

Tyler County WV (NAD 27 UTM 17N us ft)
 Site: Ball Pad
 Well: Ball 9H
 Wellbore: Wellbore #1
 Design: Design #3

SECTION DETAILS

MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
850.00	0.00	0.00	850.00	0.00	0.00	0.00	0.00	0.00	Start Build
1250.00	8.00	265.00	1248.70	-2.43	-27.77	2.00	265.00	4.84	End Build
2300.00	8.00	265.00	2288.48	-15.17	-173.35	0.00	0.00	30.22	Start Drop
2700.00	0.00	0.00	2687.18	-17.60	-201.12	2.00	180.00	35.06	End Drop
5937.50	0.00	0.00	5924.68	-17.60	-201.12	0.00	0.00	35.06	Start Build
6587.52	65.00	292.53	6443.97	109.15	-506.71	10.00	292.53	236.58	End Build
7434.88	65.00	292.53	6802.05	403.38	-1216.09	0.00	0.00	704.39	Start Build/Turn
8001.81	90.40	345.00	6930.52	809.29	-1554.87	10.00	71.60	1184.14	End Build/Turn
14951.81	90.40	345.00	6882.00	7522.31	-3353.62	0.00	0.00	8133.97	TD

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N-S	+E-W	Northing	Easting
Ball 9H BHL	6882.00	7522.31	-3353.62	14353741.00	1705842.00
Ball 9H LTP	6931.00	712.31	-1528.62	14346931.00	1707667.00

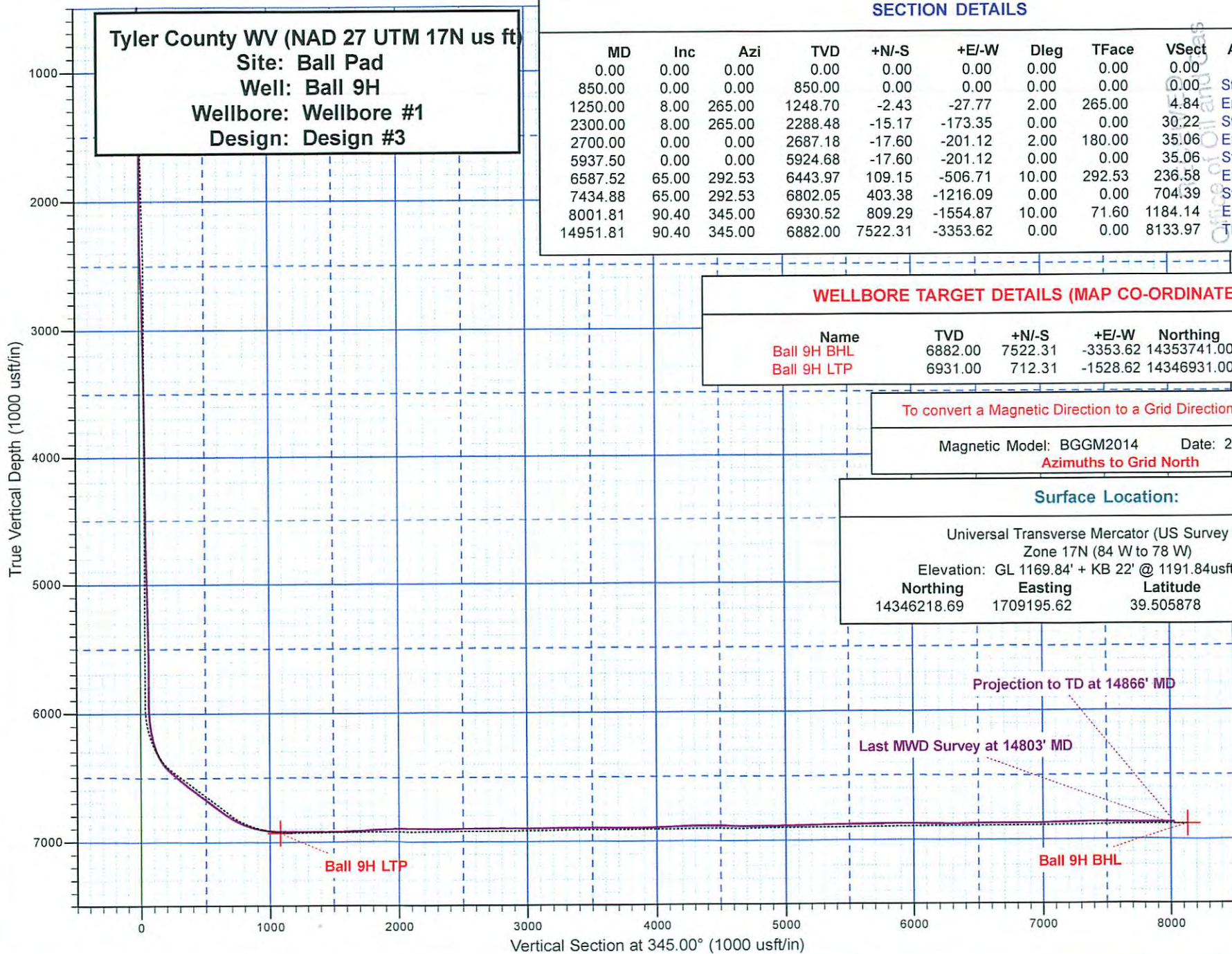
To convert a Magnetic Direction to a Grid Direction, Subtract 8.70°

Magnetic Model: BGGM2014 Date: 29-Jan-15
 Azimuths to Grid North

Surface Location:

Universal Transverse Mercator (US Survey Feet)
 Zone 17N (84 W to 78 W)
 Elevation: GL 1169.84' + KB 22' @ 1191.84usft (Orion Polaris)

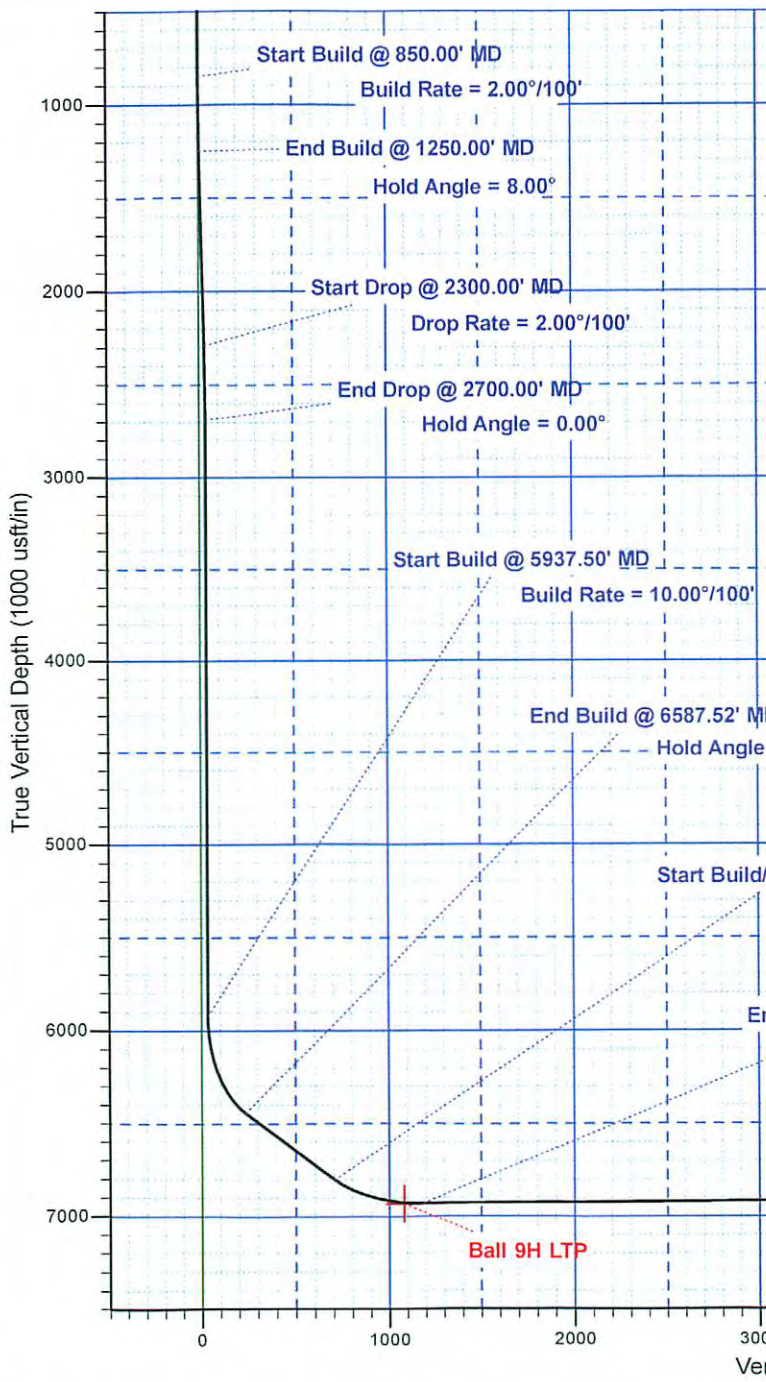
Northing	Easting	Latitude	Longitude
14346218.69	1709195.62	39.505878	-80.756161



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Statoil - Proposed

HALLIBURTON
Sperry Drilling Services



SECTION DETAILS										
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V Sect	Annotation	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Start Build	
850.00	0.00	0.00	850.00	0.00	0.00	0.00	0.00	0.00	End Build	
1250.00	8.00	265.00	1248.70	-2.43	-27.77	2.00	265.00	4.84	Start Drop	
2300.00	8.00	265.00	2288.48	-15.17	-173.35	0.00	0.00	30.22	End Drop	
2700.00	0.00	0.00	2687.18	-17.60	-201.12	2.00	180.00	35.06	Start Build	
5937.50	0.00	0.00	5924.68	-17.60	-201.12	0.00	0.00	35.06	End Build	
6587.52	65.00	292.53	6443.97	109.15	-506.71	10.00	292.53	236.58	Start Build/Turn	
7434.88	65.00	292.53	6802.05	403.38	-1216.09	0.00	0.00	704.39	End Build/Turn	
8001.81	90.40	345.00	6930.52	809.29	-1554.87	10.00	71.60	1184.14	TD	
14951.81	90.40	345.00	6882.00	7522.31	-3353.62	0.00	0.00	8133.97		

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)					
Name	TVD	+N/-S	+E/-W	Northing	Easting
Ball 9H BHL	6882.00	7522.31	-3353.62	14353741.00	1705842.00
Ball 9H LTP	6931.00	712.31	-1528.62	14346931.00	1707667.00

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Magnetic Model: BGGM2014 Date: 29-Jan-15
Azimuths to Grid North

Surface Location:

Universal Transverse Mercator (US Survey Feet)
Zone 17N (84 W to 78 W)
Elevation: GL 1169.84' + KB 22' @ 1191.84usft (Orion Polaris)

Northing	Easting	Latitude	Longitude
14346218.69	1709195.62	39.505878	-80.756161

Tyler County WV (NAD 27 UTM 17N us ft)
Site: Ball Pad
Well: Ball 9H
Wellbore: Wellbore #1
Design: Design #3

WV Department of Environmental Protection

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Statoil
Ball 9H
Marcellus
Tyler County West Virginia
USA
CR-XX-0902154331

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
100.00	0.49	134.96	100.00	0.30 S	0.30 E	-0.37	0.49
200.00	0.17	110.87	200.00	0.66 S	0.74 E	-0.83	0.34
300.00	0.88	137.19	299.99	1.27 S	1.40 E	-1.59	0.73
400.00	1.41	138.15	399.97	2.75 S	2.75 E	-3.37	0.53
491.00	1.71	135.51	490.94	4.56 S	4.45 E	-5.55	0.34
583.00	1.58	165.48	582.90	6.77 S	5.73 E	-8.02	0.94
675.00	1.65	209.61	674.87	9.15 S	5.40 E	-10.24	1.32
766.00	2.12	239.37	765.82	11.15 S	3.30 E	-11.62	1.17
859.00	3.06	261.81	858.73	12.38 S	0.64 W	-11.79	1.47
950.00	4.18	272.15	949.55	12.60 S	6.36 W	-10.52	1.42
1043.00	4.88	276.26	1042.25	12.04 S	13.68 W	-8.09	0.83
1134.00	5.87	275.38	1132.85	11.18 S	22.16 W	-5.06	1.09
1227.00	6.28	273.14	1225.33	10.46 S	31.97 W	-1.83	0.51
1320.00	5.82	272.00	1317.81	10.01 S	41.76 W	1.13	0.51
1415.00	5.65	269.19	1412.34	9.91 S	51.25 W	3.69	0.34
1509.00	6.00	264.30	1505.85	10.47 S	60.76 W	5.62	0.64
1605.00	6.28	258.86	1601.30	11.98 S	70.90 W	6.78	0.67
1700.00	5.90	255.29	1695.77	14.22 S	80.73 W	7.16	0.56
1796.00	7.26	253.96	1791.13	17.15 S	91.33 W	7.07	1.42
1890.00	8.57	256.77	1884.24	20.40 S	103.86 W	7.18	1.45
1985.00	8.15	255.33	1978.23	23.72 S	117.26 W	7.44	0.49
2080.00	8.71	254.12	2072.20	27.39 S	130.69 W	7.37	0.62
2175.00	9.60	254.22	2165.99	31.52 S	145.24 W	7.15	0.94
2269.00	9.44	256.30	2258.69	35.48 S	160.27 W	7.21	0.40
2364.00	8.38	256.39	2352.54	38.95 S	174.57 W	7.56	1.12
2460.00	6.62	269.23	2447.73	40.67 S	186.90 W	9.09	2.52
2550.00	5.35	288.20	2537.24	39.43 S	196.07 W	12.66	2.59
2581.00	5.09	287.83	2568.12	38.56 S	198.75 W	14.20	0.85
2677.00	4.44	283.40	2663.78	36.39 S	206.42 W	18.27	0.77
2773.00	3.29	279.42	2759.56	35.08 S	212.76 W	21.18	1.23
2868.00	2.90	277.66	2854.42	34.31 S	217.83 W	23.23	0.43
2963.00	2.41	279.86	2949.32	33.65 S	222.18 W	25.00	0.52
3059.00	1.83	299.26	3045.26	32.56 S	225.51 W	26.92	0.96
3155.00	1.42	326.89	3141.22	30.81 S	227.50 W	29.12	0.91
3250.00	1.41	324.98	3236.19	28.87 S	228.81 W	31.33	0.05
3346.00	1.07	356.18	3332.17	27.01 S	229.55 W	33.32	0.77
3442.00	1.36	40.21	3428.15	25.25 S	228.87 W	34.85	0.99
3537.00	1.18	33.59	3523.13	23.57 S	227.61 W	36.14	0.24
3633.00	0.86	37.84	3619.11	22.18 S	226.62 W	37.23	0.35
3729.00	0.64	25.28	3715.10	21.13 S	225.95 W	38.07	0.28
3824.00	0.58	38.49	3810.10	20.27 S	225.42 W	38.77	0.16
3919.00	0.44	2.94	3905.09	19.53 S	225.11 W	39.40	0.36
4014.00	0.60	351.39	4000.09	18.68 S	225.16 W	40.24	0.21
4109.00	0.61	342.50	4095.08	17.70 S	225.39 W	41.24	0.10
4204.00	0.76	29.62	4190.08	16.67 S	225.23 W	42.19	0.59
4299.00	1.22	75.79	4285.07	15.87 S	223.93 W	42.62	0.93
4394.00	1.12	60.31	4380.05	15.16 S	222.14 W	42.85	0.35
4489.00	1.10	60.41	4475.03	14.25 S	220.53 W	43.31	0.02
4585.00	1.10	32.87	4571.01	13.02 S	219.23 W	44.16	0.55
4681.00	1.30	28.90	4666.99	11.30 S	218.21 W	45.56	0.23
4777.00	1.31	18.89	4762.97	9.31 S	217.33 W	47.26	0.24
4873.00	1.35	8.13	4858.94	7.15 S	216.81 W	49.21	0.26

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4968.00	1.39	357.12	4953.91	4.89 S	216.71 W	51.36	0.28
5063.00	1.37	10.76	5048.89	2.63 S	216.56 W	53.51	0.35
5156.00	1.81	36.79	5141.85	0.36 S	215.47 W	55.42	0.90
5252.00	2.63	32.65	5237.78	2.71 N	213.37 W	57.84	0.88
5347.00	3.12	37.99	5332.66	6.59 N	210.60 W	60.87	0.59
5442.00	2.69	45.44	5427.54	10.19 N	207.42 W	63.53	0.61
5537.00	2.63	61.18	5522.43	12.80 N	203.93 W	65.15	0.77
5632.00	2.40	86.23	5617.35	13.99 N	200.03 W	65.28	1.17
5727.00	2.54	82.29	5712.26	14.40 N	195.95 W	64.63	0.23
5822.00	2.10	70.99	5807.18	15.25 N	192.22 W	64.48	0.67
5905.00	1.85	77.91	5890.13	16.02 N	189.48 W	64.52	0.41
6001.00	4.21	281.49	5986.06	17.05 N	191.42 W	66.01	6.20
6096.00	10.62	291.62	6080.22	20.98 N	202.99 W	72.80	6.85
6190.00	19.22	291.75	6170.97	29.92 N	225.46 W	87.25	9.16
6286.00	29.14	290.60	6258.43	44.04 N	262.11 W	110.38	10.34
6381.00	40.85	291.37	6336.12	63.57 N	312.87 W	142.38	12.33
6476.00	52.17	290.61	6401.39	88.18 N	377.13 W	182.78	11.93
6570.00	63.42	291.17	6451.41	116.52 N	451.31 W	229.36	11.98
6665.00	63.47	290.93	6493.88	147.04 N	530.62 W	279.37	0.24
6761.00	63.07	290.29	6537.06	177.22 N	610.87 W	329.29	0.72
6855.00	66.59	290.24	6577.03	206.68 N	690.67 W	378.40	3.75
6949.00	66.49	289.43	6614.46	235.94 N	771.78 W	427.65	0.80
7046.00	66.49	289.21	6653.15	265.36 N	855.72 W	477.80	0.21
7141.00	66.79	288.96	6690.83	293.88 N	938.14 W	526.68	0.40
7236.00	67.28	289.72	6727.89	322.85 N	1020.67 W	576.02	0.90
7331.00	67.32	288.76	6764.55	351.73 N	1103.42 W	625.33	0.94
7426.00	67.51	290.60	6801.05	381.26 N	1186.00 W	675.23	1.80
7521.00	69.25	302.36	6836.16	420.60 N	1264.85 W	733.64	11.65
7616.00	71.04	311.84	6868.48	474.45 N	1335.99 W	804.07	9.58
7709.00	76.68	321.96	6894.39	539.64 N	1396.83 W	882.78	12.08
7805.00	83.23	328.75	6911.14	617.35 N	1450.45 W	971.72	9.74
7900.00	89.06	336.51	6917.54	701.43 N	1493.96 W	1064.20	10.20
7995.00	88.32	343.00	6919.71	790.49 N	1526.81 W	1158.72	6.88
8091.00	88.99	342.69	6921.96	882.19 N	1555.11 W	1254.63	0.77
8185.00	89.76	342.32	6922.99	971.84 N	1583.37 W	1348.53	0.91
8281.00	90.27	342.25	6922.96	1063.29 N	1612.57 W	1444.42	0.53
8376.00	91.31	340.76	6921.65	1153.37 N	1642.70 W	1539.24	1.92
8472.00	91.71	340.39	6919.11	1243.88 N	1674.62 W	1634.92	0.57
8567.00	94.33	341.95	6914.10	1333.65 N	1705.23 W	1729.56	3.21
8663.00	93.06	343.48	6907.91	1425.12 N	1733.70 W	1825.28	2.07
8759.00	92.35	344.27	6903.38	1517.24 N	1760.33 W	1921.15	1.11
8854.00	91.85	344.05	6899.90	1608.57 N	1786.24 W	2016.08	0.58
8949.00	89.80	344.62	6898.54	1700.03 N	1811.89 W	2111.06	2.24
9041.00	89.09	344.48	6899.43	1788.70 N	1836.40 W	2203.05	0.78
9132.00	88.96	343.70	6900.97	1876.20 N	1861.34 W	2294.02	0.87
9223.00	90.17	346.73	6901.67	1964.17 N	1884.56 W	2385.01	3.59
9315.00	90.27	347.02	6901.32	2053.77 N	1905.45 W	2476.96	0.34
9407.00	90.57	347.07	6900.64	2143.43 N	1926.08 W	2568.90	0.33
9499.00	90.57	347.32	6899.72	2233.13 N	1946.47 W	2660.82	0.27
9591.00	90.64	346.59	6898.75	2322.75 N	1967.24 W	2752.77	0.79
9682.00	90.67	346.66	6897.71	2411.28 N	1988.28 W	2843.72	0.08
9775.00	89.03	345.91	6897.96	2501.62 N	2010.33 W	2936.70	1.94
9867.00	89.33	345.69	6899.28	2590.80 N	2032.89 W	3028.68	0.41
9960.00	90.03	345.39	6899.80	2680.86 N	2056.11 W	3121.67	0.82
10050.00	91.21	345.59	6898.82	2767.98 N	2078.66 W	3211.66	1.32
10143.00	90.30	345.31	6897.60	2857.99 N	2102.02 W	3304.65	1.02
10236.00	90.23	345.18	6897.16	2947.92 N	2125.70 W	3397.65	0.15
10331.00	90.27	345.22	6896.74	3039.77 N	2149.96 W	3492.64	0.06
10426.00	89.93	345.20	6896.57	3131.62 N	2174.21 W	3587.64	0.36
10522.00	89.73	345.17	6896.86	3224.43 N	2198.76 W	3683.64	0.21
10617.00	89.77	344.64	6897.28	3316.15 N	2223.50 W	3778.64	0.56
10712.00	90.00	345.28	6897.47	3407.90 N	2248.15 W	3873.64	0.72
10807.00	91.11	346.33	6896.55	3499.99 N	2271.44 W	3968.62	1.61
10902.00	91.98	346.76	6893.99	3592.35 N	2293.53 W	4063.55	1.03
10997.00	93.19	346.94	6889.70	3684.76 N	2315.12 W	4158.41	1.29
11092.00	89.90	346.12	6887.14	3777.10 N	2337.24 W	4253.32	3.58
11187.00	89.97	346.03	6887.25	3869.31 N	2360.11 W	4348.31	0.12
11282.00	89.83	346.54	6887.42	3961.60 N	2382.63 W	4443.28	0.95
11378.00	89.53	346.39	6887.95	4054.93 N	2405.11 W	4539.25	0.35
11474.00	89.06	346.13	6889.13	4148.17 N	2427.91 W	4635.22	0.56

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11570.00	89.93	343.93	6889.98	4240.91 N	2452.70 W	4731.21	2.47
11666.00	90.71	344.89	6889.45	4333.37 N	2478.50 W	4827.20	1.28
11762.00	90.37	344.56	6888.55	4425.98 N	2503.79 W	4923.19	0.49
11857.00	90.71	343.93	6887.66	4517.40 N	2529.58 W	5018.18	0.75
11953.00	90.81	343.28	6886.39	4609.49 N	2556.67 W	5114.14	0.68
12048.00	91.51	342.87	6884.46	4700.36 N	2584.32 W	5209.07	0.86
12143.00	91.68	342.57	6881.82	4791.03 N	2612.53 W	5303.96	0.36
12238.00	90.10	344.00	6880.34	4882.00 N	2639.84 W	5398.90	2.24
12332.00	90.81	344.19	6879.59	4972.40 N	2665.60 W	5492.88	0.78
12428.00	90.74	344.07	6878.30	5064.74 N	2691.85 W	5588.86	0.14
12524.00	90.67	344.08	6877.11	5157.05 N	2718.18 W	5684.84	0.07
12620.00	90.54	343.56	6876.10	5249.24 N	2744.93 W	5780.82	0.57
12714.00	90.71	343.88	6875.08	5339.46 N	2771.29 W	5874.79	0.38
12810.00	89.63	344.85	6874.80	5431.91 N	2797.16 W	5970.78	1.51
12904.00	89.66	344.64	6875.38	5522.59 N	2821.90 W	6064.78	0.23
13000.00	89.26	344.35	6876.28	5615.09 N	2847.56 W	6160.77	0.52
13095.00	89.56	344.58	6877.25	5706.62 N	2873.00 W	6255.76	0.40
13190.00	90.54	346.32	6877.17	5798.57 N	2896.87 W	6350.75	2.10
13284.00	91.21	347.32	6875.73	5890.08 N	2918.30 W	6444.69	1.28
13380.00	91.61	347.40	6873.37	5983.72 N	2939.30 W	6540.58	0.43
13475.00	89.50	345.59	6872.45	6076.08 N	2961.48 W	6635.53	2.93
13569.00	89.70	345.06	6873.12	6167.01 N	2985.30 W	6729.53	0.60
13665.00	89.73	345.13	6873.60	6259.78 N	3009.98 W	6825.53	0.08
13760.00	91.11	343.98	6872.90	6351.35 N	3035.28 W	6920.52	1.89
13854.00	91.04	344.12	6871.14	6441.71 N	3061.11 W	7014.49	0.16
13948.00	91.14	343.97	6869.35	6532.07 N	3086.95 W	7108.46	0.19
14042.00	91.18	344.10	6867.45	6622.43 N	3112.80 W	7202.43	0.15
14138.00	91.51	343.71	6865.20	6714.64 N	3139.40 W	7298.38	0.54
14232.00	90.37	344.68	6863.65	6805.07 N	3165.00 W	7392.36	1.60
14328.00	88.89	345.24	6864.27	6897.78 N	3189.92 W	7488.35	1.64
14424.00	88.89	345.90	6866.13	6990.73 N	3213.84 W	7584.33	0.69
14519.00	88.72	346.21	6868.10	7082.91 N	3236.73 W	7679.29	0.37
14613.00	88.83	345.86	6870.11	7174.11 N	3259.41 W	7773.26	0.39
14708.00	90.64	345.53	6870.56	7266.16 N	3282.88 W	7868.24	1.94
14803.00	90.47	345.61	6869.64	7358.16 N	3306.55 W	7963.23	0.19
14866.00	90.47	345.61	6869.13	7419.18 N	3322.21 W	8026.23	0.00

CALCULATION BASED ON MINIMUM CURVATURE METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 345.00 DEGREES (GRID)
A TOTAL CORRECTION OF -8.70 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 14866.00 FEET
IS 8129.04 FEET ALONG 335.88 DEGREES (GRID)

WELL ASSUMED VERTICAL AT WELLHEAD
SURVEYS FROM 100' MD TO 400' MD PROVIDED BY MS SURVEY
SURVEYS FROM 491' MD TO 14803' MD PROVIDED BY SPERRY DRILLING MWD
SURVEY AT 14803' MD HAS BEEN PROJECTED TO TD AT 14866' MD
SPERRY PERSONNEL: C. DECK, J. HIXON, C. RODRIGUEZ

Date Printed:23 April 2015

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DEC 03 2015

WV Department of
Environmental Protection
01/08/2016