	-136.25	0.14
5,199.00	6.87	242.74	5,174.70	-153.40	-296.47	-146.79	0.80
5,370.00	5.38	240.54	5,344.72	-162.02	-312.54	-155.06	0.88
5,541.00	2.37	275.36	5,515.33	-165.64	-323.05	-158.44	2.16
5,712.00	0.90	344.00	5,686.27	-164.02	-326.94	-156.73	1.29
5,884.00	0.50	319.79	5,858.25	-162.15	-327.80	-154.84	0.28
6,055.00	0.90	300.01	6,029.24	-160.90	-329.44	-153.56	0.27
6,225.00	0.99	312.49	6,199.22	-159.24	-331.68	-151.85	0.13
6,396.00	0.43	331.67	6,370.20	-157.68	-333.07	-150.26	0.35
6,567.00	0.99	359.67	6,541.19	-155.64	-333.39	-148.21	0.38
6,739.00	0.79	12.96	6,713.17	-153.00	-333.13	-145.58	0.17
6,910.00	1.00	33.53	6,884.15	-150.61	-332.04	-143.21	0.22

**Design Report for Howard 6N-29HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,038.00	1.81	48.96	7,012.11	-148.35	-329.90	-141.00	0.69
7,081.00	2.26	39.33	7,055.08	-147.25	-328.85	-139.92	1.31
7,124.00	3.89	8.76	7,098.02	-145.15	-328.09	-137.84	5.25
7,167.00	7.66	354.20	7,140.80	-140.85	-328.16	-133.55	9.34
7,210.00	10.53	356.10	7,183.25	-134.08	-328.71	-126.76	6.71
7,252.00	14.15	358.84	7,224.28	-125.12	-329.08	-117.79	8.73
7,338.00	21.73	0.47	7,306.04	-98.65	-329.16	-91.33	8.83
7,423.00	26.98	1.47	7,383.44	-63.61	-328.54	-56.32	6.20
7,450.00	30.09	1.63	7,407.16	-50.72	-328.19	-43.44	11.52
7,466.00	31.39	2.06	7,420.91	-42.55	-327.92	-35.27	8.24
7,509.00	33.94	2.88	7,457.11	-19.36	-326.92	-12.11	6.02
7,551.00	38.81	359.23	7,490.92	5.52	-326.51	12.76	12.68
7,593.00	43.55	357.62	7,522.52	33.16	-327.28	40.40	11.56
7,636.00	49.47	358.03	7,552.10	64.32	-328.46	71.58	13.78
7,679.00	55.60	356.81	7,578.25	98.39	-330.01	105.68	14.43
7,764.00	67.08	358.35	7,618.95	172.79	-333.10	180.13	13.60
7,850.00	78.34	359.58	7,644.47	254.76	-334.55	262.11	13.16
7,926.00	87.04	359.67	7,654.13	330.06	-335.05	337.41	11.45
7,957.10	88.38	359.66	7,655.37	361.14	-335.23	368.48	4.30
<b>7" Casing Set @ 7957.1' MD :: 7655.37' TVD</b>							
7,989.00	89.75	359.65	7,655.89	393.03	-335.42	400.37	4.30
8,160.00	89.72	358.87	7,656.68	564.01	-337.63	571.36	0.46
8,332.00	90.22	358.41	7,656.77	735.96	-341.71	743.36	0.40
8,504.00	90.18	358.90	7,656.17	907.92	-345.75	915.36	0.29
8,675.00	90.31	359.42	7,655.44	1,078.90	-348.26	1,086.35	0.31
8,846.00	89.94	359.26	7,655.07	1,249.88	-350.23	1,257.34	0.24
9,017.00	89.72	358.93	7,655.58	1,420.86	-352.93	1,428.33	0.23
9,188.00	89.72	358.72	7,656.41	1,591.82	-356.43	1,599.33	0.12
9,359.00	90.03	357.87	7,656.79	1,762.74	-361.52	1,770.32	0.53
9,531.00	89.66	358.47	7,657.25	1,934.66	-367.01	1,942.31	0.41
9,616.00	90.65	359.38	7,657.02	2,019.64	-368.61	2,027.31	1.58
9,787.00	90.99	359.89	7,654.57	2,190.62	-369.70	2,198.27	0.36
9,957.00	91.36	359.70	7,651.09	2,360.58	-370.30	2,368.21	0.24
10,128.00	91.64	358.83	7,646.61	2,531.50	-372.50	2,539.14	0.53
10,299.00	91.33	358.66	7,642.18	2,702.41	-376.24	2,710.08	0.21
10,469.00	91.29	359.24	7,638.29	2,872.33	-379.36	2,880.03	0.34
10,639.00	91.20	358.96	7,634.60	3,042.27	-382.03	3,049.99	0.17
10,810.00	91.73	358.96	7,630.23	3,213.19	-385.13	3,220.93	0.31
10,896.00	90.71	358.31	7,628.40	3,299.14	-387.18	3,306.91	1.41
10,981.00	90.18	357.62	7,627.74	3,384.08	-390.19	3,391.90	1.02
11,067.00	89.60	358.86	7,627.90	3,470.04	-392.84	3,477.90	1.59
11,238.00	90.12	357.73	7,628.32	3,640.96	-397.92	3,648.89	0.73
11,410.00	90.15	357.19	7,627.91	3,812.79	-405.55	3,820.84	0.31
11,580.00	90.19	358.55	7,627.41	3,982.67	-411.86	3,990.82	0.80
11,751.00	89.45	358.44	7,627.95	4,153.61	-416.36	4,161.82	0.44
11,922.00	90.19	359.38	7,628.48	4,324.57	-419.61	4,332.81	0.70
12,094.00	90.80	358.86	7,627.00	4,496.55	-422.25	4,504.80	0.47
12,179.00	90.28	358.93	7,626.20	4,581.53	-423.89	4,589.79	0.62
12,350.00	90.96	359.99	7,624.35	4,752.50	-425.50	4,760.77	0.74
12,521.00	90.12	358.99	7,622.74	4,923.49	-427.02	4,931.74	0.76
12,692.00	89.94	359.79	7,622.65	5,094.48	-428.84	5,102.73	0.48

## Design Report for Howard 6N-29HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,863.00	90.28	359.91	7,622.32	5,265.47	-429.29	5,273.70	0.21
13,034.00	90.25	358.99	7,621.53	5,436.46	-430.93	5,444.68	0.54
13,206.00	90.28	357.93	7,620.73	5,608.40	-435.55	5,616.67	0.62
13,261.00	89.85	358.29	7,620.67	5,663.37	-437.37	5,671.67	1.02
<b>Final MWD Survey @ 13261.00ft</b>							
13,310.00	89.85	358.29	7,620.80	5,712.34	-438.83	5,720.67	0.00
<b>Str Line Proj to Bit @ 13310' MD :: 7620.80' TVD</b>							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
878.00	877.97	5.49	2.64	Tie-On to Gyro Surveys @ 878.00ft
1,107.00	1,106.96	7.71	2.42	First MWD Survey @ 1107.00ft
13,261.00	7,620.67	5,663.37	-437.37	Final MWD Survey @ 13261.00ft
13,310.00	7,620.80	5,712.34	-438.83	Str Line Proj to Bit @ 13310' MD :: 7620.80' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	358.73	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	878.00	MS Energy Surveys	NS-GYRO-MS
1,107.00	7,989.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,160.00	13,261.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
992.00	991.97	9 5/8" Casing Set @ 992' MD :: 991.97	9-5/8	13-1/2
7,957.10	7,655.37	7" Casing Set @ 7957.1' MD :: 7655.37' TVD	7	8-3/4

## Design Report for Howard 6N-29HZ - Actual 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
Howard 6N-29HZ_SE(	0.00	0.00	0.00	0.00	0.00	1,246,347.21	3,163,224.85	40° 0' 29.293 N	104° 55' 2.280 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	-201.09	-1,803.60	1,246,134.28	3,161,422.67	
Point 2				0.00	-197.76	3,485.92	1,246,172.37	3,166,711.87	
Howard 6N-29HZ_SE(	0.00	0.00	0.00	0.00	0.00	1,246,347.21	3,163,224.85	40° 0' 29.293 N	104° 55' 2.280 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	7,719.37	-1,824.04	1,254,054.16	3,161,350.18	
Point 2				0.00	7,719.27	812.82	1,254,071.39	3,163,986.90	
Point 3				0.00	7,715.59	3,450.78	1,254,085.04	3,166,624.73	
Point 4				0.00	2,441.05	3,483.60	1,248,811.01	3,166,692.21	
Point 5				0.00	2,439.62	827.37	1,248,792.13	3,164,036.14	
Point 6				0.00	2,438.35	-1,816.40	1,248,773.49	3,161,392.52	
Point 7				0.00	2,439.62	827.37	1,248,792.13	3,164,036.14	
Point 8				0.00	2,441.05	3,483.60	1,248,811.01	3,166,692.21	
Point 9				0.00	-197.76	3,485.92	1,246,172.37	3,166,711.87	
Point 10				0.00	-2,837.93	3,504.32	1,243,532.46	3,166,747.62	
Point 11				0.00	-2,839.23	856.77	1,243,513.77	3,164,100.22	
Point 12				0.00	-2,840.53	-1,790.79	1,243,495.07	3,161,452.82	
Point 13				0.00	-201.09	-1,803.60	1,246,134.28	3,161,422.67	
Point 14				0.00	2,438.35	-1,816.40	1,248,773.49	3,161,392.52	
Howard 6N-29HZ_LD	0.00	0.00	0.00	0.00	0.00	1,246,347.21	3,163,224.85	40° 0' 29.293 N	104° 55' 2.280 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	8,577.87	-970.34	1,254,918.22	3,162,198.20	
Point 2				0.00	8,576.46	-50.28	1,254,922.86	3,163,118.21	
Point 3				0.00	259.93	-21.59	1,246,606.98	3,163,201.55	
Point 4				0.00	259.38	-941.63	1,246,600.39	3,162,281.56	
Howard 6N-29HZ_SHI	0.00	0.00	0.00	0.00	0.00	1,246,347.21	3,163,224.85	40° 0' 29.293 N	104° 55' 2.280 W
- actual wellpath hits target center									
- Point									
Howard 6N-29HZ_Toe	0.00	0.00	7,655.00	5,691.00	-441.71	1,252,034.99	3,162,745.77	40° 1' 25.533 N	104° 55' 7.958 W
- actual wellpath misses target center by 34.44usft at 13288.84usft MD (7620.74 TVD, 5691.19 N, -438.20 E)									
- Point									

**Directional Difficulty Index**

Average Dogleg over Survey:	1.18 °/100usft	Maximum Dogleg over Survey:	14.43 °/100usft at 7,679.00 usft
Net Tortosity applicable to Plans:	0.33 °/100usft	Directional Difficulty Index:	6.233

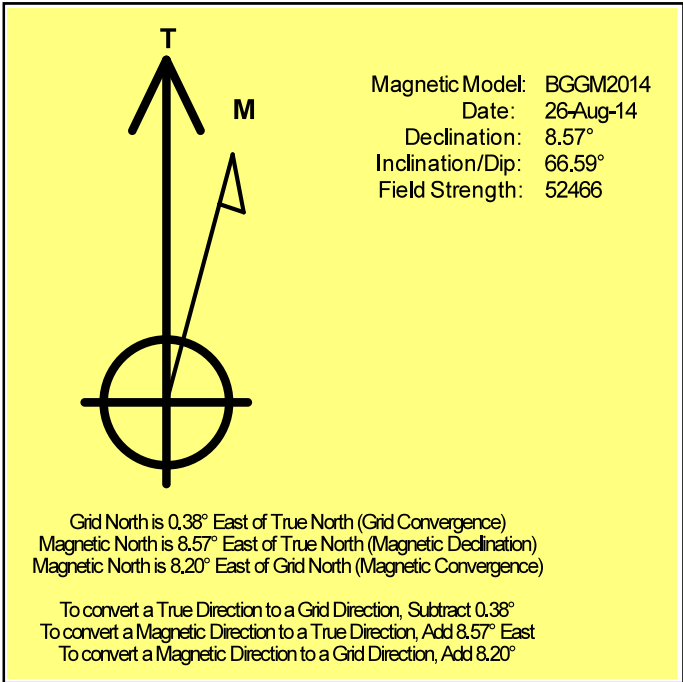
**Audit Info**

**North Reference Sheet for Sec. 32-T1N-R67W - Howard 6N-29HZ - Plan B**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.  
 Vertical Depths are relative to RKB = 16' @ 5065.00usft (Xtreme 22). Northing and Easting are relative to Howard 6N-29HZ  
 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: 0.99996576

Grid Coordinates of Well: 1,246,347.21 usft N, 3,163,224.85 usft E  
 Geographical Coordinates of Well: 40° 00' 29.29" N, 104° 55' 02.28" W  
 Grid Convergence at Surface is: 0.38°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,310.00usft  
 the Bottom Hole Displacement is 5,729.17usft in the Direction of 355.61° ( True).  
 Magnetic Convergence at surface is: -8.20° (26 August 2014, , BGGM2014)



# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 32-T1N-R67W

Howard 6N-29HZ

Plan B

Design: Actual Field Surveys

## Sperry Drilling Services

### Geodetic Report

10 September, 2014

Well Coordinates: 1,246,347.21 N, 3,163,224.85 E (40° 00' 29.29" N, 104° 55' 02.28" W)

Ground Level: 5,049.00 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 Howard 6N-29HZ

RKB = 16' @ 5065.00usft (Xtreme 22)

N

True

Dec-Deg - API - US Survey Feet - Custom

## HALLIBURTON



## Design Report for Howard 6N-29HZ - Actual Field 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)
0.00	0.00	0.00	0.00	0.00	0.00	40.008137	-104.917300	1,246,347.21	3,163,224.85
16.00	0.00	0.00	16.00	0.00	0.00	40.008137	-104.917300	1,246,347.21	3,163,224.85
116.00	0.63	43.96	116.00	0.40	0.38	40.008138	-104.917299	1,246,347.61	3,163,225.22
216.00	0.60	23.00	215.99	1.27	0.97	40.008141	-104.917297	1,246,348.49	3,163,225.80
316.00	0.50	33.82	315.99	2.12	1.42	40.008143	-104.917295	1,246,349.34	3,163,226.25
416.00	0.49	43.51	415.98	2.79	1.95	40.008145	-104.917293	1,246,350.01	3,163,226.78
516.00	0.38	33.00	515.98	3.38	2.43	40.008146	-104.917292	1,246,350.60	3,163,227.25
616.00	0.32	3.27	615.98	3.94	2.62	40.008148	-104.917291	1,246,351.16	3,163,227.44
716.00	0.23	5.78	715.98	4.41	2.66	40.008149	-104.917291	1,246,351.64	3,163,227.48
816.00	0.44	355.28	815.98	5.00	2.65	40.008151	-104.917291	1,246,352.22	3,163,227.46
878.00	0.48	1.61	877.97	5.49	2.64	40.008152	-104.917291	1,246,352.72	3,163,227.45
992.00	0.56	354.53	991.97	6.52	2.60	40.008155	-104.917291	1,246,353.75	3,163,227.40
1,107.00	0.64	349.18	1,106.96	7.71	2.42	40.008158	-104.917292	1,246,354.93	3,163,227.22
1,202.00	0.50	342.63	1,201.96	8.63	2.20	40.008161	-104.917292	1,246,355.85	3,163,226.99
1,297.00	1.00	257.90	1,296.95	8.85	1.27	40.008161	-104.917296	1,246,356.06	3,163,226.05
1,487.00	1.35	282.34	1,486.91	8.98	-2.54	40.008162	-104.917309	1,246,356.17	3,163,222.24
1,673.00	1.07	254.58	1,672.87	8.98	-6.36	40.008162	-104.917323	1,246,356.15	3,163,218.43
1,856.00	0.88	286.12	1,855.85	8.92	-9.35	40.008162	-104.917334	1,246,356.07	3,163,215.43
2,039.00	1.22	285.94	2,038.82	9.85	-12.58	40.008164	-104.917345	1,246,356.97	3,163,212.20
2,222.00	1.33	263.65	2,221.77	10.15	-16.56	40.008165	-104.917359	1,246,357.25	3,163,208.22
2,405.00	0.89	187.60	2,404.75	8.50	-18.86	40.008160	-104.917368	1,246,355.59	3,163,205.93
2,588.00	1.18	166.63	2,587.72	5.26	-18.61	40.008151	-104.917367	1,246,352.35	3,163,206.20
2,772.00	1.49	185.95	2,771.67	1.04	-18.42	40.008140	-104.917366	1,246,348.13	3,163,206.42
2,955.00	2.26	215.60	2,954.57	-4.26	-20.77	40.008125	-104.917374	1,246,342.81	3,163,204.11
3,138.00	3.26	250.45	3,137.37	-8.94	-27.77	40.008113	-104.917399	1,246,338.09	3,163,197.13
3,321.00	5.72	240.00	3,319.80	-15.24	-40.58	40.008095	-104.917445	1,246,331.70	3,163,184.37
3,491.00	8.78	246.21	3,488.42	-24.71	-59.79	40.008069	-104.917514	1,246,322.11	3,163,165.22
3,661.00	9.29	236.55	3,656.32	-37.51	-83.11	40.008034	-104.917597	1,246,309.15	3,163,141.98
3,832.00	9.59	232.43	3,825.01	-53.80	-105.92	40.007989	-104.917678	1,246,292.71	3,163,119.29
4,003.00	9.41	242.39	3,993.67	-68.97	-129.60	40.007948	-104.917763	1,246,277.39	3,163,095.71
4,173.00	9.13	239.14	4,161.45	-82.33	-153.49	40.007911	-104.917848	1,246,263.88	3,163,071.90
4,345.00	10.64	251.43	4,330.91	-94.39	-180.26	40.007878	-104.917944	1,246,251.64	3,163,045.21
4,516.00	10.14	247.70	4,499.11	-105.13	-209.15	40.007848	-104.918047	1,246,240.72	3,163,016.39
4,687.00	8.97	241.44	4,667.74	-117.21	-234.79	40.007815	-104.918138	1,246,228.46	3,162,990.84
4,859.00	8.13	239.22	4,837.83	-129.85	-257.02	40.007781	-104.918218	1,246,215.68	3,162,968.70
5,030.00	8.04	237.62	5,007.13	-142.44	-277.50	40.007746	-104.918291	1,246,202.96	3,162,948.29
5,199.00	6.87	242.74	5,174.70	-153.40	-296.47	40.007716	-104.918359	1,246,191.87	3,162,929.40
5,370.00	5.38	240.54	5,344.72	-162.02	-312.54	40.007692	-104.918416	1,246,183.14	3,162,913.38
5,541.00	2.37	275.36	5,515.33	-165.64	-323.05	40.007682	-104.918453	1,246,179.46	3,162,902.90
5,712.00	0.90	344.00	5,686.27	-164.02	-326.94	40.007687	-104.918467	1,246,181.05	3,162,899.00
5,884.00	0.50	319.79	5,858.25	-162.15	-327.80	40.007692	-104.918470	1,246,182.92	3,162,898.13
6,055.00	0.90	300.01	6,029.24	-160.90	-329.44	40.007695	-104.918476	1,246,184.15	3,162,896.48

## Design Report for Howard 6N-29HZ - Actual Field 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)
6,225.00	0.99	312.49	6,199.22	-159.24	-331.68	40.007700	-104.918484	1,246,185.79	3,162,894.23
6,396.00	0.43	331.67	6,370.20	-157.68	-333.07	40.007704	-104.918489	1,246,187.35	3,162,892.83
6,567.00	0.99	359.67	6,541.19	-155.64	-333.39	40.007710	-104.918490	1,246,189.39	3,162,892.50
6,739.00	0.79	12.96	6,713.17	-153.00	-333.13	40.007717	-104.918489	1,246,192.03	3,162,892.74
6,910.00	1.00	33.53	6,884.15	-150.61	-332.04	40.007724	-104.918486	1,246,194.43	3,162,893.81
7,038.00	1.81	48.96	7,012.11	-148.35	-329.90	40.007730	-104.918478	1,246,196.70	3,162,895.94
7,081.00	2.26	39.33	7,055.08	-147.25	-328.85	40.007733	-104.918474	1,246,197.81	3,162,896.98
7,124.00	3.89	8.76	7,098.02	-145.15	-328.09	40.007739	-104.918471	1,246,199.91	3,162,897.73
7,167.00	7.66	354.20	7,140.80	-140.85	-328.16	40.007750	-104.918472	1,246,204.21	3,162,897.63
7,210.00	10.53	356.10	7,183.25	-134.08	-328.71	40.007769	-104.918474	1,246,210.98	3,162,897.03
7,252.00	14.15	358.84	7,224.28	-125.12	-329.08	40.007794	-104.918475	1,246,219.94	3,162,896.61
7,338.00	21.73	0.47	7,306.04	-98.65	-329.16	40.007866	-104.918475	1,246,246.40	3,162,896.35
7,423.00	26.98	1.47	7,383.44	-63.61	-328.54	40.007962	-104.918473	1,246,281.44	3,162,896.74
7,450.00	30.09	1.63	7,407.16	-50.72	-328.19	40.007998	-104.918472	1,246,294.33	3,162,897.01
7,466.00	31.39	2.06	7,420.91	-42.55	-327.92	40.008020	-104.918471	1,246,302.51	3,162,897.22
7,509.00	33.94	2.88	7,457.11	-19.36	-326.92	40.008084	-104.918467	1,246,325.70	3,162,898.07
7,551.00	38.81	359.23	7,490.92	5.52	-326.51	40.008152	-104.918466	1,246,350.59	3,162,898.32
7,593.00	43.55	357.62	7,522.52	33.16	-327.28	40.008228	-104.918469	1,246,378.21	3,162,897.36
7,636.00	49.47	358.03	7,552.10	64.32	-328.46	40.008314	-104.918473	1,246,409.36	3,162,895.98
7,679.00	55.60	356.81	7,578.25	98.39	-330.01	40.008407	-104.918478	1,246,443.43	3,162,894.21
7,764.00	67.08	358.35	7,618.95	172.79	-333.10	40.008611	-104.918489	1,246,517.80	3,162,890.63
7,850.00	78.34	359.58	7,644.47	254.76	-334.55	40.008836	-104.918495	1,246,599.75	3,162,888.64
7,926.00	87.04	359.67	7,654.13	330.06	-335.05	40.009043	-104.918496	1,246,675.05	3,162,887.65
7,957.10	88.38	359.66	7,655.37	361.14	-335.23	40.009128	-104.918497	1,246,706.12	3,162,887.26
7,989.00	89.75	359.65	7,655.89	393.03	-335.42	40.009216	-104.918498	1,246,738.02	3,162,886.86
8,160.00	89.72	358.87	7,656.68	564.01	-337.63	40.009685	-104.918506	1,246,908.97	3,162,883.53
8,332.00	90.22	358.41	7,656.77	735.96	-341.71	40.010157	-104.918520	1,247,080.89	3,162,878.32
8,504.00	90.18	358.90	7,656.17	907.92	-345.75	40.010629	-104.918535	1,247,252.80	3,162,873.15
8,675.00	90.31	359.42	7,655.44	1,078.90	-348.26	40.011099	-104.918544	1,247,423.76	3,162,869.52
8,846.00	89.94	359.26	7,655.07	1,249.88	-350.23	40.011568	-104.918551	1,247,594.72	3,162,866.43
9,017.00	89.72	358.93	7,655.58	1,420.86	-352.93	40.012037	-104.918560	1,247,765.67	3,162,862.60
9,188.00	89.72	358.72	7,656.41	1,591.82	-356.43	40.012507	-104.918573	1,247,936.60	3,162,857.97
9,359.00	90.03	357.87	7,656.79	1,762.74	-361.52	40.012976	-104.918591	1,248,107.48	3,162,851.76
9,531.00	89.66	358.47	7,657.25	1,934.66	-367.01	40.013448	-104.918611	1,248,279.35	3,162,845.14
9,616.00	90.65	359.38	7,657.02	2,019.64	-368.61	40.013681	-104.918616	1,248,364.31	3,162,842.99
9,787.00	90.99	359.89	7,654.57	2,190.62	-369.70	40.014150	-104.918620	1,248,535.27	3,162,840.78
9,957.00	91.36	359.70	7,651.09	2,360.58	-370.30	40.014617	-104.918622	1,248,705.22	3,162,839.05
10,128.00	91.64	358.83	7,646.61	2,531.50	-372.50	40.015086	-104.918630	1,248,876.13	3,162,835.73
10,299.00	91.33	358.66	7,642.18	2,702.41	-376.24	40.015555	-104.918644	1,249,046.99	3,162,830.87
10,469.00	91.29	359.24	7,638.29	2,872.33	-379.36	40.016022	-104.918655	1,249,216.89	3,162,826.64
10,639.00	91.20	358.96	7,634.60	3,042.27	-382.03	40.016488	-104.918664	1,249,386.80	3,162,822.85
10,810.00	91.73	358.96	7,630.23	3,213.19	-385.13	40.016958	-104.918675	1,249,557.69	3,162,818.63

## Design Report for Howard 6N-29HZ - Actual Field 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)
10,896.00	90.71	358.31	7,628.40	3,299.14	-387.18	40.017193	-104.918683	1,249,643.62	3,162,816.01
10,981.00	90.18	357.62	7,627.74	3,384.08	-390.19	40.017427	-104.918693	1,249,728.54	3,162,812.44
11,067.00	89.60	358.86	7,627.90	3,470.04	-392.84	40.017663	-104.918703	1,249,814.48	3,162,809.23
11,238.00	90.12	357.73	7,628.32	3,640.96	-397.92	40.018132	-104.918721	1,249,985.35	3,162,803.02
11,410.00	90.15	357.19	7,627.91	3,812.79	-405.55	40.018603	-104.918748	1,250,157.12	3,162,794.27
11,580.00	90.19	358.55	7,627.41	3,982.67	-411.86	40.019070	-104.918771	1,250,326.95	3,162,786.83
11,751.00	89.45	358.44	7,627.95	4,153.61	-416.36	40.019539	-104.918787	1,250,497.85	3,162,781.22
11,922.00	90.19	359.38	7,628.48	4,324.57	-419.61	40.020008	-104.918798	1,250,668.78	3,162,776.84
12,094.00	90.80	358.86	7,627.00	4,496.55	-422.25	40.020480	-104.918808	1,250,840.73	3,162,773.07
12,179.00	90.28	358.93	7,626.20	4,581.53	-423.89	40.020714	-104.918814	1,250,925.69	3,162,770.88
12,350.00	90.96	359.99	7,624.35	4,752.50	-425.50	40.021183	-104.918819	1,251,096.65	3,162,768.14
12,521.00	90.12	358.99	7,622.74	4,923.49	-427.02	40.021652	-104.918825	1,251,267.61	3,162,765.49
12,692.00	89.94	359.79	7,622.65	5,094.48	-428.84	40.022122	-104.918831	1,251,438.58	3,162,762.55
12,863.00	90.28	359.91	7,622.32	5,265.47	-429.29	40.022591	-104.918833	1,251,609.57	3,162,760.98
13,034.00	90.25	358.99	7,621.53	5,436.46	-430.93	40.023061	-104.918839	1,251,780.54	3,162,758.21
13,206.00	90.28	357.93	7,620.73	5,608.40	-435.55	40.023533	-104.918855	1,251,952.43	3,162,752.46
13,261.00	89.85	358.29	7,620.67	5,663.37	-437.37	40.023683	-104.918862	1,252,007.38	3,162,750.29
13,310.00	89.85	358.29	7,620.80	5,712.34	-438.83	40.023818	-104.918867	1,252,056.35	3,162,748.50

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
878.00	877.97	5.49	2.64	Tie-On to Gyro Surveys @ 878.00ft
1,107.00	1,106.96	7.71	2.42	First MWD Survey @ 1107.00ft
13,261.00	7,620.67	5,663.37	-437.37	Final MWD Survey @ 13261.00ft
13,310.00	7,620.80	5,712.34	-438.83	Str Line Proj to Bit @ 13310' MD :: 7620.80' TVD

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	358.73	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 Howard 6N-29HZ - Actual Field Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	878.00	MS Energy Surveys	NS-GYRO-MS
1,107.00	7,989.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,160.00	13,261.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
992.00	991.97	9 5/8" Casing Set @ 992' MD :: 991.97	9-5/8	13-1/2
7,957.10	7,655.37	7" Casing Set @ 7957.1' MD :: 7655.37' TVD	7	8-3/4

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:	1.18 °/100usft	Maximum Dogleg over Survey:	14.43 °/100usft at 7,679.00 usft
Net Tortousity applicable to Plans:	0.33 °/100usft	Directional Difficulty Index:	6.233

Audit Info

**North Reference Sheet for Sec. 32-T1N-R67W - Howard 6N-29HZ - Plan B**

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

Vertical Depths are relative to RKB = 16' @ 5065.00usft (Xtreme 22). Northing and Easting are relative to Howard 6N-29HZ

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: 0.99996576

Grid Coordinates of Well: 1,246,347.21 usft N, 3,163,224.85 usft E

Geographical Coordinates of Well: 40° 00' 29.29" N, 104° 55' 02.28" W

Grid Convergence at Surface is: 0.38°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,310.00usft

the Bottom Hole Displacement is 5,729.17usft in the Direction of 355.61° ( True).

Magnetic Convergence at surface is: -8.20° (26 August 2014, , BGGM2014)

