



Company: Chesapeake Operating
 Lease/Well: Roy Ferrell OHI/210H

Rig Name: Nomac 37
 State/County: West Virginia/Ohio
 Latitude: 40.04, Longitude: -80.54
 GRID North is 0.66 Degrees West of True North
 VS-Azi: 0.00 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB= 18 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...rell ohi #210h gyro survey.ut
 Minimum Curvature Method
 Report Date/Time: 1/4/2014 / 14:45

Vaughn Energy Services
 1000 Heavy Haul Road
 Morgantown, WV 26508
 (304) 777-2189
 Surveyor: Colby Ware

RECEIVED
 Office of Oil and Gas
 JUN 21 2016

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.70	310.78	100.00	0.40	-0.47	0.40	0.61	310.78	0.70
200.00	0.51	316.40	199.99	1.12	-1.24	1.12	1.67	312.27	0.20
300.00	0.43	310.58	299.99	1.69	-1.83	1.69	2.49	312.75	0.09
400.00	0.34	307.59	399.99	2.12	-2.35	2.12	3.16	312.00	0.09
500.00	0.42	304.47	499.98	2.51	-2.89	2.51	3.83	310.93	0.08
600.00	0.37	300.51	599.98	2.88	-3.48	2.88	4.52	309.66	0.06
700.00	0.36	304.37	699.98	3.23	-4.02	3.23	5.15	308.76	0.03
800.00	0.28	318.94	799.98	3.59	-4.44	3.59	5.71	308.95	0.11
900.00	0.39	327.52	899.98	4.06	-4.78	4.06	6.27	310.33	0.12
1000.00	0.21	330.20	999.97	4.50	-5.05	4.50	6.77	311.70	0.18
1100.00	0.29	308.66	1099.97	4.81	-5.34	4.81	7.19	312.05	0.12
1200.00	0.33	287.91	1199.97	5.06	-5.80	5.06	7.70	311.07	0.12
1300.00	0.23	293.60	1299.97	5.23	-6.26	5.23	8.15	309.86	0.10
1400.00	0.21	295.13	1399.97	5.39	-6.61	5.39	8.53	309.16	0.02
1500.00	0.29	334.57	1499.97	5.69	-6.89	5.69	8.93	309.56	0.18
1600.00	0.25	53.13	1599.97	6.05	-6.82	6.05	9.12	311.58	0.34
1700.00	0.44	113.26	1699.97	6.03	-6.29	6.03	8.71	313.80	0.38
1800.00	0.50	146.05	1799.96	5.52	-5.69	5.52	7.93	314.11	0.27
1900.00	0.43	169.28	1899.96	4.79	-5.38	4.79	7.20	311.67	0.20
2000.00	0.40	174.82	1999.96	4.07	-5.28	4.07	6.66	307.64	0.05
2100.00	0.46	153.87	2099.96	3.36	-5.07	3.36	6.08	303.55	0.17
2125.00	0.41	151.93	2124.95	3.19	-4.98	3.19	5.92	302.64	0.19

HORIZONTAL DISPLACEMENT IS
 5.92 FEET AT 302.64 DEGREES

10/28/2016

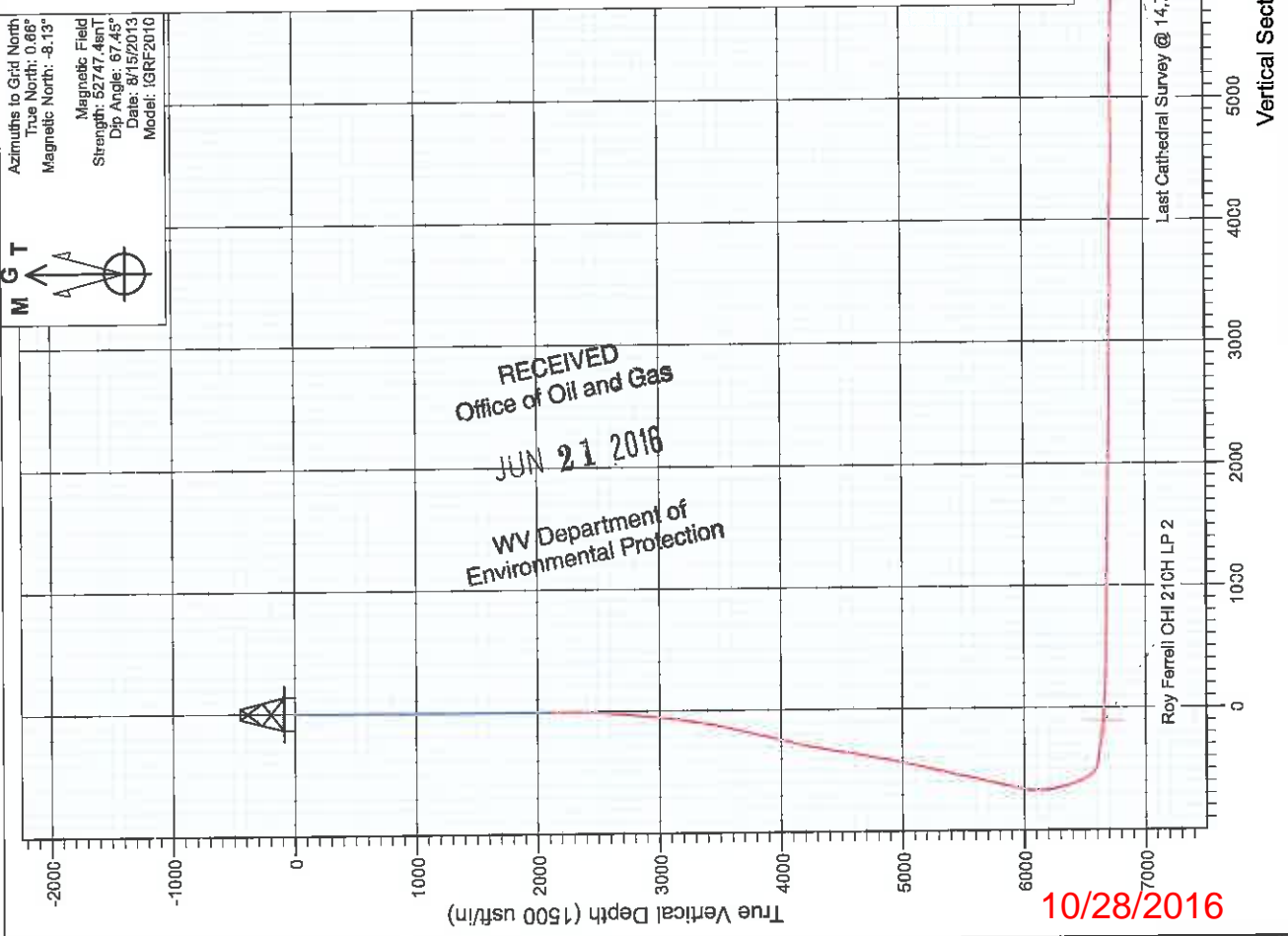


Project: Ohio County, WV
Site: Roy Ferrell OHI Pad
Well: Roy Ferrell OHI 210H
Wellbore: HZ
Design: HZ



M G T

Azimuths to Grid North
True North: 0.66°
Magnetic North: -8.13°
Magnetic Field
Strength: 52747.4enT
Dip Angle: 67.45°
Date: 8/15/2013
Model: IGRF2010



RECEIVED
Office of Oil and Gas

JUN 21 2016

WV Department of
Environmental Protection

10/28/2016

Cathedral Energy Services

Survey Report

Company: Chesapeake Energy Corp	Local Co-ordinate Reference: Well Roy Ferrell OHI 210H
Project: Ohio County, WV	TVD Reference: WELL @ 1214.0usft (Original Well Elev)
Site: Roy Ferrell OHI Pad	MD Reference: WELL @ 1214.0usft (Original Well Elev)
Well: Roy Ferrell OHI 210H	North Reference: Grid
Wellbore: HZ	Survey Calculation Method: Minimum Curvature
Design: HZ	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: Roy Ferrell OHI Pad					
Site Position:	Northing:	563,734.16 usft	Latitude:	40° 2' 35.50 N	
From: Lat/Long	Easting:	1,711,287.79 usft	Longitude:	80° 31' 52.30 W	
Position Uncertainty: 0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	-0.66 °	

Well: Roy Ferrell OHI 210H					
Well Position	+N/-S	0.0 usft	Northing:	563,713.73 usft	Latitude: 40° 2' 35.30 N
	+E/-W	0.0 usft	Easting:	1,711,303.11 usft	Longitude: 80° 31' 52.10 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level: 1,196.0 usft

Wellbore: HZ					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/15/2013	-8.79	67.45	52,747

Design: HZ					
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	158.00	

Survey Program		Date	1/18/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	2,125.0	Gyro (HZ)	Gyro	Gyro	
2,305.0	14,784.0	Survey #2 (HZ)	ISCWSA MWD	MWD - ISCWSA	

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
2,125.0	0.41	151.93	2,125.0	3.2	-5.0	-4.8	0.00	0.00	
2,305.0	0.60	109.10	2,304.9	2.3	-3.8	-3.6	0.23	0.11	
2,368.0	1.60	29.60	2,367.9	3.0	-3.0	-3.9	2.54	1.59	
2,430.0	4.00	35.60	2,429.9	5.5	-1.4	-5.6	3.89	3.87	
2,492.0	5.80	36.00	2,491.6	9.8	1.7	-8.4	2.90	2.90	
2,555.0	6.90	31.20	2,554.2	15.6	5.6	-12.4	1.94	1.75	
2,618.0	8.10	33.40	2,618.7	22.5	10.0	-17.1	1.96	1.90	
2,681.0	9.50	37.00	2,679.0	30.4	15.6	-22.3	2.39	2.22	
2,743.0	10.40	39.20	2,740.0	38.8	22.2	-27.7	1.58	1.45	
2,806.0	11.60	41.00	2,801.9	48.0	29.9	-33.3	1.98	1.90	
2,869.0	12.80	40.20	2,863.4	58.1	38.6	-39.4	1.92	1.90	
2,931.0	14.60	42.50	2,923.7	69.1	48.3	-46.0	3.03	2.90	

RECEIVED
Office of Oil and Gas
JUN 21 2016
WV Department of
Environmental Protection

Cathedral Energy Services

Survey Report

Company: Chesapeake Energy Corp
Project: Ohio County, WV
Site: Roy Ferrell OHI Pad
Well: Roy Ferrell OHI 210H
Wellbore: HZ
Design: HZ

Local Co-ordinate Reference: Well Roy Ferrell OHI 210H
TVD Reference: WELL @ 1214.0usft (Original Well Elev)
MD Reference: WELL @ 1214.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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
2,994.0	15.20	46.30	2,984.6	80.7	59.6	-52.5	1.82	0.95	
3,057.0	16.90	49.40	3,045.1	92.3	72.6	-58.4	3.02	2.70	
3,118.0	18.10	46.90	3,103.3	104.6	86.2	-64.7	2.32	1.97	
3,181.0	18.60	42.70	3,163.1	118.7	100.2	-72.5	2.24	0.79	
3,243.0	18.80	42.40	3,221.8	133.3	113.6	-81.0	0.36	0.32	
3,306.0	20.20	42.30	3,281.2	148.8	127.8	-90.1	2.22	2.22	
3,369.0	21.70	43.40	3,340.0	165.4	143.1	-99.7	2.46	2.38	
3,432.0	22.80	44.80	3,398.3	182.5	159.7	-109.4	1.94	1.75	
3,495.0	24.10	44.10	3,456.1	200.4	177.3	-119.4	2.11	2.06	
3,558.0	25.60	41.70	3,513.3	219.8	195.3	-130.6	2.87	2.38	
3,621.0	26.30	39.80	3,569.9	240.7	213.3	-143.3	1.73	1.11	
3,684.0	27.30	39.70	3,626.2	262.5	231.4	-156.7	1.59	1.59	
3,746.0	28.50	40.50	3,681.0	284.7	250.1	-170.3	2.03	1.94	
3,810.0	28.60	42.20	3,737.2	307.7	270.3	-184.0	1.28	0.16	
3,872.0	27.80	43.50	3,791.8	329.1	290.2	-196.4	1.63	-1.29	
3,933.0	26.60	42.70	3,846.1	349.5	309.3	-208.2	2.06	-1.97	
3,996.0	26.20	41.80	3,902.5	370.2	328.1	-220.3	0.90	-0.63	
4,059.0	25.40	40.30	3,959.2	390.9	346.1	-232.8	1.64	-1.27	
4,121.0	26.40	40.40	4,015.0	411.5	363.7	-245.3	1.61	1.61	
4,185.0	28.00	41.50	4,071.9	433.6	382.8	-258.6	2.62	2.50	
4,247.0	28.90	41.90	4,126.4	455.7	402.5	-271.7	1.48	1.45	
4,310.0	30.70	42.80	4,181.1	478.8	423.6	-285.3	2.94	2.86	
4,371.0	30.50	44.30	4,233.6	501.3	445.0	-298.1	1.29	-0.33	
4,435.0	29.30	48.50	4,289.1	523.3	468.1	-309.9	3.77	-1.87	
4,497.0	29.40	50.00	4,343.1	543.2	491.1	-319.6	1.20	0.16	
4,559.0	27.70	50.50	4,397.6	562.1	513.9	-328.7	2.77	-2.74	
4,623.0	27.80	50.30	4,454.2	581.1	536.8	-337.7	0.21	0.16	
4,686.0	27.70	50.40	4,510.0	599.8	559.4	-346.6	0.18	-0.16	
4,748.0	27.40	50.10	4,565.0	618.1	581.4	-355.3	0.53	-0.48	
4,811.0	25.60	47.50	4,621.3	636.6	602.6	-364.5	3.40	-2.86	
4,874.0	24.40	44.00	4,678.4	655.2	621.7	-374.6	3.02	-1.90	
4,937.0	23.10	41.10	4,736.1	673.9	638.8	-385.5	2.77	-2.06	
4,999.0	23.90	41.90	4,793.0	692.4	655.2	-396.5	1.39	1.29	
5,061.0	24.40	42.40	4,849.5	711.2	672.3	-407.6	0.87	0.81	
5,124.0	24.50	42.70	4,906.9	730.4	689.9	-418.8	0.25	0.16	
5,187.0	24.90	42.70	4,964.1	749.8	707.7	-430.0	0.63	0.63	
5,250.0	26.10	40.80	5,021.0	770.0	725.8	-442.0	2.30	1.90	
5,314.0	26.90	38.60	5,078.3	792.0	744.0	-455.6	1.98	1.25	
5,376.0	26.20	41.30	5,133.7	813.2	761.8	-468.6	2.25	-1.13	
5,439.0	26.40	44.00	5,190.2	833.7	780.7	-480.6	1.93	0.32	
5,502.0	26.70	44.00	5,246.6	854.0	800.3	-492.0	0.48	0.48	
5,564.0	27.30	42.40	5,301.8	874.5	819.5	-503.8	1.52	0.97	
5,627.0	28.30	42.00	5,357.5	896.3	839.3	-516.6	1.61	1.59	
5,690.0	28.20	43.30	5,413.0	918.2	859.5	-529.4	0.99	-0.16	
5,754.0	28.00	44.20	5,469.5	940.0	880.3	-541.8	0.73	-0.31	
5,816.0	29.00	44.90	5,524.0	961.1	901.1	-553.5	1.70	1.61	
5,878.0	29.30	44.10	5,578.1	982.6	922.2	-565.6	0.79	0.48	
5,941.0	27.80	42.40	5,633.5	1,004.5	942.9	-578.2	2.71	-2.38	
6,004.0	27.40	40.00	5,689.3	1,026.5	962.1	-591.3	1.88	-0.63	
6,067.0	28.20	40.90	5,745.0	1,048.8	981.2	-604.9	1.43	1.27	
6,131.0	28.40	42.00	5,801.4	1,071.6	1,001.3	-618.5	0.87	0.31	
6,193.0	27.60	42.20	5,856.1	1,093.2	1,020.8	-631.2	1.30	-1.29	
6,249.0	28.00	42.70	5,905.7	1,112.4	1,038.4	-642.4	0.83	0.71	

RECEIVED
 Office of Oil and Gas

JUN 21 2016

WV Department of
 Environmental Protection

Cathedral Energy Services

Survey Report

Company: Chesapeake Energy Corp
Project: Ohio County, WV
Site: Roy Ferrell OHI Pad
Well: Roy Ferrell OHI 210H
Wellbore: HZ
Design: HZ

Local Co-ordinate Reference: Well Roy Ferrell OHI 210H
TVD Reference: WELL @ 1214.0usft (Original Well Elev)
MD Reference: WELL @ 1214.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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
6,337.0	27.90	44.30	5,983.4	1,142.4	1,066.8	-659.6	0.86	-0.11	
6,368.0	27.70	49.70	6,010.8	1,152.2	1,077.3	-664.7	8.15	-0.65	
6,400.0	28.00	54.80	6,039.1	1,161.3	1,089.2	-668.8	7.50	0.94	
6,432.0	28.10	59.60	6,067.3	1,169.5	1,101.8	-671.6	7.06	0.31	
6,463.0	28.10	63.90	6,094.7	1,176.4	1,114.6	-673.2	6.53	0.00	
6,494.0	27.60	69.50	6,122.1	1,182.1	1,127.9	-673.5	8.59	-1.61	
6,525.0	26.50	74.40	6,149.7	1,186.5	1,141.3	-672.6	8.01	-3.55	
6,557.0	26.50	79.30	6,178.4	1,189.7	1,155.2	-670.4	6.83	0.00	
6,588.0	27.00	83.70	6,206.0	1,191.8	1,169.0	-667.1	6.59	1.61	
6,618.0	28.20	86.90	6,232.6	1,192.9	1,182.9	-663.0	6.36	4.00	
6,649.0	29.60	88.30	6,259.8	1,193.6	1,197.8	-657.9	5.01	4.51	
6,680.0	31.10	89.70	6,286.5	1,193.8	1,213.5	-652.3	5.35	4.84	
6,712.0	32.70	90.50	6,313.7	1,193.8	1,230.4	-646.0	5.17	5.00	
6,743.0	34.60	91.60	6,339.5	1,193.5	1,247.6	-639.2	6.44	6.13	
6,775.0	36.80	91.90	6,365.5	1,192.9	1,266.2	-631.7	6.90	6.87	
6,805.0	38.50	93.00	6,389.2	1,192.1	1,284.5	-624.1	6.09	5.67	
6,836.0	39.90	93.70	6,413.3	1,191.0	1,304.1	-615.7	4.74	4.52	
6,868.0	41.90	94.20	6,437.5	1,189.5	1,325.0	-608.6	6.33	6.25	
6,899.0	43.70	94.30	6,460.2	1,188.0	1,346.0	-597.2	5.81	5.81	
6,930.0	44.90	95.70	6,482.4	1,186.1	1,367.6	-587.4	4.99	3.87	
6,962.0	46.50	96.90	6,504.7	1,183.6	1,390.3	-576.6	5.68	5.00	
6,996.0	49.10	96.80	6,527.6	1,180.6	1,415.3	-564.4	7.65	7.65	
7,028.0	54.50	97.50	6,547.3	1,177.4	1,440.3	-552.2	16.96	16.88	
7,060.0	62.70	98.10	6,564.0	1,173.7	1,467.3	-538.6	25.67	25.63	
7,091.0	68.60	101.90	6,576.8	1,168.8	1,495.1	-523.6	22.06	19.03	
7,123.0	74.80	107.90	6,586.8	1,161.0	1,524.4	-505.4	26.30	19.38	
7,154.0	77.40	114.20	6,594.3	1,150.2	1,552.5	-484.8	21.43	8.39	
7,184.0	79.10	121.70	6,600.4	1,136.4	1,578.4	-462.4	25.12	5.67	
7,216.0	80.00	128.90	6,606.2	1,118.2	1,604.1	-435.9	22.30	2.81	
7,245.0	81.80	137.80	6,610.8	1,098.6	1,624.9	-409.9	30.93	6.21	
7,276.0	83.20	143.50	6,614.9	1,074.8	1,644.3	-380.6	18.78	4.52	
7,308.0	82.40	147.90	6,618.9	1,048.6	1,662.2	-349.6	13.87	-2.50	
7,340.0	82.70	152.90	6,623.0	1,021.0	1,677.9	-318.1	15.52	0.94	
7,371.0	84.10	158.10	6,626.6	993.0	1,690.7	-287.4	17.26	4.52	
7,402.0	83.50	160.40	6,629.9	964.2	1,701.6	-256.6	7.63	-1.94	
7,434.0	83.90	160.60	6,633.4	934.2	1,712.2	-224.8	1.40	1.25	
7,465.0	84.50	160.30	6,636.6	905.1	1,722.5	-194.0	2.16	1.94	
7,496.0	84.70	162.90	6,639.5	875.9	1,732.3	-163.2	8.37	0.65	
7,527.0	84.80	163.80	6,642.3	846.3	1,741.1	-132.4	2.91	0.32	
7,589.0	85.50	163.80	6,647.6	787.0	1,758.3	-71.0	1.13	1.13	
7,652.0	85.60	164.30	6,652.5	726.6	1,775.6	-8.5	0.81	0.16	
7,716.0	85.90	164.50	6,657.2	665.1	1,792.8	54.9	0.56	0.47	
7,779.0	86.70	165.20	6,661.3	604.4	1,809.2	117.3	1.69	1.27	
7,843.0	86.80	164.30	6,664.9	542.8	1,826.0	180.8	1.41	0.16	
7,905.0	86.80	165.20	6,668.4	483.0	1,842.3	242.3	1.45	0.00	
7,967.0	86.90	165.60	6,671.8	423.1	1,857.9	303.6	0.66	0.16	
8,031.0	88.80	165.50	6,674.2	361.2	1,873.8	367.0	2.97	2.97	
8,093.0	89.90	165.40	6,674.9	301.2	1,889.4	428.5	1.78	1.77	
8,155.0	90.40	165.40	6,674.7	241.2	1,905.0	490.0	0.81	0.81	
8,218.0	90.80	165.50	6,674.1	180.2	1,920.9	552.5	0.65	0.63	
8,281.0	88.60	165.70	6,674.4	119.2	1,936.5	614.9	3.51	-3.49	
8,344.0	88.50	164.80	6,676.0	58.3	1,952.6	677.4	1.44	-0.16	
8,407.0	88.90	165.00	6,677.4	-2.5	1,969.0	739.9	0.71	0.63	

RECEIVED
 Office of Oil and Gas

JUN 21 2016

WV Department of
 Environmental Protection

Cathedral Energy Services

Survey Report

Company:	Chesapeake Energy Corp	Local Co-ordinate Reference:	Well Roy Ferrell OHI 210H
Project:	Ohio County, WV	TVD Reference:	WELL @ 1214.0usft (Original Well Elev)
Site:	Roy Ferrell OHI Pad	MD Reference:	WELL @ 1214.0usft (Original Well Elev)
Well:	Roy Ferrell OHI 210H	North Reference:	Grd
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 (°/100usf)	Build Rate (°/100u)	Formations / Comments
8,469.0	89.00	164.90	6,678.5	-62.4	1,985.1	801.4	0.23	0.16	
8,532.0	89.50	164.80	6,679.4	-123.2	2,001.5	864.0	0.81	0.79	
8,595.0	89.40	164.50	6,680.0	-183.9	2,018.2	926.6	0.50	-0.16	
8,657.0	89.60	164.70	6,680.5	-243.7	2,034.7	988.1	0.46	0.32	
8,720.0	90.00	164.00	6,680.7	-304.3	2,051.7	1,050.8	1.28	0.63	
8,782.0	87.80	162.30	6,681.9	-363.7	2,069.6	1,112.5	4.48	-3.55	
8,846.0	88.10	161.70	6,684.2	-424.5	2,089.4	1,176.3	1.05	0.47	
8,908.0	88.10	161.80	6,686.3	-483.3	2,108.8	1,238.1	0.16	0.00	
8,971.0	89.30	159.60	6,687.7	-542.8	2,129.6	1,301.0	3.98	1.90	
9,034.0	89.60	159.10	6,688.3	-601.7	2,151.8	1,364.0	0.93	0.48	
9,096.0	89.70	159.10	6,688.7	-659.7	2,174.0	1,426.0	0.16	0.16	
9,159.0	90.30	158.80	6,688.7	-718.5	2,196.6	1,489.0	1.06	0.95	
9,220.0	89.30	159.80	6,688.9	-775.5	2,218.1	1,550.0	2.32	-1.64	
9,284.0	90.10	159.30	6,689.2	-835.5	2,240.5	1,613.9	1.47	1.25	
9,345.0	89.40	160.60	6,689.5	-892.8	2,261.4	1,674.9	2.42	-1.15	
9,408.0	88.80	163.40	6,690.5	-952.7	2,280.9	1,737.7	4.54	-0.95	
9,472.0	89.20	163.20	6,691.6	-1,014.0	2,299.3	1,801.5	0.70	0.63	
9,535.0	90.00	163.60	6,692.0	-1,074.3	2,317.3	1,864.2	1.42	1.27	
9,598.0	88.60	162.50	6,692.8	-1,134.6	2,335.6	1,926.9	2.83	-2.22	
9,659.0	87.50	162.00	6,694.9	-1,192.7	2,354.2	1,987.7	1.98	-1.80	
9,722.0	87.70	161.50	6,697.5	-1,252.4	2,373.9	2,050.5	0.85	0.32	
9,785.0	88.00	161.10	6,699.9	-1,312.1	2,394.1	2,113.4	0.79	0.48	
9,848.0	88.00	161.40	6,702.1	-1,371.7	2,414.4	2,176.2	0.48	0.00	
9,912.0	88.60	159.60	6,704.0	-1,432.0	2,435.7	2,240.1	2.96	0.94	
9,975.0	88.90	159.70	6,705.4	-1,491.0	2,457.6	2,303.1	0.50	0.48	
10,038.0	88.50	159.20	6,706.8	-1,550.0	2,479.7	2,366.1	1.02	-0.63	
10,102.0	89.00	158.80	6,708.2	-1,609.8	2,502.6	2,430.0	1.00	0.78	
10,164.0	89.40	158.70	6,709.1	-1,667.5	2,525.1	2,492.0	0.67	0.65	
10,226.0	88.30	158.70	6,710.3	-1,725.3	2,547.6	2,554.0	1.77	-1.77	
10,289.0	89.60	158.70	6,711.5	-1,784.0	2,570.5	2,617.0	2.06	2.06	
10,352.0	90.40	158.20	6,711.5	-1,842.6	2,593.7	2,680.0	1.50	1.27	
10,414.0	90.80	158.30	6,710.8	-1,900.1	2,616.6	2,742.0	0.67	0.65	
10,476.0	90.80	159.30	6,709.9	-1,957.9	2,639.0	2,804.0	1.61	0.00	
10,539.0	90.40	158.70	6,709.3	-2,016.8	2,661.6	2,867.0	1.14	-0.63	
10,603.0	90.60	158.10	6,708.7	-2,076.3	2,685.2	2,931.0	0.99	0.31	
10,665.0	90.00	157.40	6,708.4	-2,133.6	2,708.7	2,993.0	1.49	-0.97	
10,729.0	88.20	157.60	6,709.4	-2,192.8	2,733.2	3,057.0	2.83	-2.81	
10,792.0	87.90	157.40	6,711.5	-2,251.0	2,757.2	3,119.9	0.57	-0.48	
10,855.0	87.90	157.10	6,713.9	-2,309.0	2,781.6	3,182.9	0.48	0.00	
10,919.0	87.70	157.50	6,716.3	-2,368.0	2,806.3	3,246.8	0.70	-0.31	
10,982.0	88.50	156.70	6,718.4	-2,426.0	2,830.8	3,309.8	1.80	1.27	
11,045.0	88.80	157.10	6,719.9	-2,483.9	2,855.5	3,372.8	0.79	0.48	
11,107.0	89.40	156.90	6,720.9	-2,541.0	2,879.7	3,434.7	1.02	0.97	
11,169.0	90.10	155.90	6,721.1	-2,597.8	2,904.5	3,496.7	1.97	1.13	
11,232.0	90.40	155.90	6,720.8	-2,655.3	2,930.3	3,559.7	0.48	0.48	
11,295.0	90.80	156.60	6,720.2	-2,713.0	2,955.6	3,622.6	1.28	0.63	
11,358.0	89.40	156.40	6,720.1	-2,770.8	2,980.7	3,685.6	2.24	-2.22	
11,421.0	89.30	156.90	6,720.8	-2,828.6	3,005.7	3,748.6	0.81	-0.16	
11,485.0	89.90	157.00	6,721.2	-2,887.5	3,030.8	3,812.6	0.95	0.94	
11,548.0	89.10	156.50	6,721.8	-2,945.4	3,055.6	3,875.6	1.50	-1.27	
11,610.0	89.30	156.20	6,722.7	-3,002.2	3,080.5	3,937.5	0.58	0.32	
11,674.0	89.80	155.70	6,723.2	-3,060.6	3,106.6	4,001.5	1.10	0.78	
11,737.0	89.50	156.30	6,723.5	-3,118.2	3,132.2	4,064.4	1.06	-0.48	

RECEIVED
 Office of Oil and Gas

 JUN 21 2016

 WV Department of
 Environmental Protection

Cathedral Energy Services

Survey Report

Company:	Chesapeake Energy Corp	Local Co-ordinate Reference:	Well Roy Ferrell OHI 210H
Project:	Ohio County, WV	TVD Reference:	WELL @ 1214.0usft (Original Well Elev)
Site:	Roy Ferrell OHI Pad	MD Reference:	WELL @ 1214.0usft (Original Well Elev)
Well:	Roy Ferrell OHI 210H	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 (°/100usf)	Build Rate (°/100u)	Formations / Comments
11,801.0	90.00	156.90	6,723.8	-3,176.9	3,157.6	4,128.4	1.22	0.78	
11,863.0	88.50	157.20	6,724.6	-3,234.0	3,181.8	4,190.4	2.47	-2.42	
11,926.0	88.80	157.40	6,726.1	-3,292.1	3,206.1	4,253.4	0.57	0.48	
11,989.0	89.20	156.90	6,727.2	-3,350.1	3,230.6	4,316.4	1.02	0.63	
12,051.0	87.40	156.60	6,729.1	-3,407.1	3,255.0	4,378.3	2.94	-2.90	
12,114.0	88.30	157.00	6,731.4	-3,464.9	3,279.8	4,441.3	1.56	1.43	
12,176.0	88.00	157.70	6,733.4	-3,522.1	3,303.7	4,503.2	1.23	-0.48	
12,240.0	88.70	157.20	6,735.3	-3,581.2	3,328.2	4,567.2	1.34	1.09	
12,302.0	90.30	155.70	6,735.8	-3,638.0	3,353.0	4,629.1	3.54	2.58	
12,365.0	90.20	154.20	6,735.5	-3,695.1	3,379.7	4,692.1	2.39	-0.16	
12,429.0	91.20	154.30	6,734.7	-3,752.7	3,407.5	4,755.9	1.57	1.56	
12,492.0	91.90	153.90	6,733.0	-3,809.4	3,435.0	4,818.7	1.28	1.11	
12,555.0	90.40	154.60	6,731.8	-3,866.1	3,462.3	4,881.6	2.63	-2.38	
12,617.0	90.20	154.70	6,731.5	-3,922.1	3,488.9	4,943.5	0.36	-0.32	
12,681.0	88.30	151.20	6,732.3	-3,979.1	3,518.0	5,007.2	6.22	-2.97	
12,744.0	89.70	151.60	6,733.4	-4,034.4	3,548.1	5,069.8	2.31	2.22	
12,808.0	89.80	150.40	6,733.7	-4,090.4	3,579.2	5,133.3	1.88	0.16	
12,871.0	91.30	153.90	6,733.1	-4,146.1	3,608.6	5,196.0	6.04	2.38	
12,934.0	90.80	157.20	6,731.9	-4,203.4	3,634.6	5,258.9	5.30	-0.79	
12,998.0	89.70	157.70	6,731.6	-4,262.5	3,659.2	5,322.9	1.89	-1.72	
13,060.0	89.60	158.10	6,732.0	-4,320.0	3,682.5	5,384.9	0.67	-0.16	
13,124.0	88.90	157.40	6,732.9	-4,379.2	3,706.7	5,448.9	1.55	-1.09	
13,186.0	87.60	157.40	6,734.7	-4,436.4	3,730.6	5,510.8	2.10	-2.10	
13,250.0	87.60	157.70	6,737.4	-4,495.5	3,755.0	5,574.8	0.47	0.00	
13,313.0	88.10	158.20	6,739.8	-4,553.8	3,778.6	5,637.7	1.12	0.79	
13,376.0	88.20	158.00	6,741.8	-4,612.3	3,802.1	5,700.7	0.35	0.16	
13,439.0	88.30	158.20	6,743.7	-4,670.7	3,825.6	5,763.7	0.35	0.16	
13,501.0	89.80	159.10	6,744.8	-4,728.4	3,848.2	5,825.7	2.82	2.42	
13,565.0	88.60	158.80	6,745.7	-4,788.1	3,871.1	5,889.6	1.93	-1.88	
13,628.0	89.80	162.50	6,746.5	-4,847.6	3,892.0	5,952.6	6.17	1.90	
13,690.0	89.60	160.60	6,746.9	-4,906.4	3,911.6	6,014.4	3.08	-0.32	
13,752.0	89.00	160.30	6,747.6	-4,964.8	3,932.4	6,076.4	1.08	-0.97	
13,814.0	88.60	159.00	6,748.9	-5,022.9	3,953.9	6,138.3	2.19	-0.65	
13,878.0	89.10	159.50	6,750.2	-5,082.8	3,976.6	6,202.3	1.10	0.78	
13,941.0	89.50	158.80	6,751.0	-5,141.6	3,999.0	6,265.3	1.28	0.63	
14,004.0	89.70	159.60	6,751.4	-5,200.5	4,021.4	6,328.3	1.31	0.32	
14,065.0	88.00	159.80	6,752.6	-5,257.7	4,042.5	6,389.2	2.81	-2.79	
14,128.0	85.80	157.40	6,756.1	-5,316.3	4,065.5	6,452.1	5.16	-3.49	
14,190.0	84.20	155.20	6,761.5	-5,372.8	4,090.3	6,513.9	4.38	-2.58	
14,252.0	85.30	154.60	6,767.1	-5,428.7	4,116.5	6,575.5	2.02	1.77	
14,316.0	87.40	153.80	6,771.2	-5,486.2	4,144.3	6,639.2	3.51	3.28	
14,379.0	89.10	154.30	6,773.1	-5,542.9	4,171.9	6,702.1	2.81	2.70	
14,443.0	90.70	154.10	6,773.2	-5,600.5	4,199.7	6,765.9	2.52	2.50	
14,507.0	90.40	153.70	6,772.6	-5,657.9	4,227.9	6,829.7	0.78	-0.47	
14,568.0	90.90	153.90	6,771.9	-5,712.7	4,254.8	6,890.6	0.88	0.82	
14,631.0	91.10	154.10	6,770.8	-5,769.3	4,282.4	6,953.4	0.45	0.32	
14,692.0	91.90	153.70	6,769.2	-5,824.0	4,309.2	7,014.2	1.47	1.31	
14,734.0	91.70	153.90	6,767.9	-5,861.7	4,327.8	7,056.1	0.67	-0.48	Last Cathedral Survey @ 14,734' MD
14,784.0	91.70	153.90	6,766.4	-5,906.6	4,349.8	7,105.9	0.00	0.00	PTB @ 14,784' MD

RECEIVED
Office of Oil and Gas
JUN 21 2016
WV Department of
Environmental Protection

Cathedral Energy Services

Survey Report

Company: Chesapeake Energy Corp	Local Co-ordinate Reference: Well Roy Ferrell OHI 210H
Project: Ohio County, WV	TVD Reference: WELL @ 1214.0usft (Original Well Elev)
Site: Roy Ferrell OHI Pad	MD Reference: WELL @ 1214.0usft (Original Well Elev)
Well: Roy Ferrell OHI 210H	North Reference: Grid
Wellbore: HZ	Survey Calculation Method: Minimum Curvature
Design: HZ	Database: USA EDM 5000 Multi Users DB

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
Roy Ferrell OHI 210H PI - survey misses target center by 17.2usft at 11925.6usft MD (6726.1 TVD, -3291.7 N, 3206.0 E) - Point	0.00	360.00	6,724.2	-3,285.2	3,221.7	560,428.69	1,714,524.75	40° 2' 3.20 N	80° 31' 10.20 W
Roy Ferrell OHI 210H PI - survey misses target center by 8.1usft at 14784.0usft MD (6766.4 TVD, -5906.6 N, 4349.8 E) - Point	0.00	360.00	6,758.8	-5,908.8	4,351.2	557,805.14	1,715,654.15	40° 1' 37.40 N	80° 30' 55.30 W
Roy Ferrell OHI 210H PI - survey misses target center by 118.4usft at 11837.8usft MD (6724.1 TVD, -3210.8 N, 3172.0 E) - Point	0.00	360.00	6,722.9	-3,164.6	3,281.1	560,549.25	1,714,584.09	40° 2' 4.40 N	80° 31' 9.45 W
Roy Ferrell OHI 210H PI - survey misses target center by 2.7usft at 14784.0usft MD (6766.4 TVD, -5906.6 N, 4349.8 E) - Point	0.00	360.00	6,767.0	-5,908.8	4,351.2	557,805.14	1,715,654.15	40° 1' 37.40 N	80° 30' 55.30 W
Interp @ 6710.9 (Roy Fe - survey misses target center by 10.4usft at 10857.9usft MD (6714.0 TVD, -2311.7 N, 2782.7 E) - Point	0.00	0.00	6,710.9	-2,308.0	2,791.9	561,405.82	1,714,094.95	40° 2' 12.81 N	80° 31' 15.87 W
Roy Ferrell OHI 210H PI - survey misses target center by 18.8usft at 14784.0usft MD (6766.4 TVD, -5906.6 N, 4349.8 E) - Point	0.00	360.00	6,748.0	-5,908.8	4,351.2	557,805.14	1,715,654.15	40° 1' 37.40 N	80° 30' 55.30 W
Roy Ferrell OHI 210H PI - survey misses target center by 2.7usft at 14784.0usft MD (6766.4 TVD, -5906.6 N, 4349.8 E) - Point	0.00	360.00	6,765.8	-5,908.8	4,351.2	557,805.14	1,715,654.15	40° 1' 37.40 N	80° 30' 55.30 W
Roy Ferrell OHI 210H PI - survey misses target center by 8.0usft at 14784.0usft MD (6766.4 TVD, -5906.6 N, 4349.8 E) - Point	0.00	360.00	6,758.8	-5,908.8	4,351.2	557,805.14	1,715,654.15	40° 1' 37.40 N	80° 30' 55.30 W
Roy Ferrell OHI 210H LF - survey misses target center by 180.3usft at 7566.0usft MD (6645.7 TVD, 808.9 N, 1751.9 E) - Point	0.00	360.00	6,670.6	761.1	1,579.9	564,474.85	1,712,882.93	40° 2' 43.00 N	80° 31' 31.90 W
Roy Ferrell OHI 210H LF - survey misses target center by 179.2usft at 7565.1usft MD (6645.7 TVD, 808.8 N, 1751.7 E) - Point	0.00	360.00	6,660.0	761.1	1,579.9	564,474.85	1,712,882.93	40° 2' 43.00 N	80° 31' 31.90 W

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
14,734.0	6,767.9	-5,861.7	4,327.8	Last Cathedral Survey @ 14,734' MD
14,784.0	6,766.4	-5,906.6	4,349.8	PTB @ 14,784' MD

Checked By: _____ Approved By: _____ Date: _____

RECEIVED
Office of Oil and Gas

JUN 21 2016

WV Department of
Environmental Protection