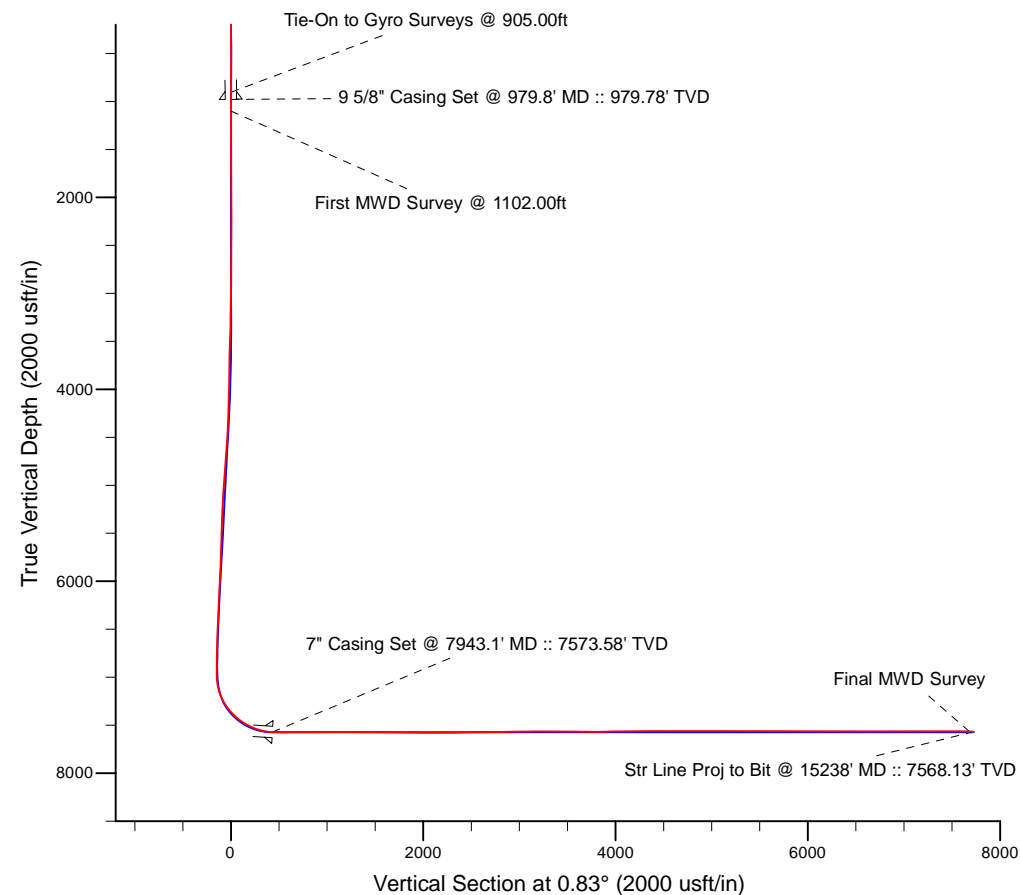
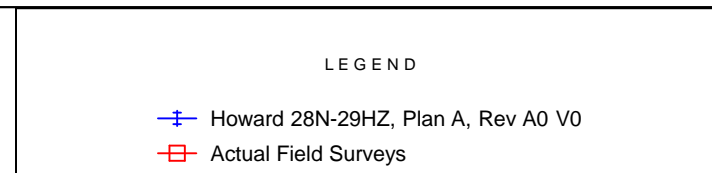
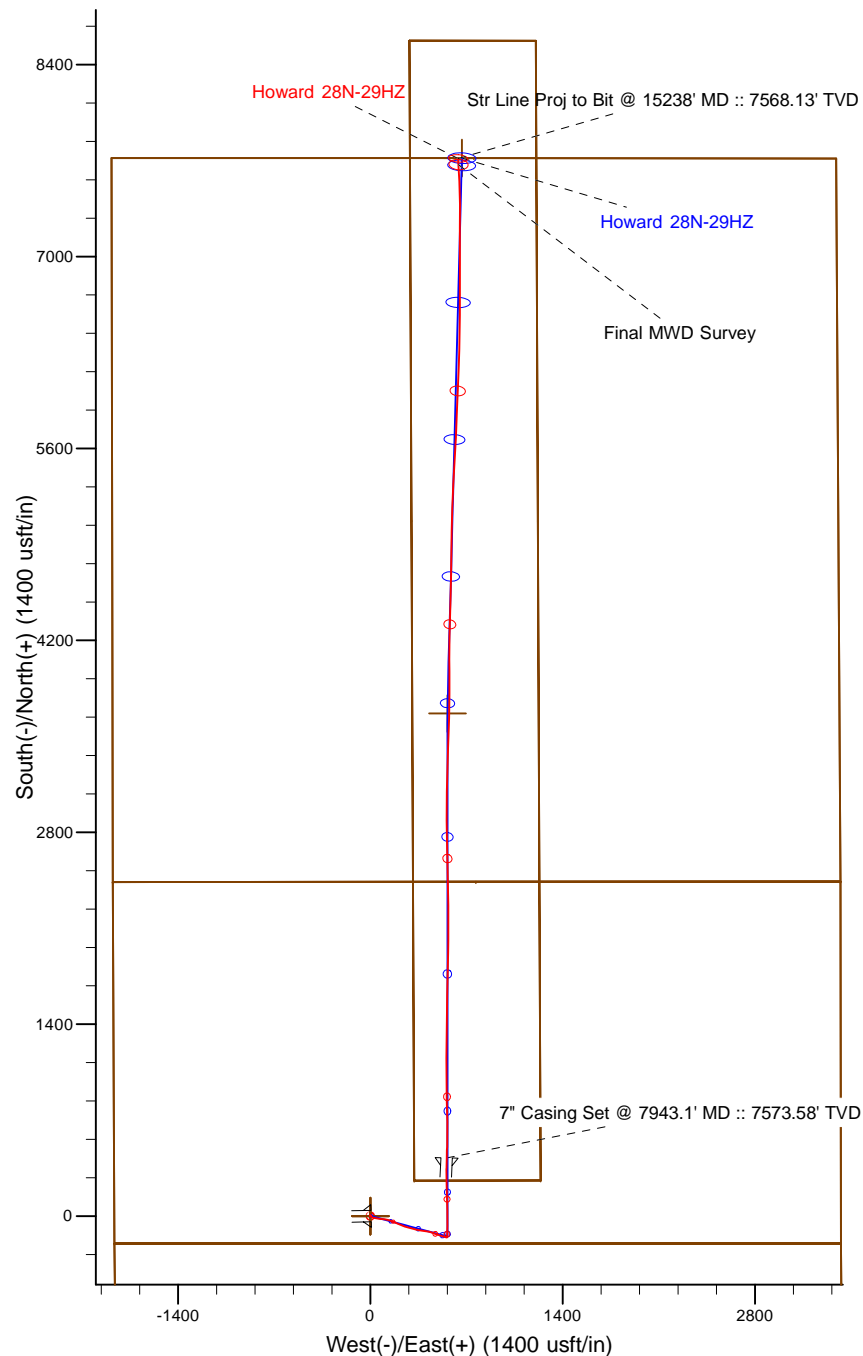


Project: Weld County, CO (NAD 83)
 Site: Sec. 32-T1N-R67W
 Well: Howard 28N-29HZ
 Wellbore: Plan A
 Design: Actual Field Surveys



7" Casing: ~2014.97' FNL, ~2422.91' FWL
 Lat/Long: 40.009302 N, -104.915100 E
 State Planes - CO Northern: 1,246,775.73' N, 3,163,838.41' E
 Location: Sec. 32-T1N-R67W

BHL: ~2.79' FNL, ~2522.93' FWL
 Lat/Long: 40.029319 N, -104.914804 E
 State Planes - CO Northern: 1,254,067.87' N, 3,163,873.07' E
 Location: Sec. 29-T1N-R67W

WELL DETAILS: Howard 28N-29HZ	
Ground Level:	5049.00
RKB = 16' @ 5065.00usft (Xtreme 22)	
Design: Actual Field Surveys (Howard 28N-29HZ/Plan A)	
Created By: Clint Eshelman	Date: 8/13/2014
Reviewed: _____	Date: _____

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 32-T1N-R67W

Howard 28N-29HZ

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

13 August, 2014

Well Coordinates: 1,246,347.61 N, 3,163,285.07 E (40° 00' 29.29" N, 104° 55' 01.51" 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 28N-29HZ

RKB = 16' @ 5065.00usft (Xtreme 22)

N

True

API - US Survey Feet - Custom

HALLIBURTON

Design Report for Howard 28N-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	0.54	14.61	116.00	0.46	0.12	0.46	0.54
216.00	0.48	31.94	215.99	1.27	0.46	1.27	0.16
316.00	0.44	56.37	315.99	1.84	1.00	1.85	0.20
416.00	0.45	85.99	415.99	2.08	1.71	2.10	0.23
516.00	0.54	96.98	515.98	2.05	2.57	2.08	0.13
616.00	0.37	118.17	615.98	1.84	3.32	1.88	0.24
716.00	0.46	135.83	715.98	1.40	3.89	1.45	0.16
816.00	0.41	103.74	815.98	1.02	4.52	1.09	0.25
905.00	0.08	145.86	904.98	0.90	4.86	0.97	0.40
Tie-On to Gyro Surveys @ 905.00ft							
979.80	0.03	88.79	979.78	0.85	4.91	0.92	0.09
9 5/8" Casing Set @ 979.8' MD :: 979.78' TVD							
1,102.00	0.11	3.03	1,101.98	0.97	4.95	1.04	0.09
First MWD Survey @ 1102.00ft							
1,291.00	0.42	2.97	1,290.97	1.84	4.99	1.92	0.16
1,480.00	0.40	304.60	1,479.97	2.91	4.49	2.97	0.21
1,666.00	0.28	291.69	1,665.97	3.45	3.53	3.50	0.08
1,849.00	0.33	299.59	1,848.96	3.87	2.65	3.91	0.04
2,032.00	0.40	315.62	2,031.96	4.59	1.75	4.61	0.07
2,215.00	0.66	304.75	2,214.95	5.65	0.44	5.65	0.15
2,399.00	0.65	317.57	2,398.94	7.02	-1.14	7.00	0.08
2,581.00	1.18	169.01	2,580.93	5.94	-1.48	5.92	0.97
2,765.00	1.11	170.21	2,764.89	2.33	-0.81	2.31	0.04
2,948.00	0.36	124.44	2,947.88	0.26	-0.04	0.25	0.49
3,131.00	0.32	174.25	3,130.87	-0.58	0.49	-0.57	0.16
3,315.00	2.55	125.39	3,314.81	-3.46	3.88	-3.40	1.28
3,485.00	5.21	112.13	3,484.41	-8.56	14.11	-8.35	1.64
3,657.00	7.44	100.51	3,655.35	-13.53	32.30	-13.06	1.49
3,828.00	8.11	97.81	3,824.78	-17.19	55.13	-16.39	0.45
3,999.00	9.03	94.83	3,993.87	-19.96	80.46	-18.79	0.60
4,169.00	9.92	99.86	4,161.55	-23.59	108.18	-22.02	0.71
4,340.00	10.07	105.50	4,329.96	-30.11	137.10	-28.12	0.58
4,511.00	10.39	112.81	4,498.25	-40.08	165.72	-37.68	0.78
4,680.00	11.15	113.24	4,664.27	-52.44	194.78	-49.61	0.45
4,851.00	10.16	112.25	4,832.32	-64.67	223.93	-61.42	0.59
5,022.00	11.96	109.37	5,000.14	-76.26	254.61	-72.57	1.10
5,192.00	11.79	104.22	5,166.51	-86.37	288.06	-82.19	0.63
5,362.00	10.95	106.55	5,333.17	-95.24	320.38	-90.59	0.56
5,534.00	12.34	98.06	5,501.64	-102.47	354.24	-97.33	1.28
5,702.00	11.58	97.70	5,665.99	-107.24	388.72	-101.60	0.45
5,871.00	10.74	101.21	5,831.80	-112.58	420.98	-106.47	0.64
6,043.00	9.05	110.63	6,001.24	-120.46	449.36	-113.94	1.36
6,214.00	7.26	110.77	6,170.51	-129.03	472.05	-122.18	1.05
6,385.00	10.55	107.24	6,339.42	-137.51	497.11	-130.29	1.95
6,555.00	7.29	108.46	6,507.34	-145.54	522.22	-137.96	1.92
6,726.00	5.44	105.44	6,677.28	-151.13	540.32	-143.29	1.10
6,898.00	3.12	105.03	6,848.79	-154.51	552.70	-146.49	1.35
6,983.00	2.04	93.63	6,933.71	-155.21	556.45	-147.13	1.40

Design Report for Howard 28N-29HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,026.00	1.57	81.97	6,976.68	-155.18	557.79	-147.08	1.38
7,068.00	4.29	359.74	7,018.64	-153.52	558.36	-145.42	10.39
7,111.00	8.78	359.54	7,061.35	-148.63	558.32	-140.53	10.44
7,154.00	12.08	357.88	7,103.63	-140.85	558.13	-132.75	7.71
7,196.00	15.96	359.24	7,144.37	-130.68	557.89	-122.59	9.27
7,238.00	20.20	1.46	7,184.29	-117.65	558.00	-109.56	10.23
7,281.00	25.05	4.30	7,223.97	-101.14	558.87	-93.04	11.56
7,323.00	29.57	1.47	7,261.28	-81.91	559.80	-73.79	11.19
7,366.00	33.93	1.57	7,297.84	-59.29	560.41	-51.17	10.14
7,409.00	38.31	359.70	7,332.56	-33.95	560.66	-25.83	10.50
7,452.00	42.07	358.81	7,365.41	-6.21	560.30	1.90	8.85
7,494.00	45.90	359.15	7,395.62	22.94	559.78	31.05	9.14
7,537.00	49.64	359.89	7,424.52	54.78	559.52	62.88	8.79
7,580.00	53.26	358.88	7,451.31	88.40	559.15	96.49	8.62
7,623.00	56.91	357.66	7,475.92	123.63	558.08	131.70	8.80
7,665.00	61.19	358.19	7,497.51	159.62	556.78	167.67	10.25
7,708.00	65.11	358.49	7,516.93	197.96	555.67	205.99	9.14
7,751.00	68.86	358.47	7,533.74	237.52	554.62	245.53	8.72
7,794.00	72.73	358.92	7,547.88	278.11	553.70	286.10	9.05
7,837.00	76.60	359.95	7,559.25	319.57	553.29	327.55	9.29
7,879.00	81.19	1.81	7,567.34	360.76	553.93	368.75	11.76
7,903.00	84.42	2.21	7,570.35	384.55	554.76	392.55	13.56
7,943.10	86.32	1.79	7,573.58	424.50	556.16	432.51	4.86
7" Casing Set @ 7943.1' MD :: 7573.58' TVD							
8,023.00	90.12	0.97	7,576.06	504.32	558.09	512.35	4.86
8,206.00	90.22	0.17	7,575.52	687.31	559.91	695.35	0.44
8,390.00	89.54	358.29	7,575.90	871.28	557.43	879.27	1.09
8,572.00	91.72	358.63	7,573.90	1,053.19	552.54	1,061.09	1.21
8,755.00	89.38	1.32	7,572.14	1,236.16	552.46	1,244.03	1.95
8,933.00	89.17	0.73	7,574.40	1,414.11	555.65	1,422.01	0.35
9,104.00	89.63	1.46	7,576.19	1,585.07	558.92	1,593.00	0.50
9,274.00	89.54	1.03	7,577.42	1,755.03	562.61	1,762.99	0.26
9,445.00	89.14	0.92	7,579.39	1,925.99	565.52	1,933.98	0.24
9,617.00	90.18	359.92	7,580.41	2,097.98	566.78	2,105.97	0.84
9,787.00	90.65	359.73	7,579.18	2,267.97	566.26	2,275.94	0.30
9,958.00	90.37	358.98	7,577.65	2,438.95	564.33	2,446.87	0.47
10,128.00	90.92	358.45	7,575.74	2,608.90	560.52	2,616.74	0.45
10,299.00	91.32	359.70	7,572.40	2,779.84	557.76	2,787.63	0.77
10,470.00	90.71	359.38	7,569.37	2,950.81	556.39	2,958.56	0.40
10,641.00	90.34	1.02	7,567.80	3,121.79	556.99	3,129.53	0.98
10,811.00	90.43	1.65	7,566.66	3,291.74	560.95	3,299.52	0.37
10,982.00	89.60	2.16	7,566.61	3,462.64	566.63	3,470.49	0.57
11,153.00	88.89	1.43	7,568.87	3,633.54	571.99	3,641.45	0.60
11,324.00	89.94	0.69	7,570.61	3,804.50	575.15	3,812.43	0.75
11,496.00	91.97	359.59	7,567.75	3,976.46	575.57	3,984.38	1.34
11,667.00	90.37	0.00	7,564.26	4,147.42	574.96	4,155.32	0.97
11,837.00	91.02	2.28	7,562.19	4,317.36	578.34	4,325.29	1.39
12,008.00	89.26	1.40	7,561.78	4,488.27	583.83	4,496.25	1.15
12,180.00	89.51	0.30	7,563.62	4,660.23	586.38	4,668.24	0.66
12,351.00	90.25	1.45	7,563.98	4,831.21	588.99	4,839.24	0.80
12,519.00	89.66	1.00	7,564.11	4,999.17	592.59	5,007.23	0.44

Design Report for Howard 28N-29HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,689.00	89.75	1.56	7,564.99	5,169.13	596.38	5,177.22	0.33
12,859.00	90.83	3.52	7,564.13	5,338.95	603.92	5,347.13	1.32
13,031.00	89.88	2.33	7,563.06	5,510.71	612.69	5,519.01	0.89
13,202.00	90.03	3.13	7,563.20	5,681.52	620.84	5,689.91	0.48
13,373.00	89.51	2.16	7,563.88	5,852.33	628.73	5,860.82	0.64
13,541.00	91.02	2.47	7,563.10	6,020.19	635.51	6,028.76	0.92
13,712.00	89.66	2.04	7,562.09	6,191.05	642.24	6,199.70	0.83
13,883.00	88.71	1.29	7,564.52	6,361.95	647.21	6,370.66	0.71
14,053.00	89.72	1.09	7,566.85	6,531.90	650.74	6,540.64	0.61
14,223.00	89.97	359.85	7,567.31	6,701.89	652.14	6,710.63	0.74
14,392.00	89.94	359.38	7,567.44	6,870.89	651.00	6,879.60	0.28
14,561.00	89.88	0.14	7,567.71	7,039.88	650.29	7,048.56	0.45
14,729.00	90.89	0.49	7,566.58	7,207.87	651.22	7,216.55	0.64
14,900.00	90.59	359.89	7,564.37	7,378.86	651.78	7,387.53	0.39
15,070.00	89.20	357.70	7,564.68	7,548.81	648.21	7,557.40	1.53
15,193.00	88.61	356.24	7,567.03	7,671.61	641.71	7,680.10	1.28
Final MWD Survey							
15,238.00	88.61	356.24	7,568.13	7,716.50	638.76	7,724.94	0.00
Str Line Proj to Bit @ 15238' MD :: 7568.13' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
905.00	904.98	0.90	4.86	Tie-On to Gyro Surveys @ 905.00ft
1,102.00	1,101.98	0.97	4.95	First MWD Survey @ 1102.00ft
15,193.00	7,567.03	7,671.61	641.71	Final MWD Survey
15,238.00	7,568.13	7,716.50	638.76	Str Line Proj to Bit @ 15238' MD :: 7568.13' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	0.83	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	905.00	MS Energy Gyros	NS-GYRO-MS
1,102.00	8,023.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,206.00	15,193.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
979.80	979.78	9 5/8" Casing Set @ 979.8' MD :: 979.78' TVD	9-5/8	13-1/2
7,943.10	7,573.58	7" Casing Set @ 7943.1' MD :: 7573.58' TVD	7	8-3/4

Design Report for Howard 28N-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 28N-29HZ_SF - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,246,347.61	3,163,285.07	40° 0' 29.293 N	104° 55' 1.506 W
Howard 28N-29HZ_SE - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,246,347.61	3,163,285.07	40° 0' 29.293 N	104° 55' 1.506 W
Point 1				0.00	7,719.38	-1,884.25	1,254,054.17	3,161,350.18	
Point 2				0.00	7,719.27	752.61	1,254,071.39	3,163,986.90	
Point 3				0.00	7,715.59	3,390.57	1,254,085.05	3,166,624.73	
Point 4				0.00	2,441.05	3,423.38	1,248,811.02	3,166,692.21	
Point 5				0.00	2,439.62	767.15	1,248,792.13	3,164,036.14	
Point 6				0.00	2,438.35	-1,876.63	1,248,773.48	3,161,392.52	
Point 7				0.00	2,439.62	767.15	1,248,792.13	3,164,036.14	
Point 8				0.00	2,441.05	3,423.38	1,248,811.02	3,166,692.21	
Point 9				0.00	-197.77	3,425.69	1,246,172.36	3,166,711.87	
Point 10				0.00	-2,837.94	3,444.09	1,243,532.46	3,166,747.62	
Point 11				0.00	-2,839.23	796.53	1,243,513.77	3,164,100.22	
Point 12				0.00	-2,840.53	-1,851.03	1,243,495.07	3,161,452.82	
Point 13				0.00	-201.09	-1,863.83	1,246,134.27	3,161,422.67	
Point 14				0.00	2,438.35	-1,876.63	1,248,773.48	3,161,392.52	
Howard 28N-29HZ_LC - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,246,347.61	3,163,285.07	40° 0' 29.293 N	104° 55' 1.506 W
Point 1				0.00	8,575.85	283.56	1,254,924.84	3,163,512.24	
Point 2				0.00	8,574.12	1,203.66	1,254,929.16	3,164,432.30	
Point 3				0.00	5,074.69	1,219.63	1,251,430.03	3,164,471.27	
Point 4				0.00	260.78	1,239.45	1,246,616.52	3,164,522.74	
Point 5				0.00	260.19	319.41	1,246,609.88	3,163,602.75	
Point 6				0.00	5,074.52	299.59	1,251,423.81	3,163,551.29	
Howard 28N-29HZ_Se - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,246,347.61	3,163,285.07	40° 0' 29.293 N	104° 55' 1.506 W
Point 1				0.00	-201.09	-1,863.83	1,246,134.27	3,161,422.67	
Point 2				0.00	-197.77	3,425.69	1,246,172.36	3,166,711.87	
Howard 28N-29HZ_BF - actual wellpath misses target center by 28.09usft at 15238.00usft MD (7568.13 TVD, 7716.50 N, 638.76 E) - Point	0.00	0.00	7,575.00	7,718.17	665.94	1,254,069.72	3,163,900.24	40° 1' 45.566 N	104° 54' 52.945 W
Howard 28N-29HZ_La - actual wellpath misses target center by 13.22usft at 11186.10usft MD (7569.45 TVD, 3666.63 N, 572.77 E) - Point	0.00	0.00	7,575.00	3,666.80	560.77	1,250,017.88	3,163,821.71	40° 1' 5.529 N	104° 54' 54.298 W

Directional Difficulty Index

Average Dogleg over Survey:	1.26 °/100usft	Maximum Dogleg over Survey:	13.56 °/100usft at 7,903.00 usft
Net Tortousity applicable to Plans:	0.34 °/100usft	Directional Difficulty Index:	6.514

Audit Info

North Reference Sheet for Sec. 32-T1N-R67W - Howard 28N-29HZ - Plan A

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 28N-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

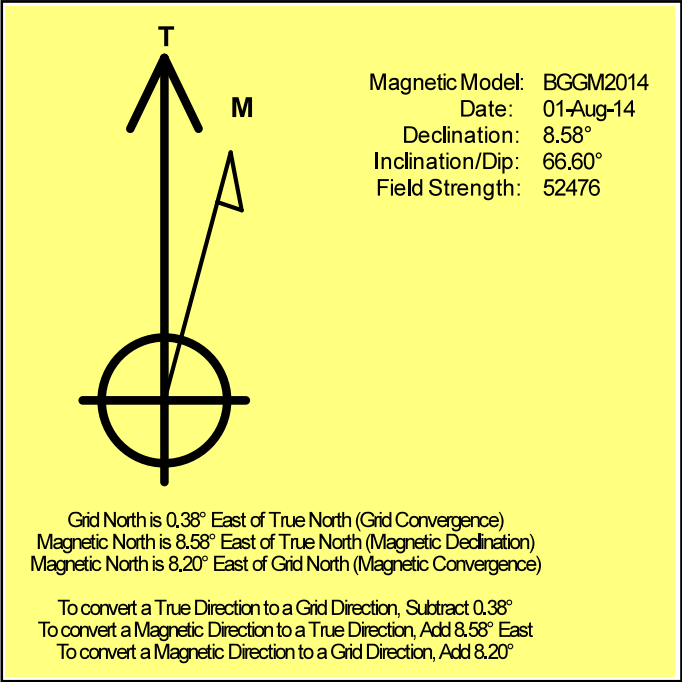
Grid Coordinates of Well: 1,246,347.61 usft N, 3,163,285.07 usft E

Geographical Coordinates of Well: 40° 00' 29.29" N, 104° 55' 01.51" W

Grid Convergence at Surface is: 0.38°

Based upon Minimum Curvature type calculations, at a Measured Depth of 15,238.00usft the Bottom Hole Displacement is 7,742.89usft in the Direction of 4.73° (True).

Magnetic Convergence at surface is: -8.20° (1 August 2014, , BGGM2014)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 32-T1N-R67W

Howard 28N-29HZ

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

13 August, 2014

Well Coordinates: 1,246,347.61 N, 3,163,285.07 E (40° 00' 29.29" N, 104° 55' 01.51" W)

Ground Level: 5,049.00 usft

Local Coordinate Origin:

Centered on Well Howard 28N-29HZ

Viewing Datum:

RKB = 16' @ 5065.00usft (Xtreme 22)

TVDs to System:

N

North Reference:

True

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

HALLIBURTON

Design Report for Howard 28N-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	-104.917085	1,246,347.61	3,163,285.07
16.00	0.00	0.00	16.00	0.00	0.00	40.008137	-104.917085	1,246,347.61	3,163,285.07
116.00	0.54	14.61	116.00	0.46	0.12	40.008138	-104.917085	1,246,348.06	3,163,285.19
216.00	0.48	31.94	215.99	1.27	0.46	40.008141	-104.917084	1,246,348.88	3,163,285.52
316.00	0.44	56.37	315.99	1.84	1.00	40.008142	-104.917082	1,246,349.45	3,163,286.06
416.00	0.45	85.99	415.99	2.08	1.71	40.008143	-104.917079	1,246,349.69	3,163,286.77
516.00	0.54	96.98	515.98	2.05	2.57	40.008143	-104.917076	1,246,349.67	3,163,287.63
616.00	0.37	118.17	615.98	1.84	3.32	40.008142	-104.917073	1,246,349.46	3,163,288.38
716.00	0.46	135.83	715.98	1.40	3.89	40.008141	-104.917071	1,246,349.03	3,163,288.95
816.00	0.41	103.74	815.98	1.02	4.52	40.008140	-104.917069	1,246,348.66	3,163,289.58
905.00	0.08	145.86	904.98	0.90	4.86	40.008140	-104.917068	1,246,348.53	3,163,289.92
979.80	0.03	88.79	979.78	0.85	4.91	40.008139	-104.917068	1,246,348.49	3,163,289.97
1,102.00	0.11	3.03	1,101.98	0.97	4.95	40.008140	-104.917068	1,246,348.61	3,163,290.01
1,291.00	0.42	2.97	1,290.97	1.84	4.99	40.008142	-104.917067	1,246,349.48	3,163,290.05
1,480.00	0.40	304.60	1,479.97	2.91	4.49	40.008145	-104.917069	1,246,350.54	3,163,289.54
1,666.00	0.28	291.69	1,665.97	3.45	3.53	40.008147	-104.917073	1,246,351.07	3,163,288.58
1,849.00	0.33	299.59	1,848.96	3.87	2.65	40.008148	-104.917076	1,246,351.49	3,163,287.70
2,032.00	0.40	315.62	2,031.96	4.59	1.75	40.008150	-104.917079	1,246,352.21	3,163,286.79
2,215.00	0.66	304.75	2,214.95	5.65	0.44	40.008153	-104.917084	1,246,353.25	3,163,285.47
2,399.00	0.65	317.57	2,398.94	7.02	-1.14	40.008156	-104.917089	1,246,354.62	3,163,283.89
2,581.00	1.18	169.01	2,580.93	5.94	-1.48	40.008153	-104.917091	1,246,353.54	3,163,283.55
2,765.00	1.11	170.21	2,764.89	2.33	-0.81	40.008143	-104.917088	1,246,349.93	3,163,284.24
2,948.00	0.36	124.44	2,947.88	0.26	-0.04	40.008138	-104.917085	1,246,347.86	3,163,285.03
3,131.00	0.32	174.25	3,130.87	-0.58	0.49	40.008135	-104.917084	1,246,347.03	3,163,285.56
3,315.00	2.55	125.39	3,314.81	-3.46	3.88	40.008128	-104.917071	1,246,344.17	3,163,288.97
3,485.00	5.21	112.13	3,484.41	-8.56	14.11	40.008114	-104.917035	1,246,339.14	3,163,299.24
3,657.00	7.44	100.51	3,655.35	-13.53	32.30	40.008100	-104.916970	1,246,334.28	3,163,317.46
3,828.00	8.11	97.81	3,824.78	-17.19	55.13	40.008090	-104.916888	1,246,330.78	3,163,340.31
3,999.00	9.03	94.83	3,993.87	-19.96	80.46	40.008082	-104.916798	1,246,328.17	3,163,365.65
4,169.00	9.92	99.86	4,161.55	-23.59	108.18	40.008072	-104.916699	1,246,324.73	3,163,393.40
4,340.00	10.07	105.50	4,329.96	-30.11	137.10	40.008054	-104.916596	1,246,318.40	3,163,422.36
4,511.00	10.39	112.81	4,498.25	-40.08	165.72	40.008027	-104.916494	1,246,308.61	3,163,451.04
4,680.00	11.15	113.24	4,664.27	-52.44	194.78	40.007993	-104.916390	1,246,296.45	3,163,480.18
4,851.00	10.16	112.25	4,832.32	-64.67	223.93	40.007960	-104.916286	1,246,284.41	3,163,509.41
5,022.00	11.96	109.37	5,000.14	-76.26	254.61	40.007928	-104.916176	1,246,273.02	3,163,540.17
5,192.00	11.79	104.22	5,166.51	-86.37	288.06	40.007900	-104.916057	1,246,263.13	3,163,573.68
5,362.00	10.95	106.55	5,333.17	-95.24	320.38	40.007876	-104.915942	1,246,254.48	3,163,606.05
5,534.00	12.34	98.06	5,501.64	-102.47	354.24	40.007856	-104.915821	1,246,247.47	3,163,639.96
5,702.00	11.58	97.70	5,665.99	-107.24	388.72	40.007843	-104.915698	1,246,242.92	3,163,674.47
5,871.00	10.74	101.21	5,831.80	-112.58	420.98	40.007828	-104.915582	1,246,237.80	3,163,706.76
6,043.00	9.05	110.63	6,001.24	-120.46	449.36	40.007806	-104.915481	1,246,230.10	3,163,735.20
6,214.00	7.26	110.77	6,170.51	-129.03	472.05	40.007783	-104.915400	1,246,221.68	3,163,757.95

Design Report for Howard 28N-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)
6,385.00	10.55	107.24	6,339.42	-137.51	497.11	40.007760	-104.915311	1,246,213.38	3,163,783.06
6,555.00	7.29	108.46	6,507.34	-145.54	522.22	40.007738	-104.915221	1,246,205.51	3,163,808.21
6,726.00	5.44	105.44	6,677.28	-151.13	540.32	40.007722	-104.915156	1,246,200.04	3,163,826.35
6,898.00	3.12	105.03	6,848.79	-154.51	552.70	40.007713	-104.915112	1,246,196.73	3,163,838.76
6,983.00	2.04	93.63	6,933.71	-155.21	556.45	40.007711	-104.915099	1,246,196.06	3,163,842.51
7,026.00	1.57	81.97	6,976.68	-155.18	557.79	40.007711	-104.915094	1,246,196.10	3,163,843.85
7,068.00	4.29	359.74	7,018.64	-153.52	558.36	40.007716	-104.915092	1,246,197.76	3,163,844.40
7,111.00	8.78	359.54	7,061.35	-148.63	558.32	40.007729	-104.915092	1,246,202.65	3,163,844.34
7,154.00	12.08	357.88	7,103.63	-140.85	558.13	40.007750	-104.915093	1,246,210.43	3,163,844.09
7,196.00	15.96	359.24	7,144.37	-130.68	557.89	40.007778	-104.915094	1,246,220.60	3,163,843.79
7,238.00	20.20	1.46	7,184.29	-117.65	558.00	40.007814	-104.915093	1,246,233.63	3,163,843.81
7,281.00	25.05	4.30	7,223.97	-101.14	558.87	40.007859	-104.915090	1,246,250.14	3,163,844.58
7,323.00	29.57	1.47	7,261.28	-81.91	559.80	40.007912	-104.915087	1,246,269.38	3,163,845.38
7,366.00	33.93	1.57	7,297.84	-59.29	560.41	40.007974	-104.915085	1,246,292.00	3,163,845.83
7,409.00	38.31	359.70	7,332.56	-33.95	560.66	40.008044	-104.915084	1,246,317.34	3,163,845.93
7,452.00	42.07	358.81	7,365.41	-6.21	560.30	40.008120	-104.915085	1,246,345.07	3,163,845.38
7,494.00	45.90	359.15	7,395.62	22.94	559.78	40.008200	-104.915087	1,246,374.23	3,163,844.67
7,537.00	49.64	359.89	7,424.52	54.78	559.52	40.008287	-104.915088	1,246,406.06	3,163,844.20
7,580.00	53.26	358.88	7,451.31	88.40	559.15	40.008380	-104.915089	1,246,439.67	3,163,843.61
7,623.00	56.91	357.66	7,475.92	123.63	558.08	40.008476	-104.915093	1,246,474.90	3,163,842.30
7,665.00	61.19	358.19	7,497.51	159.62	556.78	40.008575	-104.915098	1,246,510.88	3,163,840.77
7,708.00	65.11	358.49	7,516.93	197.96	555.67	40.008680	-104.915102	1,246,549.21	3,163,839.41
7,751.00	68.86	358.47	7,533.74	237.52	554.62	40.008789	-104.915105	1,246,588.76	3,163,838.10
7,794.00	72.73	358.92	7,547.88	278.11	553.70	40.008900	-104.915109	1,246,629.34	3,163,836.91
7,837.00	76.60	359.95	7,559.25	319.57	553.29	40.009014	-104.915110	1,246,670.79	3,163,836.23
7,879.00	81.19	1.81	7,567.34	360.76	553.93	40.009127	-104.915108	1,246,711.99	3,163,836.60
7,903.00	84.42	2.21	7,570.35	384.55	554.76	40.009193	-104.915105	1,246,735.78	3,163,837.28
7,943.10	86.32	1.79	7,573.58	424.50	556.16	40.009302	-104.915100	1,246,775.73	3,163,838.41
8,023.00	90.12	0.97	7,576.06	504.32	558.09	40.009521	-104.915093	1,246,855.57	3,163,839.81
8,206.00	90.22	0.17	7,575.52	687.31	559.91	40.010024	-104.915086	1,247,038.56	3,163,840.43
8,390.00	89.54	358.29	7,575.90	871.28	557.43	40.010529	-104.915095	1,247,222.50	3,163,836.75
8,572.00	91.72	358.63	7,573.90	1,053.19	552.54	40.011028	-104.915113	1,247,404.37	3,163,830.66
8,755.00	89.38	1.32	7,572.14	1,236.16	552.46	40.011530	-104.915113	1,247,587.32	3,163,829.38
8,933.00	89.17	0.73	7,574.40	1,414.11	555.65	40.012019	-104.915102	1,247,765.29	3,163,831.39
9,104.00	89.63	1.46	7,576.19	1,585.07	558.92	40.012488	-104.915090	1,247,936.26	3,163,833.53
9,274.00	89.54	1.03	7,577.42	1,755.03	562.61	40.012955	-104.915077	1,248,106.23	3,163,836.11
9,445.00	89.14	0.92	7,579.39	1,925.99	565.52	40.013424	-104.915066	1,248,277.20	3,163,837.90
9,617.00	90.18	359.92	7,580.41	2,097.98	566.78	40.013896	-104.915062	1,248,449.19	3,163,838.03
9,787.00	90.65	359.73	7,579.18	2,267.97	566.26	40.014363	-104.915064	1,248,619.17	3,163,836.39
9,958.00	90.37	358.98	7,577.65	2,438.95	564.33	40.014832	-104.915071	1,248,790.13	3,163,833.34
10,128.00	90.92	358.45	7,575.74	2,608.90	560.52	40.015299	-104.915084	1,248,960.04	3,163,828.41
10,299.00	91.32	359.70	7,572.40	2,779.84	557.76	40.015768	-104.915094	1,249,130.95	3,163,824.53

Design Report for Howard 28N-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)
10,470.00	90.71	359.38	7,569.37	2,950.81	556.39	40.016237	-104.915099	1,249,301.90	3,163,822.03
10,641.00	90.34	1.02	7,567.80	3,121.79	556.99	40.016707	-104.915097	1,249,472.88	3,163,821.51
10,811.00	90.43	1.65	7,566.66	3,291.74	560.95	40.017173	-104.915083	1,249,642.85	3,163,824.35
10,982.00	89.60	2.16	7,566.61	3,462.64	566.63	40.017642	-104.915062	1,249,813.78	3,163,828.91
11,153.00	88.89	1.43	7,568.87	3,633.54	571.99	40.018111	-104.915043	1,249,984.70	3,163,833.14
11,324.00	89.94	0.69	7,570.61	3,804.50	575.15	40.018581	-104.915032	1,250,155.67	3,163,835.18
11,496.00	91.97	359.59	7,567.75	3,976.46	575.57	40.019053	-104.915030	1,250,327.63	3,163,834.47
11,667.00	90.37	0.00	7,564.26	4,147.42	574.96	40.019522	-104.915032	1,250,498.57	3,163,832.74
11,837.00	91.02	2.28	7,562.19	4,317.36	578.34	40.019989	-104.915020	1,250,668.53	3,163,835.00
12,008.00	89.26	1.40	7,561.78	4,488.27	583.83	40.020458	-104.915001	1,250,839.46	3,163,839.37
12,180.00	89.51	0.30	7,563.62	4,660.23	586.38	40.020930	-104.914992	1,251,011.43	3,163,840.79
12,351.00	90.25	1.45	7,563.98	4,831.21	588.99	40.021399	-104.914982	1,251,182.42	3,163,842.27
12,519.00	89.66	1.00	7,564.11	4,999.17	592.59	40.021860	-104.914969	1,251,350.39	3,163,844.76
12,689.00	89.75	1.56	7,564.99	5,169.13	596.38	40.022327	-104.914956	1,251,520.36	3,163,847.44
12,859.00	90.83	3.52	7,564.13	5,338.95	603.92	40.022793	-104.914929	1,251,690.22	3,163,853.86
13,031.00	89.88	2.33	7,563.06	5,510.71	612.69	40.023264	-104.914898	1,251,862.04	3,163,861.51
13,202.00	90.03	3.13	7,563.20	5,681.52	620.84	40.023733	-104.914869	1,252,032.89	3,163,868.53
13,373.00	89.51	2.16	7,563.88	5,852.33	628.73	40.024202	-104.914840	1,252,203.74	3,163,875.29
13,541.00	91.02	2.47	7,563.10	6,020.19	635.51	40.024663	-104.914816	1,252,371.63	3,163,880.98
13,712.00	89.66	2.04	7,562.09	6,191.05	642.24	40.025132	-104.914792	1,252,542.53	3,163,886.58
13,883.00	88.71	1.29	7,564.52	6,361.95	647.21	40.025601	-104.914774	1,252,713.46	3,163,890.43
14,053.00	89.72	1.09	7,566.85	6,531.90	650.74	40.026068	-104.914762	1,252,883.42	3,163,892.84
14,223.00	89.97	359.85	7,567.31	6,701.89	652.14	40.026534	-104.914757	1,253,053.41	3,163,893.11
14,392.00	89.94	359.38	7,567.44	6,870.89	651.00	40.026998	-104.914761	1,253,222.39	3,163,890.87
14,561.00	89.88	0.14	7,567.71	7,039.88	650.29	40.027462	-104.914763	1,253,391.37	3,163,889.05
14,729.00	90.89	0.49	7,566.58	7,207.87	651.22	40.027923	-104.914760	1,253,559.36	3,163,888.87
14,900.00	90.59	359.89	7,564.37	7,378.86	651.78	40.028393	-104.914758	1,253,730.34	3,163,888.31
15,070.00	89.20	357.70	7,564.68	7,548.81	648.21	40.028859	-104.914771	1,253,900.25	3,163,883.62
15,193.00	88.61	356.24	7,567.03	7,671.61	641.71	40.029196	-104.914794	1,254,023.00	3,163,876.31
15,238.00	88.61	356.24	7,568.13	7,716.50	638.76	40.029319	-104.914804	1,254,067.87	3,163,873.07

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
905.00	904.98	0.90	4.86	Tie-On to Gyro Surveys @ 905.00ft
1,102.00	1,101.98	0.97	4.95	First MWD Survey @ 1102.00ft
15,193.00	7,567.03	7,671.61	641.71	Final MWD Survey
15,238.00	7,568.13	7,716.50	638.76	Str Line Proj to Bit @ 15238' MD :: 7568.13' TVD

Design Report for Howard 28N-29HZ - Actual Field Surveys

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	0.83	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	905.00	MS Energy Gyros	NS-GYRO-MS
1,102.00	8,023.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,206.00	15,193.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
979.80	979.78	9 5/8" Casing Set @ 979.8' MD :: 979.78' TVD	9-5/8	13-1/2
7,943.10	7,573.58	7" Casing Set @ 7943.1' MD :: 7573.58' 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:	1.26 °/100usft	Maximum Dogleg over Survey:	13.56 °/100usft at 7,903.00 usft
Net Tortousity applicable to Plans:	0.34 °/100usft	Directional Difficulty Index:	6.514

Design Report for Howard 28N-29HZ - Actual Field Surveys

Audit Info

North Reference Sheet for Sec. 32-T1N-R67W - Howard 28N-29HZ - Plan A

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 28N-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: 1,246,347.61 usft N, 3,163,285.07 usft E

Geographical Coordinates of Well: 40° 00' 29.29" N, 104° 55' 01.51" W

Grid Convergence at Surface is: 0.38°

Based upon Minimum Curvature type calculations, at a Measured Depth of 15,238.00usft

the Bottom Hole Displacement is 7,742.89usft in the Direction of 4.73° (True).

Magnetic Convergence at surface is: -8.20° (1 August 2014, , BGGM2014)

