

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Chesapeake Energy Corp	<b>Local Co-ordinate Reference:</b>	Well Larry Ball OHI 1H
<b>Project:</b>	Ohio County, WV	<b>TVD Reference:</b>	WELL @ 1358.0usft (Nomac 37)
<b>Site:</b>	Larry Ball OHI Pad	<b>MD Reference:</b>	WELL @ 1358.0usft (Nomac 37)
<b>Well:</b>	Larry Ball OHI 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	HZ	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project:</b> Ohio County, WV			
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	West Virginia North 4701		Using geodetic scale factor

<b>Site:</b> Larry Ball OHI Pad			
<b>Site Position:</b>	<b>Northing:</b>	608,903.67 usft	<b>Latitude:</b>
<b>From:</b>	Lat/Long	<b>Easting:</b>	40.166779
		1,698,737.19 usft	<b>Longitude:</b>
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	-80.577953
		13-3/16"	<b>Grid Convergence:</b>
			-0.69 °

<b>Well:</b> Larry Ball OHI 1H			
<b>Well Position</b>	<b>+N/-S</b>	<b>0.0 usft</b>	<b>Northing:</b>
	<b>+E/-W</b>	<b>0.0 usft</b>	<b>608,903.67 usft</b>
			<b>Latitude:</b>
			40.166779
			<b>Longitude:</b>
			-80.577953
<b>Position Uncertainty</b>	<b>0.0 usft</b>	<b>Wellhead Elevation:</b>	<b>Ground Level:</b>
		usft	1,340.0 usft

<b>Wellbore:</b> HZ					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/20/2013	-8.77	67.59	52,862

<b>Design:</b> HZ					
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	338.53	

<b>Survey Program</b>					
		<b>Date:</b> 4/15/2013			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	5,335.0	Survey #3 (HZ)	Gyro	Gyro	
5,361.0	15,356.0	Survey #4 (HZ)	MWD	Geolink MWD	

<b>Survey</b>									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Formations / Comments
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
100.0	0.01	7.49	100.0	0.0	0.0	0.0	0.01	0.01	
200.0	0.11	272.46	200.0	0.0	-0.1	0.1	0.11	0.10	
300.0	0.11	282.40	300.0	0.0	-0.3	0.1	0.02	0.00	
400.0	0.16	310.94	400.0	0.2	-0.5	0.3	0.08	0.05	
500.0	0.26	344.05	500.0	0.5	-0.7	0.7	0.15	0.10	
600.0	0.29	316.01	600.0	0.9	-0.9	1.1	0.14	0.03	
700.0	0.35	306.71	700.0	1.2	-1.3	1.6	0.08	0.06	
800.0	1.07	335.83	800.0	2.3	-1.9	2.8	0.78	0.72	
900.0	2.67	324.17	899.9	5.0	-3.7	6.0	1.64	1.60	
1,000.0	4.44	320.74	999.7	9.9	-7.5	12.0	1.78	1.77	
1,100.0	5.78	313.83	1,099.3	16.4	-13.6	20.2	1.47	1.34	

RECEIVED

AUG 13 2013

WV GEOLOGICAL SURVEY  
MORGANTOWN, WV

# Cathedral Energy Services

## Survey Report

Company:	Chesapeake Energy Corp	Local Co-ordinate Reference:	Well Larry Ball OHI 1H
Project:	Ohio County, WV	TVD Reference:	WELL @ 1358.0usft (Nomac 37)
Site:	Larry Ball OHI Pad	MD Reference:	WELL @ 1358.0usft (Nomac 37)
Well:	Larry Ball OHI 1H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	USA EDM 5000 Multi Users DB

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	N/S (usft)	E/W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Formations / Comments
1,200.0	5.82	311.39	1,198.8	23.2	-21.0	29.3	0.25	0.04	
1,300.0	5.21	315.13	1,298.4	29.8	-28.0	38.0	0.71	-0.61	
1,400.0	5.37	321.16	1,397.9	36.7	-34.2	46.6	0.58	0.16	
1,500.0	5.46	320.84	1,497.5	44.0	-40.1	55.6	0.09	0.09	
1,600.0	6.04	322.46	1,597.0	51.8	-46.3	65.2	0.60	0.58	
1,700.0	6.70	321.60	1,696.4	60.6	-53.1	75.8	0.67	0.66	
1,800.0	4.26	314.36	1,795.9	67.8	-59.4	84.8	2.53	-2.44	
1,900.0	2.42	304.31	1,895.7	71.5	-63.8	89.9	1.92	-1.84	
2,000.0	0.88	283.88	1,995.7	72.9	-66.3	92.1	1.62	-1.54	
2,100.0	0.99	285.32	2,095.7	73.3	-67.9	93.1	0.11	0.11	
2,200.0	1.09	276.45	2,195.7	73.7	-69.7	94.1	0.19	0.10	
2,300.0	0.97	278.27	2,295.6	73.9	-71.4	94.9	0.12	-0.12	
2,400.0	0.92	295.47	2,395.6	74.4	-73.0	95.9	0.29	-0.05	
2,500.0	0.99	297.01	2,495.6	75.1	-74.5	97.2	0.07	0.07	
2,600.0	1.10	294.22	2,595.6	75.9	-76.1	98.5	0.12	0.11	
2,700.0	1.00	288.38	2,695.6	76.6	-77.9	99.7	0.15	-0.10	
2,800.0	0.86	290.81	2,795.6	77.1	-79.4	100.8	0.15	-0.14	
2,900.0	0.81	298.54	2,895.6	77.7	-80.7	101.8	0.12	-0.05	
3,000.0	0.70	308.29	2,995.5	78.4	-81.8	102.9	0.17	-0.11	
3,100.0	0.76	303.16	3,095.5	79.2	-82.8	104.0	0.09	0.06	
3,200.0	0.86	291.34	3,195.5	79.8	-84.1	105.0	0.19	0.10	
3,300.0	0.72	291.63	3,295.5	80.3	-85.4	106.0	0.14	-0.14	
3,400.0	0.65	284.58	3,395.5	80.7	-86.5	106.7	0.11	-0.07	
3,500.0	0.66	283.57	3,495.5	81.0	-87.6	107.4	0.02	0.01	
3,600.0	0.68	292.48	3,595.5	81.3	-88.7	108.1	0.11	0.02	
3,700.0	0.62	300.47	3,695.5	81.8	-89.7	109.0	0.11	-0.06	
3,800.0	0.80	305.64	3,795.5	82.5	-90.8	110.0	0.19	0.18	
3,900.0	0.78	308.69	3,895.5	83.3	-91.9	111.2	0.05	-0.02	
4,000.0	0.78	302.45	3,995.5	84.1	-93.0	112.3	0.08	0.00	
4,100.0	0.78	302.24	4,095.5	84.8	-94.1	113.4	0.00	0.00	
4,200.0	0.72	298.13	4,195.5	85.5	-95.3	114.4	0.08	-0.06	
4,300.0	0.68	289.97	4,295.4	86.0	-96.4	115.3	0.11	-0.04	
4,400.0	0.63	278.88	4,395.4	86.3	-97.5	116.0	0.14	-0.05	
4,500.0	0.54	276.66	4,495.4	86.4	-98.5	116.5	0.09	-0.09	
4,600.0	0.86	288.24	4,595.4	86.7	-99.7	117.2	0.35	0.32	
4,700.0	0.85	297.55	4,695.4	87.3	-101.0	118.2	0.14	-0.01	
4,800.0	0.61	317.40	4,795.4	88.0	-102.1	119.3	0.35	-0.24	
4,900.0	0.67	307.43	4,895.4	88.8	-102.9	120.3	0.13	0.06	
5,000.0	0.86	290.30	4,995.4	89.4	-104.0	121.3	0.30	0.19	
5,100.0	0.89	283.72	5,095.4	89.8	-105.5	122.2	0.10	0.03	
5,200.0	0.91	302.01	5,195.4	90.4	-106.9	123.3	0.29	0.02	
5,300.0	0.65	303.64	5,295.4	91.2	-108.1	124.4	0.26	-0.26	
5,335.0	0.58	297.53	5,330.4	91.4	-108.4	124.7	0.27	-0.20	Last Gyro Survey @ 5,335' MD
5,361.0	0.30	288.20	5,356.3	91.5	-108.6	124.9	1.11	-1.08	
5,424.0	2.20	231.20	5,419.3	90.8	-109.7	124.6	3.26	3.02	
5,455.0	5.10	231.90	5,450.3	89.5	-111.2	124.0	9.36	9.35	
5,487.0	8.40	233.00	5,482.0	87.2	-114.2	123.0	10.32	10.31	
5,518.0	12.10	231.60	5,512.5	83.9	-118.6	121.4	11.96	11.94	
5,549.0	14.90	232.00	5,542.7	79.4	-124.3	119.4	9.04	9.03	
5,581.0	18.70	233.90	5,573.3	73.8	-131.6	116.9	12.00	11.88	
5,612.0	21.20	235.70	5,602.4	67.7	-140.3	114.4	8.30	8.06	
5,643.0	25.00	237.90	5,631.0	61.1	-150.5	111.9	12.57	12.26	
5,675.0	28.60	239.10	5,659.5	53.6	-162.8	109.4	11.38	11.25	

RECEIVED

AUG 13 2013

WV GEOLOGICAL SURVEY  
MORGANTOWN, WV

# Cathedral Energy Services

## Survey Report

Company:	Chesapeake Energy Corp	Local Co-ordinate Reference:	Well Larry Ball OHI 1H
Project:	Ohio County, WV	TVD Reference:	WELL @ 1358.0usft (Nomac 37)
Site:	Larry Ball OHI Pad	MD Reference:	WELL @ 1358.0usft (Nomac 37)
Well:	Larry Ball OHI 1H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Formations/Comments
5,706.0	32.60	239.70	5,686.2	45.5	-176.4	106.9	12.94	12.90	
5,738.0	37.10	238.50	5,712.4	36.1	-192.0	103.9	14.22	14.06	
5,770.0	41.90	239.20	5,737.1	25.6	-209.5	100.5	15.06	15.00	
5,801.0	46.50	239.50	5,759.3	14.6	-228.1	97.1	14.85	14.84	
5,833.0	51.40	240.20	5,780.4	2.5	-248.9	93.4	15.40	15.31	
5,865.0	54.60	240.20	5,799.6	-10.2	-271.1	89.7	10.00	10.00	
5,896.0	58.00	239.80	5,816.8	-23.1	-293.4	85.9	11.02	10.97	
5,928.0	61.60	239.70	5,832.9	-37.0	-317.3	81.7	11.25	11.25	
5,960.0	63.30	240.10	5,847.7	-51.3	-341.9	77.4	5.43	5.31	
5,991.0	63.60	240.40	5,861.6	-65.0	-365.9	73.4	1.30	0.97	
6,023.0	64.10	240.90	5,875.7	-79.1	-391.0	69.5	2.10	1.56	
6,055.0	65.00	240.80	5,889.4	-93.2	-416.2	65.6	2.83	2.81	
6,087.0	65.30	241.60	5,902.9	-107.2	-441.6	61.9	2.45	0.94	
6,119.0	65.80	242.00	5,916.1	-120.9	-467.3	58.5	1.93	1.56	
6,151.0	66.40	242.00	5,929.1	-134.7	-493.1	55.2	1.88	1.88	
6,182.0	67.10	242.50	5,941.3	-147.9	-518.4	52.1	2.70	2.26	
6,213.0	68.20	244.10	5,953.1	-160.8	-544.0	49.5	5.95	3.55	
6,244.0	68.50	246.40	5,964.5	-172.9	-570.1	47.8	6.96	0.97	
6,275.0	67.60	248.80	5,976.1	-183.8	-596.7	47.3	7.75	-2.90	
6,306.0	65.90	252.30	5,988.4	-193.3	-623.6	48.3	11.73	-5.48	
6,337.0	63.80	255.50	6,001.5	-201.1	-650.5	51.0	11.54	-6.77	
6,369.0	62.80	259.80	6,015.9	-207.2	-678.4	55.5	12.40	-3.13	
6,400.0	63.20	263.30	6,030.0	-211.3	-705.7	61.7	10.14	1.29	
6,431.0	63.70	266.60	6,043.9	-213.7	-733.4	69.6	9.66	1.61	
6,463.0	63.50	270.10	6,058.1	-214.5	-762.0	79.3	9.82	-0.63	
6,494.0	63.10	272.70	6,072.0	-213.8	-789.7	90.0	7.60	-1.29	
6,525.0	61.90	275.40	6,086.3	-211.9	-817.1	101.9	8.64	-3.87	
6,556.0	62.80	279.50	6,100.7	-208.3	-844.3	115.1	12.07	2.90	
6,587.0	65.20	284.00	6,114.3	-202.7	-871.6	130.4	15.17	7.74	
6,618.0	66.50	287.90	6,127.0	-194.9	-898.8	147.6	12.22	4.19	
6,649.0	67.10	290.80	6,139.2	-185.4	-925.7	166.2	8.81	1.94	
6,680.0	67.80	292.90	6,151.1	-174.8	-952.2	185.9	6.65	2.26	
6,711.0	68.80	295.80	6,162.6	-162.9	-978.5	206.5	9.27	3.23	
6,743.0	68.70	298.70	6,174.2	-149.3	-1,005.0	228.9	8.45	-0.31	
6,774.0	69.10	301.50	6,185.3	-134.8	-1,030.0	251.6	8.52	1.29	
6,805.0	70.60	303.80	6,196.0	-119.1	-1,054.5	275.2	8.48	4.84	
6,836.0	72.70	307.20	6,205.8	-102.0	-1,078.4	299.8	12.42	6.77	
6,867.0	74.50	311.00	6,214.5	-83.2	-1,101.5	325.7	13.11	5.81	
6,897.0	74.80	312.70	6,222.5	-63.9	-1,123.1	351.6	5.56	1.00	
6,928.0	76.90	316.70	6,230.1	-42.8	-1,144.4	379.1	14.23	6.77	
6,958.0	78.30	320.50	6,236.5	-20.8	-1,163.8	406.6	13.22	4.67	
6,990.0	80.20	323.30	6,242.5	3.9	-1,183.2	436.7	10.45	5.94	
7,022.0	81.20	325.30	6,247.6	29.6	-1,201.6	467.3	6.91	3.13	
7,053.0	84.00	327.50	6,251.6	55.2	-1,218.6	497.4	11.45	9.03	
7,085.0	86.00	329.10	6,254.4	82.3	-1,235.4	528.8	7.99	6.25	
7,116.0	88.20	331.50	6,256.0	109.2	-1,250.7	559.4	10.49	7.10	
7,148.0	90.60	334.50	6,256.3	137.7	-1,265.2	591.2	12.00	7.50	
7,180.0	91.20	337.60	6,255.8	166.9	-1,278.2	623.2	9.87	1.88	
7,242.0	90.80	339.70	6,254.7	224.7	-1,300.8	685.2	3.45	-0.65	
7,306.0	91.10	338.10	6,253.7	284.4	-1,323.8	749.2	2.54	0.47	
7,368.0	90.20	339.20	6,253.0	342.1	-1,346.4	811.2	2.29	-1.45	
7,494.0	92.60	340.30	6,249.9	460.3	-1,390.0	937.1	2.10	1.90	
7,621.0	92.20	341.20	6,244.6	580.1	-1,431.8	1,063.9	0.77	-0.31	

RECEIVED

AUG 13 2013

WV GEOLOGICAL SURVEY  
MORGANTOWN, WV

# Cathedral Energy Services

## Survey Report

Company	Chesapeake Energy Corp	Local Co-ordinate Reference	Well Larry Ball OHI 1H
Project	Ohio County, WV	TVD Reference	WELL @ 1358.0usft (Nomac 37)
Site	Larry Ball OHI Pad	MD Reference	WELL @ 1358.0usft (Nomac 37)
Well	Larry Ball OHI 1H	North Reference	Grid
Wellbore	HZ	Survey Calculation Method	Minimum Curvature
Design	HZ	Database	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100)	Formations / Comments
7,748.0	92.60	341.10	6,239.3	700.1	-1,472.8	1,190.6	0.32	0.31	
7,873.0	91.70	341.30	6,234.6	818.4	-1,513.1	1,315.4	0.74	-0.72	
7,998.0	92.10	341.20	6,230.4	936.7	-1,553.2	1,440.2	0.33	0.32	
8,123.0	90.90	341.70	6,227.2	1,055.2	-1,593.0	1,565.0	1.04	-0.96	
8,249.0	90.70	339.80	6,225.4	1,174.1	-1,634.5	1,690.9	1.52	-0.16	
8,374.0	90.40	338.90	6,224.2	1,291.1	-1,678.6	1,815.9	0.76	-0.24	
8,500.0	91.40	338.50	6,222.2	1,408.4	-1,724.4	1,941.8	0.85	0.79	
8,624.0	91.30	338.20	6,219.3	1,523.7	-1,770.1	2,065.8	0.25	-0.08	
8,750.0	89.80	338.00	6,218.1	1,640.6	-1,817.1	2,191.8	1.20	-1.19	
8,876.0	89.30	337.90	6,219.1	1,757.3	-1,864.4	2,317.8	0.40	-0.40	
9,002.0	89.10	337.10	6,220.8	1,873.7	-1,912.6	2,443.7	0.65	-0.16	
9,125.0	89.60	337.30	6,222.2	1,987.1	-1,960.3	2,566.7	0.44	0.41	
9,252.0	90.40	338.10	6,222.2	2,104.6	-2,008.5	2,693.7	0.89	0.63	
9,377.0	89.70	338.30	6,222.1	2,220.7	-2,054.9	2,818.7	0.58	-0.56	
9,503.0	90.30	338.40	6,222.1	2,337.8	-2,101.4	2,944.7	0.48	0.48	
9,629.0	90.10	339.00	6,221.7	2,455.2	-2,147.1	3,070.7	0.50	-0.16	
9,755.0	90.30	338.10	6,221.2	2,572.5	-2,193.2	3,196.7	0.73	0.16	
9,881.0	91.10	338.10	6,219.7	2,689.4	-2,240.2	3,322.7	0.63	0.63	
10,008.0	91.40	337.90	6,216.9	2,807.1	-2,287.8	3,449.7	0.28	0.24	
10,133.0	91.30	337.20	6,214.0	2,922.6	-2,335.5	3,574.6	0.57	-0.08	
10,257.0	89.70	338.20	6,212.9	3,037.3	-2,382.5	3,698.6	1.52	-1.29	
10,381.0	91.80	338.30	6,211.3	3,152.4	-2,428.5	3,822.6	1.70	1.69	
10,507.0	89.90	339.20	6,209.4	3,269.9	-2,474.1	3,948.5	1.67	-1.51	
10,631.0	90.50	339.40	6,209.0	3,385.9	-2,518.0	4,072.5	0.51	0.48	
10,757.0	90.40	339.80	6,208.0	3,504.0	-2,561.9	4,198.5	0.33	-0.08	
10,884.0	89.00	338.20	6,208.7	3,622.5	-2,607.4	4,325.5	1.67	-1.10	
11,009.0	88.90	338.90	6,210.9	3,738.8	-2,653.1	4,450.4	0.57	-0.08	
11,136.0	89.70	339.10	6,212.5	3,857.4	-2,698.6	4,577.4	0.65	0.63	
11,259.0	89.80	339.30	6,213.0	3,972.3	-2,742.3	4,700.4	0.18	0.08	
11,386.0	90.20	338.40	6,213.0	4,090.8	-2,788.1	4,827.4	0.78	0.31	
11,512.0	90.70	338.20	6,212.0	4,207.9	-2,834.7	4,953.4	0.43	0.40	
11,639.0	91.10	338.00	6,210.1	4,325.7	-2,882.0	5,080.4	0.35	0.31	
11,766.0	89.50	338.60	6,209.4	4,443.7	-2,929.0	5,207.4	1.35	-1.26	
11,892.0	88.90	338.10	6,211.1	4,560.8	-2,975.5	5,333.4	0.62	-0.48	
12,018.0	89.00	338.00	6,213.5	4,677.6	-3,022.6	5,459.3	0.11	0.08	
12,050.0	89.40	337.80	6,213.9	4,707.3	-3,034.6	5,491.3	1.40	1.25	
12,082.0	88.50	337.30	6,214.5	4,736.8	-3,046.8	5,523.3	3.22	-2.81	
12,114.0	89.10	337.40	6,215.2	4,766.4	-3,059.1	5,555.3	1.90	1.88	
12,145.0	89.70	337.40	6,215.5	4,795.0	-3,071.1	5,586.3	1.94	1.94	
12,272.0	88.90	338.10	6,217.0	4,912.5	-3,119.1	5,713.3	0.84	-0.63	
12,397.0	89.70	338.10	6,218.6	5,028.5	-3,165.8	5,838.3	0.64	0.64	
12,523.0	90.80	339.00	6,218.0	5,145.7	-3,211.8	5,964.3	1.13	0.87	
12,648.0	90.40	339.40	6,216.7	5,262.6	-3,256.2	6,089.3	0.45	-0.32	
12,775.0	91.00	339.20	6,215.1	5,381.4	-3,301.1	6,216.2	0.50	0.47	
12,901.0	90.80	340.00	6,213.2	5,499.5	-3,345.0	6,342.2	0.65	-0.16	
13,027.0	89.10	338.50	6,213.3	5,617.3	-3,389.7	6,468.2	1.80	-1.35	
13,152.0	90.00	337.90	6,214.3	5,733.4	-3,436.1	6,593.2	0.87	0.72	
13,277.0	90.50	340.00	6,213.7	5,850.0	-3,481.0	6,718.1	1.73	0.40	
13,402.0	89.10	338.10	6,214.2	5,966.7	-3,525.7	6,843.1	1.89	-1.12	
13,528.0	89.30	338.10	6,215.9	6,083.6	-3,572.7	6,969.1	0.16	0.16	
13,653.0	90.40	338.50	6,216.2	6,199.7	-3,618.9	7,094.1	0.94	0.88	
13,779.0	91.70	336.70	6,213.9	6,316.2	-3,666.9	7,220.1	1.76	1.03	
13,904.0	90.90	338.00	6,211.1	6,431.5	-3,715.0	7,345.0	1.22	-0.64	

RECEIVED

AUG 13 2013

WV GEOLOGICAL SURVEY  
MORGANTOWN, WV

# Cathedral Energy Services

## Survey Report

Company	Chesapeake Energy Corp	Local Co-ordinate Reference	Well Larry Ball OHI 1H
Project	Ohio County, WV	TVD Reference	WELL @ 1358.0usft (Nomac 37)
Site	Larry Ball OHI Pad	MD Reference	WELL @ 1358.0usft (Nomac 37)
Well	Larry Ball OHI 1H	North Reference	Grid
Wellbore	HZ	Survey Calculation Method	Minimum Curvature
Design	HZ	Database	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/1000)	Formations / Comments
14,029.0	91.10	336.60	6,208.9	6,546.8	-3,763.2	7,469.9	1.13	0.16	
14,155.0	91.40	337.70	6,206.2	6,662.9	-3,812.2	7,595.9	0.90	0.24	
14,281.0	91.00	336.50	6,203.5	6,779.0	-3,861.2	7,721.8	1.00	-0.32	
14,408.0	90.70	337.90	6,201.6	6,896.0	-3,910.4	7,848.8	1.13	-0.24	
14,500.0	91.20	339.40	6,200.1	6,981.7	-3,943.9	7,940.7	1.72	0.54	
14,562.0	90.30	338.50	6,199.3	7,039.5	-3,966.1	8,002.7	2.05	-1.45	
14,688.0	91.40	337.80	6,197.4	7,156.5	-4,013.0	8,128.7	1.03	0.87	
14,814.0	92.40	337.50	6,193.3	7,273.0	-4,060.9	8,254.6	0.83	0.79	
14,940.0	90.90	339.30	6,189.6	7,390.0	-4,107.3	8,380.6	1.86	-1.19	
15,064.0	90.10	340.50	6,188.5	7,506.5	-4,149.9	8,504.5	1.16	-0.65	
15,191.0	92.90	340.70	6,185.2	7,626.2	-4,192.0	8,631.4	2.21	2.20	
15,302.0	94.90	341.20	6,177.7	7,730.9	-4,228.2	8,742.0	1.86	1.80	Last Cathedral Survey @ 15302' MD
15,356.0	94.90	341.20	6,173.1	7,781.8	-4,245.5	8,795.8	0.00	0.00	Projection to Bit @ 15356' MD

RECEIVED

AUG 13 2013

WV GEOLOGICAL SURVEY  
MORGANTOWN, WV

# Cathedral Energy Services

## Survey Report

<b>Company:</b> Chesapeake Energy Corp	<b>Local Co-ordinate Reference:</b> Well Larry Ball OHI 1H
<b>Project:</b> Ohio County, WV	<b>TVD Reference:</b> WELL @ 1358.0usft (Nomac 37)
<b>Site:</b> Larry Ball OHI Pad	<b>MD Reference:</b> WELL @ 1358.0usft (Nomac 37)
<b>Well:</b> Larry Ball OHI 1H	<b>North Reference:</b> Grid
<b>Wellbore:</b> HZ	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> HZ	<b>Database:</b> USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle	Dip Dir	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
Shape									
Larry Ball OHI 1H PBHL - actual wellpath misses target center by 20.3usft at 15355.9usft MD (6173.1 TVD, 7781.7 N, -4245.5 E) - Point	0.00	360.00	6,193.1	7,784.3	-4,243.2	616,687.86	1,694,494.04	40.188005	-80.593473
Larry Ball OHI 1H PBHL - actual wellpath misses target center by 20.8usft at 15356.0usft MD (6173.1 TVD, 7781.8 N, -4245.5 E) - Point	0.00	360.00	6,152.5	7,784.3	-4,243.2	616,687.86	1,694,494.04	40.188005	-80.593473
Larry Ball OHI 1H PBHL - actual wellpath misses target center by 18.5usft at 15356.0usft MD (6173.1 TVD, 7781.8 N, -4245.5 E) - Point	0.00	360.00	6,191.2	7,784.3	-4,243.2	616,687.86	1,694,494.04	40.188005	-80.593473
Larry Ball OHI 1H PBHL - actual wellpath misses target center by 5.7usft at 15356.0usft MD (6173.1 TVD, 7781.8 N, -4245.5 E) - Point	0.00	360.00	6,177.6	7,784.3	-4,243.2	616,687.86	1,694,494.04	40.188005	-80.593473
Larry Ball OHI 1H PBHL - actual wellpath misses target center by 31.1usft at 15356.0usft MD (6173.1 TVD, 7781.8 N, -4245.5 E) - Point	0.00	360.00	6,142.2	7,784.3	-4,243.2	616,687.86	1,694,494.04	40.188005	-80.593473
Larry Ball OHI 1H PBHL - actual wellpath misses target center by 35.4usft at 15354.6usft MD (6173.2 TVD, 7780.5 N, -4245.1 E) - Point	0.00	360.00	6,208.3	7,784.3	-4,243.2	616,687.86	1,694,494.04	40.188005	-80.593473
Larry Ball OHI 1H PBHL - actual wellpath misses target center by 41.0usft at 15356.0usft MD (6173.1 TVD, 7781.8 N, -4245.5 E) - Point	0.00	360.00	6,132.2	7,784.3	-4,243.2	616,687.86	1,694,494.04	40.188005	-80.593473

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S	+E/-W	
		(usft)	(usft)	
5,335.0	5,330.4	91.4	-108.4	Last Gyro Survey @ 5,335' MD
15,302.0	6,177.7	7,730.9	-4,228.2	Last Cathedral Survey @ 15302' MD
15,356.0	6,173.1	7,781.8	-4,245.5	Projection to Bit @ 15356' MD

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------

RECEIVED

AUG 13 2013

WV GEOLOGICAL SURVEY  
MORGANTOWN, WV