



Company: Chesapeake Operating, Inc
 Lease / Well: Roy Ferrell-Ohl 10H
 County/Parish: Ohio County
 State: WV
 Date: 1/23/2014
 AP#: 47-6900114
 Dir. Company: CATHEDRAL
 Latitude: NA
 Longitude: NA

Operator: Chris Gross
 Job Number: SVP-A-140024
 Gyro Serial #: SRG 118
 Proposed Direction: 157.98
 Mag. Declination: 8.79
 Rig/RKB: Nomac #37
 Tie-In Company: NA
 X: NA
 Y: NA

WEST GRID NORTH
 18 ft.

FIELD USE ONLY, DEFINITIVE SURVEY WILL COME FROM M/S SURVEY OFFICES

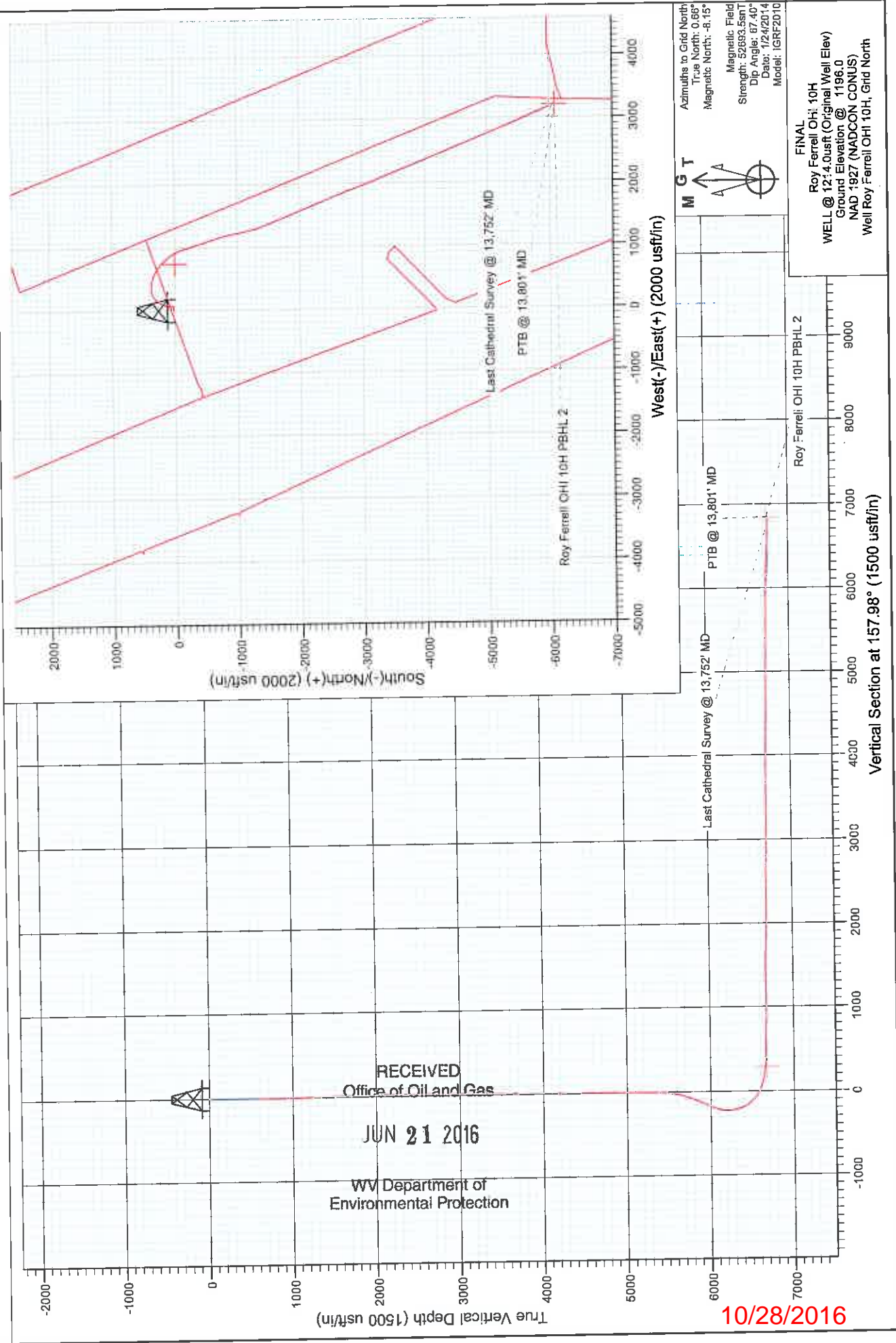
TIE-IN SURVEY			
Measured Depth (ft.)	Inclination	Azimuth Bearing	Vertical Depth
0.00	0.00	0.00	0.00

Measured Depth (ft.)	Inclination	Azimuth Bearing	Digital Multi-Shot Survey Report			Dog-Leg / 100 ft.	Closure Distance	Closure Direction
			Vertical Section	Coordinates (+N/-S)	Coordinates (+E/-W)			
100.00	0.35	346.93	-0.30	0.30	-0.07	0.35	0.31	346.93
200.00	0.25	324.64	-0.82	0.77	-0.26	0.15	0.82	341.12
300.00	0.29	14.83	-1.23	1.20	-0.33	0.23	1.24	344.75
400.00	0.20	244.75	-1.42	1.37	-0.42	0.45	1.43	342.95
500.00	0.18	42.49	-1.48	1.41	-0.47	0.37	1.48	341.50
600.00	0.19	269.11	-1.61	1.52	-0.53	0.34	1.61	340.74

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Project: Ohio County, WV
Site: Roy Ferrell OHI Pad
Well: Roy Ferrell OHI 10H
Wellbore: HZ
Design: FINAL



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Environmental Protection

10/28/2016

Cathedral Energy Services

Survey Report

Company: Chesapeake Energy Corp	Local Co-ordinate Reference: Well Roy Ferrell OHI 10H
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 10H	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)	Using geodetic scale factor
Map Zone: West Virginia North 4701	

Site: Roy Ferrell OHI Pad		
Site Position:	Northing: 563,734.16 usft	Latitude: 40° 2' 35.50 N
From: Lat/Long	Easting: 1,711,267.79 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 10H			
Well Position +N/-S	0.0 usft	Northing: 563,703.71 usft	Latitude: 40° 2' 35.20 N
+E/-W	0.0 usft	Easting: 1,711,295.22 usft	Longitude: 80° 31' 52.20 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	1/24/2014	-8.81	67.40	52,694

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	157.98

Survey Program		Date: 2/6/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	600.0	Gyro (HZ)	Gyro	Gyro
836.0	13,801.0	Survey #1 (HZ)	MWD	Geolink MWD

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
600.0	0.19	268.11	600.0	1.5	-0.5	-1.6	0.00	0.00	
836.0	0.50	303.10	836.0	2.1	-1.8	-2.6	0.15	0.13	
929.0	1.10	69.60	929.0	2.6	-1.3	-2.9	1.56	0.65	
961.0	2.00	72.50	961.0	2.9	-0.5	-2.8	2.82	2.81	
992.0	3.10	79.30	991.9	3.2	0.9	-2.6	3.67	3.55	
1,023.0	4.40	88.00	1,022.9	3.4	2.9	-2.1	4.57	4.19	
1,054.0	5.50	94.80	1,053.8	3.3	5.6	-1.0	4.02	3.55	
1,398.0	4.10	77.20	1,396.6	4.7	34.0	8.4	0.59	-0.41	
1,461.0	3.80	79.50	1,459.4	5.5	38.2	9.2	0.54	-0.48	
1,523.0	3.40	81.50	1,521.3	6.2	42.1	10.0	0.68	-0.65	
1,586.0	3.30	83.40	1,584.2	6.7	45.7	11.0	0.24	-0.16	
1,649.0	3.30	84.90	1,647.1	7.0	49.3	12.0	0.14	0.00	

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Site: Roy Ferrell OHI Pad
Well: Roy Ferrell OHI 10H
Wellbore: HZ
Design: FINAL

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well Roy Ferrell OHI 10H
 WELL @ 1214.0usft (Original Well Elev)
 WELL @ 1214.0usft (Original Well Elev)
 Grid
 Minimum Curvature
 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
1,713.0	2.70	88.70	1,711.0	7.2	52.7	13.0	0.99	-0.94	
1,775.0	2.60	94.30	1,772.9	7.2	55.5	14.2	0.45	-0.16	
1,838.0	2.90	96.30	1,835.8	6.9	58.5	15.6	0.50	0.48	
1,901.0	2.90	95.30	1,898.8	6.6	61.7	17.1	0.08	0.00	
1,964.0	3.00	90.30	1,961.7	6.4	64.9	18.4	0.44	0.16	
2,027.0	3.10	87.90	2,024.6	6.5	68.3	19.6	0.26	0.16	
2,089.0	2.60	86.70	2,086.5	6.6	71.4	20.6	0.81	-0.81	
2,130.0	2.30	81.90	2,127.5	6.8	73.1	21.1	0.89	-0.73	
2,207.0	1.60	71.80	2,204.4	7.3	75.7	21.6	1.01	-0.91	
2,269.0	0.60	63.90	2,266.4	7.7	76.8	21.6	1.63	-1.61	
2,332.0	0.70	54.60	2,329.4	8.1	77.4	21.5	0.23	0.16	
2,394.0	0.40	0.20	2,391.4	8.5	77.7	21.2	0.92	-0.48	
2,457.0	0.10	291.40	2,454.4	8.8	77.6	21.0	0.60	-0.48	
2,520.0	0.30	261.90	2,517.4	8.8	77.4	20.9	0.35	0.32	
2,582.0	0.20	271.70	2,579.4	8.8	77.2	20.8	0.17	-0.16	
2,643.0	0.60	305.60	2,640.4	8.9	76.8	20.5	0.73	0.66	
2,769.0	0.70	269.60	2,766.4	9.3	75.5	19.7	0.33	0.08	
2,895.0	0.80	305.10	2,892.4	9.8	74.0	18.6	0.37	0.08	
3,021.0	0.20	290.10	3,018.4	10.4	73.1	17.8	0.48	-0.48	
3,147.0	0.40	335.60	3,144.4	10.9	72.7	17.2	0.24	0.16	
3,273.0	0.60	281.30	3,270.4	11.4	71.9	16.4	0.39	0.16	
3,527.0	0.60	314.20	3,524.4	12.6	69.6	14.4	0.13	0.00	
3,716.0	0.60	323.20	3,713.4	14.1	68.3	12.6	0.05	0.00	
3,903.0	0.50	308.00	3,900.3	15.4	67.1	10.9	0.09	-0.05	
4,091.0	0.90	356.20	4,088.3	17.3	66.3	8.8	0.36	0.21	
4,217.0	0.70	18.60	4,214.3	19.1	66.5	7.3	0.29	-0.16	
4,344.0	0.50	34.00	4,341.3	20.3	67.1	6.4	0.20	-0.16	
4,596.0	0.60	356.80	4,593.3	22.5	67.6	4.5	0.14	0.04	
4,721.0	0.30	311.20	4,718.3	23.4	67.3	3.6	0.36	-0.24	
4,846.0	0.40	56.50	4,843.3	23.8	67.4	3.2	0.45	0.08	
4,970.0	0.20	333.70	4,967.3	24.2	67.7	2.9	0.34	-0.16	
5,095.0	0.50	26.80	5,092.3	24.9	67.9	2.3	0.33	0.24	
5,220.0	0.40	333.80	5,217.3	25.8	67.9	1.5	0.33	-0.08	
5,312.0	0.60	9.00	5,309.3	26.6	67.8	0.8	0.39	0.22	
5,339.0	0.70	359.60	5,336.3	26.9	67.9	0.5	0.54	0.37	
5,370.0	0.90	344.60	5,367.3	27.3	67.8	0.1	0.93	0.65	
5,401.0	1.80	2.60	5,398.3	28.0	67.8	-0.6	3.17	2.90	
5,485.0	5.40	2.50	5,462.1	32.0	67.9	-4.2	5.63	5.63	
5,528.0	9.90	3.30	5,524.6	40.4	68.4	-11.8	7.14	7.14	
5,590.0	12.60	10.70	5,585.4	52.4	69.9	-22.3	4.93	4.35	
5,653.0	16.90	8.30	5,646.3	68.2	72.5	-36.0	6.89	6.83	
5,716.0	20.30	9.90	5,706.0	88.0	75.7	-53.2	5.46	5.40	
5,779.0	23.40	11.30	5,764.4	111.1	80.1	-72.9	4.99	4.92	
5,811.0	25.40	13.40	5,793.6	124.0	82.9	-83.8	6.81	6.25	
5,841.0	25.80	18.00	5,820.6	136.4	86.4	-94.1	6.76	1.33	
5,873.0	28.00	19.10	5,849.2	150.2	91.0	-105.1	7.05	6.88	
5,904.0	30.20	19.40	5,876.3	164.4	96.0	-116.4	7.11	7.10	
5,936.0	32.30	19.90	5,903.6	180.0	101.6	-128.8	6.61	6.56	
5,968.0	34.00	22.30	5,930.4	196.3	107.9	-141.6	6.71	5.31	
6,000.0	35.30	25.50	5,956.7	213.0	115.3	-154.2	6.99	4.06	
6,031.0	35.70	30.10	5,982.0	228.9	123.7	-165.8	8.71	1.29	
6,063.0	37.00	33.80	6,007.8	245.0	133.7	-177.0	7.97	4.06	
6,095.0	37.40	37.10	6,033.2	260.7	144.9	-187.4	6.36	1.25	

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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 10H	North Reference: Grid
Wellbore: HZ	Survey Calculation Method: Minimum Curvature
Design: FINAL	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
6,127.0	38.10	40.90	6,058.6	275.9	157.2	-196.9	7.59	2.19	
6,159.0	39.70	44.70	6,083.5	290.7	170.9	-205.4	8.98	5.00	
6,190.0	39.50	49.50	6,107.4	304.1	185.4	-212.4	9.89	-0.65	
6,222.0	39.00	52.90	6,132.1	316.8	201.1	-218.3	6.90	-1.56	
6,253.0	37.90	57.70	6,156.4	327.8	217.0	-222.5	10.26	-3.55	
6,285.0	37.70	62.50	6,181.7	337.5	234.0	-225.2	9.21	-0.63	
6,317.0	38.10	67.10	6,207.0	345.9	251.7	-226.3	8.92	1.25	
6,348.0	37.80	72.40	6,231.4	352.5	269.6	-225.7	10.56	-0.97	
6,380.0	37.70	76.60	6,256.7	357.7	288.5	-223.5	8.04	-0.31	
6,411.0	37.80	80.20	6,281.2	361.5	307.1	-220.0	7.12	0.32	
6,441.0	38.80	84.10	6,304.8	364.1	325.5	-215.5	8.72	3.33	
6,473.0	39.40	85.40	6,329.6	365.9	345.6	-209.7	3.17	1.88	
6,505.0	41.70	89.00	6,353.9	366.9	366.3	-202.8	10.25	7.19	
6,536.0	44.00	90.60	6,376.7	367.0	387.4	-195.0	8.21	7.42	
6,567.0	45.20	95.00	6,398.7	365.9	409.1	-185.8	10.69	3.87	
6,599.0	46.50	98.70	6,421.0	363.2	431.9	-174.7	9.24	4.06	
6,631.0	48.30	101.20	6,442.7	359.1	455.1	-162.3	8.04	5.63	
6,662.0	50.00	103.70	6,463.0	354.0	478.0	-149.0	8.20	5.48	
6,694.0	52.10	106.60	6,483.1	347.5	502.0	-133.9	9.63	6.56	
6,724.0	54.30	109.50	6,501.1	340.1	524.9	-118.5	10.66	7.33	
6,756.0	56.70	112.10	6,519.2	330.7	549.5	-100.6	10.05	7.50	
6,788.0	58.60	115.40	6,536.3	319.8	574.2	-81.2	10.54	5.94	
6,820.0	60.50	117.70	6,552.5	307.5	598.9	-60.5	8.58	5.94	
6,852.0	62.20	120.30	6,567.9	293.9	623.5	-38.7	8.89	5.31	
6,883.0	65.00	122.30	6,581.7	279.4	647.2	-16.4	10.72	9.03	
6,915.0	67.70	123.60	6,594.5	263.5	671.8	7.6	9.22	8.44	
6,946.0	70.80	125.10	6,605.5	247.1	695.7	31.7	10.98	10.00	
6,978.0	73.30	126.80	6,615.3	229.3	720.3	57.5	9.30	7.81	
7,009.0	75.50	130.10	6,623.7	210.7	743.7	83.5	12.47	7.10	
7,041.0	76.50	132.30	6,631.4	190.2	767.1	111.2	7.37	3.13	
7,072.0	77.70	134.80	6,638.3	169.4	789.0	138.7	8.76	3.87	
7,103.0	78.00	136.90	6,644.9	147.7	810.1	166.8	6.69	0.97	
7,135.0	80.10	139.90	6,650.9	124.2	830.9	196.4	11.30	6.56	
7,166.0	81.70	142.60	6,655.8	100.3	850.1	225.7	10.03	5.16	
7,198.0	83.70	145.50	6,659.9	74.6	868.7	256.5	10.95	6.25	
7,229.0	85.40	147.20	6,662.9	48.9	885.8	286.8	7.74	5.48	
7,261.0	86.40	149.30	6,665.1	21.8	902.6	318.2	7.25	3.13	
7,292.0	87.60	151.10	6,666.8	-5.1	918.0	348.9	6.97	3.87	
7,323.0	88.60	153.90	6,667.8	-32.5	932.3	379.7	9.59	3.23	
7,355.0	89.40	156.90	6,668.4	-61.6	945.6	411.7	9.70	2.50	
7,386.0	89.70	160.60	6,668.6	-90.5	956.9	442.7	11.97	0.97	
7,418.0	90.00	162.10	6,668.7	-120.8	967.1	474.6	4.78	0.94	
7,481.0	88.50	162.20	6,669.5	-180.8	986.4	537.4	2.39	-2.38	
7,544.0	89.10	162.00	6,670.8	-240.7	1,005.8	600.3	1.00	0.95	
7,606.0	87.80	163.40	6,672.5	-299.9	1,024.2	662.0	3.08	-2.10	
7,669.0	88.20	163.70	6,674.7	-360.3	1,042.0	724.7	0.79	0.63	
7,733.0	88.30	162.80	6,676.7	-421.5	1,060.4	788.4	1.41	0.16	
7,796.0	88.00	162.60	6,678.7	-481.7	1,079.2	851.1	0.57	-0.48	
7,859.0	88.20	162.60	6,680.8	-541.7	1,098.0	913.9	0.32	0.32	
7,922.0	89.10	162.60	6,682.3	-601.8	1,116.8	976.7	1.43	1.43	
7,985.0	89.40	162.10	6,683.1	-661.9	1,135.9	1,039.5	0.93	0.48	
8,048.0	90.30	162.60	6,683.3	-721.9	1,155.0	1,102.3	1.63	1.43	
8,111.0	91.00	164.90	6,682.5	-782.4	1,172.7	1,165.0	3.82	1.11	

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Survey									
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8,175.0	90.50	166.50	6,681.7	-844.4	1,188.5	1,228.4	2.62	-0.78	
8,237.0	90.80	166.80	6,681.0	-904.9	1,201.7	1,289.5	3.74	0.48	
8,300.0	90.80	169.50	6,680.1	-966.8	1,213.6	1,351.3	1.11	0.00	
8,363.0	90.70	169.00	6,679.3	-1,028.7	1,225.3	1,413.1	0.81	-0.16	
8,426.0	90.00	168.20	6,678.9	-1,090.5	1,237.8	1,475.0	1.69	-1.11	
8,489.0	89.30	166.70	6,679.3	-1,152.0	1,251.5	1,537.1	2.63	-1.11	
8,552.0	88.90	165.10	6,680.3	-1,213.0	1,266.8	1,599.5	2.62	-0.63	
8,615.0	88.10	163.60	6,681.9	-1,273.7	1,283.8	1,662.1	2.70	-1.27	
8,679.0	88.70	161.40	6,683.7	-1,334.7	1,303.0	1,725.9	3.56	0.94	
8,741.0	87.70	160.90	6,685.7	-1,393.3	1,323.1	1,787.8	1.80	-1.81	
8,804.0	87.60	159.50	6,688.2	-1,452.6	1,344.4	1,850.7	2.23	-0.16	
8,867.0	89.20	158.80	6,690.0	-1,511.4	1,366.8	1,913.6	2.77	2.54	
8,930.0	89.10	158.40	6,690.9	-1,570.1	1,389.8	1,976.6	0.65	-0.16	
8,993.0	89.50	157.20	6,691.7	-1,628.4	1,413.6	2,039.6	2.01	0.63	
9,056.0	88.90	158.20	6,692.6	-1,686.7	1,437.5	2,102.6	1.85	-0.95	
9,119.0	88.60	157.30	6,694.0	-1,745.0	1,461.3	2,165.6	1.51	-0.48	
9,181.0	88.80	155.50	6,695.4	-1,801.8	1,486.2	2,227.5	2.92	0.32	
9,243.0	89.00	157.00	6,696.6	-1,858.5	1,511.1	2,289.5	2.44	0.32	
9,305.0	90.00	158.80	6,697.1	-1,915.9	1,534.4	2,351.5	3.32	1.61	
9,367.0	90.40	158.50	6,696.9	-1,973.7	1,557.0	2,413.5	0.81	0.65	
9,430.0	90.60	157.80	6,696.3	-2,032.2	1,580.5	2,476.5	1.16	0.32	
9,494.0	90.70	157.90	6,695.6	-2,091.4	1,604.6	2,540.5	0.22	0.16	
9,557.0	90.90	158.00	6,694.7	-2,149.8	1,628.2	2,603.5	0.35	0.32	
9,620.0	89.60	157.70	6,694.5	-2,208.2	1,652.0	2,666.5	2.12	-2.06	
9,682.0	88.20	157.70	6,695.6	-2,265.5	1,675.5	2,728.4	2.26	-2.26	
9,744.0	88.30	157.40	6,697.5	-2,322.8	1,699.2	2,790.4	0.51	0.16	
9,807.0	88.20	157.40	6,699.5	-2,380.9	1,723.4	2,853.4	0.16	-0.16	
9,870.0	88.90	157.30	6,701.1	-2,439.0	1,747.6	2,916.4	1.12	1.11	
9,934.0	89.30	156.60	6,702.1	-2,497.9	1,772.7	2,980.3	1.28	0.63	
9,996.0	89.10	158.10	6,702.9	-2,555.1	1,796.6	3,042.3	2.44	-0.32	
10,059.0	89.10	159.50	6,703.9	-2,613.9	1,819.3	3,105.3	2.22	0.00	
10,121.0	89.20	159.40	6,704.8	-2,671.9	1,841.1	3,167.3	0.23	0.16	
10,183.0	89.60	159.10	6,705.5	-2,729.9	1,863.1	3,229.3	0.81	0.65	
10,245.0	89.80	159.90	6,705.8	-2,788.0	1,884.8	3,291.2	1.33	0.32	
10,309.0	89.90	160.90	6,706.0	-2,848.2	1,906.2	3,355.2	1.57	0.16	
10,372.0	89.10	160.10	6,706.5	-2,907.6	1,927.3	3,418.1	1.80	-1.27	
10,434.0	89.40	159.80	6,707.3	-2,965.9	1,948.5	3,480.1	0.68	0.48	
10,496.0	90.00	159.60	6,707.7	-3,024.0	1,970.0	3,542.1	1.02	0.97	
10,559.0	90.30	160.30	6,707.5	-3,083.2	1,991.6	3,605.0	1.21	0.48	
10,621.0	89.20	158.80	6,707.8	-3,141.3	2,013.3	3,667.0	3.00	-1.77	
10,683.0	89.10	158.10	6,708.7	-3,198.9	2,036.1	3,729.0	1.14	-0.16	
10,746.0	89.30	158.00	6,709.6	-3,257.4	2,059.6	3,792.0	0.35	0.32	
10,809.0	89.90	157.80	6,710.0	-3,315.7	2,083.3	3,855.0	1.00	0.95	
10,872.0	89.80	158.60	6,710.2	-3,374.2	2,106.7	3,918.0	1.28	-0.16	
10,933.0	90.60	158.70	6,710.0	-3,431.0	2,128.9	3,979.0	1.32	1.31	
10,996.0	90.50	158.30	6,709.4	-3,489.7	2,152.0	4,042.0	0.65	-0.16	
11,059.0	89.70	157.90	6,709.2	-3,548.1	2,175.5	4,105.0	1.42	-1.27	
11,122.0	88.20	158.90	6,710.4	-3,606.7	2,198.7	4,167.9	2.86	-2.38	
11,184.0	88.20	158.80	6,712.4	-3,664.5	2,221.1	4,229.9	0.16	0.00	
11,245.0	88.20	158.40	6,714.3	-3,721.2	2,243.3	4,290.9	0.66	0.00	
11,308.0	88.40	158.60	6,716.1	-3,779.8	2,266.4	4,353.8	0.45	0.32	
11,370.0	88.70	158.60	6,717.7	-3,837.5	2,289.0	4,415.8	0.48	0.48	
11,433.0	89.00	158.10	6,719.0	-3,896.1	2,312.2	4,478.8	0.93	0.48	

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Cathedral Energy Services

Survey Report

Company: Chesapeake Energy Corp
Project: Ohio County, WV
Site: Roy Ferrell OHI Pad
Well: Roy Ferrell OHI 10H
Wellbore: HZ
Design: FINAL

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well Roy Ferrell OHI 10H
 WELL @ 1214.0usft (Original Well Elev)
 WELL @ 1214.0usft (Original Well Elev)
 Grid
 Minimum Curvature
 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
11,495.0	89.20	157.20	6,719.9	-3,953.4	2,335.8	4,540.8	1.49	0.32	
11,557.0	89.50	157.40	6,720.6	-4,010.6	2,359.7	4,602.8	0.58	0.48	
11,621.0	89.70	158.00	6,721.1	-4,069.8	2,384.0	4,666.8	0.99	0.31	
11,684.0	90.00	157.60	6,721.3	-4,128.1	2,407.8	4,729.8	0.79	0.48	
11,747.0	90.10	157.60	6,721.2	-4,186.4	2,431.8	4,792.8	0.16	0.16	
11,810.0	90.50	157.60	6,720.9	-4,244.6	2,455.8	4,855.8	0.63	0.63	
11,873.0	90.00	157.60	6,720.6	-4,302.9	2,479.8	4,918.8	0.79	-0.79	
11,936.0	90.00	158.10	6,720.6	-4,361.2	2,503.6	4,981.8	0.79	0.00	
11,999.0	88.30	158.20	6,721.5	-4,419.7	2,527.0	5,044.8	2.70	-2.70	
12,063.0	88.30	158.60	6,723.4	-4,479.2	2,550.6	5,108.7	0.62	0.00	
12,125.0	89.00	159.10	6,724.9	-4,537.0	2,572.9	5,170.7	1.39	1.13	
12,187.0	89.00	159.10	6,726.0	-4,594.9	2,595.1	5,232.7	0.00	0.00	
12,249.0	89.30	158.40	6,726.9	-4,652.7	2,617.5	5,294.7	1.23	0.48	
12,313.0	89.60	158.60	6,727.5	-4,712.2	2,641.0	5,358.7	0.56	0.47	
12,374.0	89.60	158.80	6,727.9	-4,769.1	2,663.1	5,419.7	0.33	0.00	
12,437.0	89.20	158.80	6,728.6	-4,827.8	2,685.9	5,482.6	0.63	-0.63	
12,501.0	89.80	158.40	6,729.2	-4,887.4	2,709.3	5,546.6	1.13	0.94	
12,562.0	90.10	159.10	6,729.2	-4,944.2	2,731.4	5,607.6	1.25	0.49	
12,623.0	88.80	157.30	6,729.8	-5,000.9	2,754.0	5,668.6	3.64	-2.13	
12,686.0	88.80	157.10	6,731.1	-5,058.9	2,778.4	5,731.6	0.32	0.00	
12,750.0	89.60	157.70	6,732.0	-5,118.0	2,803.0	5,795.6	1.56	1.25	
12,812.0	90.20	158.10	6,732.1	-5,175.4	2,826.4	5,857.6	1.16	0.97	
12,875.0	90.20	157.40	6,731.9	-5,233.8	2,850.2	5,920.6	1.11	0.00	
12,938.0	90.80	157.20	6,731.3	-5,291.9	2,874.5	5,983.6	1.00	0.95	
13,001.0	88.90	156.50	6,731.5	-5,349.8	2,899.3	6,046.6	3.21	-3.02	
13,063.0	87.90	155.10	6,733.2	-5,406.3	2,924.7	6,108.5	2.77	-1.61	
13,126.0	87.50	156.60	6,735.8	-5,463.8	2,950.5	6,171.4	2.46	-0.63	
13,189.0	87.60	156.40	6,738.5	-5,521.5	2,975.5	6,234.3	0.35	0.16	
13,251.0	87.10	157.50	6,741.3	-5,578.5	2,999.8	6,296.2	1.95	-0.81	
13,313.0	87.70	157.40	6,744.1	-5,635.7	3,023.5	6,358.2	0.98	0.97	
13,377.0	88.10	157.20	6,746.5	-5,694.7	3,048.2	6,422.1	0.70	0.63	
13,440.0	87.10	157.80	6,749.1	-5,752.8	3,072.3	6,485.1	1.85	-1.59	
13,503.0	87.40	158.10	6,752.1	-5,811.1	3,095.9	6,548.0	0.67	0.48	
13,564.0	87.90	158.20	6,754.6	-5,867.7	3,118.6	6,609.0	0.84	0.82	
13,627.0	87.60	158.30	6,757.1	-5,926.2	3,142.0	6,671.9	0.50	-0.48	
13,689.0	88.20	158.70	6,759.4	-5,983.8	3,164.7	6,733.9	1.16	0.97	
13,752.0	88.70	159.20	6,761.1	-6,042.6	3,187.3	6,796.9	1.12	0.79	Last Cathedral Survey @ 13,752' MD
13,801.0	88.70	159.20	6,762.2	-6,088.4	3,204.7	6,845.8	0.00	0.00	PTB @ 13,801' MD

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WV Department of
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Cathedral Energy Services

Survey Report

Company: Chesapeake Energy Corp
Project: Ohio County, WV
Site: Roy Ferrell OHI Pad
Well: Roy Ferrell OHI 10H
Wellbore: HZ
Design: FINAL

Local Co-ordinate Reference: Well Roy Ferrell OHI 10H
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

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 10H LP - survey misses target center by 149.1usft at 7191.1usft MD (6659.1 TVD, 80.2 N, 864.8 E) - Point	0.00	0.00	6,640.0	-8.6	746.6	563,695.16	1,712,041.80	40° 2' 35.20 N	80° 31' 42.60 W
Roy Ferrell OHI 10H PBI - survey misses target center by 1.8usft at 13800.9usft MD (6762.2 TVD, -6088.4 N, 3204.7 E) - Point	0.00	0.00	6,760.6	-6,088.1	3,205.5	557,615.82	1,714,500.61	40° 1' 35.40 N	80° 31' 10.10 W
Roy Ferrell OHI 10H PBI - survey misses target center by 16.6usft at 13800.6usft MD (6762.2 TVD, -6088.1 N, 3204.5 E) - Point	0.00	0.00	6,745.6	-6,088.1	3,205.5	557,615.82	1,714,500.61	40° 1' 35.40 N	80° 31' 10.10 W
Roy Ferrell OHI 10H LP ² - survey misses target center by 53.6usft at 8030.1usft MD (6683.3 TVD, -704.8 N, 1149.7 E) - Point	0.00	0.00	6,685.3	-688.6	1,200.7	563,015.13	1,712,495.88	40° 2' 28.53 N	80° 31' 36.66 W
Roy Ferrell OHI 10H PBI - survey misses target center by 122.2usft at 13798.2usft MD (6762.1 TVD, -6085.8 N, 3203.7 E) - Point	0.00	0.00	6,640.0	-6,088.1	3,205.5	557,615.82	1,714,500.61	40° 1' 35.40 N	80° 31' 10.10 W
Roy Ferrell OHI 10H LP - survey misses target center by 148.7usft at 7201.2usft MD (6660.3 TVD, 72.0 N, 870.5 E) - Point	0.00	0.00	6,677.0	-8.6	746.6	563,695.16	1,712,041.80	40° 2' 35.20 N	80° 31' 42.60 W

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
13,752.0	6,761.1	-6,042.6	3,187.3	Last Cathedral Survey @ 13,752' MD
13,801.0	6,762.2	-6,088.4	3,204.7	PTB @ 13,801' MD

Checked By: _____ Approved By: _____ Date: _____

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