



Cathedral Energy Services
Survey Report

69 00118

Company:	Chesapeake Energy Corp	Local Co-ordinate Reference:	Well George Gantzer OHI 5H
Project:	Ohio County, WV	TVD Reference:	WELL @ 1262.0usft (Nomac 37)
Site:	George Gantzer OHI Pad	MD Reference:	WELL @ 1262.0usft (Nomac 37)
Well:	George Gantzer OHI 5H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

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

Site:	George Gantzer OHI Pad				
Site Position:		Northing:	564,648.81 usft	Latitude:	40.045074
From:	Lat/Long	Easting:	1,691,907.90 usft	Longitude:	-80.600447
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	-0.70 °

Well:	George Gantzer OHI 5H					
Well Position	+N/-S	0.0 usft	Northing:	564,663.17 usft	Latitude:	40.045113
	+E/-W	0.0 usft	Easting:	1,691,894.07 usft	Longitude:	-80.600497
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	1,244.0 usft	

Wellbore:	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/11/2013	-8.73	67.49	52,798

Design:	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	323.09	

Survey Program	Date 5/25/2013			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	570.0	Gyro (HZ)	Gyro	Gyro
700.0	11,694.0	Survey #2 (HZ)	MWD	Geolink MWD

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	0.12	73.30	100.0	0.0	0.1	0.0	0.12	0.12	
200.0	0.09	106.21	200.0	0.0	0.3	-0.1	0.07	-0.03	
300.0	0.05	303.18	300.0	0.0	0.3	-0.2	0.14	-0.04	
400.0	0.11	35.79	400.0	0.1	0.3	-0.1	0.12	0.06	
500.0	0.28	56.91	500.0	0.4	0.6	-0.1	0.18	0.17	
570.0	0.08	346.46	570.0	0.5	0.7	0.0	0.38	-0.29	Last Gyro Survey @ 570' MD
700.0	0.20	98.90	700.0	0.5	0.9	-0.1	0.19	0.09	
731.0	0.10	101.60	731.0	0.5	1.0	-0.2	0.32	-0.32	
762.0	0.20	7.30	762.0	0.6	1.0	-0.2	0.74	0.32	
794.0	0.40	35.70	794.0	0.7	1.1	-0.1	0.76	0.63	
826.0	0.60	104.80	826.0	0.8	1.3	-0.2	1.85	0.63	

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Design:	FINAL	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
857.0	0.70	86.40	857.0	0.7	1.7	-0.4	0.74	0.32	
889.0	0.90	75.20	889.0	0.8	2.1	-0.6	0.79	0.63	
920.0	1.20	75.30	920.0	1.0	2.7	-0.8	0.97	0.97	
952.0	1.60	115.50	952.0	0.9	3.4	-1.4	3.23	1.25	
983.0	2.00	110.30	983.0	0.5	4.3	-2.2	1.39	1.29	
1,014.0	2.40	105.00	1,013.9	0.1	5.4	-3.2	1.45	1.29	
1,046.0	2.60	97.10	1,045.9	-0.1	6.8	-4.2	1.24	0.63	
1,077.0	2.90	98.80	1,076.9	-0.3	8.3	-5.2	1.00	0.97	
1,109.0	3.70	96.20	1,108.8	-0.6	10.1	-6.5	2.54	2.50	
1,140.0	4.40	90.30	1,139.7	-0.7	12.3	-7.9	2.63	2.26	
1,172.0	5.30	88.80	1,171.6	-0.7	15.0	-9.5	2.84	2.81	
1,204.0	6.40	82.10	1,203.5	-0.4	18.2	-11.3	4.04	3.44	
1,235.0	7.10	87.90	1,234.2	-0.1	21.9	-13.2	3.15	2.26	
1,297.0	7.90	80.70	1,295.7	0.7	29.9	-17.4	1.99	1.29	
1,327.0	8.20	78.90	1,325.4	1.5	34.0	-19.2	1.31	1.00	
1,358.0	8.60	77.80	1,356.1	2.4	38.5	-21.2	1.39	1.29	
1,389.0	8.60	80.50	1,386.7	3.3	43.0	-23.2	1.30	0.00	
1,421.0	8.20	85.60	1,418.4	3.9	47.7	-25.5	2.64	-1.25	
1,452.0	8.00	87.00	1,449.1	4.1	52.0	-27.9	0.91	-0.65	
1,484.0	8.10	89.80	1,480.8	4.3	56.5	-30.5	1.26	0.31	
1,516.0	8.20	88.50	1,512.4	4.3	61.0	-33.2	0.66	0.31	
1,546.0	8.80	90.40	1,542.1	4.4	65.5	-35.8	2.21	2.00	
1,578.0	8.30	91.20	1,573.8	4.3	70.2	-38.7	1.61	-1.56	
1,610.0	7.60	96.30	1,605.5	4.0	74.6	-41.6	3.10	-2.19	
1,641.0	7.00	97.00	1,636.2	3.6	78.5	-44.3	1.96	-1.94	
1,703.0	5.90	95.20	1,697.8	2.8	85.5	-49.1	1.80	-1.77	
1,767.0	4.70	97.30	1,761.5	2.2	91.3	-53.1	1.90	-1.88	
1,830.0	4.20	91.40	1,824.3	1.8	96.2	-56.3	1.08	-0.79	
1,894.0	3.00	87.30	1,888.2	1.8	100.2	-58.7	1.92	-1.88	
1,955.0	2.00	86.20	1,949.2	2.0	102.9	-60.2	1.64	-1.64	
2,021.0	1.40	110.40	2,015.1	1.8	104.8	-61.5	1.40	-0.91	
2,113.0	0.80	115.10	2,107.1	1.1	106.4	-63.0	0.66	-0.65	
2,239.0	0.00	348.30	2,233.1	0.7	107.2	-63.8	0.63	-0.63	
2,364.0	0.30	242.70	2,358.1	0.6	106.9	-63.8	0.24	0.24	
2,489.0	0.20	228.10	2,483.1	0.3	106.5	-63.7	0.09	-0.08	
2,614.0	0.40	304.30	2,608.1	0.4	105.9	-63.3	0.32	0.16	
2,737.0	0.40	306.50	2,731.1	0.9	105.2	-62.5	0.01	0.00	
2,862.0	0.40	283.30	2,856.1	1.2	104.5	-61.8	0.13	0.00	
2,991.0	0.40	271.50	2,985.1	1.4	103.6	-61.1	0.06	0.00	
3,116.0	0.20	267.30	3,110.1	1.4	102.9	-60.7	0.16	-0.16	
3,242.0	0.30	272.40	3,236.1	1.4	102.4	-60.4	0.08	0.08	
3,365.0	0.60	303.40	3,359.1	1.7	101.5	-59.6	0.31	0.24	
3,491.0	0.60	310.70	3,485.1	2.5	100.5	-58.3	0.06	0.00	
3,617.0	0.30	322.30	3,611.1	3.2	99.8	-57.4	0.25	-0.24	
3,742.0	0.40	291.40	3,736.1	3.6	99.2	-56.7	0.17	0.08	
3,866.0	0.60	305.60	3,860.1	4.2	98.2	-55.7	0.19	0.16	
3,991.0	0.60	318.80	3,985.1	5.0	97.3	-54.4	0.11	0.00	
4,115.0	0.60	322.80	4,109.1	6.0	96.4	-53.1	0.03	0.00	
4,240.0	0.40	327.90	4,234.1	6.9	95.8	-52.0	0.16	-0.16	
4,365.0	0.40	335.30	4,359.1	7.7	95.4	-51.1	0.04	0.00	
4,489.0	0.40	332.60	4,483.1	8.5	95.0	-50.3	0.02	0.00	
4,614.0	0.40	290.00	4,608.0	9.0	94.4	-49.5	0.23	0.00	
4,738.0	0.50	298.70	4,732.0	9.4	93.5	-48.6	0.10	0.08	

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4,865.0	0.30	210.50	4,859.0	9.4	92.9	-48.3	0.45	-0.16	
4,988.0	0.60	262.00	4,982.0	9.0	92.1	-48.1	0.39	0.24	
5,116.0	0.20	290.00	5,110.0	9.0	91.2	-47.6	0.34	-0.31	
5,240.0	0.30	229.50	5,234.0	8.9	90.8	-47.4	0.21	0.08	
5,365.0	0.50	262.00	5,359.0	8.6	90.0	-47.2	0.24	0.16	
5,550.0	1.00	307.70	5,544.0	9.5	87.9	-45.2	0.40	0.27	
5,568.0	1.00	301.20	5,562.0	9.6	87.6	-44.9	0.63	0.00	
5,600.0	1.30	337.80	5,594.0	10.1	87.3	-44.3	2.43	0.94	
5,631.0	4.80	32.60	5,625.0	11.5	87.8	-43.5	13.51	11.29	
5,662.0	9.70	35.60	5,655.7	14.8	90.0	-42.3	15.85	15.81	
5,694.0	13.40	37.10	5,687.0	19.9	93.8	-40.4	11.60	11.56	
5,726.0	16.20	40.00	5,718.0	26.3	99.0	-38.4	9.05	8.75	
5,758.0	18.60	41.90	5,748.5	33.5	105.2	-36.4	7.71	7.50	
5,789.0	20.90	44.30	5,777.7	41.1	112.4	-34.6	7.87	7.42	
5,820.0	23.10	44.00	5,806.4	49.5	120.5	-32.8	7.11	7.10	
5,851.0	25.00	43.90	5,834.7	58.6	129.3	-30.8	6.13	6.13	
5,883.0	27.30	42.60	5,863.5	68.9	138.9	-28.4	7.41	7.19	
5,914.0	30.30	43.40	5,890.6	79.8	149.1	-25.8	9.76	9.68	
5,946.0	31.70	43.20	5,918.0	91.8	160.4	-23.0	4.39	4.38	
5,978.0	34.10	44.30	5,944.9	104.3	172.4	-20.1	7.73	7.50	
6,009.0	36.30	46.50	5,970.2	116.9	185.1	-17.8	8.19	7.10	
6,041.0	38.10	46.20	5,995.7	130.2	199.1	-15.5	5.65	5.63	
6,072.0	40.30	45.70	6,019.8	143.8	213.2	-13.1	7.17	7.10	
6,104.0	42.40	44.70	6,043.8	158.7	228.2	-10.1	6.88	6.56	
6,136.0	44.70	44.70	6,067.0	174.4	243.7	-6.9	7.19	7.19	
6,167.0	47.20	44.20	6,088.5	190.3	259.3	-3.6	8.15	8.06	
6,198.0	49.80	44.40	6,109.1	206.9	275.5	0.0	8.40	8.39	
6,230.0	53.00	43.20	6,129.0	225.0	292.8	4.0	10.42	10.00	
6,261.0	56.00	42.90	6,147.0	243.4	310.1	8.4	9.71	9.68	
6,293.0	58.80	43.00	6,164.3	263.1	328.4	13.2	8.75	8.75	
6,324.0	60.90	42.60	6,179.8	282.8	346.7	17.9	6.87	6.77	
6,356.0	63.10	41.80	6,194.8	303.7	365.6	23.3	7.22	6.88	
6,387.0	65.90	41.90	6,208.2	324.6	384.3	28.7	9.04	9.03	
6,418.0	68.20	42.30	6,220.3	345.8	403.4	34.2	7.51	7.42	
6,450.0	68.70	42.40	6,232.0	367.8	423.5	39.7	1.59	1.56	
6,481.0	69.00	38.30	6,243.2	389.8	442.2	46.1	12.37	0.97	
6,513.0	70.00	33.50	6,254.4	414.1	459.8	55.0	14.39	3.13	
6,545.0	70.80	30.80	6,265.2	439.6	475.8	65.7	8.33	2.50	
6,577.0	71.80	29.30	6,275.4	465.8	491.0	77.6	5.43	3.13	
6,608.0	71.90	26.10	6,285.1	491.9	504.7	90.2	9.81	0.32	
6,640.0	72.80	21.60	6,294.8	519.8	517.0	105.1	13.69	2.81	
6,671.0	73.20	18.00	6,303.9	547.7	527.0	121.4	11.18	1.29	
6,701.0	72.80	15.90	6,312.6	575.1	535.4	138.3	6.83	-1.33	
6,733.0	73.70	11.80	6,321.9	604.9	542.7	157.7	12.59	2.81	
6,764.0	74.80	8.70	6,330.3	634.2	548.0	178.0	10.26	3.55	
6,795.0	77.00	6.10	6,337.8	664.0	551.9	199.5	10.79	7.10	
6,827.0	77.50	2.40	6,344.9	695.1	554.2	223.0	11.38	1.56	
6,858.0	77.50	357.80	6,351.6	725.4	554.3	247.1	14.49	0.00	
6,889.0	78.20	354.30	6,358.1	755.6	552.2	272.6	11.27	2.26	
6,921.0	79.30	350.60	6,364.4	786.7	548.1	299.9	11.85	3.44	
6,952.0	79.40	345.90	6,370.1	816.6	541.9	327.5	14.90	0.32	
6,982.0	78.90	341.10	6,375.8	844.8	533.5	355.1	15.81	-1.67	
7,013.0	80.20	336.50	6,381.4	873.2	522.5	384.4	15.18	4.19	

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7,045.0	81.70	334.30	6,386.4	901.9	509.3	415.3	8.25	4.69	
7,075.0	83.00	330.10	6,390.4	928.2	495.4	444.6	14.54	4.33	
7,107.0	83.10	326.90	6,394.3	955.3	478.9	476.3	9.93	0.31	
7,138.0	84.10	322.60	6,397.7	980.4	461.1	507.0	14.16	3.23	
7,170.0	85.80	322.00	6,400.6	1,005.7	441.6	538.9	5.63	5.31	
7,202.0	87.40	322.90	6,402.5	1,031.0	422.1	570.9	5.73	5.00	
7,265.0	92.00	325.20	6,402.8	1,082.0	385.1	633.8	8.16	7.30	
7,328.0	91.50	323.00	6,400.9	1,133.0	348.2	696.8	3.58	-0.79	
7,392.0	90.40	321.70	6,399.8	1,183.6	309.1	760.8	2.66	-1.72	
7,454.0	90.20	321.80	6,399.5	1,232.3	270.8	822.7	0.36	-0.32	
7,517.0	90.70	321.40	6,399.0	1,281.7	231.6	885.7	1.02	0.79	
7,579.0	91.50	321.60	6,397.8	1,330.2	193.0	947.7	1.33	1.29	
7,642.0	90.20	321.40	6,396.9	1,379.5	153.8	1,010.7	2.09	-2.06	
7,705.0	91.20	321.40	6,396.1	1,428.7	114.5	1,073.6	1.59	1.59	
7,768.0	90.40	321.00	6,395.2	1,477.8	75.0	1,136.6	1.42	-1.27	
7,831.0	88.90	321.70	6,395.6	1,527.0	35.7	1,199.5	2.63	-2.38	
7,894.0	89.50	321.20	6,396.5	1,576.3	-3.6	1,262.5	1.24	0.95	
7,956.0	89.50	319.40	6,397.0	1,624.0	-43.2	1,324.4	2.90	0.00	
8,018.0	89.20	321.30	6,398.4	1,720.2	-122.9	1,449.3	1.54	-0.24	
8,207.0	91.00	324.70	6,398.2	1,820.8	-198.7	1,575.3	3.05	1.43	
8,333.0	91.10	324.50	6,395.9	1,923.5	-271.7	1,701.2	0.18	0.08	
8,459.0	90.40	324.20	6,394.3	2,025.9	-345.1	1,827.1	0.60	-0.56	
8,586.0	90.70	321.60	6,393.0	2,127.2	-421.7	1,954.1	2.06	0.24	
8,711.0	90.10	320.40	6,392.2	2,224.3	-500.4	2,079.0	1.07	-0.48	
8,837.0	90.60	323.10	6,391.4	2,323.3	-578.4	2,205.0	2.18	0.40	
8,964.0	90.20	322.30	6,390.5	2,424.3	-655.3	2,332.0	0.70	-0.31	
9,088.0	91.30	323.60	6,388.9	2,523.2	-730.0	2,456.0	1.37	0.89	
9,212.0	91.70	325.00	6,385.6	2,623.9	-802.4	2,579.9	1.17	0.32	
9,339.0	90.90	325.00	6,382.8	2,727.9	-875.2	2,706.8	0.63	-0.63	
9,467.0	91.70	324.10	6,379.9	2,832.1	-949.4	2,834.7	0.94	0.63	
9,592.0	90.80	322.60	6,377.1	2,932.4	-1,024.0	2,959.7	1.40	-0.72	
9,718.0	90.30	323.60	6,375.9	3,033.2	-1,099.7	3,085.7	0.89	-0.40	
9,844.0	89.30	325.50	6,376.4	3,135.8	-1,172.7	3,211.6	1.70	-0.79	
9,970.0	90.90	324.40	6,376.1	3,238.9	-1,245.1	3,337.5	1.54	1.27	
10,096.0	91.90	323.40	6,373.1	3,340.7	-1,319.3	3,463.5	1.12	0.79	
10,222.0	91.10	323.60	6,369.8	3,442.0	-1,394.2	3,589.4	0.65	-0.63	
10,347.0	91.30	324.50	6,367.1	3,543.1	-1,467.6	3,714.4	0.74	0.16	
10,472.0	88.80	324.20	6,367.0	3,644.7	-1,540.4	3,839.4	2.01	-2.00	
10,598.0	89.70	323.60	6,368.7	3,746.5	-1,614.7	3,965.3	0.86	0.71	
10,723.0	89.90	323.70	6,369.1	3,847.2	-1,688.8	4,090.3	0.18	0.16	
10,847.0	91.50	323.70	6,367.6	3,947.1	-1,762.2	4,214.3	1.29	1.29	
10,973.0	89.90	322.30	6,366.1	4,047.7	-1,838.0	4,340.3	1.69	-1.27	
11,100.0	91.10	320.80	6,365.0	4,147.2	-1,917.0	4,467.2	1.51	0.94	
11,226.0	91.20	321.50	6,362.4	4,245.3	-1,996.0	4,593.1	0.56	0.08	
11,352.0	89.30	322.10	6,361.9	4,344.3	-2,073.9	4,719.1	1.58	-1.51	
11,476.0	89.20	324.00	6,363.5	4,443.4	-2,148.4	4,843.1	1.53	-0.08	
11,600.0	90.60	323.50	6,363.7	4,543.4	-2,221.7	4,967.1	1.20	1.13	
11,648.0	91.20	322.40	6,363.0	4,581.7	-2,250.7	5,015.1	2.61	1.25	Last Cathedral Survey @ 11648' MD
11,694.0	91.20	322.40	6,362.0	4,618.1	-2,278.7	5,061.0	0.00	0.00	Projection to Bit @ 11694' MD



Cathedral Energy Services
Survey Report

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Company:	Chesapeake Energy Corp	Local Co-ordinate Reference:	Well George Gantzer OHI 5H
Project:	Ohio County, WV	TVD Reference:	WELL @ 1262.0usft (Nomac 37)
Site:	George Gantzer OHI Pad	MD Reference:	WELL @ 1262.0usft (Nomac 37)
Well:	George Gantzer OHI 5H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	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									
George Gantzer OHI 5H - actual wellpath misses target center by 13.4usft at 7142.9usft MD (6398.2 TVD, 984.4 N, 458.1 E) - Point	0.00	0.00	6,394.6	976.7	447.6	565,639.85	1,692,341.70	40.047809	-80.598941
George Gantzer OHI 5H - actual wellpath misses target center by 17.0usft at 11694.0usft MD (6362.0 TVD, 4618.1 N, -2278.7 E) - Point	0.00	0.00	6,347.0	4,617.4	-2,286.7	569,280.38	1,689,607.48	40.057710	-80.608867
George Gantzer OHI 5H - actual wellpath misses target center by 40.8usft at 11694.0usft MD (6362.0 TVD, 4618.1 N, -2278.7 E) - Point	0.00	0.00	6,322.0	4,617.4	-2,286.7	569,280.38	1,689,607.48	40.057710	-80.608867
George Gantzer OHI 5H - actual wellpath misses target center by 15.9usft at 7144.1usft MD (6398.4 TVD, 985.3 N, 457.4 E) - Point	0.00	0.00	6,407.6	976.7	447.6	565,639.85	1,692,341.70	40.047809	-80.598941
George Gantzer OHI 5H - actual wellpath misses target center by 8.2usft at 11694.0usft MD (6362.0 TVD, 4618.1 N, -2278.7 E) - Point	0.00	0.00	6,360.0	4,617.4	-2,286.7	569,280.38	1,689,607.48	40.057710	-80.608867
George Gantzer OHI 5H - actual wellpath misses target center by 31.3usft at 7140.7usft MD (6398.0 TVD, 982.6 N, 459.4 E) - Point	0.00	0.00	6,369.6	976.7	447.6	565,639.85	1,692,341.70	40.047809	-80.598941

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
570.0	570.0	0.5	0.7	Last Gyro Survey @ 570' MD	
11,648.0	6,363.0	4,581.7	-2,250.7	Last Cathedral Survey @ 11648' MD	
11,694.0	6,362.0	4,618.1	-2,278.7	Projection to Bit @ 11694' MD	

Checked By: _____ Approved By: _____ Date: _____