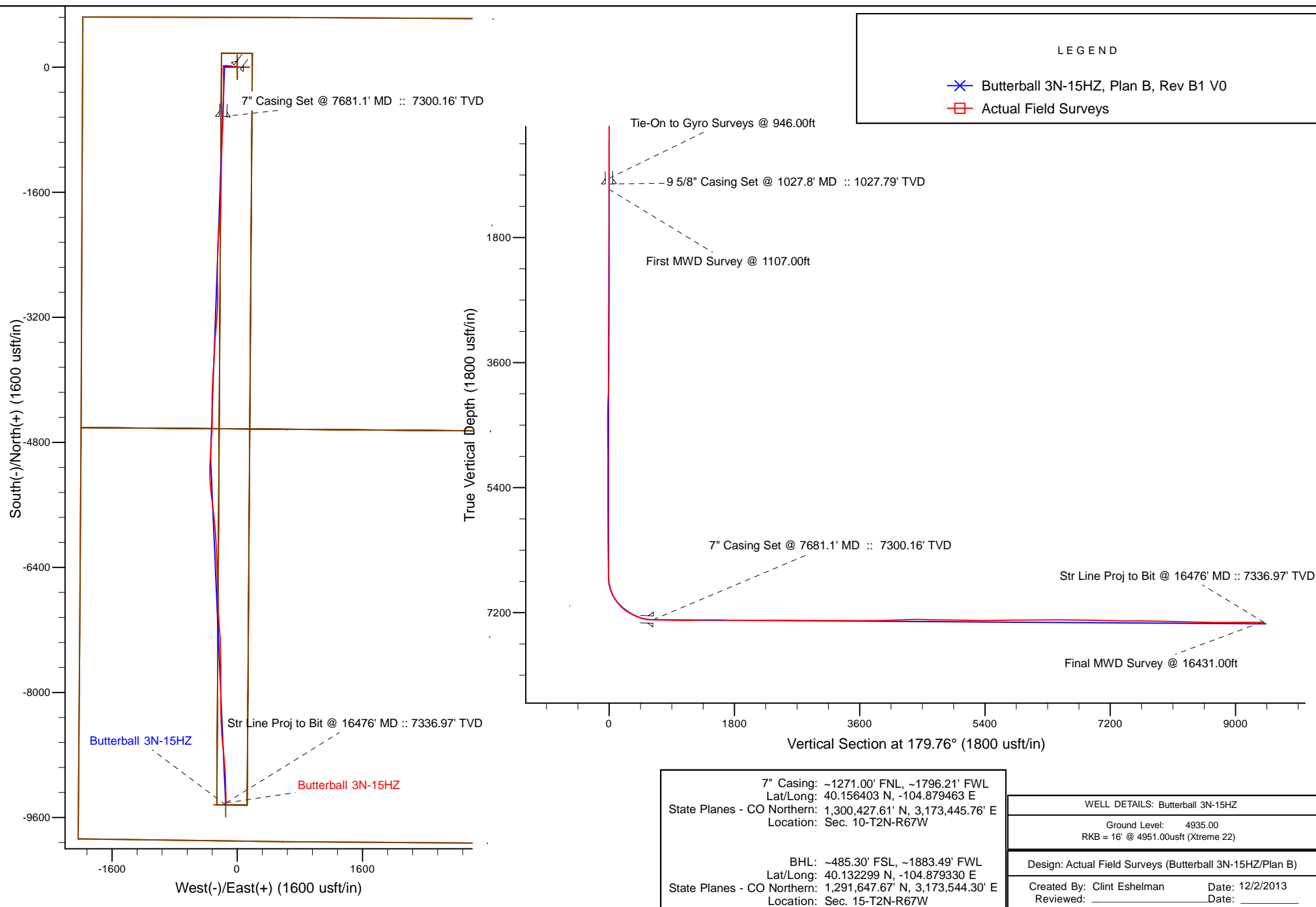


Project: Weld County, CO (NAD 83)
 Site: Sec 10-T2N-R67W
 Well: Butterball 3N-15HZ
 Wellbore: Plan B
 Design: Actual Field Surveys



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec 10-T2N-R67W

Butterball 3N-15HZ

Plan B

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

22 November, 2013

Well Coordinates: 1,301,060.64 N, 3,173,622.25 E (40° 09' 29.29" N, 104° 52' 43.73" 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 3N-15HZ

RKB = 16' @ 4951.00usft (Xtreme 22)

N

True

API - US Survey Feet - Custom

HALLIBURTON

Design Report for Butterball 3N-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	0.50	68.64	116.00	0.16	0.41	-0.16	0.50
216.00	0.53	49.83	215.99	0.62	1.17	-0.61	0.17
316.00	0.14	28.44	315.99	1.02	1.58	-1.02	0.40
416.00	0.24	62.87	415.99	1.22	1.82	-1.22	0.15
516.00	0.31	26.96	515.99	1.56	2.13	-1.55	0.18
616.00	0.24	70.48	615.99	1.87	2.45	-1.86	0.21
716.00	0.05	342.99	715.99	1.98	2.64	-1.97	0.24
816.00	0.15	299.47	815.99	2.09	2.51	-2.08	0.12
916.00	0.22	321.16	915.99	2.30	2.27	-2.29	0.10
946.00	0.23	308.67	945.99	2.39	2.19	-2.38	0.17
Tie-On to Gyro Surveys @ 946.00ft							
1,027.80	0.20	216.19	1,027.79	2.37	1.98	-2.37	0.38
9 5/8" Casing Set @ 1027.8' MD :: 1027.79' TVD							
1,107.00	0.46	187.27	1,106.99	1.95	1.86	-1.94	0.38
First MWD Survey @ 1107.00ft							
1,202.00	0.43	196.53	1,201.98	1.23	1.71	-1.22	0.08
1,297.00	0.47	205.81	1,296.98	0.54	1.44	-0.53	0.09
1,392.00	0.57	204.90	1,391.98	-0.24	1.07	0.25	0.11
1,487.00	0.50	228.52	1,486.97	-0.95	0.56	0.95	0.24
1,580.00	0.68	248.38	1,579.97	-1.42	-0.26	1.42	0.29
1,676.00	0.49	272.64	1,675.96	-1.61	-1.20	1.61	0.32
1,767.00	0.55	275.51	1,766.96	-1.55	-2.02	1.54	0.07
1,860.00	0.99	280.88	1,859.95	-1.36	-3.25	1.34	0.48
1,952.00	1.00	306.37	1,951.94	-0.73	-4.68	0.71	0.48
2,044.00	1.06	290.28	2,043.92	0.04	-6.13	-0.07	0.32
2,137.00	1.15	301.18	2,136.91	0.82	-7.73	-0.85	0.25
2,228.00	0.57	235.89	2,227.90	1.04	-8.89	-1.08	1.15
2,320.00	0.22	129.60	2,319.90	0.67	-9.13	-0.71	0.72
2,413.00	1.29	81.12	2,412.89	0.72	-7.96	-0.75	1.24
2,505.00	0.96	76.81	2,504.87	1.06	-6.18	-1.08	0.37
2,597.00	0.74	76.85	2,596.86	1.37	-4.86	-1.39	0.24
2,689.00	0.37	57.12	2,688.85	1.66	-4.03	-1.68	0.45
2,780.00	0.28	0.19	2,779.85	2.04	-3.78	-2.06	0.35
2,872.00	0.26	22.32	2,871.85	2.46	-3.70	-2.48	0.11
2,963.00	0.35	331.90	2,962.85	2.90	-3.75	-2.91	0.30
3,053.00	0.40	322.12	3,052.85	3.39	-4.08	-3.41	0.09
3,145.00	0.48	291.30	3,144.85	3.78	-4.63	-3.80	0.27
3,327.00	0.82	306.46	3,326.83	4.83	-6.39	-4.86	0.21
3,418.00	0.92	316.88	3,417.82	5.75	-7.41	-5.78	0.21
3,510.00	1.56	271.04	3,509.80	6.32	-9.17	-6.35	1.23
3,601.00	2.60	263.63	3,600.74	6.11	-12.46	-6.16	1.18
3,693.00	4.26	276.74	3,692.58	6.28	-17.93	-6.35	1.98
3,784.00	6.05	271.24	3,783.21	6.78	-26.08	-6.89	2.04
3,875.00	7.40	277.89	3,873.58	7.69	-36.68	-7.84	1.71
3,966.00	9.30	281.38	3,963.61	9.94	-49.69	-10.15	2.16
4,057.00	9.53	283.86	4,053.38	13.20	-64.22	-13.47	0.51
4,148.00	10.19	279.89	4,143.04	16.39	-79.46	-16.72	1.04
4,240.00	9.60	278.13	4,233.67	18.87	-95.07	-19.27	0.72

Design Report for Butterball 3N-15HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,332.00	8.97	275.93	4,324.47	20.69	-109.80	-21.15	0.79
4,418.00	8.15	278.28	4,409.51	22.26	-122.50	-22.78	1.04
4,504.00	7.63	272.46	4,494.70	23.39	-134.24	-23.95	1.11
4,589.00	7.60	261.15	4,578.95	22.77	-145.43	-23.37	1.76
4,674.00	7.19	255.61	4,663.24	20.58	-156.14	-21.23	0.97
4,760.00	5.21	257.65	4,748.74	18.41	-165.16	-19.10	2.32
4,846.00	3.37	261.55	4,834.49	17.20	-171.48	-17.92	2.17
4,931.00	1.94	288.99	4,919.40	17.30	-175.31	-18.03	2.21
5,017.00	0.37	261.12	5,005.38	17.73	-176.96	-18.47	1.89
5,102.00	0.46	269.41	5,090.38	17.68	-177.57	-18.43	0.13
5,188.00	0.37	283.51	5,176.38	17.75	-178.19	-18.49	0.16
5,274.00	0.41	97.18	5,262.38	17.77	-178.15	-18.52	0.91
5,359.00	0.55	83.85	5,347.37	17.78	-177.45	-18.52	0.21
5,445.00	0.40	92.05	5,433.37	17.81	-176.74	-18.55	0.19
5,530.00	0.47	89.12	5,518.37	17.81	-176.09	-18.54	0.09
5,616.00	0.38	71.55	5,604.37	17.90	-175.47	-18.64	0.18
5,702.00	0.20	34.25	5,690.37	18.12	-175.11	-18.85	0.29
5,788.00	0.00	121.73	5,776.37	18.24	-175.03	-18.97	0.23
5,873.00	0.37	195.12	5,861.36	17.98	-175.10	-18.71	0.44
5,959.00	0.71	151.25	5,947.36	17.24	-174.92	-17.97	0.60
6,045.00	0.68	137.38	6,033.35	16.40	-174.31	-17.13	0.20
6,130.00	0.68	155.01	6,118.35	15.57	-173.76	-16.30	0.25
6,216.00	0.55	173.70	6,204.34	14.70	-173.50	-15.42	0.28
6,302.00	0.44	169.23	6,290.34	13.96	-173.39	-14.69	0.14
6,387.00	0.50	184.83	6,375.34	13.27	-173.36	-14.00	0.17
6,473.00	0.51	186.53	6,461.33	12.52	-173.44	-13.24	0.02
6,559.00	0.56	197.23	6,547.33	11.74	-173.61	-12.46	0.13
6,645.00	0.31	203.24	6,633.33	11.12	-173.82	-11.85	0.30
6,688.00	0.65	188.52	6,676.33	10.77	-173.90	-11.50	0.83
6,730.00	5.43	193.06	6,718.26	8.60	-174.39	-9.33	11.39
6,773.00	10.46	192.38	6,760.83	2.80	-175.69	-3.54	11.70
6,816.00	12.58	191.05	6,802.96	-5.61	-177.42	4.86	4.97
6,859.00	15.91	185.38	6,844.63	-16.07	-178.87	15.33	8.39
6,902.00	19.26	181.17	6,885.62	-29.04	-179.57	28.28	8.33
6,945.00	22.78	181.00	6,925.75	-44.46	-179.86	43.70	8.19
6,987.00	27.25	176.35	6,963.81	-62.19	-179.39	61.44	11.62
7,030.00	31.60	177.09	7,001.25	-83.28	-178.19	82.53	10.15
7,073.00	36.46	177.09	7,036.88	-107.30	-176.97	106.56	11.30
7,116.00	40.49	177.45	7,070.53	-134.02	-175.70	133.28	9.39
7,159.00	42.89	177.40	7,102.64	-162.59	-174.41	161.86	5.58
7,202.00	47.33	178.98	7,132.98	-193.03	-173.47	192.30	10.65
7,244.00	52.94	179.79	7,159.89	-225.25	-173.13	224.52	13.44
7,287.00	57.42	179.81	7,184.44	-260.54	-173.01	259.82	10.42
7,330.00	61.10	180.89	7,206.42	-297.49	-173.24	296.77	8.83
7,373.00	63.65	181.13	7,226.35	-335.58	-173.91	334.85	5.95
7,416.00	67.08	181.43	7,244.27	-374.65	-174.79	373.92	8.00
7,459.00	70.67	180.80	7,259.77	-414.75	-175.56	414.01	8.46
7,501.00	72.60	180.45	7,273.00	-454.61	-176.00	453.86	4.66
7,544.00	75.99	180.79	7,284.64	-495.99	-176.45	495.25	7.92
7,587.00	81.02	181.36	7,293.21	-538.11	-177.24	537.36	11.77
7,630.00	86.46	181.84	7,297.89	-580.82	-178.43	580.07	12.70

Design Report for Butterball 3N-15HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,643.00	87.53	182.96	7,298.57	-593.79	-178.98	593.03	11.91
7,681.10	87.69	182.91	7,300.16	-631.81	-180.93	631.04	0.45
7" Casing Set @ 7681.1' MD :: 7300.16' TVD							
7,866.00	88.49	182.67	7,306.32	-816.38	-189.92	815.58	0.45
8,037.00	89.54	181.56	7,309.26	-987.24	-196.23	986.41	0.89
8,208.00	90.65	181.66	7,308.97	-1,158.17	-201.04	1,157.31	0.65
8,379.00	91.33	180.05	7,306.02	-1,329.11	-203.59	1,328.25	1.02
8,551.00	90.03	180.38	7,303.98	-1,501.10	-204.23	1,500.23	0.78
8,722.00	88.09	182.32	7,306.78	-1,672.01	-208.26	1,671.12	1.60
8,894.00	89.82	183.75	7,309.92	-1,843.73	-217.36	1,842.80	1.30
9,065.00	90.55	185.34	7,309.37	-2,014.18	-230.91	2,013.20	1.02
9,237.00	89.63	182.73	7,309.10	-2,185.74	-243.02	2,184.70	1.61
9,408.00	90.12	181.47	7,309.47	-2,356.62	-249.28	2,355.56	0.79
9,579.00	89.97	180.72	7,309.34	-2,527.59	-252.55	2,526.51	0.45
9,757.00	88.98	178.53	7,310.97	-2,705.57	-251.39	2,704.49	1.35
9,941.00	90.40	180.05	7,311.96	-2,889.54	-249.11	2,888.47	1.13
10,125.00	89.08	182.12	7,312.80	-3,073.49	-252.59	3,072.40	1.33
10,309.00	90.71	184.57	7,313.14	-3,257.16	-263.32	3,256.02	1.60
10,494.00	89.32	184.97	7,313.09	-3,441.51	-278.71	3,440.31	0.78
10,678.00	90.09	182.49	7,314.03	-3,625.10	-290.68	3,623.85	1.41
10,861.00	90.22	183.13	7,313.54	-3,807.88	-299.65	3,806.59	0.36
11,044.00	92.28	183.95	7,309.55	-3,990.48	-310.94	3,989.14	1.21
11,226.00	91.94	181.46	7,302.85	-4,172.14	-319.53	4,170.76	1.38
11,408.00	91.23	179.35	7,297.81	-4,354.05	-320.81	4,352.67	1.22
11,591.00	88.03	180.03	7,298.99	-4,537.02	-319.82	4,535.64	1.79
11,774.00	89.38	184.32	7,303.13	-4,719.79	-326.76	4,718.38	2.46
11,956.00	88.95	183.23	7,305.78	-4,901.38	-338.75	4,899.91	0.64
12,138.00	90.12	182.67	7,307.26	-5,083.12	-348.11	5,081.62	0.71
12,320.00	87.81	177.03	7,310.55	-5,265.01	-347.64	5,263.51	3.35
12,498.00	90.18	173.72	7,313.67	-5,442.36	-333.29	5,440.92	2.29
12,669.00	91.42	173.14	7,311.28	-5,612.22	-313.73	5,610.86	0.80
12,841.00	91.67	173.48	7,306.65	-5,782.99	-293.70	5,781.71	0.25
13,012.00	90.49	175.91	7,303.42	-5,953.21	-277.89	5,951.99	1.58
13,183.00	90.37	176.93	7,302.14	-6,123.87	-267.21	6,122.69	0.60
13,354.00	89.57	178.32	7,302.23	-6,294.71	-260.13	6,293.57	0.94
13,525.00	89.78	178.52	7,303.20	-6,465.65	-255.41	6,464.52	0.17
13,696.00	89.26	179.13	7,304.63	-6,636.60	-251.91	6,635.49	0.47
13,868.00	89.66	178.49	7,306.25	-6,808.56	-248.33	6,807.46	0.44
14,039.00	88.86	177.20	7,308.46	-6,979.42	-241.90	6,978.34	0.89
14,211.00	88.33	174.62	7,312.68	-7,150.91	-229.64	7,149.89	1.53
14,382.00	88.67	176.84	7,317.16	-7,321.37	-216.92	7,320.40	1.31
14,554.00	90.65	179.52	7,318.18	-7,493.25	-211.45	7,492.30	1.94
14,725.00	88.83	179.81	7,318.95	-7,664.24	-210.45	7,663.29	1.08
14,896.00	89.35	180.18	7,321.67	-7,835.22	-210.44	7,834.27	0.37
15,068.00	89.45	179.32	7,323.47	-8,007.21	-209.69	8,006.26	0.50
15,239.00	88.40	179.62	7,326.68	-8,178.17	-208.11	8,177.22	0.64
15,410.00	87.90	178.67	7,332.20	-8,349.06	-205.56	8,348.12	0.63
15,582.00	88.53	175.84	7,337.56	-8,520.76	-197.32	8,519.86	1.68
15,754.00	89.57	173.89	7,340.41	-8,692.03	-181.93	8,691.19	1.28
15,925.00	90.99	174.64	7,339.57	-8,862.17	-164.85	8,861.40	0.94
16,097.00	90.40	177.35	7,337.49	-9,033.72	-152.84	9,033.00	1.61

Design Report for Butterball 3N-15HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
16,268.00	89.66	179.22	7,337.40	-9,204.63	-147.72	9,203.94	1.18
16,431.00	89.11	178.77	7,339.15	-9,367.60	-144.86	9,366.91	0.44
Final MWD Survey @ 16431.00ft							
16,476.00	89.11	178.77	7,339.85	-9,412.58	-143.89	9,411.90	0.00
Str Line Proj to Bit @ 16476' MD :: 7336.97' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
946.00	945.99	2.39	2.19	Tie-On to Gyro Surveys @ 946.00ft
1,107.00	1,106.99	1.95	1.86	First MWD Survey @ 1107.00ft
16,431.00	7,339.15	-9,367.60	-144.86	Final MWD Survey @ 16431.00ft
16,476.00	7,339.85	-9,412.58	-143.89	Str Line Proj to Bit @ 16476' MD :: 7336.97' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	179.76	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	946.00	Winserve Gyro Surveys	NS-GYRO-MS
1,107.00	7,643.00	MWD Vertical/Build	MWD+IFR1+SC
7,695.00	16,431.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,027.80	1,027.79	9 5/8" Casing Set @ 1027.8' MD :: 1027.79' TVD	9-5/8	13-1/2
7,681.10	7,300.16	7" Casing Set @ 7681.1' MD :: 7300.16' TVD	7	8-3/4

Design Report for Butterball 3N-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 3N-15HZ_LI	0.00	0.00	0.00	0.00	0.00	1,301,060.64	3,173,622.25	40° 9' 29.293 N	104° 52' 43.734 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	179.28	-200.81	1,301,238.50	3,173,420.20	
Point 2				0.00	178.45	192.00	1,301,240.42	3,173,812.99	
Point 3				0.00	-9,441.54	127.83	1,291,620.62	3,173,816.21	
Point 4				0.00	-9,436.33	-259.87	1,291,623.11	3,173,428.50	
Point 5				0.00	179.28	-200.81	1,301,238.50	3,173,420.20	
Butterball 3N-15HZ_SI	0.00	0.00	0.00	0.00	0.00	1,301,060.64	3,173,622.25	40° 9' 29.293 N	104° 52' 43.734 W
- actual wellpath hits target center									
- Point									
Butterball 3N-15HZ_SI	0.00	0.00	0.00	0.00	0.00	1,301,060.64	3,173,622.25	40° 9' 29.293 N	104° 52' 43.734 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	643.06	-1,971.67	1,301,689.84	3,171,646.21	
Point 2				0.00	637.49	653.51	1,301,702.66	3,174,271.25	
Point 3				0.00	621.44	3,268.81	1,301,704.94	3,176,886.49	
Point 4				0.00	-2,020.02	3,254.22	1,299,063.55	3,176,890.40	
Point 5				0.00	-4,653.15	3,234.45	1,296,430.45	3,176,889.08	
Point 6				0.00	-4,631.21	636.40	1,296,434.19	3,174,291.05	
Point 7				0.00	-4,609.85	-1,994.36	1,296,437.12	3,171,660.31	
Point 8				0.00	-4,631.21	636.40	1,296,434.19	3,174,291.05	
Point 9				0.00	-4,653.15	3,234.45	1,296,430.45	3,176,889.08	
Point 10				0.00	-7,286.33	3,223.05	1,293,797.37	3,176,896.13	
Point 11				0.00	-9,925.50	3,194.65	1,291,158.18	3,176,886.21	
Point 12				0.00	-9,907.71	583.18	1,291,157.67	3,174,274.79	
Point 13				0.00	-9,872.61	-2,030.65	1,291,174.46	3,171,660.89	
Point 14				0.00	-7,241.10	-2,012.68	1,293,805.92	3,171,660.43	
Point 15				0.00	-4,609.85	-1,994.36	1,296,437.12	3,171,660.31	
Point 16				0.00	-1,983.22	-1,983.13	1,299,063.66	3,171,653.14	
Point 17				0.00	643.06	-1,971.67	1,301,689.84	3,171,646.21	
Butterball 3N-15HZ_BI	0.00	0.00	7,360.00	-9,437.78	-147.64	1,291,622.45	3,173,540.73	40° 7' 56.028 N	104° 52' 45.635 W
- actual wellpath misses target center by 32.48usft at 16476.00usft MD (7339.85 TVD, -9412.58 N, -143.89 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.36 °/100usft	Maximum Dogleg over Survey:	13.44 °/100usft at 7,244.00 usft
Net Tortousity applicable to Plans:	0.56 °/100usft	Directional Difficulty Index:	6.687

Audit Info

North Reference Sheet for Sec 10-T2N-R67W - Butterball 3N-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 (Xtreme 22). Northing and Easting are relative to Butterball 3N-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° 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: 0.99995815

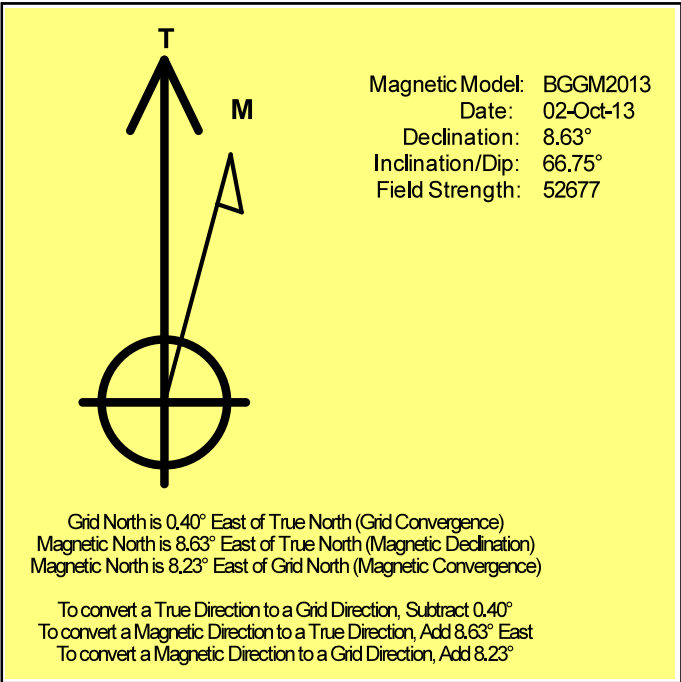
Grid Coordinates of Well: 1,301,060.64 usft N, 3,173,622.25 usft E

Geographical Coordinates of Well: 40° 09' 29.29" N, 104° 52' 43.73" W

Grid Convergence at Surface is: 0.40°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,476.00usft the Bottom Hole Displacement is 9,413.68usft in the Direction of 180.88° (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 3N-15HZ

Plan B

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

02 December, 2013

Well Coordinates: 1,301,060.64 N, 3,173,622.25 E (40° 09' 29.29" N, 104° 52' 43.73" 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 3N-15HZ

RKB = 16' @ 4951.00usft (Xtreme 22)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Butterball 3N-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	-104.878815	1,301,060.64	3,173,622.25
16.00	0.00	0.00	16.00	0.00	0.00	40.158137	-104.878815	1,301,060.64	3,173,622.25
116.00	0.50	68.64	116.00	0.16	0.41	40.158137	-104.878814	1,301,060.80	3,173,622.65
216.00	0.53	49.83	215.99	0.62	1.17	40.158139	-104.878811	1,301,061.26	3,173,623.41
316.00	0.14	28.44	315.99	1.02	1.58	40.158140	-104.878810	1,301,061.67	3,173,623.82
416.00	0.24	62.87	415.99	1.22	1.82	40.158140	-104.878809	1,301,061.88	3,173,624.06
516.00	0.31	26.96	515.99	1.56	2.13	40.158141	-104.878808	1,301,062.22	3,173,624.37
616.00	0.24	70.48	615.99	1.87	2.45	40.158142	-104.878806	1,301,062.53	3,173,624.69
716.00	0.05	342.99	715.99	1.98	2.64	40.158142	-104.878806	1,301,062.64	3,173,624.87
816.00	0.15	299.47	815.99	2.09	2.51	40.158143	-104.878806	1,301,062.75	3,173,624.74
916.00	0.22	321.16	915.99	2.30	2.27	40.158143	-104.878807	1,301,062.96	3,173,624.51
946.00	0.23	308.67	945.99	2.39	2.19	40.158144	-104.878807	1,301,063.04	3,173,624.42
1,027.80	0.20	216.19	1,027.79	2.37	1.98	40.158144	-104.878808	1,301,063.03	3,173,624.21
1,107.00	0.46	187.27	1,106.99	1.95	1.86	40.158142	-104.878809	1,301,062.60	3,173,624.09
1,202.00	0.43	196.53	1,201.98	1.23	1.71	40.158140	-104.878809	1,301,061.88	3,173,623.95
1,297.00	0.47	205.81	1,296.98	0.54	1.44	40.158139	-104.878810	1,301,061.18	3,173,623.68
1,392.00	0.57	204.90	1,391.98	-0.24	1.07	40.158136	-104.878811	1,301,060.40	3,173,623.32
1,487.00	0.50	228.52	1,486.97	-0.95	0.56	40.158134	-104.878813	1,301,059.70	3,173,622.81
1,580.00	0.68	248.38	1,579.97	-1.42	-0.26	40.158133	-104.878816	1,301,059.22	3,173,622.00
1,676.00	0.49	272.64	1,675.96	-1.61	-1.20	40.158133	-104.878820	1,301,059.02	3,173,621.06
1,767.00	0.55	275.51	1,766.96	-1.55	-2.02	40.158133	-104.878822	1,301,059.07	3,173,620.24
1,860.00	0.99	280.88	1,859.95	-1.36	-3.25	40.158133	-104.878827	1,301,059.26	3,173,619.00
1,952.00	1.00	306.37	1,951.94	-0.73	-4.68	40.158135	-104.878832	1,301,059.88	3,173,617.57
2,044.00	1.06	290.28	2,043.92	0.04	-6.13	40.158137	-104.878837	1,301,060.64	3,173,616.12
2,137.00	1.15	301.18	2,136.91	0.82	-7.73	40.158139	-104.878843	1,301,061.41	3,173,614.51
2,228.00	0.57	235.89	2,227.90	1.04	-8.89	40.158140	-104.878847	1,301,061.62	3,173,613.36
2,320.00	0.22	129.60	2,319.90	0.67	-9.13	40.158139	-104.878848	1,301,061.25	3,173,613.11
2,413.00	1.29	81.12	2,412.89	0.72	-7.96	40.158139	-104.878844	1,301,061.30	3,173,614.29
2,505.00	0.96	76.81	2,504.87	1.06	-6.18	40.158140	-104.878837	1,301,061.65	3,173,616.06
2,597.00	0.74	76.85	2,596.86	1.37	-4.86	40.158141	-104.878833	1,301,061.97	3,173,617.38
2,689.00	0.37	57.12	2,688.85	1.66	-4.03	40.158142	-104.878830	1,301,062.27	3,173,618.21
2,780.00	0.28	0.19	2,779.85	2.04	-3.78	40.158143	-104.878829	1,301,062.66	3,173,618.45
2,872.00	0.26	22.32	2,871.85	2.46	-3.70	40.158144	-104.878829	1,301,063.08	3,173,618.53
2,963.00	0.35	331.90	2,962.85	2.90	-3.75	40.158145	-104.878829	1,301,063.51	3,173,618.48
3,053.00	0.40	322.12	3,052.85	3.39	-4.08	40.158146	-104.878830	1,301,064.00	3,173,618.15
3,145.00	0.48	291.30	3,144.85	3.78	-4.63	40.158147	-104.878832	1,301,064.39	3,173,617.59
3,327.00	0.82	306.46	3,326.83	4.83	-6.39	40.158150	-104.878838	1,301,065.43	3,173,615.83
3,418.00	0.92	316.88	3,417.82	5.75	-7.41	40.158153	-104.878842	1,301,066.34	3,173,614.80
3,510.00	1.56	271.04	3,509.80	6.32	-9.17	40.158154	-104.878848	1,301,066.89	3,173,613.04
3,601.00	2.60	263.63	3,600.74	6.11	-12.46	40.158154	-104.878860	1,301,066.66	3,173,609.75
3,693.00	4.26	276.74	3,692.58	6.28	-17.93	40.158154	-104.878879	1,301,066.79	3,173,604.28
3,784.00	6.05	271.24	3,783.21	6.78	-26.08	40.158156	-104.878909	1,301,067.23	3,173,596.13

Design Report for Butterball 3N-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)
3,875.00	7.40	277.89	3,873.58	7.69	-36.68	40.158158	-104.878946	1,301,068.07	3,173,585.52
3,966.00	9.30	281.38	3,963.61	9.94	-49.69	40.158164	-104.878993	1,301,070.23	3,173,572.49
4,057.00	9.53	283.86	4,053.38	13.20	-64.22	40.158173	-104.879045	1,301,073.39	3,173,557.95
4,148.00	10.19	279.89	4,143.04	16.39	-79.46	40.158182	-104.879100	1,301,076.47	3,173,542.68
4,240.00	9.60	278.13	4,233.67	18.87	-95.07	40.158189	-104.879155	1,301,078.84	3,173,527.05
4,332.00	8.97	275.93	4,324.47	20.69	-109.80	40.158194	-104.879208	1,301,080.56	3,173,512.31
4,418.00	8.15	278.28	4,409.51	22.26	-122.50	40.158198	-104.879254	1,301,082.04	3,173,499.60
4,504.00	7.63	272.46	4,494.70	23.39	-134.24	40.158201	-104.879296	1,301,083.08	3,173,487.86
4,589.00	7.60	261.15	4,578.95	22.77	-145.43	40.158200	-104.879336	1,301,082.38	3,173,476.67
4,674.00	7.19	255.61	4,663.24	20.58	-156.14	40.158194	-104.879374	1,301,080.12	3,173,465.98
4,760.00	5.21	257.65	4,748.74	18.41	-165.16	40.158188	-104.879406	1,301,077.89	3,173,456.97
4,846.00	3.37	261.55	4,834.49	17.20	-171.48	40.158184	-104.879429	1,301,076.64	3,173,450.66
4,931.00	1.94	288.99	4,919.40	17.30	-175.31	40.158185	-104.879442	1,301,076.71	3,173,446.83
5,017.00	0.37	261.12	5,005.38	17.73	-176.96	40.158186	-104.879448	1,301,077.13	3,173,445.17
5,102.00	0.46	269.41	5,090.38	17.68	-177.57	40.158186	-104.879451	1,301,077.08	3,173,444.56
5,188.00	0.37	283.51	5,176.38	17.75	-178.19	40.158186	-104.879453	1,301,077.14	3,173,443.95
5,274.00	0.41	97.18	5,262.38	17.77	-178.15	40.158186	-104.879453	1,301,077.16	3,173,443.98
5,359.00	0.55	83.85	5,347.37	17.78	-177.45	40.158186	-104.879450	1,301,077.17	3,173,444.69
5,445.00	0.40	92.05	5,433.37	17.81	-176.74	40.158186	-104.879448	1,301,077.21	3,173,445.40
5,530.00	0.47	89.12	5,518.37	17.81	-176.09	40.158186	-104.879445	1,301,077.21	3,173,446.04
5,616.00	0.38	71.55	5,604.37	17.90	-175.47	40.158186	-104.879443	1,301,077.31	3,173,446.67
5,702.00	0.20	34.25	5,690.37	18.12	-175.11	40.158187	-104.879442	1,301,077.53	3,173,447.02
5,788.00	0.00	121.73	5,776.37	18.24	-175.03	40.158187	-104.879441	1,301,077.65	3,173,447.10
5,873.00	0.37	195.12	5,861.36	17.98	-175.10	40.158186	-104.879442	1,301,077.39	3,173,447.03
5,959.00	0.71	151.25	5,947.36	17.24	-174.92	40.158184	-104.879441	1,301,076.65	3,173,447.22
6,045.00	0.68	137.38	6,033.35	16.40	-174.31	40.158182	-104.879439	1,301,075.81	3,173,447.83
6,130.00	0.68	155.01	6,118.35	15.57	-173.76	40.158180	-104.879437	1,301,074.99	3,173,448.39
6,216.00	0.55	173.70	6,204.34	14.70	-173.50	40.158177	-104.879436	1,301,074.12	3,173,448.66
6,302.00	0.44	169.23	6,290.34	13.96	-173.39	40.158175	-104.879436	1,301,073.39	3,173,448.77
6,387.00	0.50	184.83	6,375.34	13.27	-173.36	40.158173	-104.879435	1,301,072.70	3,173,448.81
6,473.00	0.51	186.53	6,461.33	12.52	-173.44	40.158171	-104.879436	1,301,071.94	3,173,448.74
6,559.00	0.56	197.23	6,547.33	11.74	-173.61	40.158169	-104.879436	1,301,071.16	3,173,448.57
6,645.00	0.31	203.24	6,633.33	11.12	-173.82	40.158168	-104.879437	1,301,070.54	3,173,448.36
6,688.00	0.65	188.52	6,676.33	10.77	-173.90	40.158167	-104.879437	1,301,070.19	3,173,448.28
6,730.00	5.43	193.06	6,718.26	8.60	-174.39	40.158161	-104.879439	1,301,068.02	3,173,447.81
6,773.00	10.46	192.38	6,760.83	2.80	-175.69	40.158145	-104.879444	1,301,062.21	3,173,446.56
6,816.00	12.58	191.05	6,802.96	-5.61	-177.42	40.158122	-104.879450	1,301,053.79	3,173,444.88
6,859.00	15.91	185.38	6,844.63	-16.07	-178.87	40.158093	-104.879455	1,301,043.31	3,173,443.50
6,902.00	19.26	181.17	6,885.62	-29.04	-179.57	40.158057	-104.879458	1,301,030.35	3,173,442.90
6,945.00	22.78	181.00	6,925.75	-44.46	-179.86	40.158015	-104.879459	1,301,014.93	3,173,442.71
6,987.00	27.25	176.35	6,963.81	-62.19	-179.39	40.157966	-104.879457	1,300,997.19	3,173,443.31
7,030.00	31.60	177.09	7,001.25	-83.28	-178.19	40.157908	-104.879453	1,300,976.12	3,173,444.66

Design Report for Butterball 3N-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)
7,073.00	36.46	177.09	7,036.88	-107.30	-176.97	40.157842	-104.879448	1,300,952.10	3,173,446.04
7,116.00	40.49	177.45	7,070.53	-134.02	-175.70	40.157769	-104.879444	1,300,925.40	3,173,447.50
7,159.00	42.89	177.40	7,102.64	-162.59	-174.41	40.157691	-104.879439	1,300,896.84	3,173,448.99
7,202.00	47.33	178.98	7,132.98	-193.03	-173.47	40.157607	-104.879436	1,300,866.41	3,173,450.15
7,244.00	52.94	179.79	7,159.89	-225.25	-173.13	40.157519	-104.879435	1,300,834.19	3,173,450.71
7,287.00	57.42	179.81	7,184.44	-260.54	-173.01	40.157422	-104.879434	1,300,798.90	3,173,451.08
7,330.00	61.10	180.89	7,206.42	-297.49	-173.24	40.157320	-104.879435	1,300,761.95	3,173,451.11
7,373.00	63.65	181.13	7,226.35	-335.58	-173.91	40.157216	-104.879437	1,300,723.86	3,173,450.70
7,416.00	67.08	181.43	7,244.27	-374.65	-174.79	40.157109	-104.879441	1,300,684.79	3,173,450.10
7,459.00	70.67	180.80	7,259.77	-414.75	-175.56	40.156999	-104.879443	1,300,644.69	3,173,449.60
7,501.00	72.60	180.45	7,273.00	-454.61	-176.00	40.156889	-104.879445	1,300,604.83	3,173,449.45
7,544.00	75.99	180.79	7,284.64	-495.99	-176.45	40.156776	-104.879447	1,300,563.44	3,173,449.29
7,587.00	81.02	181.36	7,293.21	-538.11	-177.24	40.156660	-104.879449	1,300,521.32	3,173,448.79
7,630.00	86.46	181.84	7,297.89	-580.82	-178.43	40.156543	-104.879454	1,300,478.61	3,173,447.90
7,643.00	87.53	182.96	7,298.57	-593.79	-178.98	40.156507	-104.879456	1,300,465.64	3,173,447.44
7,681.10	87.69	182.91	7,300.16	-631.81	-180.93	40.156403	-104.879463	1,300,427.61	3,173,445.76
7,866.00	88.49	182.67	7,306.32	-816.38	-189.92	40.155896	-104.879495	1,300,242.98	3,173,438.06
8,037.00	89.54	181.56	7,309.26	-987.24	-196.23	40.155427	-104.879517	1,300,072.09	3,173,432.95
8,208.00	90.65	181.66	7,308.97	-1,158.17	-201.04	40.154958	-104.879534	1,299,901.14	3,173,429.34
8,379.00	91.33	180.05	7,306.02	-1,329.11	-203.59	40.154489	-104.879544	1,299,730.19	3,173,427.99
8,551.00	90.03	180.38	7,303.98	-1,501.10	-204.23	40.154016	-104.879546	1,299,558.21	3,173,428.55
8,722.00	88.09	182.32	7,306.78	-1,672.01	-208.26	40.153547	-104.879560	1,299,387.28	3,173,425.72
8,894.00	89.82	183.75	7,309.92	-1,843.73	-217.36	40.153076	-104.879593	1,299,215.51	3,173,417.81
9,065.00	90.55	185.34	7,309.37	-2,014.18	-230.91	40.152608	-104.879641	1,299,044.97	3,173,405.46
9,237.00	89.63	182.73	7,309.10	-2,185.74	-243.02	40.152137	-104.879685	1,298,873.34	3,173,394.56
9,408.00	90.12	181.47	7,309.47	-2,356.62	-249.28	40.151668	-104.879707	1,298,702.43	3,173,389.49
9,579.00	89.97	180.72	7,309.34	-2,527.59	-252.55	40.151199	-104.879719	1,298,531.45	3,173,387.42
9,757.00	88.98	178.53	7,310.97	-2,705.57	-251.39	40.150710	-104.879715	1,298,353.49	3,173,389.83
9,941.00	90.40	180.05	7,311.96	-2,889.54	-249.11	40.150205	-104.879706	1,298,169.55	3,173,393.40
10,125.00	89.08	182.12	7,312.80	-3,073.49	-252.59	40.149700	-104.879719	1,297,985.58	3,173,391.21
10,309.00	90.71	184.57	7,313.14	-3,257.16	-263.32	40.149196	-104.879757	1,297,801.86	3,173,381.76
10,494.00	89.32	184.97	7,313.09	-3,441.51	-278.71	40.148690	-104.879812	1,297,617.41	3,173,367.67
10,678.00	90.09	182.49	7,314.03	-3,625.10	-290.68	40.148186	-104.879855	1,297,433.74	3,173,356.99
10,861.00	90.22	183.13	7,313.54	-3,807.88	-299.65	40.147684	-104.879887	1,297,250.91	3,173,349.30
11,044.00	92.28	183.95	7,309.55	-3,990.48	-310.94	40.147183	-104.879928	1,297,068.25	3,173,339.28
11,226.00	91.94	181.46	7,302.85	-4,172.14	-319.53	40.146684	-104.879958	1,296,886.54	3,173,331.97
11,408.00	91.23	179.35	7,297.81	-4,354.05	-320.81	40.146185	-104.879963	1,296,704.63	3,173,331.96
11,591.00	88.03	180.03	7,298.99	-4,537.02	-319.82	40.145683	-104.879959	1,296,521.68	3,173,334.23
11,774.00	89.38	184.32	7,303.13	-4,719.79	-326.76	40.145181	-104.879984	1,296,338.87	3,173,328.57
11,956.00	88.95	183.23	7,305.78	-4,901.38	-338.75	40.144683	-104.880027	1,296,157.22	3,173,317.86
12,138.00	90.12	182.67	7,307.26	-5,083.12	-348.11	40.144184	-104.880060	1,295,975.41	3,173,309.77
12,320.00	87.81	177.03	7,310.55	-5,265.01	-347.64	40.143684	-104.880059	1,295,793.54	3,173,311.51

Design Report for Butterball 3N-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)
12,498.00	90.18	173.72	7,313.67	-5,442.36	-333.29	40.143198	-104.880007	1,295,616.30	3,173,327.11
12,669.00	91.42	173.14	7,311.28	-5,612.22	-313.73	40.142731	-104.879937	1,295,446.59	3,173,347.86
12,841.00	91.67	173.48	7,306.65	-5,782.99	-293.70	40.142263	-104.879866	1,295,275.98	3,173,369.08
13,012.00	90.49	175.91	7,303.42	-5,953.21	-277.89	40.141795	-104.879809	1,295,105.88	3,173,386.08
13,183.00	90.37	176.93	7,302.14	-6,123.87	-267.21	40.141327	-104.879771	1,294,935.31	3,173,397.95
13,354.00	89.57	178.32	7,302.23	-6,294.71	-260.13	40.140858	-104.879746	1,294,764.52	3,173,406.23
13,525.00	89.78	178.52	7,303.20	-6,465.65	-255.41	40.140389	-104.879729	1,294,593.63	3,173,412.14
13,696.00	89.26	179.13	7,304.63	-6,636.60	-251.91	40.139919	-104.879716	1,294,422.71	3,173,416.85
13,868.00	89.66	178.49	7,306.25	-6,808.56	-248.33	40.139447	-104.879703	1,294,250.79	3,173,421.62
14,039.00	88.86	177.20	7,308.46	-6,979.42	-241.90	40.138978	-104.879680	1,294,079.99	3,173,429.25
14,211.00	88.33	174.62	7,312.68	-7,150.91	-229.64	40.138508	-104.879637	1,293,908.59	3,173,442.71
14,382.00	88.67	176.84	7,317.16	-7,321.37	-216.92	40.138040	-104.879591	1,293,738.24	3,173,456.63
14,554.00	90.65	179.52	7,318.18	-7,493.25	-211.45	40.137568	-104.879572	1,293,566.40	3,173,463.30
14,725.00	88.83	179.81	7,318.95	-7,664.24	-210.45	40.137099	-104.879568	1,293,395.43	3,173,465.50
14,896.00	89.35	180.18	7,321.67	-7,835.22	-210.44	40.136629	-104.879568	1,293,224.46	3,173,466.71
15,068.00	89.45	179.32	7,323.47	-8,007.21	-209.69	40.136157	-104.879565	1,293,052.49	3,173,468.66
15,239.00	88.40	179.62	7,326.68	-8,178.17	-208.11	40.135688	-104.879560	1,292,881.56	3,173,471.44
15,410.00	87.90	178.67	7,332.20	-8,349.06	-205.56	40.135219	-104.879550	1,292,710.70	3,173,475.19
15,582.00	88.53	175.84	7,337.56	-8,520.76	-197.32	40.134747	-104.879521	1,292,539.06	3,173,484.62
15,754.00	89.57	173.89	7,340.41	-8,692.03	-181.93	40.134277	-104.879466	1,292,367.91	3,173,501.22
15,925.00	90.99	174.64	7,339.57	-8,862.17	-164.85	40.133810	-104.879405	1,292,197.90	3,173,519.49
16,097.00	90.40	177.35	7,337.49	-9,033.72	-152.84	40.133339	-104.879362	1,292,026.45	3,173,532.70
16,268.00	89.66	179.22	7,337.40	-9,204.63	-147.72	40.132870	-104.879344	1,291,855.58	3,173,539.02
16,431.00	89.11	178.77	7,339.15	-9,367.60	-144.86	40.132423	-104.879333	1,291,692.65	3,173,543.02
16,476.00	89.11	178.77	7,339.85	-9,412.58	-143.89	40.132299	-104.879330	1,291,647.67	3,173,544.30

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
946.00	945.99	2.39	2.19	Tie-On to Gyro Surveys @ 946.00ft
1,107.00	1,106.99	1.95	1.86	First MWD Survey @ 1107.00ft
16,431.00	7,339.15	-9,367.60	-144.86	Final MWD Survey @ 16431.00ft
16,476.00	7,339.85	-9,412.58	-143.89	Str Line Proj to Bit @ 16476' MD :: 7336.97' TVD

Design Report for Butterball 3N-15HZ - 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)	179.76	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	946.00	Winserve Gyro Surveys	NS-GYRO-MS
1,107.00	7,643.00	MWD Vertical/Build	MWD+IFR1+SC
7,695.00	16,431.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,027.80	1,027.79	9 5/8" Casing Set @ 1027.8' MD :: 1027.79' TVD	9-5/8	13-1/2
7,681.10	7,300.16	7" Casing Set @ 7681.1' MD :: 7300.16' 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:	1.36 °/100usft	Maximum Dogleg over Survey:	13.44 °/100usft at 7,244.00 usft
Net Tortousity applicable to Plans:	0.56 °/100usft	Directional Difficulty Index:	6.687

Design Report for Butterball 3N-15HZ - Actual Field Surveys

Audit Info

North Reference Sheet for Sec 10-T2N-R67W - Butterball 3N-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 (Xtreme 22). Northing and Easting are relative to Butterball 3N-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: 1,301,060.64 usft N, 3,173,622.25 usft E

Geographical Coordinates of Well: 40° 09' 29.29" N, 104° 52' 43.73" W

Grid Convergence at Surface is: 0.40°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,476.00usft

the Bottom Hole Displacement is 9,413.68usft in the Direction of 180.88° (True).

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

