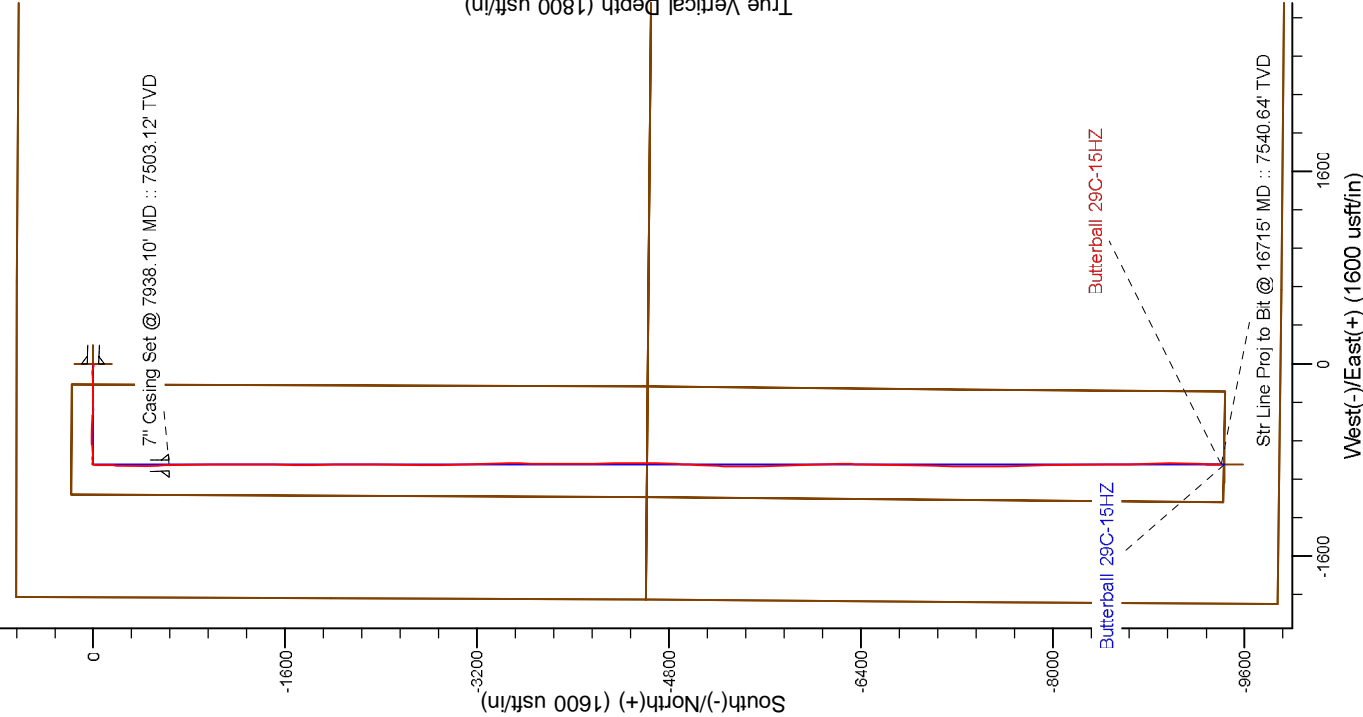


Project: Weld County, CO (NAD 83)
Site: Sec 10-T2N-R67W
Well: Butterball 29C-15HZ
Wellbore: Plan B
Design: Actual Field Surveys



LEGEND

- Butterball 29C-15HZ, Plan B, Rev B1 V0
- Actual Field Surveys

7" Casing: ~1272.78' FNL, ~1101.52' FWL
Lat/Long: 40.156402 N, -104.881948 E
State Planes - CO Northern: 1,300,422.44' N, 3,172,751.08' E
Location: Sec. 10-T2N-R67W

BHL: ~482.13' FSL, ~1158.13' FWL
Lat/Long: 40.132317 N, -104.881924 E
State Planes - CO Northern: 1,291,649.16' N, 3,172,818.94' E
Location: Sec. 15-T2N-R67W

WELL DETAILS: Butterball 29C-15HZ
Ground Level: 4935.00
RKB = 16' @ 4951.00usft (Xtreme22)

Design: Actual Field Surveys (Butterball 29C-15HZ/Plan B)
Created By: Clint Eshelman
Reviewed: Date: 12/2/2013

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec 10-T2N-R67W

Butterball 29C-15HZ

Plan B

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

22 November, 2013

Well Coordinates: 1,301,060.44 N, 3,173,592.06 E (40° 09' 29.29" N, 104° 52' 44.12" W)

Ground Level: 4,935.00 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 Butterball 29C-15HZ

RKB = 16' @ 4951.00usft (Xtreme22)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Butterball 29C-15HZ - 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	0.28	10.74	116.00	0.24	0.05	-0.24	0.28
216.00	0.21	9.05	216.00	0.66	0.12	-0.66	0.07
316.00	0.16	50.39	316.00	0.93	0.26	-0.93	0.14
416.00	0.03	182.21	416.00	0.99	0.36	-0.99	0.18
516.00	0.19	306.91	516.00	1.07	0.23	-1.07	0.21
616.00	0.24	339.19	616.00	1.36	0.02	-1.36	0.13
716.00	0.35	279.89	716.00	1.61	-0.35	-1.61	0.31
816.00	0.37	249.75	815.99	1.55	-0.96	-1.55	0.19
916.00	0.31	252.72	915.99	1.36	-1.52	-1.36	0.06
926.00	0.46	258.52	925.99	1.34	-1.58	-1.34	1.55
Tie-On to Gyro Surveys @ 926.00ft							
1,033.10	0.70	270.60	1,033.09	1.26	-2.66	-1.26	0.25
9 5/8" Casing Set @ 1033.10' MD :: 1033.09' TVD							
1,083.00	0.82	273.74	1,082.98	1.29	-3.32	-1.29	0.25
First MWD Survey @ 1083.00ft							
1,174.00	0.99	274.28	1,173.97	1.39	-4.76	-1.39	0.19
1,266.00	1.10	275.98	1,265.96	1.54	-6.43	-1.54	0.12
1,359.00	1.13	206.94	1,358.94	0.82	-7.73	-0.82	1.36
1,444.00	1.44	210.49	1,443.92	-0.85	-8.65	0.85	0.38
1,530.00	1.74	249.13	1,529.89	-2.24	-10.42	2.24	1.27
1,615.00	3.02	272.56	1,614.82	-2.60	-13.86	2.60	1.86
1,701.00	4.87	283.10	1,700.61	-1.68	-19.68	1.68	2.30
1,860.00	7.86	279.89	1,858.61	1.72	-36.97	-1.72	1.89
1,952.00	9.51	284.07	1,949.56	4.65	-50.54	-4.65	1.92
2,044.00	10.36	278.13	2,040.18	7.67	-66.10	-7.67	1.45
2,137.00	11.07	266.86	2,131.57	8.36	-83.30	-8.36	2.37
2,228.00	10.67	265.23	2,220.93	7.18	-100.42	-7.18	0.55
2,320.00	10.36	267.13	2,311.39	6.06	-117.17	-6.06	0.51
2,413.00	9.85	267.79	2,402.94	5.33	-133.47	-5.33	0.56
2,505.00	9.18	267.13	2,493.68	4.66	-148.66	-4.66	0.74
2,597.00	10.07	267.01	2,584.38	3.88	-164.02	-3.88	0.97
2,689.00	9.84	268.66	2,675.00	3.27	-179.91	-3.27	0.40
2,781.00	9.90	269.38	2,765.64	3.00	-195.68	-3.00	0.15
2,873.00	9.83	270.30	2,856.28	2.96	-211.44	-2.96	0.19
2,959.00	9.37	270.25	2,941.07	3.03	-225.78	-3.03	0.53
3,045.00	10.20	266.55	3,025.82	2.60	-240.39	-2.60	1.21
3,130.00	9.69	265.99	3,109.54	1.65	-255.03	-1.65	0.61
3,215.00	9.97	269.53	3,193.30	1.09	-269.53	-1.09	0.78
3,301.00	10.25	270.92	3,277.96	1.15	-284.62	-1.15	0.43
3,387.00	9.50	271.86	3,362.69	1.50	-299.37	-1.50	0.89
3,472.00	9.79	273.28	3,446.48	2.14	-313.59	-2.14	0.44
3,558.00	11.36	268.90	3,531.02	2.40	-329.36	-2.40	2.05
3,643.00	10.56	265.70	3,614.47	1.65	-345.50	-1.65	1.18
3,729.00	9.66	264.63	3,699.14	0.39	-360.54	-0.39	1.07
3,815.00	9.42	270.42	3,783.95	-0.24	-374.76	0.24	1.15
3,900.00	10.14	277.53	3,867.72	0.80	-389.14	-0.80	1.65
3,986.00	9.23	277.86	3,952.49	2.73	-403.47	-2.73	1.06
4,071.00	10.04	274.28	4,036.29	4.22	-417.62	-4.22	1.18

Design Report for Butterball 29C-15HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,157.00	9.83	273.57	4,121.00	5.23	-432.42	-5.23	0.28
4,243.00	9.51	273.16	4,205.78	6.08	-446.84	-6.08	0.38
4,329.00	8.53	273.30	4,290.71	6.84	-460.30	-6.84	1.14
4,414.00	9.02	273.10	4,374.72	7.56	-473.25	-7.56	0.58
4,500.00	9.83	274.76	4,459.56	8.54	-487.30	-8.54	0.99
4,586.00	10.87	273.78	4,544.16	9.68	-502.70	-9.68	1.23
4,671.00	10.60	273.99	4,627.67	10.75	-518.50	-10.75	0.32
4,757.00	10.70	273.72	4,712.19	11.82	-534.36	-11.82	0.13
4,843.00	10.07	273.25	4,796.78	12.77	-549.83	-12.77	0.74
4,928.00	9.79	274.81	4,880.50	13.79	-564.45	-13.79	0.46
5,014.00	10.40	269.50	4,965.17	14.34	-579.50	-14.34	1.29
5,100.00	10.45	268.82	5,049.76	14.11	-595.06	-14.11	0.15
5,186.00	9.89	268.16	5,134.40	13.71	-610.24	-13.71	0.67
5,271.00	8.94	268.38	5,218.26	13.29	-624.14	-13.29	1.12
5,357.00	8.82	265.67	5,303.23	12.61	-637.39	-12.61	0.51
5,443.00	9.59	266.01	5,388.12	11.61	-651.11	-11.61	0.90
5,528.00	10.35	265.73	5,471.84	10.55	-665.79	-10.55	0.90
5,614.00	8.95	264.35	5,556.62	9.31	-680.15	-9.31	1.65
5,700.00	9.47	266.51	5,641.51	8.22	-693.87	-8.22	0.73
5,785.00	10.58	268.72	5,725.21	7.62	-708.65	-7.62	1.38
5,871.00	9.43	265.67	5,809.90	6.92	-723.57	-6.92	1.47
5,957.00	10.08	262.97	5,894.66	5.46	-738.07	-5.46	0.92
6,042.00	9.33	268.83	5,978.44	4.41	-752.34	-4.41	1.46
6,128.00	9.39	272.03	6,063.30	4.52	-766.32	-4.52	0.61
6,214.00	9.24	272.40	6,148.16	5.06	-780.23	-5.06	0.19
6,300.00	7.89	272.02	6,233.20	5.55	-793.03	-5.55	1.57
6,386.00	6.75	270.53	6,318.50	5.81	-803.98	-5.81	1.34
6,471.00	5.66	268.86	6,403.00	5.77	-813.17	-5.77	1.30
6,557.00	5.01	281.75	6,488.63	6.45	-821.08	-6.45	1.58
6,643.00	4.39	281.91	6,574.34	7.90	-827.98	-7.90	0.72
6,728.00	3.22	275.11	6,659.15	8.78	-833.54	-8.78	1.47
6,814.00	1.85	261.38	6,745.07	8.79	-837.32	-8.79	1.73
6,900.00	0.34	229.51	6,831.05	8.41	-838.89	-8.41	1.83
6,943.00	0.52	194.51	6,874.05	8.14	-839.03	-8.14	0.72
6,986.00	4.32	181.17	6,917.00	6.33	-839.11	-6.33	8.87
7,029.00	8.14	186.99	6,959.74	1.69	-839.52	-1.69	8.99
7,072.00	12.06	185.25	7,002.07	-5.81	-840.30	5.81	9.14
7,114.00	15.92	188.20	7,042.81	-15.88	-841.52	15.88	9.34
7,157.00	20.27	184.37	7,083.68	-29.15	-842.93	29.15	10.48
7,200.00	25.30	180.43	7,123.31	-45.78	-843.57	45.78	12.22
7,243.00	27.49	177.27	7,161.83	-64.88	-843.17	64.88	6.05
7,286.00	31.04	178.09	7,199.34	-85.88	-842.32	85.88	8.31
7,329.00	35.69	181.55	7,235.24	-109.52	-842.29	109.52	11.68
7,371.00	40.07	183.96	7,268.39	-135.26	-843.56	135.26	11.01
7,414.00	45.31	184.03	7,299.98	-164.34	-845.59	164.34	12.19
7,457.00	49.58	183.24	7,329.06	-195.94	-847.59	195.94	10.02
7,500.00	51.54	181.26	7,356.37	-229.12	-848.89	229.12	5.78
7,543.00	52.56	179.24	7,382.82	-263.03	-849.03	263.03	4.40
7,586.00	57.47	178.31	7,407.46	-298.24	-848.27	298.24	11.56
7,629.00	61.62	180.10	7,429.26	-335.29	-847.77	335.29	10.30
7,672.00	65.51	181.10	7,448.40	-373.78	-848.17	373.78	9.28

Design Report for Butterball 29C-15HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,714.00	69.47	180.51	7,464.47	-412.57	-848.72	412.57	9.52
7,757.00	73.34	179.65	7,478.18	-453.32	-848.77	453.32	9.20
7,800.00	77.98	179.20	7,488.83	-494.96	-848.35	494.96	10.84
7,843.00	82.98	178.87	7,495.94	-537.35	-847.64	537.35	11.65
7,900.00	86.11	178.58	7,501.36	-594.07	-846.37	594.07	5.51
7,938.10	88.58	178.70	7,503.12	-632.12	-845.47	632.12	6.49
7" Casing Set @ 7938.10' MD :: 7503.12' TVD							
7,952.00	89.48	178.75	7,503.36	-646.01	-845.16	646.01	6.49
8,123.00	89.54	178.67	7,504.82	-816.96	-841.31	816.96	0.06
8,295.00	89.78	178.79	7,505.84	-988.92	-837.50	988.92	0.16
8,466.00	90.25	180.33	7,505.80	-1,159.91	-836.19	1,159.91	0.94
8,637.00	90.06	180.44	7,505.33	-1,330.90	-837.34	1,330.90	0.13
8,809.00	89.48	180.86	7,506.02	-1,502.89	-839.29	1,502.89	0.42
8,980.00	90.49	180.11	7,506.07	-1,673.88	-840.74	1,673.88	0.74
9,152.00	89.85	179.68	7,505.56	-1,845.88	-840.42	1,845.88	0.45
9,323.00	89.38	179.08	7,506.71	-2,016.86	-838.57	2,016.86	0.45
9,494.00	89.88	179.57	7,507.81	-2,187.85	-836.56	2,187.85	0.41
9,666.00	90.59	180.64	7,507.11	-2,359.84	-836.87	2,359.84	0.75
9,849.00	90.49	181.61	7,505.38	-2,542.80	-840.46	2,542.80	0.53
10,033.00	90.40	181.11	7,503.95	-2,726.74	-844.83	2,726.74	0.28
10,218.00	88.40	178.58	7,505.89	-2,911.70	-844.33	2,911.70	1.74
10,402.00	89.01	177.20	7,510.05	-3,095.52	-837.56	3,095.52	0.82
10,587.00	89.60	178.88	7,512.29	-3,280.40	-831.23	3,280.40	0.96
10,771.00	89.44	179.89	7,513.83	-3,464.38	-829.26	3,464.38	0.56
10,953.00	90.00	181.45	7,514.72	-3,646.36	-831.38	3,646.36	0.91
11,135.00	90.06	180.61	7,514.63	-3,828.32	-834.66	3,828.32	0.46
11,312.00	89.23	179.51	7,515.72	-4,005.32	-834.84	4,005.32	0.78
11,483.00	89.11	177.97	7,518.20	-4,176.25	-831.08	4,176.25	0.90
11,654.00	88.95	178.67	7,521.10	-4,347.15	-826.07	4,347.15	0.42
11,826.00	90.43	180.79	7,522.03	-4,519.13	-825.26	4,519.13	1.50
11,997.00	88.12	182.09	7,524.19	-4,690.05	-829.56	4,690.05	1.55
12,169.00	88.43	181.45	7,529.37	-4,861.89	-834.87	4,861.89	0.41
12,341.00	90.18	183.11	7,531.45	-5,033.73	-841.71	5,033.73	1.40
12,512.00	89.04	183.06	7,532.62	-5,204.47	-850.91	5,204.47	0.67
12,684.00	88.27	180.16	7,536.66	-5,376.34	-855.74	5,376.34	1.74
12,855.00	89.35	179.61	7,540.21	-5,547.30	-855.40	5,547.30	0.71
13,026.00	90.15	177.23	7,540.95	-5,718.22	-850.68	5,718.22	1.47
13,198.00	88.89	177.12	7,542.40	-5,890.00	-842.21	5,890.00	0.74
13,369.00	89.78	178.82	7,544.38	-6,060.87	-836.15	6,060.87	1.12
13,540.00	89.04	179.81	7,546.14	-6,231.85	-834.11	6,231.85	0.72
13,712.00	91.11	182.00	7,545.92	-6,403.81	-836.82	6,403.81	1.75
13,883.00	90.59	180.94	7,543.38	-6,574.73	-841.21	6,574.73	0.69
14,054.00	90.15	181.39	7,542.27	-6,745.69	-844.69	6,745.69	0.37
14,226.00	89.85	180.33	7,542.27	-6,917.67	-847.27	6,917.67	0.64
14,397.00	91.63	182.15	7,540.07	-7,088.60	-850.97	7,088.60	1.49
14,568.00	89.20	180.36	7,538.83	-7,259.53	-854.71	7,259.53	1.76
14,740.00	89.57	179.39	7,540.67	-7,431.52	-854.34	7,431.52	0.60
14,911.00	90.18	179.74	7,541.05	-7,602.51	-853.04	7,602.51	0.41
15,082.00	90.43	178.10	7,540.14	-7,773.48	-849.81	7,773.48	0.97
15,253.00	89.60	178.47	7,540.09	-7,944.40	-844.70	7,944.40	0.53
15,425.00	89.38	179.57	7,541.62	-8,116.36	-841.75	8,116.36	0.65

Design Report for Butterball 29C-15HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
15,596.00	90.18	179.42	7,542.28	-8,287.35	-840.25	8,287.35	0.48
15,767.00	89.88	179.61	7,542.19	-8,458.35	-838.80	8,458.35	0.21
15,936.00	90.12	179.07	7,542.19	-8,627.33	-836.85	8,627.33	0.35
16,108.00	89.29	177.18	7,543.08	-8,799.23	-831.23	8,799.23	1.20
16,279.00	90.31	181.24	7,543.67	-8,970.18	-828.87	8,970.18	2.45
16,450.00	90.06	180.74	7,543.12	-9,141.15	-831.82	9,141.15	0.33
16,628.00	90.65	181.86	7,542.02	-9,319.10	-835.86	9,319.10	0.71
16,670.00	90.99	182.18	7,541.42	-9,361.06	-837.34	9,361.06	1.11
Final MWD Survey @ 16670.00ft							
16,715.00	90.99	182.18	7,540.64	-9,406.03	-839.05	9,406.03	0.00
Str Line Proj to Bit @ 16715' MD :: 7540.64' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
926.00	925.99	1.34	-1.58	Tie-On to Gyro Surveys @ 926.00ft
1,083.00	1,082.98	1.29	-3.32	First MWD Survey @ 1083.00ft
16,670.00	7,541.42	-9,361.06	-837.34	Final MWD Survey @ 16670.00ft
16,715.00	7,540.64	-9,406.03	-839.05	Str Line Proj to Bit @ 16715' MD :: 7540.64' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	+E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	180.00	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	926.00	Winserve Gyro Surveys	NS-GYRO-MS
1,083.00	7,952.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,123.00	16,670.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,033.10	1,033.09	9 5/8" Casing Set @ 1033.10' MD :: 1033.09' TVD	9-5/8	13-1/2
7,938.10	7,503.12	7" Casing Set @ 7938.10' MD :: 7503.12' TVD	7	8-3/4

Design Report for Butterball 29C-15HZ - 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
Butterball 29C-15HZ_ξ	0.00	0.00	0.00	0.00	0.00	1,301,060.44	3,173,592.06	40.158137	-104.878923
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	643.04	-1,941.48	1,301,689.84	3,171,646.21	
Point 2				0.00	637.48	683.70	1,301,702.66	3,174,271.25	
Point 3				0.00	621.44	3,299.00	1,301,704.94	3,176,886.49	
Point 4				0.00	-2,020.02	3,284.41	1,299,063.55	3,176,890.40	
Point 5				0.00	-4,653.16	3,264.64	1,296,430.45	3,176,889.08	
Point 6				0.00	-4,631.22	666.60	1,296,434.19	3,174,291.05	
Point 7				0.00	-4,609.87	-1,964.17	1,296,437.12	3,171,660.31	
Point 8				0.00	-4,631.22	666.60	1,296,434.19	3,174,291.05	
Point 9				0.00	-4,653.16	3,264.64	1,296,430.45	3,176,889.08	
Point 10				0.00	-7,286.33	3,253.25	1,293,797.37	3,176,896.13	
Point 11				0.00	-9,925.50	3,224.85	1,291,158.18	3,176,886.21	
Point 12				0.00	-9,907.72	613.38	1,291,157.67	3,174,274.79	
Point 13				0.00	-9,872.62	-2,000.45	1,291,174.46	3,171,660.89	
Point 14				0.00	-7,241.11	-1,982.48	1,293,805.92	3,171,660.43	
Point 15				0.00	-4,609.87	-1,964.17	1,296,437.12	3,171,660.31	
Point 16				0.00	-1,983.23	-1,952.94	1,299,063.66	3,171,653.14	
Point 17				0.00	643.04	-1,941.48	1,301,689.84	3,171,646.21	
Butterball 29C-15HZ_L	0.00	0.00	0.00	0.00	0.00	1,301,060.44	3,173,592.06	40.158137	-104.878923
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	181.21	-1,090.66	1,301,234.00	3,172,500.21	
Point 2				0.00	179.27	-170.62	1,301,238.50	3,173,420.20	
Point 3				0.00	-1,995.70	-178.89	1,299,063.62	3,173,427.16	
Point 4				0.00	-4,624.28	-188.78	1,296,435.14	3,173,435.68	
Point 5				0.00	-7,256.55	-211.23	1,293,802.89	3,173,431.67	
Point 6				0.00	-9,436.34	-229.67	1,291,623.11	3,173,428.50	
Point 7				0.00	-9,423.98	-1,149.63	1,291,629.03	3,172,508.51	
Point 8				0.00	-4,616.81	-1,108.79	1,296,436.17	3,172,515.68	
Point 9				0.00	181.21	-1,090.66	1,301,234.00	3,172,500.21	
Butterball 29C-15HZ_ξ	0.00	0.00	0.00	0.00	0.00	1,301,060.44	3,173,592.06	40.158137	-104.878923
- actual wellpath hits target center									
- Point									
Butterball 29C-15HZ_E	0.00	0.00	7,572.00	-9,431.96	-837.25	1,291,623.24	3,172,820.93	40.132246	-104.881917
- actual wellpath misses target center by 40.73usft at 16715.00usft MD (7540.64 TVD, -9406.03 N, -839.05 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.34 °/100usft	Maximum Dogleg over Survey:	12.22 °/100usft at 7,200.00 usft
Net Tortousity applicable to Plans:	0.42 °/100usft	Directional Difficulty Index:	6.706

Audit Info

North Reference Sheet for Sec 10-T2N-R67W - Butterball 29C-15HZ - 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' @ 4951.00usft (Xtreme22). Northing and Easting are relative to Butterball 29C-15HZ

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: 0.99995815

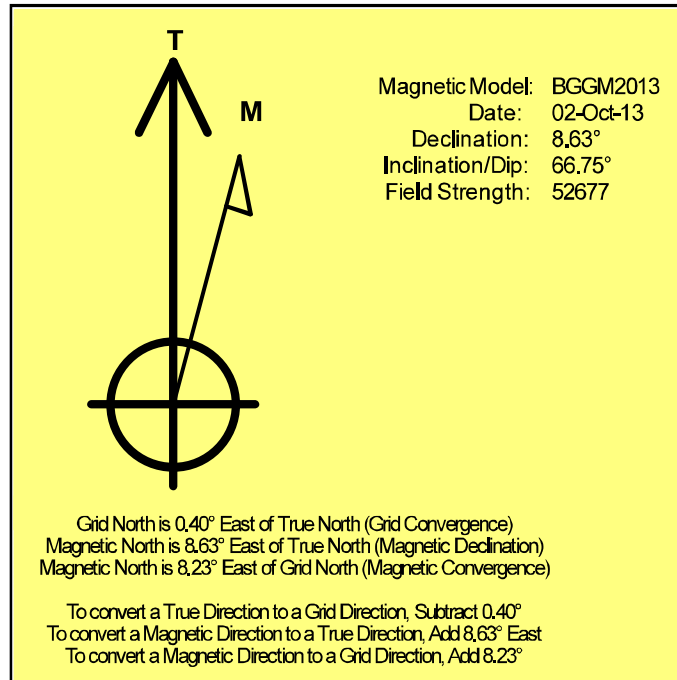
Grid Coordinates of Well: 1,301,060.44 usft N, 3,173,592.06 usft E

Geographical Coordinates of Well: 40° 09' 29.29" N, 104° 52' 44.12" W

Grid Convergence at Surface is: 0.40°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,715.00usft
the Bottom Hole Displacement is 9,443.37usft in the Direction of 185.10° (True).

Magnetic Convergence at surface is: -8.23° (2 October 2013 , BGGM2013)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec 10-T2N-R67W

Butterball 29C-15HZ

Plan B

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

22 November, 2013

Well Coordinates: 1,301,060.44 N, 3,173,592.06 E (40° 09' 29.29" N, 104° 52' 44.12" W)
Ground Level: 4,935.00 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 Butterball 29C-15HZ

RKB = 16' @ 4951.00usft (Xtreme22)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Butterball 29C-15HZ - 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	40.158137	-104.878923	1,301,060.44	3,173,592.06
16.00	0.00	0.00	16.00	0.00	0.00	40.158137	-104.878923	1,301,060.44	3,173,592.06
116.00	0.28	10.74	116.00	0.24	0.05	40.158138	-104.878923	1,301,060.68	3,173,592.11
216.00	0.21	9.05	216.00	0.66	0.12	40.158139	-104.878923	1,301,061.10	3,173,592.18
316.00	0.16	50.39	316.00	0.93	0.26	40.158140	-104.878922	1,301,061.37	3,173,592.31
416.00	0.03	182.21	416.00	0.99	0.36	40.158140	-104.878922	1,301,061.43	3,173,592.42
516.00	0.19	306.91	516.00	1.07	0.23	40.158140	-104.878922	1,301,061.50	3,173,592.29
616.00	0.24	339.19	616.00	1.36	0.02	40.158141	-104.878923	1,301,061.80	3,173,592.08
716.00	0.35	279.89	716.00	1.61	-0.35	40.158141	-104.878925	1,301,062.04	3,173,591.70
816.00	0.37	249.75	815.99	1.55	-0.96	40.158141	-104.878927	1,301,061.98	3,173,591.10
916.00	0.31	252.72	915.99	1.36	-1.52	40.158141	-104.878929	1,301,061.78	3,173,590.54
926.00	0.46	258.52	925.99	1.34	-1.58	40.158141	-104.878929	1,301,061.77	3,173,590.47
1,033.10	0.70	270.60	1,033.09	1.26	-2.66	40.158141	-104.878933	1,301,061.68	3,173,589.39
1,083.00	0.82	273.74	1,082.98	1.29	-3.32	40.158141	-104.878935	1,301,061.70	3,173,588.73
1,174.00	0.99	274.28	1,173.97	1.39	-4.76	40.158141	-104.878940	1,301,061.79	3,173,587.30
1,266.00	1.10	275.98	1,265.96	1.54	-6.43	40.158141	-104.878946	1,301,061.93	3,173,585.63
1,359.00	1.13	206.94	1,358.94	0.82	-7.73	40.158139	-104.878951	1,301,061.20	3,173,584.33
1,444.00	1.44	210.49	1,443.92	-0.85	-8.65	40.158135	-104.878954	1,301,059.53	3,173,583.42
1,530.00	1.74	249.13	1,529.89	-2.24	-10.42	40.158131	-104.878961	1,301,058.12	3,173,581.66
1,615.00	3.02	272.56	1,614.82	-2.60	-13.86	40.158130	-104.878973	1,301,057.73	3,173,578.22
1,701.00	4.87	283.10	1,700.61	-1.68	-19.68	40.158132	-104.878994	1,301,058.62	3,173,572.39
1,860.00	7.86	279.89	1,858.61	1.72	-36.97	40.158142	-104.879056	1,301,061.90	3,173,555.08
1,952.00	9.51	284.07	1,949.56	4.65	-50.54	40.158150	-104.879104	1,301,064.73	3,173,541.49
2,044.00	10.36	278.13	2,040.18	7.67	-66.10	40.158158	-104.879160	1,301,067.64	3,173,525.91
2,137.00	11.07	266.86	2,131.57	8.36	-83.30	40.158160	-104.879221	1,301,068.21	3,173,508.71
2,228.00	10.67	265.23	2,220.93	7.18	-100.42	40.158157	-104.879283	1,301,066.91	3,173,491.60
2,320.00	10.36	267.13	2,311.39	6.06	-117.17	40.158154	-104.879342	1,301,065.67	3,173,474.86
2,413.00	9.85	267.79	2,402.94	5.33	-133.47	40.158152	-104.879401	1,301,064.84	3,173,458.57
2,505.00	9.18	267.13	2,493.68	4.66	-148.66	40.158150	-104.879455	1,301,064.06	3,173,443.38
2,597.00	10.07	267.01	2,584.38	3.88	-164.02	40.158148	-104.879510	1,301,063.16	3,173,428.03
2,689.00	9.84	268.66	2,675.00	3.27	-179.91	40.158146	-104.879567	1,301,062.45	3,173,412.14
2,781.00	9.90	269.38	2,765.64	3.00	-195.68	40.158145	-104.879623	1,301,062.07	3,173,396.38
2,873.00	9.83	270.30	2,856.28	2.96	-211.44	40.158145	-104.879680	1,301,061.91	3,173,380.62
2,959.00	9.37	270.25	2,941.07	3.03	-225.78	40.158145	-104.879731	1,301,061.88	3,173,366.27
3,045.00	10.20	266.55	3,025.82	2.60	-240.39	40.158144	-104.879783	1,301,061.35	3,173,351.68
3,130.00	9.69	265.99	3,109.54	1.65	-255.03	40.158142	-104.879836	1,301,060.30	3,173,337.04
3,215.00	9.97	269.53	3,193.30	1.09	-269.53	40.158140	-104.879888	1,301,059.64	3,173,322.55
3,301.00	10.25	270.92	3,277.96	1.15	-284.62	40.158140	-104.879942	1,301,059.59	3,173,307.45
3,387.00	9.50	271.86	3,362.69	1.50	-299.37	40.158141	-104.879994	1,301,059.84	3,173,292.71
3,472.00	9.79	273.28	3,446.48	2.14	-313.59	40.158143	-104.880045	1,301,060.38	3,173,278.48
3,558.00	11.36	268.90	3,531.02	2.40	-329.36	40.158144	-104.880102	1,301,060.53	3,173,262.71
3,643.00	10.56	265.70	3,614.47	1.65	-345.50	40.158142	-104.880159	1,301,059.67	3,173,246.58

Design Report for Butterball 29C-15HZ - 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)
3,729.00	9.66	264.63	3,699.14	0.39	-360.54	40,158138	-104,880213	1,301,058.30	3,173,231.54
3,815.00	9.42	270.42	3,783.95	-0.24	-374.76	40,158136	-104,880264	1,301,057.58	3,173,217.33
3,900.00	10.14	277.53	3,867.72	0.80	-389.14	40,158139	-104,880315	1,301,058.51	3,173,202.95
3,986.00	9.23	277.86	3,952.49	2.73	-403.47	40,158145	-104,880367	1,301,060.34	3,173,188.60
4,071.00	10.04	274.28	4,036.29	4.22	-417.62	40,158149	-104,880417	1,301,061.73	3,173,174.45
4,157.00	9.83	273.57	4,121.00	5.23	-432.42	40,158151	-104,880470	1,301,062.64	3,173,159.64
4,243.00	9.51	273.16	4,205.78	6.08	-446.84	40,158154	-104,880522	1,301,063.39	3,173,145.21
4,329.00	8.53	273.30	4,290.71	6.84	-460.30	40,158156	-104,880570	1,301,064.05	3,173,131.74
4,414.00	9.02	273.10	4,374.72	7.56	-473.25	40,158158	-104,880616	1,301,064.68	3,173,118.79
4,500.00	9.83	274.76	4,459.56	8.54	-487.30	40,158160	-104,880667	1,301,065.56	3,173,104.74
4,586.00	10.87	273.78	4,544.16	9.68	-502.70	40,158164	-104,880722	1,301,066.60	3,173,089.33
4,671.00	10.60	273.99	4,627.67	10.75	-518.50	40,158167	-104,880778	1,301,067.56	3,173,073.52
4,757.00	10.70	273.72	4,712.19	11.82	-534.36	40,158170	-104,880835	1,301,068.51	3,173,057.66
4,843.00	10.07	273.25	4,796.78	12.77	-549.83	40,158172	-104,880890	1,301,069.35	3,173,042.18
4,928.00	9.79	274.81	4,880.50	13.79	-564.45	40,158175	-104,880943	1,301,070.28	3,173,027.55
5,014.00	10.40	269.50	4,965.17	14.34	-579.50	40,158176	-104,880996	1,301,070.72	3,173,012.50
5,100.00	10.45	268.82	5,049.76	14.11	-595.06	40,158178	-104,881052	1,301,070.38	3,172,996.94
5,186.00	9.89	268.16	5,134.40	13.71	-610.24	40,158175	-104,881106	1,301,069.87	3,172,981.77
5,271.00	8.94	268.38	5,218.26	13.29	-624.14	40,158174	-104,881156	1,301,069.36	3,172,967.87
5,357.00	8.82	265.67	5,303.23	12.61	-637.39	40,158172	-104,881204	1,301,068.58	3,172,954.63
5,443.00	9.59	266.01	5,388.12	11.61	-651.11	40,158169	-104,881253	1,301,067.48	3,172,940.91
5,528.00	10.35	265.73	5,471.84	10.55	-665.79	40,158166	-104,881305	1,301,066.32	3,172,926.24
5,614.00	8.95	264.35	5,556.62	9.31	-680.15	40,158163	-104,881357	1,301,064.99	3,172,911.89
5,700.00	9.47	266.51	5,641.51	8.22	-693.87	40,158160	-104,881406	1,301,063.80	3,172,898.18
5,785.00	10.58	268.72	5,725.21	7.62	-708.65	40,158158	-104,881459	1,301,063.10	3,172,883.41
5,871.00	9.43	265.67	5,809.90	6.92	-723.57	40,158156	-104,881512	1,301,062.28	3,172,868.49
5,957.00	10.08	262.97	5,894.66	5.46	-738.07	40,158152	-104,881564	1,301,060.73	3,172,854.01
6,042.00	9.33	268.83	5,978.44	4.41	-752.34	40,158149	-104,881615	1,301,059.58	3,172,839.75
6,128.00	9.39	272.03	6,063.30	4.52	-766.32	40,158149	-104,881665	1,301,059.59	3,172,825.76
6,214.00	9.24	272.40	6,148.16	5.06	-780.23	40,158151	-104,881715	1,301,060.03	3,172,811.85
6,300.00	7.89	272.02	6,233.20	5.55	-793.03	40,158152	-104,881760	1,301,060.43	3,172,799.05
6,386.00	6.75	270.53	6,318.50	5.81	-803.98	40,158153	-104,881800	1,301,060.61	3,172,788.10
6,471.00	5.66	268.86	6,403.00	5.77	-813.17	40,158153	-104,881832	1,301,060.51	3,172,778.91
6,557.00	5.01	281.75	6,488.63	6.45	-821.08	40,158155	-104,881861	1,301,061.14	3,172,770.99
6,643.00	4.39	281.91	6,574.34	7.90	-827.98	40,158159	-104,881885	1,301,062.53	3,172,764.08
6,728.00	3.22	275.11	6,659.15	8.78	-833.54	40,158161	-104,881905	1,301,063.38	3,172,758.52
6,814.00	1.85	261.38	6,745.07	8.79	-837.32	40,158161	-104,881919	1,301,063.36	3,172,754.74
6,900.00	0.34	229.51	6,831.05	8.41	-838.89	40,158160	-104,881924	1,301,062.97	3,172,753.17
6,983.00	0.52	194.51	6,874.05	8.14	-839.03	40,158159	-104,881925	1,301,062.70	3,172,753.03
6,986.00	4.32	181.17	6,917.00	6.33	-839.11	40,158154	-104,881925	1,301,060.89	3,172,752.96
7,029.00	8.14	186.99	6,959.74	1.69	-839.52	40,158142	-104,881927	1,301,056.25	3,172,752.59
7,072.00	12.06	185.25	7,002.07	-5.81	-840.30	40,158121	-104,881930	1,301,048.74	3,172,751.86

Design Report for Butterball 29C-15HZ - 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)
7,114.00	15.92	188.20	7,042.81	-15.88	-841.52	40.158093	-104.881934	1,301,038.66	3,172,750.71
7,157.00	20.27	184.37	7,083.68	-29.15	-842.93	40.158057	-104.881939	1,301,025.38	3,172,749.39
7,200.00	25.30	180.43	7,123.31	-45.78	-843.57	40.158011	-104.881941	1,301,008.75	3,172,748.87
7,243.00	27.49	177.27	7,161.83	-64.88	-843.17	40.157959	-104.881940	1,300,989.65	3,172,749.41
7,286.00	31.04	178.09	7,199.34	-85.88	-842.32	40.157901	-104.881937	1,300,968.66	3,172,750.40
7,329.00	35.69	181.55	7,235.24	-109.52	-842.29	40.157836	-104.881937	1,300,945.03	3,172,750.59
7,371.00	40.07	183.96	7,268.39	-135.26	-843.56	40.157766	-104.881941	1,300,919.27	3,172,749.51
7,414.00	45.31	184.03	7,299.98	-164.34	-845.59	40.157686	-104.881948	1,300,890.19	3,172,747.88
7,457.00	49.58	183.24	7,329.06	-195.94	-847.59	40.157599	-104.881956	1,300,858.57	3,172,745.90
7,500.00	51.54	181.26	7,356.37	-229.12	-848.89	40.157508	-104.881960	1,300,825.38	3,172,744.84
7,543.00	52.56	179.24	7,382.82	-263.03	-849.03	40.157415	-104.881961	1,300,791.48	3,172,744.93
7,586.00	57.47	178.31	7,407.46	-298.24	-848.27	40.157318	-104.881958	1,300,756.28	3,172,745.94
7,629.00	61.62	180.10	7,429.26	-335.29	-847.77	40.157217	-104.881956	1,300,719.23	3,172,746.70
7,672.00	65.51	181.10	7,448.40	-373.78	-848.17	40.157111	-104.881958	1,300,680.74	3,172,746.56
7,714.00	69.47	180.51	7,464.47	-412.57	-848.72	40.157005	-104.881960	1,300,641.95	3,172,746.29
7,757.00	73.34	179.65	7,478.18	-453.32	-848.77	40.156893	-104.881960	1,300,601.20	3,172,746.52
7,800.00	77.98	179.20	7,488.83	-494.96	-848.35	40.156778	-104.881958	1,300,559.56	3,172,747.24
7,843.00	82.98	178.87	7,495.94	-537.35	-847.64	40.156662	-104.881956	1,300,517.18	3,172,748.25
7,900.00	86.11	178.58	7,501.36	-594.07	-846.37	40.156506	-104.881951	1,300,460.47	3,172,749.91
7,938.10	88.58	178.70	7,503.12	-632.12	-845.47	40.156402	-104.881948	1,300,422.44	3,172,751.08
7,952.00	89.48	178.75	7,503.36	-646.01	-845.16	40.156364	-104.881947	1,300,408.55	3,172,751.48
8,123.00	89.54	178.67	7,504.82	-816.96	-841.31	40.155894	-104.881933	1,300,237.63	3,172,756.53
8,295.00	89.78	178.79	7,505.84	-888.92	-837.50	40.155422	-104.881919	1,300,065.72	3,172,761.54
8,466.00	90.25	180.33	7,505.80	-1,159.91	-836.19	40.154953	-104.881915	1,299,894.75	3,172,764.05
8,637.00	90.06	180.44	7,505.33	-1,330.90	-837.34	40.154484	-104.881919	1,299,723.76	3,172,764.10
8,809.00	89.48	180.86	7,506.02	-1,502.89	-839.29	40.154012	-104.881926	1,299,551.77	3,172,763.36
8,980.00	90.49	180.11	7,506.07	-1,673.88	-840.74	40.153542	-104.881931	1,299,380.78	3,172,763.11
9,152.00	89.85	179.68	7,505.56	-1,845.88	-840.42	40.153070	-104.881930	1,299,208.79	3,172,764.63
9,323.00	89.38	179.08	7,506.71	-2,016.86	-838.57	40.152601	-104.881923	1,299,037.83	3,172,767.67
9,494.00	89.88	179.57	7,507.81	-2,187.85	-836.56	40.152131	-104.881916	1,298,866.88	3,172,770.89
9,666.00	90.59	180.64	7,507.11	-2,359.84	-836.87	40.151659	-104.881917	1,298,694.89	3,172,771.78
9,849.00	90.49	181.61	7,505.38	-2,542.80	-840.46	40.151157	-104.881930	1,298,511.92	3,172,769.46
10,033.00	90.40	181.11	7,503.95	-2,726.74	-844.83	40.150652	-104.881945	1,298,327.96	3,172,766.39
10,218.00	88.40	178.58	7,505.89	-2,911.70	-844.33	40.150144	-104.881944	1,298,143.01	3,172,768.18
10,402.00	89.01	177.20	7,510.05	-3,095.52	-837.56	40.149640	-104.881919	1,297,959.25	3,172,776.24
10,587.00	89.60	178.88	7,512.29	-3,280.40	-831.23	40.149132	-104.881897	1,297,774.44	3,172,783.86
10,771.00	89.44	179.89	7,513.83	-3,464.38	-829.26	40.148627	-104.881890	1,297,590.48	3,172,787.13
10,953.00	90.00	181.45	7,514.72	-3,646.36	-831.38	40.148128	-104.881897	1,297,408.50	3,172,786.27
11,135.00	90.06	180.61	7,514.63	-3,828.32	-834.66	40.147628	-104.881909	1,297,226.52	3,172,784.27
11,312.00	89.23	179.51	7,515.72	-4,005.32	-834.84	40.147142	-104.881910	1,297,049.54	3,172,785.33
11,483.00	89.11	177.97	7,518.20	-4,176.25	-831.08	40.146673	-104.881896	1,296,878.64	3,172,790.29
11,654.00	88.95	178.67	7,521.10	-4,347.15	-826.07	40.146204	-104.881878	1,296,707.79	3,172,796.49

Design Report for Butterball 29C-15HZ - 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)
11,826.00	90.43	180.79	7,522.03	-4,519.13	-825.26	40,145732	-104,881875	1,296,535.82	3,172,798.51
11,997.00	88.12	182.09	7,524.19	-4,690.05	-829.56	40,145263	-104,881891	1,296,364.89	3,172,795.41
12,169.00	88.43	181.45	7,529.37	-4,861.89	-834.87	40,144791	-104,881910	1,296,193.02	3,172,791.30
12,341.00	90.18	183.11	7,531.45	-5,033.73	-841.71	40,144319	-104,881934	1,296,021.15	3,172,785.67
12,512.00	89.04	183.06	7,532.62	-5,204.47	-850.91	40,143851	-104,881967	1,295,850.35	3,172,777.66
12,684.00	88.27	180.16	7,536.66	-5,376.34	-855.74	40,143379	-104,881984	1,295,678.46	3,172,774.03
12,855.00	89.35	179.61	7,540.21	-5,547.30	-855.40	40,142910	-104,881983	1,295,507.51	3,172,775.57
13,026.00	90.15	177.23	7,540.95	-5,718.22	-850.68	40,142440	-104,881966	1,295,336.64	3,172,781.48
13,198.00	88.89	177.12	7,542.40	-5,890.00	-842.21	40,141969	-104,881936	1,295,164.93	3,172,791.16
13,369.00	89.78	178.82	7,544.38	-6,060.87	-836.15	40,141500	-104,881914	1,294,994.11	3,172,798.42
13,540.00	89.04	179.81	7,546.14	-6,231.85	-834.11	40,141030	-104,881907	1,294,823.16	3,172,801.66
13,712.00	91.11	182.00	7,545.92	-6,403.81	-836.82	40,140558	-104,881916	1,294,651.19	3,172,800.15
13,883.00	90.59	180.94	7,543.38	-6,574.73	-841.21	40,140089	-104,881932	1,294,480.25	3,172,796.96
14,054.00	90.15	181.39	7,542.27	-6,745.69	-844.69	40,139620	-104,881944	1,294,309.28	3,172,794.68
14,226.00	89.85	180.33	7,542.27	-6,917.67	-847.27	40,139148	-104,881954	1,294,137.29	3,172,793.30
14,397.00	91.63	182.15	7,540.07	-7,088.60	-850.97	40,138679	-104,881967	1,293,966.35	3,172,790.80
14,568.00	89.20	180.36	7,538.83	-7,259.53	-854.71	40,138209	-104,881980	1,293,795.40	3,172,788.25
14,740.00	89.57	179.39	7,540.67	-7,431.52	-854.34	40,137737	-104,881979	1,293,623.43	3,172,789.83
14,911.00	90.18	179.74	7,541.05	-7,602.51	-853.04	40,137268	-104,881974	1,293,452.45	3,172,792.33
15,082.00	90.43	178.10	7,540.14	-7,773.48	-849.81	40,136799	-104,881963	1,293,281.52	3,172,796.75
15,253.00	89.60	178.47	7,540.09	-7,944.40	-844.70	40,136329	-104,881944	1,293,110.65	3,172,803.06
15,425.00	89.38	179.57	7,541.62	-8,116.36	-841.75	40,135857	-104,881934	1,292,938.72	3,172,807.21
15,596.00	90.18	179.42	7,542.28	-8,287.35	-840.25	40,135388	-104,881928	1,292,767.75	3,172,809.91
15,767.00	89.88	179.61	7,542.19	-8,458.35	-838.80	40,134919	-104,881923	1,292,596.78	3,172,812.56
15,936.00	90.12	179.07	7,542.19	-8,627.33	-836.85	40,134455	-104,881916	1,292,427.81	3,172,815.69
16,108.00	89.29	177.18	7,543.08	-8,799.23	-831.23	40,133983	-104,881896	1,292,255.97	3,172,822.52
16,279.00	90.31	181.24	7,543.67	-8,970.18	-828.87	40,133514	-104,881888	1,292,085.05	3,172,826.07
16,450.00	90.06	180.74	7,543.12	-9,141.15	-831.82	40,133044	-104,881898	1,291,914.07	3,172,824.32
16,628.00	90.65	181.86	7,542.02	-9,319.10	-835.86	40,132556	-104,881913	1,291,736.10	3,172,821.52
16,870.00	90.99	182.18	7,541.42	-9,361.06	-837.34	40,132441	-104,881918	1,291,694.13	3,172,820.34
16,715.00	90.99	182.18	7,540.64	-9,406.03	-839.05	40,132317	-104,881924	1,291,649.16	3,172,818.94

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
926.00	925.99	1.34	-1.58	Tie-On to Gyro Surveys @ 926.00ft
1,083.00	1,082.98	1.29	-3.32	First MWD Survey @ 1083.00ft
16,670.00	7,541.42	-9,361.06	-837.34	Final MWD Survey @ 16670.00ft
16,715.00	7,540.64	-9,406.03	-839.05	Str Line Proj to Bit @ 16715' MD :: 7540.64' TVD

Design Report for Butterball 29C-15HZ - Actual Field Surveys

Vertical Section Information

User	Angle Type		Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
	+N/_S (usft)	+E/_W (usft)				+N/_S (usft)	+E/_W (usft)	
			No Target (Freehand)	180.00	Slot	0.00	0.00	0.00

Survey tool program

Survey/Plan		Survey Tool	
From (usft)	To (usft)		
16.00	926.00	Winserve Gyro Surveys	NS-GYRO-MS
1,083.00	7,952.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,123.00	16,670.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,033.10	1,033.09	9 5/8" Casing Set @ 1033.10' MD :: 1033.09' TVD	9-5/8	13-1/2
7,938.10	7,503.12	7" Casing Set @ 7938.10' MD :: 7503.12' TVD	7	8-3/4

Design Targets

Shape	Target Name	TVD (')	Northing (')	Easting (')	+N/_S	+E/_W	Created	Updated

Directional Difficulty Index

Average Dogleg over Survey:	1.34 °/100usft	Maximum Dogleg over Survey:	12.22 °/100usft at 7,200.00 usft
Net Tortousity applicable to Plans:	0.42 °/100usft	Directional Difficulty Index:	6.706

Design Report for Butterball 29C-15HZ - Actual Field Surveys

Audit Info

North Reference Sheet for Sec 10-T2N-R67W - Butterball 29C-15HZ - 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' @ 4951.00usft (Xtreme22). Northing and Easting are relative to Butterball 29C-15HZ

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: 0.99995815

Grid Coordinates of Well: 1,301,060.44 usft N, 3,173,592.06 usft E

Geographical Coordinates of Well: 40° 09' 29.29" N, 104° 52' 44.12" W

Grid Convergence at Surface is: 0.40°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,715.00usft the Bottom Hole Displacement is 9,443.37usft in the Direction of 185.10° (True). Magnetic Convergence at surface is: -8.23° (2 October 2013 , BGGM2013)

