

WELL DETAILS: Butterball 24C-34HZ

GL 4916' & KB 20' @ 4936.00ft (Precision 461) 4916.00
 Northing 14584393.42 Easting 1676791.63 Latitude 40.1582700 Longitude -104.8698120

Design: OH (Butterball 24C-34HZ/OH)

Created By: Seth Burstad Date: 6-05-2017

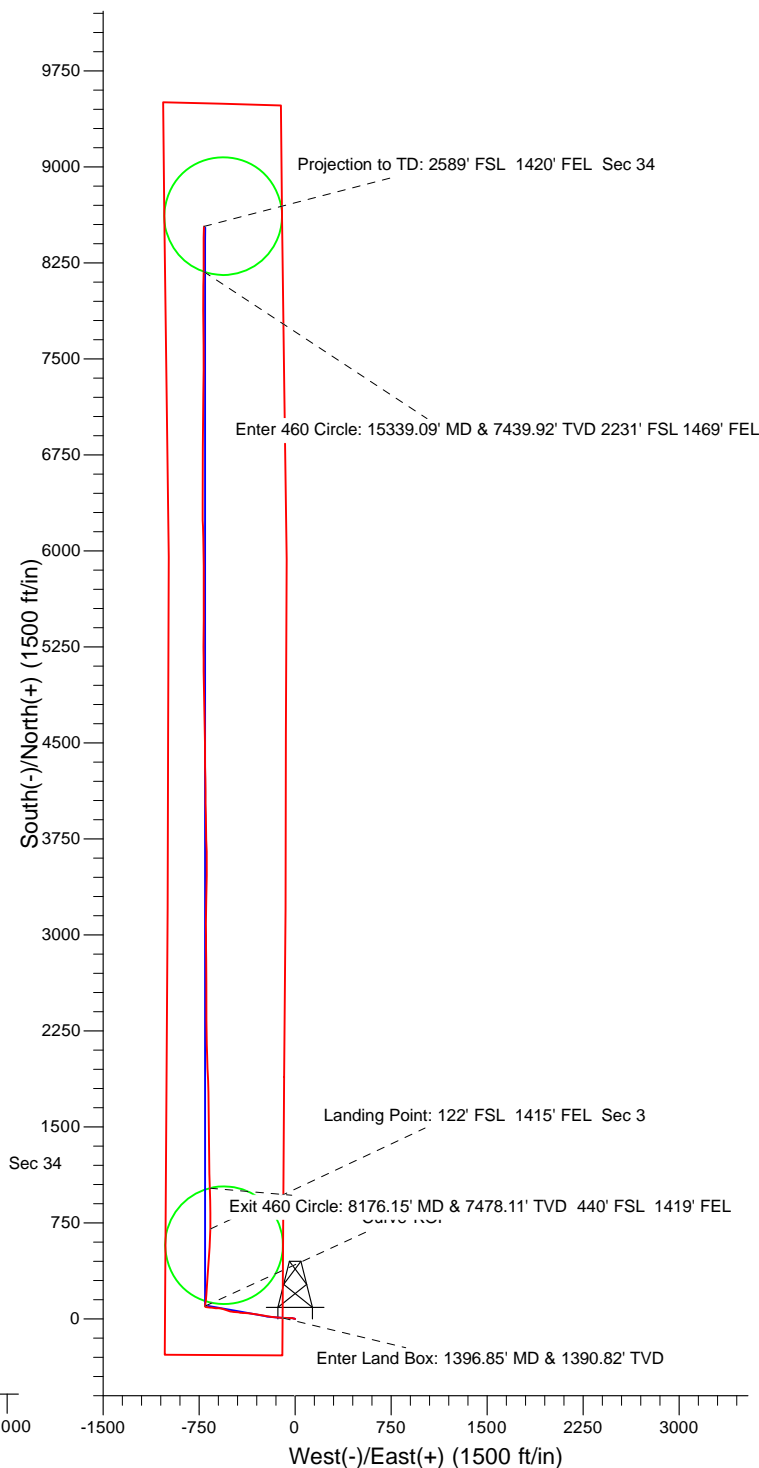
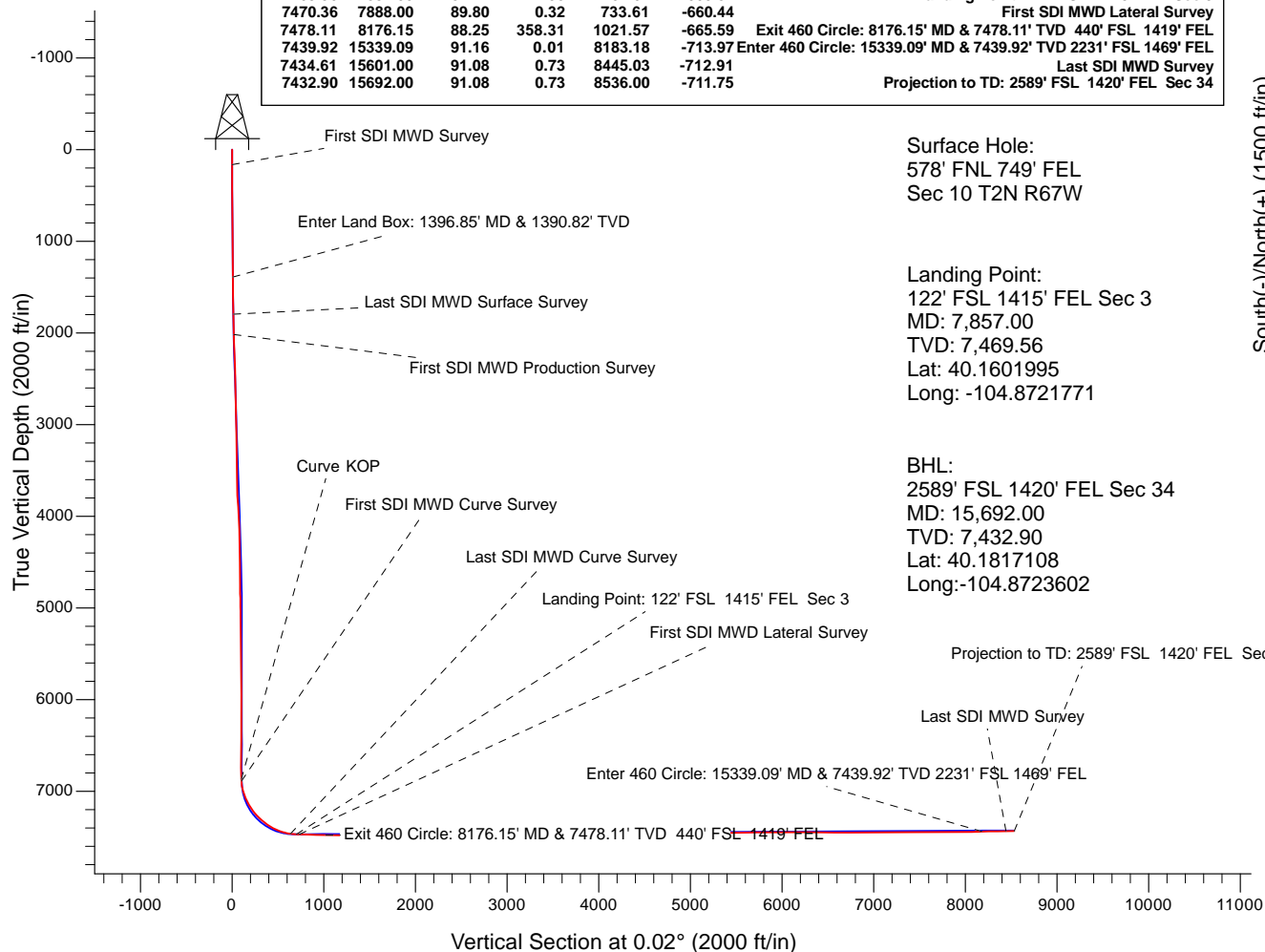
PROJECT DETAILS: US Rockies Wattenberg Planning UTM83

Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Zone 13N (108 W to 102 W)

System Datum: Mean Sea Level
 Local North: True

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	Annotation
164.00	164.00	0.40	299.07	0.28	-0.50	First SDI MWD Survey
1390.82	1396.85	10.58	274.65	8.70	-96.33	Enter Land Box: 1396.85' MD & 1390.82' TVD
1795.83	1808.00	9.48	274.26	14.16	-166.86	Last SDI MWD Surface Survey
2016.99	2033.00	11.68	280.73	19.78	-207.72	First SDI MWD Production Survey
6869.04	6926.00	2.26	5.55	101.68	-703.19	Curve KOP
6888.02	6945.00	2.79	4.83	102.51	-703.11	First SDI MWD Curve Survey
7463.67	7794.00	82.03	2.64	639.95	-662.85	Last SDI MWD Curve Survey
7469.56	7857.00	87.24	1.08	702.62	-660.82	Landing Point: 122' FSL 1415' FEL Sec 3
7470.36	7888.00	89.80	0.32	733.61	-660.44	First SDI MWD Lateral Survey
7478.11	8176.15	88.25	358.31	1021.57	-665.59	Exit 460 Circle: 8176.15' MD & 7478.11' TVD 440' FSL 1419' FEL
7439.92	15339.09	91.16	0.01	8183.18	-713.97	Enter 460 Circle: 15339.09' MD & 7439.92' TVD 2231' FSL 1469' FEL
7434.61	15601.00	91.08	0.73	8445.03	-712.91	Last SDI MWD Survey
7432.90	15692.00	91.08	0.73	8536.00	-711.75	Projection to TD: 2589' FSL 1420' FEL Sec 34





US ROCKIES REGION PLANNING

US Rockies Wattenberg Planning UTM83

Butterball 1-10HZ Pad 2N-67W-10

Butterball 24C-34HZ

OH

Design: OH

Standard Survey Report

05 June, 2017



Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well Butterball 24C-34HZ
Project:	US Rockies Wattenberg Planning UTM83	TVD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Site:	Butterball 1-10HZ Pad 2N-67W-10	MD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Well:	Butterball 24C-34HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales Office

Project	US Rockies Wattenberg Planning UTM83		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Zone 13N (108 W to 102 W)		

Site	Butterball 1-10HZ Pad 2N-67W-10, Site Center : Butterball 9N-34HZ		
Site Position:		Northing:	14,584,393.12 usft
From:	Lat/Long	Easting:	1,676,836.61 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in
		Latitude:	40.1582690
		Longitude:	-104.8696510
		Grid Convergence:	0.08 °

Well	Butterball 24C-34HZ, 578' FNL 749' FEL Sec 10 T2N R67W		
Well Position	+N/-S	0.00 ft	Latitude: 40.1582700
	+E/-W	0.00 ft	Longitude: -104.8698120
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Ground Level:	4,916.00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2016	4/6/2017	8.44	66.67	52,273

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00		0.02

Survey Program	Date	6/5/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
164.00	1,808.00	Survey #1 - Surface (OH)	APC_ISCWSA REV 2 MWD+	Fixed:v2:crustal field declination	
2,033.00	15,692.00	Survey #2 - Production (OH)	APC_ISCWSA REV 2 MWD+	Fixed:v2:crustal field declination	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
164.00	0.40	299.07	164.00	0.28	-0.50	0.28	0.24	0.24	0.00	
First SDI MWD Survey										
253.00	0.42	323.08	253.00	0.69	-0.97	0.69	0.19	0.02	26.98	
341.00	0.48	335.81	340.99	1.28	-1.31	1.28	0.13	0.07	14.47	
428.00	0.37	335.50	427.99	1.87	-1.58	1.87	0.13	-0.13	-0.36	
517.00	1.67	294.90	516.98	2.68	-2.87	2.68	1.58	1.46	-45.62	
606.00	2.05	279.65	605.93	3.49	-5.62	3.49	0.70	0.43	-17.13	
692.00	3.48	276.16	691.83	4.03	-9.73	4.03	1.67	1.66	-4.06	
779.00	4.35	285.95	778.62	5.22	-15.53	5.22	1.26	1.00	11.25	

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well Butterball 24C-34HZ
Project:	US Rockies Wattenberg Planning UTM83	TVD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Site:	Butterball 1-10HZ Pad 2N-67W-10	MD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Well:	Butterball 24C-34HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales Office

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
868.00	5.39	277.09	867.30	6.66	-22.92	6.66	1.44	1.17	-9.96
956.00	5.97	272.07	954.87	7.34	-31.60	7.33	0.87	0.66	-5.70
1,045.00	6.91	269.18	1,043.31	7.43	-41.58	7.42	1.12	1.06	-3.25
1,134.00	8.30	272.62	1,131.52	7.65	-53.35	7.63	1.64	1.56	3.87
1,223.00	9.67	270.08	1,219.43	7.95	-67.24	7.93	1.60	1.54	-2.85
1,309.00	9.13	270.28	1,304.28	7.99	-81.29	7.97	0.63	-0.63	0.23
1,394.00	10.58	274.61	1,388.02	8.65	-95.81	8.62	1.91	1.71	5.09
1,396.85	10.58	274.65	1,390.82	8.70	-96.33	8.66	0.25	-0.11	1.25
Enter Land Box: 1396.85' MD & 1390.82' TVD									
1,480.00	10.49	275.69	1,472.57	10.07	-111.47	10.03	0.25	-0.10	1.26
1,567.00	9.01	274.33	1,558.31	11.37	-126.14	11.32	1.72	-1.70	-1.56
1,654.00	9.72	274.13	1,644.15	12.41	-140.26	12.36	0.82	0.82	-0.23
1,742.00	10.32	273.39	1,730.81	13.41	-155.54	13.36	0.70	0.68	-0.84
1,808.00	9.48	274.26	1,795.83	14.16	-166.86	14.10	1.29	-1.27	1.32
Last SDI MWD Surface Survey									
2,033.00	11.68	280.73	2,016.99	19.78	-207.72	19.71	1.11	0.98	2.88
First SDI MWD Production Survey									
2,128.00	10.79	279.58	2,110.17	23.05	-225.94	22.97	0.97	-0.94	-1.21
2,223.00	11.57	281.20	2,203.37	26.38	-244.05	26.30	0.89	0.82	1.71
2,316.00	11.19	281.90	2,294.54	30.05	-262.03	29.96	0.43	-0.41	0.75
2,409.00	10.12	279.28	2,385.94	33.23	-278.93	33.13	1.26	-1.15	-2.82
2,504.00	9.40	277.94	2,479.56	35.65	-294.85	35.55	0.79	-0.76	-1.41
2,598.00	9.99	274.02	2,572.22	37.28	-310.58	37.17	0.94	0.63	-4.17
2,692.00	9.20	276.81	2,664.90	38.74	-326.18	38.63	0.97	-0.84	2.97
2,786.00	11.05	278.26	2,757.44	40.93	-342.56	40.81	1.99	1.97	1.54
2,880.00	10.62	278.76	2,849.76	43.54	-360.03	43.42	0.47	-0.46	0.53
2,974.00	9.91	277.19	2,942.26	45.87	-376.62	45.74	0.81	-0.76	-1.67
3,070.00	10.17	272.20	3,036.79	47.23	-393.28	47.10	0.95	0.27	-5.20
3,162.00	9.76	271.97	3,127.40	47.81	-409.19	47.67	0.45	-0.45	-0.25
3,256.00	10.25	278.21	3,219.97	49.28	-425.43	49.13	1.26	0.52	6.64
3,350.00	9.27	278.55	3,312.61	51.60	-441.20	51.45	1.04	-1.04	0.36
3,442.00	9.37	277.97	3,403.40	53.74	-455.94	53.58	0.15	0.11	-0.63
3,536.00	7.97	273.28	3,496.32	55.18	-470.03	55.01	1.67	-1.49	-4.99
3,630.00	8.40	274.43	3,589.36	56.08	-483.38	55.91	0.49	0.46	1.22
3,725.00	8.94	274.76	3,683.28	57.23	-497.66	57.05	0.57	0.57	0.35
3,818.00	9.08	288.18	3,775.14	60.12	-511.83	59.94	2.26	0.15	14.43
3,911.00	9.83	290.82	3,866.88	65.23	-526.22	65.04	0.93	0.81	2.84
4,006.00	9.00	291.66	3,960.60	70.85	-540.71	70.66	0.89	-0.87	0.88
4,101.00	10.11	287.70	4,054.28	76.13	-555.56	75.94	1.36	1.17	-4.17
4,195.00	10.54	282.09	4,146.76	80.44	-571.83	80.24	1.16	0.46	-5.97
4,289.00	9.65	277.18	4,239.30	83.23	-588.05	83.02	1.32	-0.95	-5.22
4,384.00	9.02	271.78	4,333.05	84.45	-603.39	84.24	1.14	-0.66	-5.68
4,478.00	9.43	272.99	4,425.83	85.08	-618.45	84.87	0.48	0.44	1.29
4,573.00	8.95	275.28	4,519.61	86.17	-633.58	85.95	0.64	-0.51	2.41

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Site:	Butterball 1-10HZ Pad 2N-67W-10	MD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Well:	Butterball 24C-34HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales Office

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,666.00	8.24	275.73	4,611.57	87.50	-647.41	87.27	0.77	-0.76	0.48
4,760.00	7.22	275.32	4,704.71	88.72	-660.00	88.49	1.09	-1.09	-0.44
4,854.00	5.58	275.74	4,798.12	89.73	-670.43	89.49	1.75	-1.74	0.45
4,949.00	4.47	278.03	4,892.76	90.70	-678.69	90.47	1.19	-1.17	2.41
5,044.00	4.28	280.55	4,987.48	91.87	-685.84	91.63	0.28	-0.20	2.65
5,137.00	2.70	283.69	5,080.30	93.02	-691.38	92.78	1.71	-1.70	3.38
5,257.00	1.66	293.47	5,200.22	94.39	-695.72	94.14	0.92	-0.87	8.15
5,352.00	1.27	298.79	5,295.18	95.44	-697.91	95.20	0.43	-0.41	5.60
5,447.00	1.44	312.18	5,390.16	96.75	-699.71	96.51	0.38	0.18	14.09
5,541.00	1.40	330.06	5,484.13	98.54	-701.16	98.29	0.47	-0.04	19.02
5,635.00	0.55	42.62	5,578.12	99.86	-701.43	99.62	1.43	-0.90	77.19
5,727.00	0.50	58.83	5,670.11	100.40	-700.79	100.15	0.17	-0.05	17.62
5,820.00	0.58	43.20	5,763.11	100.95	-700.12	100.71	0.18	0.09	-16.81
5,914.00	0.72	47.20	5,857.10	101.70	-699.36	101.45	0.16	0.15	4.26
6,006.00	0.91	263.10	5,949.10	102.00	-699.66	101.76	1.69	0.21	-156.63
6,101.00	0.92	264.98	6,044.09	101.85	-701.17	101.60	0.03	0.01	1.98
6,194.00	0.74	286.55	6,137.08	101.95	-702.49	101.71	0.38	-0.19	23.19
6,287.00	0.40	290.96	6,230.07	102.24	-703.37	101.99	0.37	-0.37	4.74
6,382.00	0.47	189.35	6,325.07	101.97	-703.74	101.73	0.71	0.07	-106.96
6,476.00	0.53	185.96	6,419.07	101.16	-703.85	100.91	0.07	0.06	-3.61
6,570.00	0.29	171.97	6,513.07	100.49	-703.86	100.25	0.27	-0.26	-14.88
6,663.00	0.29	160.86	6,606.06	100.04	-703.75	99.79	0.06	0.00	-11.95
6,757.00	0.11	38.56	6,700.06	99.88	-703.61	99.64	0.38	-0.19	-130.11
6,851.00	0.23	42.32	6,794.06	100.09	-703.43	99.85	0.13	0.13	4.00
6,926.00	2.26	5.55	6,869.04	101.68	-703.19	101.43	2.78	2.71	-49.03
Curve KOP									
6,945.00	2.79	4.83	6,888.02	102.51	-703.11	102.27	2.78	2.77	-3.77
First SDI MWD Curve Survey									
7,039.00	14.66	8.00	6,980.77	116.62	-701.26	116.38	12.63	12.63	3.37
7,133.00	23.32	8.24	7,069.57	146.87	-696.93	146.63	9.21	9.21	0.26
7,228.00	30.98	4.94	7,154.04	189.91	-692.12	189.67	8.21	8.06	-3.47
7,322.00	38.03	3.44	7,231.46	242.98	-688.29	242.74	7.55	7.50	-1.60
7,417.00	47.96	3.40	7,300.86	307.57	-684.43	307.33	10.45	10.45	-0.04
7,512.00	53.49	2.99	7,360.97	380.97	-680.35	380.73	5.83	5.82	-0.43
7,606.00	64.29	5.05	7,409.47	461.12	-674.63	460.88	11.64	11.49	2.19
7,701.00	73.29	3.74	7,443.81	549.33	-667.88	549.10	9.56	9.47	-1.38
7,794.00	82.03	2.64	7,463.67	639.95	-662.85	639.72	9.47	9.40	-1.18
Last SDI MWD Curve Survey									
7,857.00	87.24	1.08	7,469.56	702.62	-660.82	702.39	8.62	8.26	-2.48
Landing Point: 122' FSL 1415' FEL Sec 3									
7,888.00	89.80	0.32	7,470.36	733.61	-660.44	733.38	8.62	8.27	-2.45
First SDI MWD Lateral Survey									
7,983.00	88.69	359.12	7,471.61	828.59	-660.90	828.36	1.72	-1.17	-1.26
8,077.00	87.68	358.52	7,474.59	922.53	-662.84	922.29	1.25	-1.07	-0.64

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Well:	Butterball 24C-34HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales Office

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
8,172.00	88.22	358.30	7,477.98	1,017.43	-665.47	1,017.20	0.61	0.57	-0.23
8,176.15	88.25	358.31	7,478.11	1,021.57	-665.59	1,021.34	0.70	0.64	0.29
Exit 460 Circle: 8176.15' MD & 7478.11' TVD 440' FSL 1419' FEL Sec 3									
8,266.00	88.82	358.57	7,480.41	1,111.36	-668.04	1,111.13	0.70	0.64	0.29
8,359.00	90.44	359.34	7,481.01	1,204.34	-669.73	1,204.11	1.93	1.74	0.83
8,453.00	90.34	359.11	7,480.37	1,298.33	-671.00	1,298.09	0.27	-0.11	-0.24
8,547.00	90.74	359.16	7,479.49	1,392.31	-672.42	1,392.08	0.43	0.43	0.05
8,641.00	91.07	359.79	7,478.00	1,486.30	-673.28	1,486.06	0.76	0.35	0.67
8,736.00	90.81	359.05	7,476.44	1,581.28	-674.25	1,581.04	0.83	-0.27	-0.78
8,830.00	91.44	359.70	7,474.60	1,675.25	-675.27	1,675.02	0.96	0.67	0.69
8,926.00	90.60	358.98	7,472.89	1,771.23	-676.38	1,770.99	1.15	-0.88	-0.75
9,019.00	90.00	357.69	7,472.40	1,864.19	-679.08	1,863.95	1.53	-0.65	-1.39
9,114.00	89.46	357.58	7,472.85	1,959.11	-683.00	1,958.87	0.58	-0.57	-0.12
9,208.00	89.60	357.95	7,473.62	2,053.03	-686.66	2,052.79	0.42	0.15	0.39
9,303.00	89.80	358.50	7,474.12	2,147.98	-689.61	2,147.74	0.62	0.21	0.58
9,398.00	90.24	359.72	7,474.09	2,242.97	-691.08	2,242.73	1.37	0.46	1.28
9,492.00	90.67	359.80	7,473.34	2,336.97	-691.48	2,336.72	0.47	0.46	0.09
9,586.00	90.57	359.88	7,472.32	2,430.96	-691.74	2,430.72	0.14	-0.11	0.09
9,681.00	90.60	359.68	7,471.35	2,525.95	-692.10	2,525.71	0.21	0.03	-0.21
9,775.00	90.77	359.76	7,470.23	2,619.95	-692.56	2,619.70	0.20	0.18	0.09
9,869.00	90.91	359.31	7,468.85	2,713.93	-693.33	2,713.69	0.50	0.15	-0.48
9,963.00	91.24	359.59	7,467.09	2,807.91	-694.23	2,807.67	0.46	0.35	0.30
10,056.00	89.33	359.48	7,466.62	2,900.90	-694.98	2,900.66	2.06	-2.05	-0.12
10,150.00	89.60	359.49	7,467.50	2,994.90	-695.83	2,994.65	0.29	0.29	0.01
10,245.00	90.27	0.22	7,467.61	3,089.89	-696.07	3,089.65	1.04	0.71	0.77
10,338.00	90.91	0.86	7,466.65	3,182.88	-695.19	3,182.64	0.97	0.69	0.69
10,432.00	90.91	1.08	7,465.16	3,276.86	-693.60	3,276.62	0.23	0.00	0.23
10,525.00	91.68	1.70	7,463.06	3,369.81	-691.35	3,369.56	1.06	0.83	0.67
10,620.00	90.50	0.49	7,461.25	3,464.77	-689.53	3,464.53	1.78	-1.24	-1.27
10,715.00	89.73	359.12	7,461.06	3,559.76	-689.85	3,559.52	1.65	-0.81	-1.44
10,808.00	89.23	358.43	7,461.90	3,652.74	-691.84	3,652.50	0.92	-0.54	-0.74
10,902.00	89.93	359.29	7,462.59	3,746.72	-693.71	3,746.47	1.18	0.74	0.91
10,997.00	90.34	359.34	7,462.37	3,841.71	-694.85	3,841.47	0.43	0.43	0.05
11,092.00	90.37	358.91	7,461.78	3,936.70	-696.30	3,936.45	0.45	0.03	-0.45
11,185.00	90.50	359.55	7,461.07	4,029.68	-697.55	4,029.44	0.70	0.14	0.69
11,279.00	90.24	359.15	7,460.47	4,123.68	-698.61	4,123.43	0.51	-0.28	-0.43
11,372.00	90.30	358.95	7,460.03	4,216.66	-700.16	4,216.42	0.22	0.06	-0.22
11,466.00	90.07	358.68	7,459.72	4,310.64	-702.10	4,310.40	0.38	-0.24	-0.29
11,559.00	90.57	359.88	7,459.21	4,403.63	-703.27	4,403.38	1.40	0.54	1.29
11,652.00	90.30	359.46	7,458.50	4,496.63	-703.80	4,496.38	0.54	-0.29	-0.45
11,745.00	90.27	359.26	7,458.04	4,589.62	-704.84	4,589.37	0.22	-0.03	-0.22
11,840.00	90.27	358.66	7,457.59	4,684.60	-706.57	4,684.36	0.63	0.00	-0.63
11,934.00	90.30	358.93	7,457.12	4,778.58	-708.54	4,778.33	0.29	0.03	0.29

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well Butterball 24C-34HZ
Project:	US Rockies Wattenberg Planning UTM83	TVD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Site:	Butterball 1-10HZ Pad 2N-67W-10	MD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Well:	Butterball 24C-34HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales Office

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
12,028.00	90.24	358.82	7,456.68	4,872.56	-710.39	4,872.31	0.13	-0.06	-0.12	
12,123.00	90.57	359.04	7,456.01	4,967.54	-712.16	4,967.29	0.42	0.35	0.23	
12,216.00	91.41	359.94	7,454.40	5,060.52	-712.99	5,060.27	1.32	0.90	0.97	
12,311.00	91.04	359.07	7,452.37	5,155.50	-713.81	5,155.25	0.99	-0.39	-0.92	
12,405.00	90.10	0.34	7,451.43	5,249.49	-714.30	5,249.24	1.68	-1.00	1.35	
12,499.00	89.63	0.30	7,451.66	5,343.49	-713.77	5,343.24	0.50	-0.50	-0.04	
12,594.00	89.73	0.06	7,452.19	5,438.48	-713.47	5,438.23	0.27	0.11	-0.25	
12,688.00	90.47	0.51	7,452.02	5,532.48	-713.00	5,532.23	0.92	0.79	0.48	
12,783.00	90.84	0.42	7,450.94	5,627.47	-712.23	5,627.22	0.40	0.39	-0.09	
12,876.00	91.07	359.73	7,449.39	5,720.46	-712.11	5,720.21	0.78	0.25	-0.74	
12,970.00	91.24	359.37	7,447.49	5,814.44	-712.85	5,814.19	0.42	0.18	-0.38	
13,065.00	90.13	359.42	7,446.36	5,909.42	-713.85	5,909.17	1.17	-1.17	0.05	
13,158.00	90.17	359.17	7,446.11	6,002.41	-715.00	6,002.16	0.27	0.04	-0.27	
13,253.00	90.17	358.62	7,445.83	6,097.40	-716.83	6,097.15	0.58	0.00	-0.58	
13,349.00	88.96	358.40	7,446.56	6,193.36	-719.33	6,193.11	1.28	-1.26	-0.23	
13,442.00	89.40	359.75	7,447.89	6,286.34	-720.83	6,286.08	1.53	0.47	1.45	
13,535.00	89.60	359.85	7,448.70	6,379.33	-721.15	6,379.08	0.24	0.22	0.11	
13,630.00	89.50	359.66	7,449.45	6,474.33	-721.56	6,474.07	0.23	-0.11	-0.20	
13,724.00	89.33	0.87	7,450.41	6,568.32	-721.12	6,568.07	1.30	-0.18	1.29	
13,818.00	89.50	0.48	7,451.37	6,662.31	-720.02	6,662.06	0.45	0.18	-0.41	
13,911.00	90.10	0.22	7,451.69	6,755.30	-719.45	6,755.05	0.70	0.65	-0.28	
14,007.00	89.90	359.72	7,451.69	6,851.30	-719.50	6,851.05	0.56	-0.21	-0.52	
14,102.00	89.97	0.40	7,451.80	6,946.30	-719.40	6,946.05	0.72	0.07	0.72	
14,196.00	90.74	0.69	7,451.22	7,040.30	-718.50	7,040.05	0.88	0.82	0.31	
14,290.00	90.91	0.50	7,449.86	7,134.28	-717.53	7,134.03	0.27	0.18	-0.20	
14,384.00	91.51	0.95	7,447.88	7,228.25	-716.34	7,228.00	0.80	0.64	0.48	
14,478.00	90.84	1.17	7,445.95	7,322.22	-714.60	7,321.97	0.75	-0.71	0.23	
14,573.00	90.27	0.37	7,445.03	7,417.20	-713.32	7,416.95	1.03	-0.60	-0.84	
14,667.00	90.20	0.01	7,444.65	7,511.20	-713.01	7,510.95	0.39	-0.07	-0.38	
14,760.00	90.10	359.44	7,444.40	7,604.20	-713.46	7,603.95	0.62	-0.11	-0.61	
14,853.00	89.80	358.72	7,444.48	7,697.19	-714.95	7,696.94	0.84	-0.32	-0.77	
14,947.00	89.76	359.19	7,444.84	7,791.17	-716.67	7,790.92	0.50	-0.04	0.50	
15,040.00	89.90	0.24	7,445.12	7,884.17	-717.13	7,883.92	1.14	0.15	1.13	
15,134.00	90.94	1.04	7,444.43	7,978.16	-716.08	7,977.91	1.40	1.11	0.85	
15,228.00	91.58	0.75	7,442.36	8,072.12	-714.61	8,071.87	0.75	0.68	-0.31	
15,321.00	91.01	0.03	7,440.26	8,165.09	-713.98	8,164.85	0.99	-0.61	-0.77	
15,339.09	91.16	0.01	7,439.92	8,183.18	-713.97	8,182.93	0.82	0.82	-0.09	
Enter 460 Circle: 15339.09' MD & 7439.92' TVD 2231' FSL 1469' FEL										
15,415.00	91.78	359.95	7,437.97	8,259.07	-713.99	8,258.82	0.82	0.82	-0.09	
15,508.00	90.64	0.33	7,436.01	8,352.04	-713.77	8,351.79	1.29	-1.23	0.41	
15,601.00	91.08	0.73	7,434.61	8,445.03	-712.91	8,444.78	0.64	0.47	0.43	
Last SDI MWD Survey										
15,692.00	91.08	0.73	7,432.90	8,536.01	-711.75	8,535.76	0.00	0.00	0.00	
Projection to TD: 2589' FSL 1420' FEL Sec 34										

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well Butterball 24C-34HZ
Project:	US Rockies Wattenberg Planning UTM83	TVD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Site:	Butterball 1-10HZ Pad 2N-67W-10	MD Reference:	GL 4916' & KB 20' @ 4936.00ft (Precision 461)
Well:	Butterball 24C-34HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales Office

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
164.00	164.00	0.28	-0.50	First SDI MWD Survey
1,396.85	1,390.82	8.70	-96.33	Enter Land Box: 1396.85' MD & 1390.82' TVD
1,808.00	1,795.83	14.16	-166.86	Last SDI MWD Surface Survey
2,033.00	2,016.99	19.78	-207.72	First SDI MWD Production Survey
6,926.00	6,869.04	101.68	-703.19	Curve KOP
6,945.00	6,888.02	102.51	-703.11	First SDI MWD Curve Survey
7,794.00	7,463.67	639.95	-662.85	Last SDI MWD Curve Survey
7,857.00	7,469.56	702.62	-660.82	Landing Point: 122' FSL 1415' FEL Sec 3
7,888.00	7,470.36	733.61	-660.44	First SDI MWD Lateral Survey
8,176.15	7,478.11	1,021.57	-665.59	Exit 460 Circle: 8176.15' MD & 7478.11' TVD 440' FSL 1419' FEL Sec 3
15,339.09	7,439.92	8,183.18	-713.97	Enter 460 Circle: 15339.09' MD & 7439.92' TVD 2231' FSL 1469' FEL
15,601.00	7,434.61	8,445.03	-712.91	Last SDI MWD Survey
15,692.00	7,432.90	8,536.01	-711.75	Projection to TD: 2589' FSL 1420' FEL Sec 34

Checked By: _____	Approved By: _____	Date: _____
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