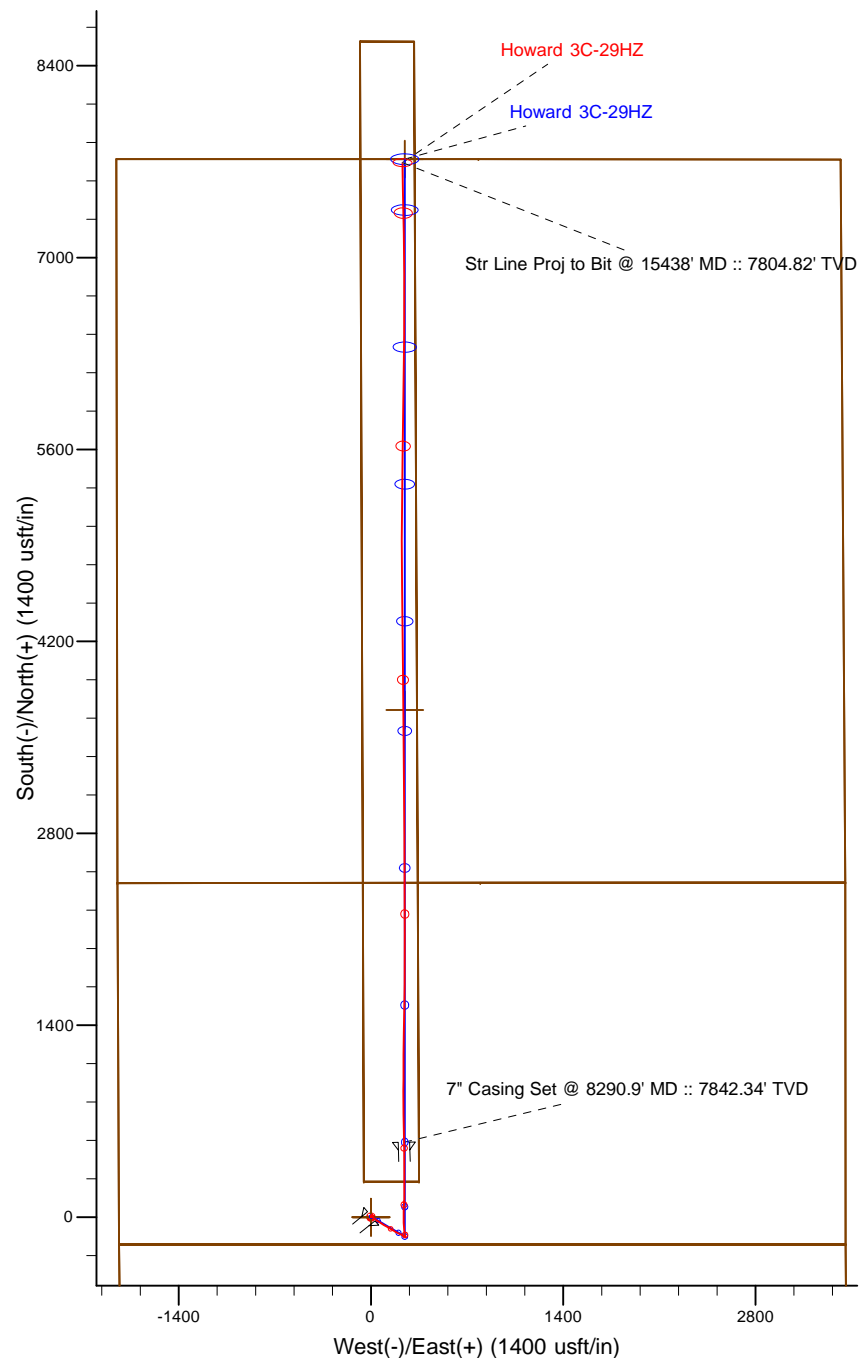
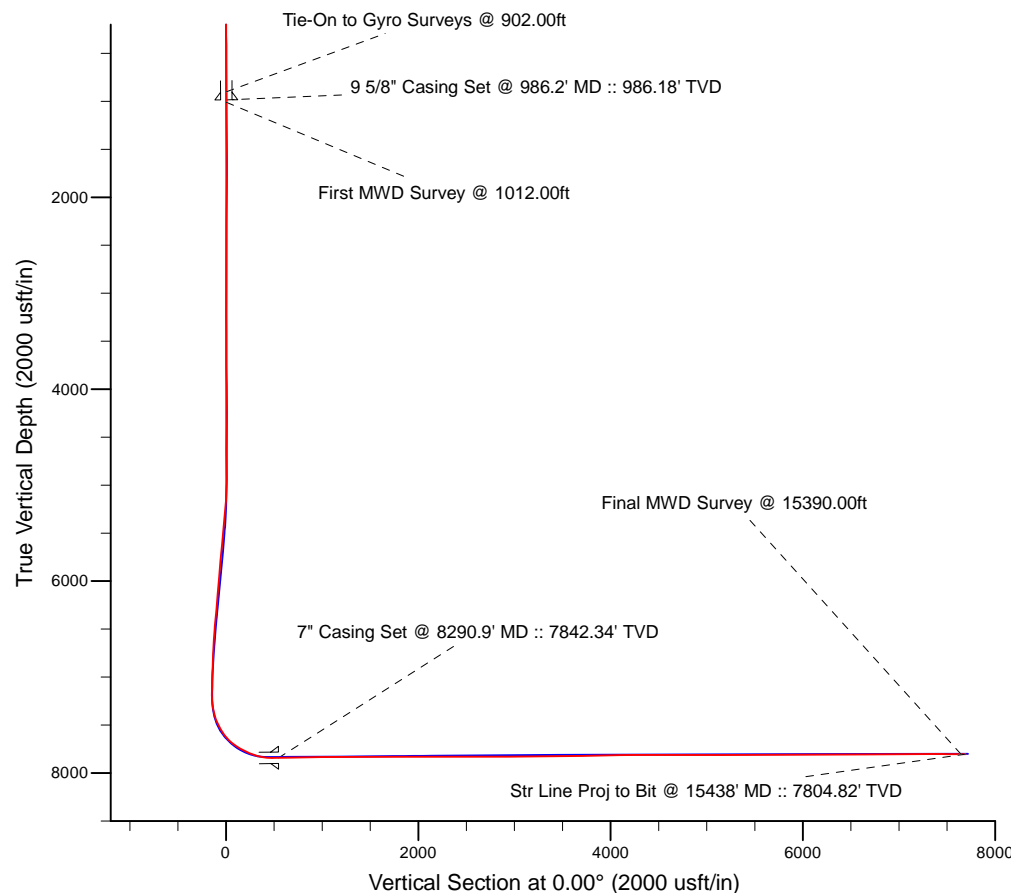


Project: Weld County, CO (NAD 83)  
 Site: Sec. 32-T1N-R67W  
 Well: Howard 3C-29HZ  
 Wellbore: Plan B  
 Design: Actual Field Surveys



LEGEND

- Howard 3C-29HZ, Plan B, Rev B1 V0
- Actual Field Surveys



7" Casing: ~1892.32' FNL, ~2077.43' FWL  
 Lat/Long: 40.009639 N, -104.916335 E  
 State Planes - CO Northern: 1,246,895.93' N, 3,163,491.53' E  
 Location: Sec. 32-T1N-R67W

BHL: ~26.13' FNL, ~2083.47' FWL  
 Lat/Long: 40.029255 N, -104.916374 E  
 State Planes - CO Northern: 1,254,041.66' N, 3,163,433.74' E  
 Location: Sec. 29-T1N-R67W

WELL DETAILS: Howard 3C-29HZ	
Ground Level:	5049.00
RKB = 16' @ 5065.00usft (Xtreme 22)	
Design: Actual Field Surveys (Howard 3C-29HZ/Plan B)	
Created By: Clint Eshelman	Date: 8/28/2014
Reviewed: _____	Date: _____

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 32-T1N-R67W

Howard 3C-29HZ

## Plan B

Design: Actual Field Surveys

## Sperry Drilling Services

## Standard Report

28 August, 2014

Well Coordinates: 1,246,347.41 N, 3,163,255.10 E (40° 00' 29.29" N, 104° 55' 01.89" 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 3C-29HZ

RKB = 16' @ 5065.00usft (Xtreme 22)

N

True

API - US Survey Feet - Custom

**HALLIBURTON**

**Design Report for Howard 3C-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	0.51	18.49	116.00	0.42	0.14	0.42	0.51
216.00	0.48	12.12	215.99	1.25	0.37	1.25	0.06
316.00	0.37	6.38	315.99	1.98	0.49	1.98	0.12
416.00	0.36	10.88	415.99	2.61	0.59	2.61	0.03
516.00	0.47	37.04	515.99	3.25	0.90	3.25	0.22
616.00	0.45	42.17	615.98	3.87	1.41	3.87	0.05
716.00	0.44	27.69	715.98	4.50	1.85	4.50	0.11
816.00	0.33	34.09	815.98	5.08	2.19	5.08	0.12
902.00	0.21	322.35	901.98	5.41	2.23	5.41	0.38
<b>Tie-On to Gyro Surveys @ 902.00ft</b>							
986.20	0.47	50.46	986.18	5.75	2.40	5.75	0.61
<b>9 5/8" Casing Set @ 986.2' MD :: 986.18' TVD</b>							
1,012.00	0.62	56.41	1,011.98	5.90	2.60	5.90	0.61
<b>First MWD Survey @ 1012.00ft</b>							
1,201.00	0.48	25.62	1,200.97	7.18	3.80	7.18	0.17
1,391.00	0.84	34.72	1,390.95	9.04	4.93	9.04	0.20
1,580.00	0.64	344.70	1,579.94	11.19	5.45	11.19	0.34
1,763.00	0.99	193.58	1,762.93	10.64	4.80	10.64	0.86
1,947.00	0.64	189.58	1,946.91	8.09	4.26	8.09	0.19
2,129.00	0.45	229.19	2,128.91	6.62	3.55	6.62	0.23
2,312.00	0.28	153.62	2,311.90	5.75	3.20	5.75	0.26
2,495.00	0.34	109.75	2,494.90	5.16	3.91	5.16	0.13
2,679.00	0.15	181.67	2,678.90	4.74	4.42	4.74	0.18
2,862.00	0.54	185.20	2,861.90	3.64	4.34	3.64	0.21
3,045.00	1.14	238.66	3,044.88	1.83	2.70	1.83	0.51
3,228.00	0.42	82.32	3,227.87	0.98	1.81	0.98	0.84
3,405.00	1.12	39.46	3,404.85	2.40	3.56	2.40	0.49
3,575.00	0.19	123.55	3,574.84	3.52	4.85	3.52	0.66
3,747.00	0.37	35.59	3,746.84	3.82	5.41	3.82	0.24
3,917.00	1.60	30.64	3,916.81	6.31	6.94	6.31	0.72
4,088.00	1.32	31.29	4,087.76	10.04	9.18	10.04	0.16
4,259.00	0.91	221.03	4,258.74	10.70	9.31	10.70	1.30
4,430.00	1.17	241.56	4,429.72	8.85	6.88	8.85	0.26
4,602.00	1.06	278.60	4,601.69	8.25	3.76	8.25	0.42
4,772.00	0.85	306.52	4,771.66	9.23	1.20	9.23	0.30
4,943.00	1.52	116.02	4,942.65	8.99	2.21	8.99	1.38
5,113.00	4.83	136.08	5,112.37	2.85	9.21	2.85	2.02
5,284.00	8.06	129.48	5,282.27	-9.96	23.46	-9.96	1.93
5,455.00	10.25	122.17	5,451.08	-25.69	45.59	-25.69	1.45
5,627.00	9.08	123.87	5,620.64	-41.40	69.82	-41.40	0.70
5,798.00	9.73	120.38	5,789.34	-56.23	93.49	-56.23	0.51
5,969.00	9.70	119.51	5,957.89	-70.63	118.49	-70.63	0.09
6,140.00	9.07	120.26	6,126.60	-84.52	142.67	-84.52	0.38
6,312.00	9.90	122.42	6,296.25	-99.28	166.86	-99.28	0.52
6,483.00	10.82	116.59	6,464.46	-114.35	193.62	-114.35	0.82
6,654.00	8.13	113.72	6,633.11	-126.40	219.05	-126.40	1.60
6,824.00	5.10	116.58	6,801.96	-134.61	236.82	-134.61	1.79
6,996.00	3.25	129.63	6,973.50	-141.15	247.41	-141.15	1.20

**Design Report for Howard 3C-29HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,167.00	0.30	193.69	7,144.41	-144.67	251.04	-144.67	1.83
7,253.00	0.74	278.64	7,230.40	-144.81	250.44	-144.81	0.90
7,294.00	4.98	348.54	7,271.35	-143.02	249.82	-143.02	11.65
7,335.00	9.49	354.14	7,312.01	-137.91	249.12	-137.91	11.12
7,378.00	12.39	349.95	7,354.23	-129.84	247.95	-129.84	6.99
7,421.00	16.23	350.93	7,395.88	-119.36	246.20	-119.36	8.95
7,464.00	20.08	351.04	7,436.74	-106.13	244.10	-106.13	8.95
7,507.00	24.18	350.71	7,476.56	-90.14	241.53	-90.14	9.54
7,550.00	26.98	354.91	7,515.34	-71.73	239.24	-71.73	7.75
7,592.00	30.57	359.74	7,552.16	-51.55	238.35	-51.55	10.18
7,635.00	35.56	359.03	7,588.18	-28.10	238.09	-28.10	11.64
7,678.00	38.97	358.39	7,622.40	-2.08	237.50	-2.08	7.98
7,721.00	44.70	0.56	7,654.43	26.59	237.26	26.59	13.74
7,763.00	50.10	3.57	7,682.85	57.47	238.41	57.47	13.89
7,806.00	53.28	2.72	7,709.50	91.15	240.26	91.15	7.56
7,849.00	57.21	1.20	7,734.01	126.45	241.45	126.45	9.59
7,892.00	62.47	0.97	7,755.61	163.61	242.16	163.61	12.24
7,934.00	65.15	0.53	7,774.14	201.29	242.65	201.29	6.45
7,977.00	66.93	359.88	7,791.60	240.58	242.79	240.58	4.36
8,020.00	69.80	359.52	7,807.45	280.55	242.58	280.55	6.72
8,063.00	72.84	0.66	7,821.23	321.28	242.64	321.28	7.50
8,106.00	77.55	0.95	7,832.21	362.84	243.23	362.84	10.97
8,148.00	83.51	359.04	7,839.12	404.24	243.22	404.24	14.88
8,190.00	88.21	358.64	7,842.15	446.11	242.37	446.11	11.23
8,248.00	90.49	358.68	7,842.81	504.09	241.01	504.09	3.93
8,290.90	90.76	358.71	7,842.34	546.97	240.04	546.97	0.63
<b>7" Casing Set @ 8290.9' MD :: 7842.34' TVD</b>							
8,386.00	91.36	358.77	7,840.58	642.04	237.94	642.04	0.63
8,569.00	91.11	0.35	7,836.63	824.98	236.54	824.98	0.87
8,752.00	89.72	359.67	7,835.31	1,007.97	236.57	1,007.97	0.85
8,930.00	90.37	0.31	7,835.17	1,185.97	236.54	1,185.97	0.51
9,100.00	90.49	1.38	7,833.89	1,355.94	239.05	1,355.94	0.63
9,271.00	90.68	0.97	7,832.15	1,526.90	242.55	1,526.90	0.26
9,442.00	89.54	0.47	7,831.82	1,697.88	244.70	1,697.88	0.73
9,614.00	90.03	0.53	7,832.47	1,869.87	246.20	1,869.87	0.29
9,784.00	90.28	0.15	7,832.01	2,039.87	247.21	2,039.87	0.27
9,956.00	90.25	359.12	7,831.21	2,211.86	246.12	2,211.86	0.60
10,126.00	89.88	359.03	7,831.02	2,381.84	243.37	2,381.84	0.22
10,297.00	89.69	0.28	7,831.66	2,552.83	242.34	2,552.83	0.74
10,468.00	90.56	359.86	7,831.29	2,723.83	242.55	2,723.83	0.56
10,637.00	89.82	359.98	7,830.72	2,892.83	242.32	2,892.83	0.44
10,809.00	90.34	359.74	7,830.48	3,064.82	241.89	3,064.82	0.33
10,980.00	91.14	359.51	7,828.28	3,235.80	240.78	3,235.80	0.49
11,151.00	90.25	359.03	7,826.20	3,406.78	238.60	3,406.78	0.59
11,323.00	92.09	359.70	7,822.69	3,578.72	236.69	3,578.72	1.14
11,494.00	90.89	358.95	7,818.24	3,749.65	234.68	3,749.65	0.83
11,665.00	90.09	359.89	7,816.78	3,920.63	232.95	3,920.63	0.72
11,835.00	90.74	359.76	7,815.55	4,090.62	232.43	4,090.62	0.39
12,006.00	90.46	359.01	7,813.76	4,261.60	230.59	4,261.60	0.47
12,176.00	90.40	359.38	7,812.48	4,431.58	228.20	4,431.58	0.22
12,344.00	89.63	359.17	7,812.44	4,599.57	226.08	4,599.57	0.48

## Design Report for Howard 3C-29HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,515.00	89.69	359.91	7,813.45	4,770.56	224.70	4,770.56	0.43
12,686.00	89.60	359.20	7,814.51	4,941.55	223.38	4,941.55	0.42
12,858.00	90.12	1.37	7,814.93	5,113.53	224.23	5,113.53	1.30
13,029.00	91.26	1.10	7,812.87	5,284.48	227.92	5,284.48	0.69
13,200.00	90.12	1.24	7,810.82	5,455.43	231.41	5,455.43	0.67
13,370.00	90.12	0.46	7,810.46	5,625.41	233.93	5,625.41	0.46
13,536.00	90.06	359.61	7,810.20	5,791.40	234.03	5,791.40	0.51
13,707.00	89.97	0.69	7,810.15	5,962.40	234.48	5,962.40	0.63
13,878.00	90.59	1.00	7,809.32	6,133.38	237.00	6,133.38	0.41
14,049.00	90.15	0.82	7,808.21	6,304.35	239.72	6,304.35	0.28
14,219.00	90.37	1.06	7,807.44	6,474.33	242.51	6,474.33	0.19
14,390.00	90.09	359.84	7,806.76	6,645.32	243.85	6,645.32	0.73
14,557.00	89.94	359.24	7,806.71	6,812.31	242.51	6,812.31	0.37
14,728.00	90.77	359.28	7,805.65	6,983.29	240.30	6,983.29	0.49
14,898.00	89.91	358.88	7,804.64	7,153.27	237.57	7,153.27	0.56
15,070.00	90.80	359.40	7,803.58	7,325.24	234.99	7,325.24	0.60
15,241.00	88.80	358.95	7,804.18	7,496.21	232.53	7,496.21	1.20
15,390.00	90.43	359.09	7,805.18	7,645.18	229.98	7,645.18	1.10
Final MWD Survey @ 15390.00ft							
15,438.00	90.43	359.09	7,804.82	7,693.18	229.22	7,693.18	0.00
Str Line Proj to Bit @ 15438' MD :: 7804.82' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
902.00	901.98	5.41	2.23	Tie-On to Gyro Surveys @ 902.00ft
1,012.00	1,011.98	5.90	2.60	First MWD Survey @ 1012.00ft
15,390.00	7,805.18	7,645.18	229.98	Final MWD Survey @ 15390.00ft
15,438.00	7,804.82	7,693.18	229.22	Str Line Proj to Bit @ 15438' MD :: 7804.82' TVD

Vertical Section Information

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

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	902.00	MS Energy Surveys	NS-GYRO-MS
1,012.00	8,248.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,386.00	15,390.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
986.20	986.18	9 5/8" Casing Set @ 986.2' MD :: 986.18' TVD	9-5/8	13-1/2
8,290.90	7,842.34	7" Casing Set @ 8290.9' MD :: 7842.34' TVD	7	8-3/4

## Design Report for Howard 3C-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 3C-29HZ_SE(	0.00	0.00	0.00	0.00	0.00	1,246,347.41	3,163,255.10	40° 0' 29.293 N	104° 55' 1.891 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	7,719.38	-1,854.29	1,254,054.17	3,161,350.18	
Point 2				0.00	7,719.27	782.58	1,254,071.39	3,163,986.90	
Point 3				0.00	7,715.59	3,420.53	1,254,085.05	3,166,624.73	
Point 4				0.00	2,441.05	3,453.35	1,248,811.02	3,166,692.21	
Point 5				0.00	2,439.62	797.12	1,248,792.13	3,164,036.14	
Point 6				0.00	2,438.35	-1,846.66	1,248,773.49	3,161,392.52	
Point 7				0.00	2,439.62	797.12	1,248,792.13	3,164,036.14	
Point 8				0.00	2,441.05	3,453.35	1,248,811.02	3,166,692.21	
Point 9				0.00	-197.76	3,455.67	1,246,172.37	3,166,711.87	
Point 10				0.00	-2,837.93	3,474.06	1,243,532.47	3,166,747.62	
Point 11				0.00	-2,839.23	826.51	1,243,513.77	3,164,100.22	
Point 12				0.00	-2,840.53	-1,821.05	1,243,495.07	3,161,452.82	
Point 13				0.00	-201.09	-1,833.85	1,246,134.28	3,161,422.67	
Point 14				0.00	2,438.35	-1,846.66	1,248,773.49	3,161,392.52	
Howard 3C-29HZ_SE(	0.00	0.00	0.00	0.00	0.00	1,246,347.41	3,163,255.10	40° 0' 29.293 N	104° 55' 1.891 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	-201.09	-1,833.85	1,246,134.28	3,161,422.67	
Point 2				0.00	-197.76	3,455.67	1,246,172.37	3,166,711.87	
Howard 3C-29HZ_SHI	0.00	0.00	0.00	0.00	0.00	1,246,347.41	3,163,255.10	40° 0' 29.293 N	104° 55' 1.891 W
- actual wellpath hits target center									
- Point									
Howard 3C-29HZ_LD	0.00	0.00	0.00	0.00	0.00	1,246,347.41	3,163,255.10	40° 0' 29.293 N	104° 55' 1.891 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	8,576.46	-80.53	1,254,922.86	3,163,118.21	
Point 2				0.00	8,575.85	313.52	1,254,924.84	3,163,512.24	
Point 3				0.00	260.19	349.38	1,246,609.88	3,163,602.75	
Point 4				0.00	259.93	-51.84	1,246,606.98	3,163,201.55	
Howard 3C-29HZ_BHI	0.00	0.00	7,800.00	7,718.16	245.88	1,254,066.76	3,163,450.24	40° 1' 45.566 N	104° 54' 58.730 W
- actual wellpath misses target center by 30.42usft at 15438.00usft MD (7804.82 TVD, 7693.18 N, 229.22 E)									
- Point									
Howard 3C-29HZ_Lat	0.00	0.00	7,810.00	3,700.01	245.80	1,250,048.83	3,163,476.57	40° 1' 5.858 N	104° 54' 58.732 W
- actual wellpath misses target center by 13.79usft at 11444.46usft MD (7819.16 TVD, 3700.13 N, 235.49 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.17 °/100usft	Maximum Dogleg over Survey:	14.88 °/100usft at 8,148.00 usft
Net Tortosity applicable to Plans:	0.25 °/100usft	Directional Difficulty Index:	6.464

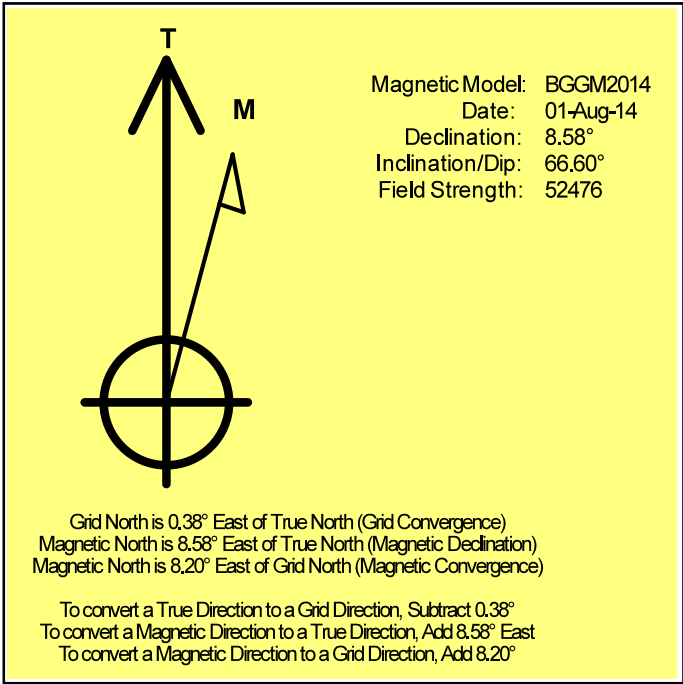
Audit Info

**North Reference Sheet for Sec. 32-T1N-R67W - Howard 3C-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 3C-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: 1,246,347.41 usft N, 3,163,255.10 usft E  
 Geographical Coordinates of Well: 40° 00' 29.29" N, 104° 55' 01.89" W  
 Grid Convergence at Surface is: 0.38°

Based upon Minimum Curvature type calculations, at a Measured Depth of 15,438.00usft  
 the Bottom Hole Displacement is 7,696.59usft in the Direction of 1.71° (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 3C-29HZ

Plan B

Design: Actual Field Surveys

## Sperry Drilling Services

### Geodetic Report

28 August, 2014

Well Coordinates: 1,246,347.41 N, 3,163,255.10 E (40° 00' 29.29" N, 104° 55' 01.89" 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 3C-29HZ

RKB = 16' @ 5065.00usft (Xtreme 22)

N

True

Dec-Deg - API - US Survey Feet - Custom

## HALLIBURTON



## Design Report for Howard 3C-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	-104.917192	1,246,347.41	3,163,255.10
16.00	0.00	0.00	16.00	0.00	0.00	40.008137	-104.917192	1,246,347.41	3,163,255.10
116.00	0.51	18.49	116.00	0.42	0.14	40.008138	-104.917192	1,246,347.83	3,163,255.24
216.00	0.48	12.12	215.99	1.25	0.37	40.008140	-104.917191	1,246,348.66	3,163,255.46
316.00	0.37	6.38	315.99	1.98	0.49	40.008143	-104.917191	1,246,349.40	3,163,255.58
416.00	0.36	10.88	415.99	2.61	0.59	40.008144	-104.917190	1,246,350.03	3,163,255.67
516.00	0.47	37.04	515.99	3.25	0.90	40.008146	-104.917189	1,246,350.66	3,163,255.97
616.00	0.45	42.17	615.98	3.87	1.41	40.008148	-104.917187	1,246,351.29	3,163,256.48
716.00	0.44	27.69	715.98	4.50	1.85	40.008149	-104.917186	1,246,351.92	3,163,256.92
816.00	0.33	34.09	815.98	5.08	2.19	40.008151	-104.917184	1,246,352.50	3,163,257.25
902.00	0.21	322.35	901.98	5.41	2.23	40.008152	-104.917184	1,246,352.83	3,163,257.29
986.20	0.47	50.46	986.18	5.75	2.40	40.008153	-104.917184	1,246,353.17	3,163,257.46
1,012.00	0.62	56.41	1,011.98	5.90	2.60	40.008153	-104.917183	1,246,353.32	3,163,257.66
1,201.00	0.48	25.62	1,200.97	7.18	3.80	40.008157	-104.917179	1,246,354.61	3,163,258.85
1,391.00	0.84	34.72	1,390.95	9.04	4.93	40.008162	-104.917175	1,246,356.48	3,163,259.97
1,580.00	0.64	344.70	1,579.94	11.19	5.45	40.008168	-104.917173	1,246,358.64	3,163,260.47
1,763.00	0.99	193.58	1,762.93	10.64	4.80	40.008166	-104.917175	1,246,358.08	3,163,259.83
1,947.00	0.64	189.58	1,946.91	8.09	4.26	40.008159	-104.917177	1,246,355.52	3,163,259.30
2,129.00	0.45	229.19	2,128.91	6.62	3.55	40.008155	-104.917180	1,246,354.05	3,163,258.60
2,312.00	0.28	153.62	2,311.90	5.75	3.20	40.008153	-104.917181	1,246,353.17	3,163,258.26
2,495.00	0.34	109.75	2,494.90	5.16	3.91	40.008151	-104.917178	1,246,352.60	3,163,258.98
2,679.00	0.15	181.67	2,678.90	4.74	4.42	40.008150	-104.917176	1,246,352.17	3,163,259.49
2,862.00	0.54	185.20	2,861.90	3.64	4.34	40.008147	-104.917177	1,246,351.07	3,163,259.41
3,045.00	1.14	238.66	3,044.88	1.83	2.70	40.008142	-104.917183	1,246,349.26	3,163,257.79
3,228.00	0.42	82.32	3,227.87	0.98	1.81	40.008140	-104.917186	1,246,348.40	3,163,256.90
3,405.00	1.12	39.46	3,404.85	2.40	3.56	40.008144	-104.917180	1,246,349.83	3,163,258.64
3,575.00	0.19	123.55	3,574.84	3.52	4.85	40.008147	-104.917175	1,246,350.96	3,163,259.92
3,747.00	0.37	35.59	3,746.84	3.82	5.41	40.008148	-104.917173	1,246,351.26	3,163,260.48
3,917.00	1.60	30.64	3,916.81	6.31	6.94	40.008154	-104.917168	1,246,353.76	3,163,261.99
4,088.00	1.32	31.29	4,087.76	10.04	9.18	40.008165	-104.917160	1,246,357.51	3,163,264.21
4,259.00	0.91	221.03	4,258.74	10.70	9.31	40.008166	-104.917159	1,246,358.17	3,163,264.33
4,430.00	1.17	241.56	4,429.72	8.85	6.88	40.008161	-104.917168	1,246,356.30	3,163,261.92
4,602.00	1.06	278.60	4,601.69	8.25	3.76	40.008160	-104.917179	1,246,355.68	3,163,258.81
4,772.00	0.85	306.52	4,771.66	9.23	1.20	40.008162	-104.917188	1,246,356.65	3,163,256.23
4,943.00	1.52	116.02	4,942.65	8.99	2.21	40.008162	-104.917184	1,246,356.42	3,163,257.25
5,113.00	4.83	136.08	5,112.37	2.85	9.21	40.008145	-104.917159	1,246,350.32	3,163,264.29
5,284.00	8.06	129.48	5,282.27	-9.96	23.46	40.008110	-104.917109	1,246,337.60	3,163,278.62
5,455.00	10.25	122.17	5,451.08	-25.69	45.59	40.008067	-104.917030	1,246,322.02	3,163,300.86
5,627.00	9.08	123.87	5,620.64	-41.40	69.82	40.008023	-104.916943	1,246,306.47	3,163,325.18
5,798.00	9.73	120.38	5,789.34	-56.23	93.49	40.007983	-104.916859	1,246,291.80	3,163,348.95
5,969.00	9.70	119.51	5,957.89	-70.63	118.49	40.007943	-104.916769	1,246,277.56	3,163,374.04
6,140.00	9.07	120.26	6,126.60	-84.52	142.67	40.007905	-104.916683	1,246,263.83	3,163,398.31



## Design Report for Howard 3C-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)
6,312.00	9.90	122.42	6,296.25	-99.28	166.86	40.007865	-104.916597	1,246,249.23	3,163,422.60
6,483.00	10.82	116.59	6,464.46	-114.35	193.62	40.007823	-104.916501	1,246,234.34	3,163,449.46
6,654.00	8.13	113.72	6,633.11	-126.40	219.05	40.007790	-104.916410	1,246,222.46	3,163,474.97
6,824.00	5.10	116.58	6,801.96	-134.61	236.82	40.007768	-104.916347	1,246,214.36	3,163,492.79
6,996.00	3.25	129.63	6,973.50	-141.15	247.41	40.007750	-104.916309	1,246,207.90	3,163,503.42
7,167.00	0.30	193.69	7,144.41	-144.67	251.04	40.007740	-104.916296	1,246,204.39	3,163,507.07
7,253.00	0.74	278.64	7,230.40	-144.81	250.44	40.007740	-104.916298	1,246,204.25	3,163,506.47
7,294.00	4.98	348.54	7,271.35	-143.02	249.82	40.007744	-104.916300	1,246,206.03	3,163,505.84
7,335.00	9.49	354.14	7,312.01	-137.91	249.12	40.007758	-104.916303	1,246,211.14	3,163,505.11
7,378.00	12.39	349.95	7,354.23	-129.84	247.95	40.007781	-104.916307	1,246,219.20	3,163,503.89
7,421.00	16.23	350.93	7,395.88	-119.36	246.20	40.007809	-104.916313	1,246,229.67	3,163,502.07
7,464.00	20.08	351.04	7,436.74	-106.13	244.10	40.007846	-104.916321	1,246,242.89	3,163,499.88
7,507.00	24.18	350.71	7,476.56	-90.14	241.53	40.007890	-104.916330	1,246,258.86	3,163,497.21
7,550.00	26.98	354.91	7,515.34	-71.73	239.24	40.007940	-104.916338	1,246,277.25	3,163,494.80
7,592.00	30.57	359.74	7,552.16	-51.55	238.35	40.007996	-104.916341	1,246,297.43	3,163,493.77
7,635.00	35.56	359.03	7,588.18	-28.10	238.09	40.008060	-104.916342	1,246,320.87	3,163,493.36
7,678.00	38.97	358.39	7,622.40	-2.08	237.50	40.008131	-104.916344	1,246,346.89	3,163,492.59
7,721.00	44.70	0.56	7,654.43	26.59	237.26	40.008210	-104.916345	1,246,375.55	3,163,492.17
7,763.00	50.10	3.57	7,682.85	57.47	238.41	40.008295	-104.916341	1,246,406.44	3,163,493.12
7,806.00	53.28	2.72	7,709.50	91.15	240.26	40.008387	-104.916335	1,246,440.13	3,163,494.74
7,849.00	57.21	1.20	7,734.01	126.45	241.45	40.008484	-104.916330	1,246,475.44	3,163,495.71
7,892.00	62.47	0.97	7,755.61	163.61	242.16	40.008586	-104.916328	1,246,512.60	3,163,496.16
7,934.00	65.15	0.53	7,774.14	201.29	242.65	40.008690	-104.916326	1,246,550.28	3,163,496.41
7,977.00	66.93	359.88	7,791.60	240.58	242.79	40.008797	-104.916326	1,246,589.57	3,163,496.29
8,020.00	69.80	359.52	7,807.45	280.55	242.58	40.008907	-104.916326	1,246,629.54	3,163,495.82
8,063.00	72.84	0.66	7,821.23	321.28	242.64	40.009019	-104.916326	1,246,670.26	3,163,495.62
8,106.00	77.55	0.95	7,832.21	362.84	243.23	40.009133	-104.916324	1,246,711.82	3,163,495.93
8,148.00	83.51	359.04	7,839.12	404.24	243.22	40.009247	-104.916324	1,246,753.23	3,163,495.65
8,190.00	88.21	358.64	7,842.15	446.11	242.37	40.009362	-104.916327	1,246,795.09	3,163,494.52
8,248.00	90.49	358.68	7,842.81	504.09	241.01	40.009521	-104.916332	1,246,853.05	3,163,492.79
8,290.90	90.76	358.71	7,842.34	546.97	240.04	40.009639	-104.916335	1,246,895.93	3,163,491.53
8,386.00	91.36	358.77	7,840.58	642.04	237.94	40.009899	-104.916343	1,246,990.97	3,163,488.81
8,569.00	91.11	0.35	7,836.63	824.98	236.54	40.010402	-104.916348	1,247,173.90	3,163,486.20
8,752.00	89.72	359.67	7,835.31	1,007.97	236.57	40.010904	-104.916348	1,247,356.88	3,163,485.03
8,930.00	90.37	0.31	7,835.17	1,185.97	236.54	40.011393	-104.916348	1,247,534.87	3,163,483.83
9,100.00	90.49	1.38	7,833.89	1,355.94	239.05	40.011859	-104.916339	1,247,704.85	3,163,485.22
9,271.00	90.68	0.97	7,832.15	1,526.90	242.55	40.012329	-104.916326	1,247,875.81	3,163,487.60
9,442.00	89.54	0.47	7,831.82	1,697.88	244.70	40.012798	-104.916319	1,248,046.80	3,163,488.63
9,614.00	90.03	0.53	7,832.47	1,869.87	246.20	40.013270	-104.916313	1,248,218.79	3,163,489.00
9,784.00	90.28	0.15	7,832.01	2,039.87	247.21	40.013737	-104.916310	1,248,388.79	3,163,488.89
9,956.00	90.25	359.12	7,831.21	2,211.86	246.12	40.014209	-104.916314	1,248,560.76	3,163,486.66
10,126.00	89.88	359.03	7,831.02	2,381.84	243.37	40.014675	-104.916323	1,248,730.71	3,163,482.80

## Design Report for Howard 3C-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)
10,297.00	89.69	0.28	7,831.66	2,552.83	242.34	40.015145	-104.916327	1,248,901.69	3,163,480.65
10,468.00	90.56	359.86	7,831.29	2,723.83	242.55	40.015614	-104.916326	1,249,072.68	3,163,479.73
10,637.00	89.82	359.98	7,830.72	2,892.83	242.32	40.016078	-104.916327	1,249,241.66	3,163,478.39
10,809.00	90.34	359.74	7,830.48	3,064.82	241.89	40.016550	-104.916329	1,249,413.65	3,163,476.84
10,980.00	91.14	359.51	7,828.28	3,235.80	240.78	40.017020	-104.916333	1,249,584.61	3,163,474.59
11,151.00	90.25	359.03	7,826.20	3,406.78	238.60	40.017489	-104.916340	1,249,755.56	3,163,471.29
11,323.00	92.09	359.70	7,822.69	3,578.72	236.69	40.017961	-104.916347	1,249,927.48	3,163,468.26
11,494.00	90.89	358.95	7,818.24	3,749.65	234.68	40.018430	-104.916354	1,250,098.39	3,163,465.12
11,665.00	90.09	359.89	7,816.78	3,920.63	232.95	40.018900	-104.916361	1,250,269.35	3,163,462.26
11,835.00	90.74	359.76	7,815.55	4,090.62	232.43	40.019366	-104.916362	1,250,439.33	3,163,460.63
12,006.00	90.46	359.01	7,813.76	4,261.60	230.59	40.019836	-104.916369	1,250,610.29	3,163,457.67
12,176.00	90.40	359.38	7,812.48	4,431.58	228.20	40.020302	-104.916377	1,250,780.24	3,163,454.16
12,344.00	89.63	359.17	7,812.44	4,599.57	226.08	40.020763	-104.916385	1,250,948.20	3,163,450.93
12,515.00	89.69	359.91	7,813.45	4,770.56	224.70	40.021233	-104.916390	1,251,119.17	3,163,448.44
12,686.00	89.60	359.20	7,814.51	4,941.55	223.38	40.021702	-104.916395	1,251,290.15	3,163,445.99
12,858.00	90.12	1.37	7,814.93	5,113.53	224.23	40.022174	-104.916392	1,251,462.13	3,163,445.71
13,029.00	91.26	1.10	7,812.87	5,284.48	227.92	40.022643	-104.916378	1,251,633.09	3,163,448.27
13,200.00	90.12	1.24	7,810.82	5,455.43	231.41	40.023113	-104.916366	1,251,804.05	3,163,450.64
13,370.00	90.12	0.46	7,810.46	5,625.41	233.93	40.023579	-104.916357	1,251,974.04	3,163,452.04
13,536.00	90.06	359.61	7,810.20	5,791.40	234.03	40.024035	-104.916357	1,252,140.03	3,163,451.06
13,707.00	89.97	0.69	7,810.15	5,962.40	234.48	40.024504	-104.916355	1,252,311.02	3,163,450.38
13,878.00	90.59	1.00	7,809.32	6,133.38	237.00	40.024974	-104.916346	1,252,482.00	3,163,451.78
14,049.00	90.15	0.82	7,808.21	6,304.35	239.72	40.025443	-104.916336	1,252,652.99	3,163,453.37
14,219.00	90.37	1.06	7,807.44	6,474.33	242.51	40.025910	-104.916326	1,252,822.97	3,163,455.04
14,390.00	90.09	359.84	7,806.76	6,645.32	243.85	40.026379	-104.916322	1,252,993.96	3,163,455.26
14,557.00	89.94	359.24	7,806.71	6,812.31	242.51	40.026837	-104.916326	1,253,160.93	3,163,452.82
14,728.00	90.77	359.28	7,805.65	6,983.29	240.30	40.027307	-104.916334	1,253,331.89	3,163,449.49
14,898.00	89.91	358.88	7,804.64	7,153.27	237.57	40.027773	-104.916344	1,253,501.84	3,163,445.64
15,070.00	90.80	359.40	7,803.58	7,325.24	234.99	40.028245	-104.916353	1,253,673.79	3,163,441.93
15,241.00	88.80	358.95	7,804.18	7,496.21	232.53	40.028715	-104.916362	1,253,844.73	3,163,438.35
15,390.00	90.43	359.09	7,805.18	7,645.18	229.98	40.029124	-104.916371	1,253,993.68	3,163,434.82
15,438.00	90.43	359.09	7,804.82	7,693.18	229.22	40.029255	-104.916374	1,254,041.66	3,163,433.74

## Design Report for Howard 3C-29HZ - Actual Field Surveys

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
902.00	901.98	5.41	2.23	Tie-On to Gyro Surveys @ 902.00ft
1,012.00	1,011.98	5.90	2.60	First MWD Survey @ 1012.00ft
15,390.00	7,805.18	7,645.18	229.98	Final MWD Survey @ 15390.00ft
15,438.00	7,804.82	7,693.18	229.22	Str Line Proj to Bit @ 15438' MD :: 7804.82' TVD

### Vertical Section Information

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

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	902.00	MS Energy Surveys	NS-GYRO-MS
1,012.00	8,248.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,386.00	15,390.00	MWD Lateral Surveys	MWD+IFR1+SC

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
986.20	986.18	9 5/8" Casing Set @ 986.2' MD :: 986.18' TVD	9-5/8	13-1/2
8,290.90	7,842.34	7" Casing Set @ 8290.9' MD :: 7842.34' TVD	7	8-3/4

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Design Report for Howard 3C-29HZ - Actual Field 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:	1.17 °/100usft	Maximum Dogleg over Survey:	14.88 °/100usft at 8,148.00 usft
Net Tortosity applicable to Plans:	0.25 °/100usft	Directional Difficulty Index:	6.464

**Audit Info**

**North Reference Sheet for Sec. 32-T1N-R67W - Howard 3C-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 3C-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: 1,246,347.41 usft N, 3,163,255.10 usft E

Geographical Coordinates of Well: 40° 00' 29.29" N, 104° 55' 01.89" W

Grid Convergence at Surface is: 0.38°

Based upon Minimum Curvature type calculations, at a Measured Depth of 15,438.00usft

the Bottom Hole Displacement is 7,696.59usft in the Direction of 1.71° (True).

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

