



Frontier 22-GL-1143-25 @ 1168.0usft

Penns Park Unit 2H
Ritchie County WV
Northing: 14270754.90
Easting: 1646556.21
As Drilled



Genie Lightfoot
 9:55, June 22 2015
 Scientific Drilling
 11220 NY 10th Street
 Yukon OK 73099

WELL DETAILS		Penns Park Unit 2H	
Ground Level:	1143.0	Latitude	39° 17' 55.928 N
Longitude	80° 58' 41.873 W	Longitude	80° 58' 41.873 W
+N-S	0.0	+E-W	1646556.21
+E-W	0.0	Northing	14270754.90

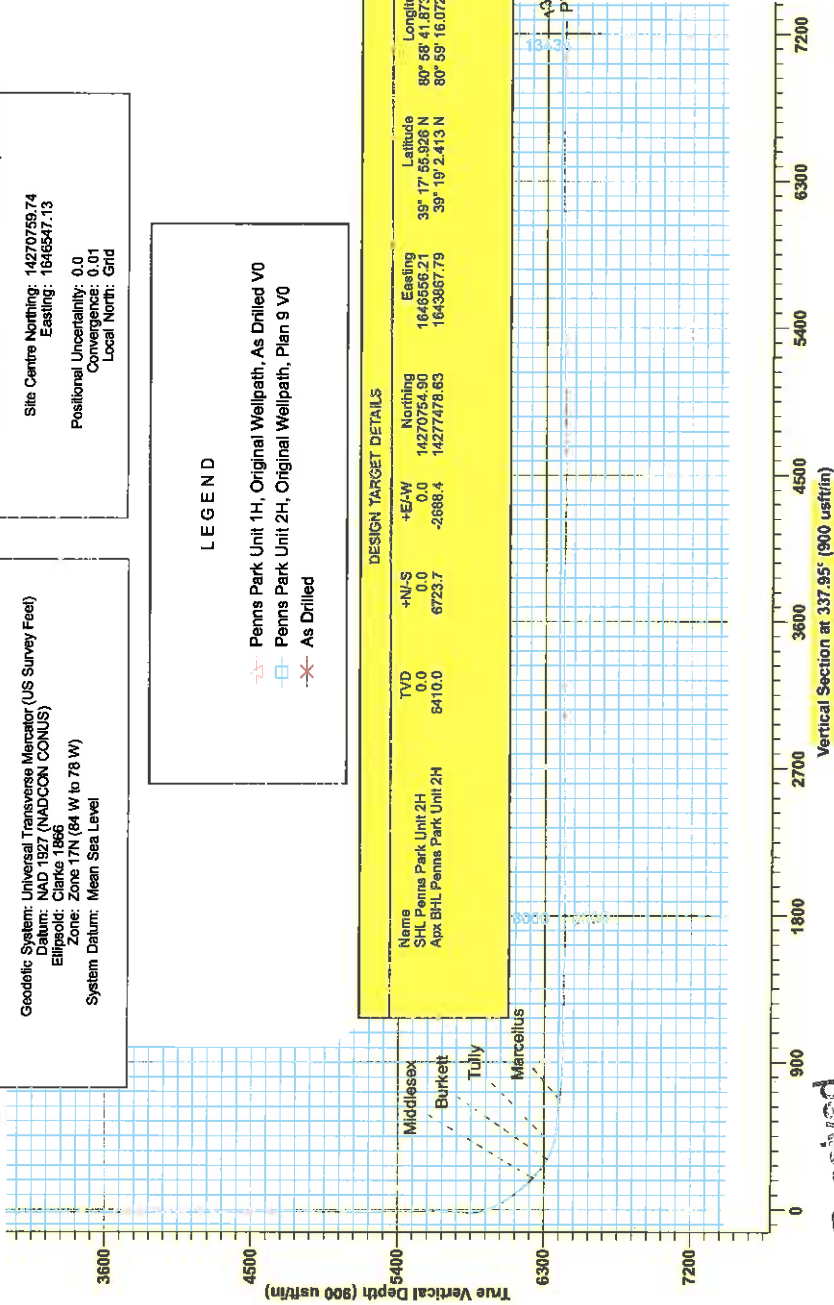
PROJECT DETAILS: Ritchie County WV
 Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD 1983 (NAD80 / CONUS)
 Ellipsoid: Clarke 1866
 Zone: Zone 17N (64 W to 78 W)
 System Datum: Mean Sea Level

SITE DETAILS: Noland Pat: Penns Park/KnoellPier/Westeln
 Site Centre Northing: 14270759.74
 Easting: 1646547.13
 Positional Uncertainty: 0.0
 Convergence: 0.01
 Local North: Grid

LEGEND

- △ Penns Park Unit 1H, Original Wellpath, As Drilled V0
- Penns Park Unit 2H, Original Wellpath, Plan 9 V0
- ✱ As Drilled

DESIGN TARGET DETAILS					
Name	TVD	+N-S	+E-W	Northing	Longitude
SHL Penns Park Unit 2H	0.0	0.0	0.0	14270754.90	80° 58' 41.873 W
Aux BHL Penns Park Unit 2H	6410.0	6723.7	-2688.4	14277478.63	80° 59' 16.072 W
				1646556.21	1643987.79



Azimuths to Grid North
 True North: -0.01°
 Magnetic North: -8.37°
 Magnetic Field
 Strength: 52161.3nT
 Dip Angle: 66.82°
 Date: 6/02/2015
 Model: BGGM2014

To convert Magnetic North to Grid, Subtract 8.37°
 To convert True North to Grid, Subtract 0.01°



Received
 Office of Oil & Gas
 JUL 18 2016



Antero

Ritchie County WV

Noland Pad: Penns Park/Knoll/Piper/Western

Penns Park Unit 2H

Original Wellpath

Design: As Drilled

EOW Completion Report

22 June, 2015

REC'D
Office of the State Auditor
JUL 18 2015





Company: Antero	Local Co-ordinate Reference: Well Penns Park Unit 2H
Project: Ritchie County WV	TVD Reference: Frontier 22 GL 1143' + 25' @ 1168.0usft
Site: Noland Pad Penns Park/Knoll/Piper/Western	MD Reference: Frontier 22 GL 1143' + 25' @ 1168.0usft
Well: Penns Park Unit 2H	North Reference: Grid
Wellbore: Original Wellpath	Survey Calculation Method: Minimum Curvature
Design: As Drilled	Database: Oklahoma District

Project	Ritchie County WV, Ritchie County WV, WV North		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	Noland Pad Penns Park/Knoll/Piper/Western				
Site Position:	Northing:	14,270,759.74 usft	Latitude:	39° 17' 55.974 N	
From: Map	Easting:	1,646,547.13 usft	Longitude:	80° 58' 41.988 W	
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.01 °

Well	Penns Park Unit 2H, Marcellus				
Well Position	+N/-S	0.0 usft	Northing:	14,270,754.90 usft	
	+E/-W	0.0 usft	Easting:	1,646,556.21 usft	
Position Uncertainty	2.0 usft	Wellhead Elevation:	1,168.0 usft	Ground Level:	1,143.0 usft

Wellbore	Original Wellpath			
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	6/8/2015	-8.36	66.82	52,161

Design	As Drilled			
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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	337.95	

Survey Program	Date 6/22/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
112.0	5,584.4	Survey #6 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
5,675.0	13,402.0	Survey #7 SDI MWD (Original Wellpath)	SDI MWD	Scientific Drilling Intl. MWD - Standard ver 1.0.1

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
112.0	0.19	70.92	112.0	0.1	0.2	0.0	0.17
137.0	0.19	49.04	137.0	0.1	0.2	0.0	0.29
162.0	0.09	82.65	162.0	0.1	0.3	0.0	0.50
187.0	0.14	30.05	187.0	0.2	0.3	0.0	0.45
212.0	0.20	79.86	212.0	0.2	0.4	0.0	0.61
237.0	0.14	88.92	237.0	0.2	0.5	0.0	0.26
262.0	0.14	85.12	262.0	0.2	0.5	0.0	0.04
287.0	0.07	123.74	287.0	0.2	0.6	0.0	0.38
312.0	0.13	38.66	312.0	0.2	0.6	0.0	0.57
337.0	0.08	47.23	337.0	0.2	0.6	0.0	0.21

Received
 Office of the State Auditor
 11/18/2015



Company:	Antero	Local Co-ordinate Reference:	Well Penns Park Unit 2H
Project:	Ritchie County WV	TVD Reference:	Frontier 22. GL 1143' + 25' @ 1168 0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22. GL 1143' + 25' @ 1168 0usft
Well:	Penns Park Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Oklahoma District

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
362.0	0.11	79.72	362.0	0.3	0.7	0.0	0.24	
387.0	0.07	87.60	387.0	0.3	0.7	0.0	0.17	
412.0	0.12	12.28	412.0	0.3	0.7	0.0	0.49	
437.0	0.15	31.94	437.0	0.3	0.7	0.0	0.22	
462.0	0.16	54.53	462.0	0.4	0.8	0.1	0.25	
487.0	0.36	75.67	487.0	0.4	0.9	0.1	0.87	
512.0	0.27	16.82	512.0	0.5	1.0	0.1	1.28	
537.0	0.27	55.33	537.0	0.6	1.1	0.2	0.71	
562.0	0.30	57.96	562.0	0.7	1.2	0.2	0.13	
587.0	0.20	156.77	587.0	0.7	1.2	0.2	1.54	
612.0	0.33	172.50	612.0	0.6	1.3	0.0	0.59	
637.0	0.59	194.60	637.0	0.4	1.2	-0.1	1.24	
662.0	1.19	195.54	662.0	0.0	1.1	-0.4	2.40	
687.0	1.62	202.37	687.0	-0.6	0.9	-0.9	1.84	
712.0	2.13	207.28	712.0	-1.3	0.6	-1.5	2.14	
737.0	2.58	209.98	737.0	-2.2	0.1	-2.1	1.85	
762.0	3.10	215.05	761.9	-3.3	-0.6	-2.8	2.31	
787.0	3.61	220.03	786.9	-4.4	-1.5	-3.6	2.35	
812.0	3.96	225.28	811.8	-5.6	-2.6	-4.3	1.97	
837.0	4.62	229.84	836.8	-6.9	-4.0	-4.9	2.97	
862.0	4.81	232.27	861.7	-8.2	-5.6	-5.5	1.10	
887.0	4.87	232.47	886.6	-9.5	-7.2	-6.1	0.25	
912.0	4.93	232.00	911.5	-10.8	-8.9	-6.6	0.29	
937.0	4.95	232.47	936.4	-12.1	-10.6	-7.2	0.18	
962.0	5.02	231.73	961.3	-13.4	-12.4	-7.8	0.38	
987.0	5.11	231.99	986.2	-14.8	-14.1	-8.4	0.37	
1,012.0	5.18	231.61	1,011.1	-16.2	-15.8	-9.1	0.31	
1,037.0	5.14	231.49	1,036.0	-17.6	-17.6	-9.7	0.17	
1,062.0	4.71	230.82	1,060.9	-18.9	-19.3	-10.3	1.74	
1,087.0	4.40	230.26	1,085.8	-20.2	-20.8	-10.9	1.25	
1,112.0	4.00	231.60	1,110.8	-21.3	-22.2	-11.4	1.65	
1,137.0	3.73	232.14	1,135.7	-22.4	-23.6	-11.9	1.09	
1,162.0	3.39	231.10	1,160.7	-23.4	-24.8	-12.3	1.38	
1,187.0	2.98	231.09	1,185.6	-24.2	-25.9	-12.7	1.64	
1,212.0	2.77	230.94	1,210.6	-25.0	-26.8	-13.1	0.84	
1,237.0	2.66	230.12	1,235.6	-25.8	-27.7	-13.5	0.47	
1,262.0	2.30	229.74	1,260.5	-26.5	-28.6	-13.8	1.44	
1,287.0	2.09	228.29	1,285.5	-27.1	-29.3	-14.1	0.87	
1,312.0	1.87	229.39	1,310.5	-27.7	-29.9	-14.4	0.89	
1,337.0	1.76	228.64	1,335.5	-28.2	-30.5	-14.6	0.45	
1,362.0	1.64	227.36	1,360.5	-28.7	-31.1	-14.9	0.50	
1,387.0	1.54	230.88	1,385.5	-29.1	-31.6	-15.1	0.56	
1,412.0	1.27	232.24	1,410.5	-29.5	-32.1	-15.3	1.09	
1,437.0	1.13	233.25	1,435.5	-29.8	-32.5	-15.4	0.57	



Company: Antero
Project: Ritchie County WV
Site: Noland Pad Penns Park/Knoll/Piper/Western
Well: Penns Park Unit 2H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Penns Park Unit 2H
TVD Reference: Frontier 22 GL 1143' + 25' @ 1168.0usft
MD Reference: Frontier 22 GL 1143' + 25' @ 1168.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,462.0	1.01	232.78	1,460.5	-30.1	-32.9	-15.6	0.48
1,487.0	0.82	235.54	1,485.4	-30.3	-33.2	-15.7	0.78
1,512.0	0.76	231.24	1,510.4	-30.5	-33.5	-15.7	0.34
1,537.0	0.69	234.16	1,535.4	-30.7	-33.7	-15.8	0.32
1,562.0	0.53	224.43	1,560.4	-30.9	-33.9	-15.9	0.76
1,587.0	0.45	212.15	1,585.4	-31.1	-34.1	-16.0	0.53
1,612.0	0.40	202.17	1,610.4	-31.2	-34.2	-16.1	0.36
1,637.0	0.38	202.71	1,635.4	-31.4	-34.2	-16.2	0.08
1,662.0	0.36	194.71	1,660.4	-31.5	-34.3	-16.4	0.22
1,687.0	0.41	191.36	1,685.4	-31.7	-34.3	-16.5	0.22
1,712.0	0.36	189.39	1,710.4	-31.9	-34.3	-16.7	0.21
1,737.0	0.26	164.00	1,735.4	-32.0	-34.3	-16.8	0.67
1,762.0	0.25	148.17	1,760.4	-32.1	-34.3	-16.9	0.28
1,787.0	0.21	129.89	1,785.4	-32.2	-34.2	-17.0	0.33
1,812.0	0.20	133.01	1,810.4	-32.2	-34.2	-17.1	0.06
1,837.0	0.20	168.65	1,835.4	-32.3	-34.1	-17.1	0.49
1,862.0	0.14	141.71	1,860.4	-32.4	-34.1	-17.2	0.39
1,887.0	0.12	119.02	1,885.4	-32.4	-34.1	-17.3	0.22
1,912.0	0.17	135.74	1,910.4	-32.5	-34.0	-17.3	0.26
1,937.0	0.16	137.87	1,935.4	-32.5	-34.0	-17.4	0.05
1,962.0	0.16	115.69	1,960.4	-32.6	-33.9	-17.4	0.25
1,987.0	0.13	123.80	1,985.4	-32.6	-33.9	-17.5	0.15
2,012.0	0.26	115.60	2,010.4	-32.6	-33.8	-17.6	0.53
2,037.0	0.24	135.72	2,035.4	-32.7	-33.7	-17.6	0.36
2,062.0	0.30	142.49	2,060.4	-32.8	-33.6	-17.8	0.27
2,087.0	0.24	147.66	2,085.4	-32.9	-33.5	-17.9	0.26
2,112.0	0.29	140.75	2,110.4	-33.0	-33.5	-18.0	0.24
2,137.0	0.21	150.21	2,135.4	-33.1	-33.4	-18.1	0.36
2,162.0	0.29	167.18	2,160.4	-33.2	-33.4	-18.2	0.43
2,187.0	0.25	162.12	2,185.4	-33.3	-33.3	-18.3	0.19
2,212.0	0.20	178.39	2,210.4	-33.4	-33.3	-18.4	0.32
2,237.0	0.13	213.48	2,235.4	-33.4	-33.3	-18.5	0.48
2,262.0	0.11	163.53	2,260.4	-33.5	-33.4	-18.5	0.41
2,287.0	0.09	172.36	2,285.4	-33.5	-33.3	-18.6	0.10
2,312.0	0.16	170.53	2,310.4	-33.6	-33.3	-18.6	0.28
2,337.0	0.05	297.23	2,335.4	-33.6	-33.3	-18.6	0.78
2,362.0	0.05	310.04	2,360.4	-33.6	-33.4	-18.6	0.04
2,387.0	0.04	97.70	2,385.4	-33.6	-33.4	-18.6	0.35
2,412.0	0.10	281.46	2,410.4	-33.6	-33.4	-18.6	0.56
2,437.0	0.21	276.54	2,435.4	-33.6	-33.4	-18.6	0.44
2,462.0	0.13	290.43	2,460.4	-33.6	-33.5	-18.5	0.36
2,487.0	0.17	226.85	2,485.4	-33.6	-33.6	-18.5	0.65
2,512.0	0.02	119.96	2,510.4	-33.6	-33.6	-18.5	0.71
2,537.0	0.08	257.78	2,535.4	-33.6	-33.6	-18.5	0.38
2,562.0	0.10	272.54	2,560.4	-33.6	-33.6	-18.5	0.12



Company:	Antero	Local Co-ordinate Reference:	Well Penns Park Unit 2H
Project:	Ritchie County WV	TVD Reference:	Frontier 22. GL 1143' + 25' @ 1168.0usft
Site:	Noland Pad. Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22. GL 1143' + 25' @ 1168.0usft
Well:	Penns Park Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
2,587.0	0.22	302.63	2,585.4	-33.6	-33.7	-18.5	0.57
2,612.0	0.19	299.65	2,610.4	-33.5	-33.8	-18.4	0.13
2,637.0	0.13	328.07	2,635.4	-33.5	-33.8	-18.3	0.39
2,662.0	0.22	348.94	2,660.4	-33.4	-33.9	-18.3	0.44
2,687.0	0.06	73.87	2,685.4	-33.4	-33.8	-18.2	0.89
2,712.0	0.05	352.91	2,710.4	-33.4	-33.8	-18.2	0.29
2,737.0	0.03	295.41	2,735.4	-33.3	-33.8	-18.2	0.17
2,762.0	0.11	255.75	2,760.4	-33.3	-33.9	-18.2	0.36
2,787.0	0.17	286.11	2,785.4	-33.3	-33.9	-18.2	0.37
2,812.0	0.17	289.01	2,810.4	-33.3	-34.0	-18.1	0.03
2,837.0	0.18	304.11	2,835.4	-33.3	-34.1	-18.1	0.19
2,862.0	0.20	338.27	2,860.4	-33.2	-34.1	-18.0	0.45
2,887.0	0.13	323.18	2,885.4	-33.2	-34.2	-17.9	0.33
2,912.0	0.14	354.03	2,910.4	-33.1	-34.2	-17.9	0.29
2,937.0	0.09	341.69	2,935.4	-33.1	-34.2	-17.8	0.22
2,962.0	0.02	339.13	2,960.4	-33.0	-34.2	-17.8	0.28
2,987.0	0.10	254.29	2,985.4	-33.0	-34.2	-17.8	0.40
3,012.0	0.16	251.81	3,010.4	-33.1	-34.3	-17.8	0.24
3,037.0	0.14	293.67	3,035.4	-33.1	-34.3	-17.7	0.44
3,062.0	0.27	288.35	3,060.4	-33.0	-34.4	-17.7	0.52
3,087.0	0.16	317.29	3,085.4	-33.0	-34.5	-17.6	0.61
3,112.0	0.24	311.77	3,110.4	-32.9	-34.6	-17.5	0.33
3,137.0	0.16	320.62	3,135.4	-32.9	-34.6	-17.5	0.34
3,162.0	0.24	327.97	3,160.4	-32.8	-34.7	-17.4	0.34
3,187.0	0.17	336.97	3,185.4	-32.7	-34.7	-17.3	0.31
3,212.0	0.25	332.25	3,210.4	-32.6	-34.7	-17.2	0.33
3,237.0	0.14	336.59	3,235.4	-32.5	-34.8	-17.1	0.44
3,262.0	0.13	336.48	3,260.4	-32.5	-34.8	-17.0	0.04
3,287.0	0.19	340.96	3,285.4	-32.4	-34.8	-17.0	0.24
3,312.0	0.08	336.39	3,310.4	-32.4	-34.9	-16.9	0.44
3,337.0	0.16	340.22	3,335.4	-32.3	-34.9	-16.9	0.32
3,362.0	0.07	286.06	3,360.4	-32.3	-34.9	-16.8	0.53
3,387.0	0.18	267.81	3,385.4	-32.3	-35.0	-16.8	0.46
3,412.0	0.22	282.71	3,410.4	-32.3	-35.0	-16.8	0.26
3,437.0	0.26	298.57	3,435.4	-32.2	-35.1	-16.7	0.31
3,462.0	0.21	314.35	3,460.4	-32.2	-35.2	-16.6	0.33
3,487.0	0.30	321.13	3,485.4	-32.1	-35.3	-16.5	0.38
3,512.0	0.22	326.04	3,510.4	-32.0	-35.4	-16.4	0.33
3,537.0	0.10	333.60	3,535.4	-31.9	-35.4	-16.3	0.49
3,562.0	0.20	324.67	3,560.4	-31.9	-35.4	-16.3	0.41
3,587.0	0.09	14.46	3,585.4	-31.8	-35.5	-16.2	0.63
3,612.0	0.19	325.06	3,610.4	-31.8	-35.5	-16.1	0.59
3,637.0	0.10	307.84	3,635.4	-31.7	-35.5	-16.1	0.40
3,662.0	0.09	294.39	3,660.4	-31.7	-35.5	-16.0	0.10



Company:	Antero	Local Co-ordinate Reference:	Well Penns Park Unit 2H
Project:	Ritchie County WV	TVD Reference:	Frontier 22. GL 1143' + 25' @ 1168 0usft
Site:	Noland Pad: Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22. GL 1143' + 25' @ 1168 0usft
Well:	Penns Park Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
3,687.0	0.08	238.45	3,685.4	-31.7	-35.6	-16.0	0.32
3,712.0	0.20	283.05	3,710.4	-31.7	-35.6	-16.0	0.61
3,737.0	0.27	292.47	3,735.4	-31.7	-35.7	-15.9	0.32
3,762.0	0.25	273.59	3,760.4	-31.7	-35.8	-15.9	0.35
3,787.0	0.30	290.30	3,785.4	-31.6	-36.0	-15.8	0.38
3,812.0	0.27	286.37	3,810.4	-31.6	-36.1	-15.7	0.14
3,837.0	0.22	291.18	3,835.4	-31.6	-36.2	-15.7	0.22
3,862.0	0.30	305.85	3,860.4	-31.5	-36.3	-15.6	0.41
3,887.0	0.20	300.72	3,885.4	-31.4	-36.4	-15.5	0.41
3,912.0	0.14	281.61	3,910.4	-31.4	-36.4	-15.4	0.33
3,937.0	0.10	302.66	3,935.4	-31.4	-36.5	-15.4	0.24
3,962.0	0.12	250.34	3,960.4	-31.4	-36.5	-15.4	0.39
3,987.0	0.14	263.91	3,985.4	-31.4	-36.6	-15.4	0.15
4,012.0	0.19	251.75	4,010.4	-31.4	-36.6	-15.4	0.24
4,037.0	0.22	250.80	4,035.4	-31.4	-36.7	-15.4	0.12
4,062.0	0.23	251.28	4,060.4	-31.5	-36.8	-15.4	0.04
4,087.0	0.24	258.73	4,085.4	-31.5	-36.9	-15.3	0.13
4,112.0	0.29	271.79	4,110.4	-31.5	-37.0	-15.3	0.31
4,137.0	0.22	255.26	4,135.4	-31.5	-37.1	-15.3	0.40
4,162.0	0.19	281.19	4,160.4	-31.5	-37.2	-15.2	0.39
4,187.0	0.17	278.44	4,185.4	-31.5	-37.3	-15.2	0.09
4,212.0	0.16	301.73	4,210.4	-31.5	-37.4	-15.2	0.27
4,237.0	0.15	322.84	4,235.4	-31.4	-37.4	-15.1	0.23
4,262.0	0.07	338.85	4,260.4	-31.4	-37.5	-15.0	0.34
4,287.0	0.07	29.04	4,285.4	-31.4	-37.5	-15.0	0.24
4,312.0	0.08	17.83	4,310.4	-31.3	-37.4	-15.0	0.07
4,337.0	0.08	19.55	4,335.4	-31.3	-37.4	-15.0	0.01
4,362.0	0.05	40.95	4,360.4	-31.3	-37.4	-15.0	0.15
4,387.0	0.04	85.22	4,385.4	-31.3	-37.4	-15.0	0.14
4,412.0	0.09	80.64	4,410.4	-31.3	-37.4	-15.0	0.20
4,437.0	0.06	331.45	4,435.4	-31.3	-37.4	-15.0	0.49
4,462.0	0.02	345.56	4,460.4	-31.2	-37.4	-14.9	0.16
4,487.0	0.08	233.45	4,485.4	-31.3	-37.4	-14.9	0.36
4,512.0	0.13	322.42	4,510.4	-31.2	-37.4	-14.9	0.61
4,537.0	0.17	301.39	4,535.4	-31.2	-37.5	-14.9	0.27
4,562.0	0.22	317.06	4,560.4	-31.1	-37.5	-14.8	0.29
4,587.0	0.17	297.93	4,585.4	-31.1	-37.6	-14.7	0.33
4,612.0	0.17	322.63	4,610.4	-31.0	-37.6	-14.6	0.29
4,637.0	0.17	317.84	4,635.4	-31.0	-37.7	-14.6	0.06
4,662.0	0.12	3.96	4,660.4	-30.9	-37.7	-14.5	0.49
4,687.0	0.16	347.72	4,685.4	-30.9	-37.7	-14.5	0.22
4,712.0	0.27	354.72	4,710.4	-30.8	-37.7	-14.4	0.45
4,737.0	0.19	354.01	4,735.4	-30.7	-37.7	-14.3	0.32
4,762.0	0.09	30.20	4,760.4	-30.6	-37.7	-14.2	0.52

Received



Company:	Antero	Local Co-ordinate Reference:	Well Penns Park Unit 2H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + 25' @ 1168.0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + 25' @ 1168.0usft
Well:	Penns Park Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
4,787.0	0.08	42.68	4,785.4	-30.6	-37.7	-14.2	0.08
4,812.0	0.14	26.00	4,810.4	-30.6	-37.7	-14.2	0.27
4,837.0	0.11	270.72	4,835.4	-30.5	-37.7	-14.1	0.85
4,862.0	0.11	307.21	4,860.4	-30.5	-37.7	-14.1	0.28
4,887.0	0.09	238.86	4,885.4	-30.5	-37.8	-14.1	0.45
4,912.0	0.10	296.73	4,910.4	-30.5	-37.8	-14.1	0.37
4,937.0	0.27	313.03	4,935.4	-30.5	-37.9	-14.0	0.71
4,962.0	0.24	318.85	4,960.4	-30.4	-38.0	-13.9	0.16
4,987.0	0.14	302.81	4,985.4	-30.3	-38.0	-13.8	0.45
5,012.0	0.37	336.04	5,010.4	-30.2	-38.1	-13.7	1.06
5,037.0	0.34	348.77	5,035.4	-30.1	-38.1	-13.6	0.34
5,062.0	0.20	348.39	5,060.4	-30.0	-38.1	-13.5	0.56
5,087.0	0.25	2.31	5,085.4	-29.9	-38.2	-13.4	0.29
5,112.0	0.22	349.40	5,110.4	-29.8	-38.2	-13.3	0.24
5,137.0	0.24	342.65	5,135.4	-29.7	-38.2	-13.2	0.13
5,162.0	0.09	18.47	5,160.4	-29.6	-38.2	-13.1	0.70
5,187.0	0.21	10.70	5,185.4	-29.5	-38.2	-13.0	0.49
5,212.0	0.11	339.21	5,210.4	-29.5	-38.2	-13.0	0.52
5,237.0	0.14	357.82	5,235.4	-29.4	-38.2	-12.9	0.20
5,262.0	0.10	22.33	5,260.4	-29.4	-38.2	-12.9	0.26
5,287.0	0.14	329.58	5,285.4	-29.3	-38.2	-12.8	0.45
5,312.0	0.18	298.44	5,310.4	-29.3	-38.2	-12.8	0.38
5,337.0	0.22	304.89	5,335.4	-29.2	-38.3	-12.7	0.18
5,362.0	0.12	290.98	5,360.4	-29.2	-38.4	-12.7	0.43
5,387.0	0.16	309.80	5,385.4	-29.2	-38.4	-12.6	0.24
5,412.0	0.24	315.26	5,410.4	-29.1	-38.5	-12.5	0.33
5,437.0	0.24	308.85	5,435.4	-29.0	-38.6	-12.4	0.11
5,462.0	0.32	306.69	5,460.4	-29.0	-38.7	-12.3	0.32
5,487.0	0.33	317.08	5,485.4	-28.9	-38.8	-12.2	0.24
5,512.0	0.37	309.82	5,510.4	-28.8	-38.9	-12.1	0.24
5,537.0	0.54	321.98	5,535.4	-28.6	-39.0	-11.9	0.78
5,562.0	0.60	306.08	5,560.4	-28.4	-39.2	-11.7	0.67
5,584.4	0.60	308.00	5,582.8	-28.3	-39.4	-11.4	0.09
5,675.0	0.64	329.82	5,673.4	-27.6	-40.0	-10.5	0.26
5,707.0	0.55	58.69	5,705.4	-27.3	-40.0	-10.3	2.61
5,740.0	5.36	102.03	5,738.4	-27.6	-38.3	-11.2	15.07
5,772.0	10.73	105.84	5,770.0	-28.7	-34.0	-13.8	16.85
5,803.0	13.94	95.66	5,800.3	-29.9	-27.5	-17.4	12.47
5,835.0	16.04	75.22	5,831.2	-29.1	-19.4	-19.7	17.66
5,867.0	19.01	59.24	5,861.8	-25.3	-10.6	-19.5	17.59
5,899.0	22.24	45.03	5,891.7	-18.4	-1.9	-16.3	18.55
5,931.0	24.31	31.96	5,921.2	-8.5	5.9	-10.1	17.35
5,962.0	25.61	18.73	5,949.3	3.3	11.5	-1.3	18.45
5,994.0	25.94	4.91	5,978.1	16.8	14.3	10.2	18.77



Company:	Antero	Local Co-ordinate Reference:	Well Penns Park Unit 2H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + 25' @ 1168 0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + 25' @ 1168.0usft
Well:	Penns Park Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
6,026.0	27.16	351.93	6,006.8	31.0	13.9	23.6	18.49
6,058.0	28.80	343.74	6,035.0	45.7	10.7	38.3	13.04
6,091.0	31.32	342.29	6,063.6	61.5	5.8	54.8	7.95
6,123.0	33.83	341.52	6,090.6	77.8	0.5	72.0	7.95
6,155.0	36.94	341.62	6,116.7	95.4	-5.4	90.5	9.72
6,187.0	40.17	341.71	6,141.7	114.4	-11.7	110.4	10.10
6,219.0	42.26	341.44	6,165.7	134.4	-18.3	131.4	6.55
6,251.0	43.55	341.16	6,189.2	155.0	-25.3	153.2	4.08
6,283.0	43.71	339.90	6,212.3	175.8	-32.7	175.2	2.76
6,308.0	44.54	339.40	6,230.3	192.1	-38.7	192.6	3.59
Middlesex							
6,315.0	44.77	339.26	6,235.3	196.7	-40.5	197.5	3.59
6,346.0	48.13	338.48	6,256.6	217.7	-48.6	220.0	10.99
6,378.0	51.62	338.03	6,277.2	240.4	-57.6	244.5	10.96
6,410.0	54.20	337.05	6,296.5	264.0	-67.4	270.0	8.42
6,442.0	58.49	337.34	6,314.3	288.5	-77.7	296.6	13.43
6,454.0	60.25	337.75	6,320.4	298.1	-81.6	306.9	14.97
Burkett							
6,474.0	63.19	338.40	6,329.9	314.4	-88.2	324.5	14.97
6,506.0	66.75	340.43	6,343.4	341.6	-98.4	353.5	12.52
6,538.0	71.27	341.14	6,354.9	369.8	-108.2	383.3	14.28
6,545.0	72.41	340.96	6,357.0	376.1	-110.4	390.0	16.43
Tully							
6,570.0	76.47	340.33	6,363.7	398.8	-118.4	414.0	16.43
6,602.0	79.91	340.35	6,370.3	428.3	-128.9	445.3	10.75
6,634.0	81.68	340.08	6,375.4	458.0	-139.6	476.9	5.59
6,657.0	83.61	339.90	6,378.4	479.4	-147.4	499.7	8.43
6,689.0	86.12	338.77	6,381.2	509.2	-158.6	531.5	8.60
6,721.0	86.61	339.05	6,383.2	539.0	-170.1	563.5	1.76
6,754.0	85.34	339.13	6,385.6	569.8	-181.9	596.4	3.86
6,786.0	83.90	339.09	6,388.6	599.5	-193.2	628.2	4.50
6,817.0	82.54	339.11	6,392.2	628.3	-204.2	659.0	4.39
6,830.0	82.43	338.86	6,393.9	640.3	-208.8	671.9	2.08
Marcellus							
6,849.0	82.26	338.50	6,396.5	657.9	-215.7	690.7	2.08
6,881.0	82.01	339.08	6,400.8	687.4	-227.2	722.4	1.96
6,913.0	83.99	339.47	6,404.7	717.1	-238.4	754.2	6.30
6,945.0	86.92	339.33	6,407.3	747.0	-249.6	786.1	9.17
6,977.0	87.72	338.98	6,408.8	776.9	-261.0	818.0	2.73
7,074.0	88.29	339.11	6,412.1	867.4	-295.7	914.9	0.60
7,170.0	89.40	337.38	6,414.1	956.5	-331.2	1,010.9	2.14
7,266.0	89.60	337.16	6,414.9	1,045.1	-368.3	1,106.9	0.31
7,363.0	88.89	338.01	6,416.2	1,134.7	-405.3	1,203.9	1.14
7,459.0	89.76	335.96	6,417.3	1,223.1	-442.8	1,299.9	2.32
7,555.0	88.49	337.34	6,418.8	1,311.2	-480.9	1,395.8	1.95

Reviewed
Office of Oil & Gas



Company:	Antero	Local Co-ordinate Reference:	Well Penns Park Unit 2H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + 25' @ 1168 0usft
Site:	Noland Pad: Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + 25' @ 1168 0usft
Well:	Penns Park Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
7,651.0	89.03	336.40	6,420.9	1,399.5	-518.6	1,491.8	1.13
7,747.0	87.99	335.98	6,423.4	1,487.3	-557.3	1,587.7	1.17
7,841.0	90.17	338.97	6,424.9	1,574.1	-593.3	1,681.7	3.94
7,937.0	92.75	340.94	6,422.4	1,664.2	-626.2	1,777.6	3.38
8,033.0	90.24	338.22	6,419.9	1,754.1	-659.7	1,873.5	3.85
8,129.0	90.13	338.24	6,419.6	1,843.3	-695.3	1,969.5	0.12
8,225.0	90.17	338.97	6,419.4	1,932.7	-730.3	2,065.5	0.76
8,321.0	89.97	338.01	6,419.2	2,022.0	-765.5	2,161.5	1.02
8,416.0	90.27	337.65	6,419.0	2,110.0	-801.4	2,256.5	0.49
8,512.0	88.83	335.38	6,419.8	2,198.0	-839.6	2,352.4	2.80
8,608.0	90.10	335.75	6,420.7	2,285.4	-879.3	2,448.3	1.38
8,704.0	90.94	337.33	6,419.8	2,373.4	-917.5	2,544.3	1.86
8,801.0	90.17	336.87	6,418.9	2,462.8	-955.3	2,641.3	0.92
8,897.0	89.53	337.03	6,419.1	2,551.1	-992.9	2,737.3	0.69
8,993.0	90.50	338.24	6,419.1	2,639.9	-1,029.4	2,833.3	1.62
9,089.0	90.37	336.84	6,418.4	2,728.6	-1,066.1	2,929.3	1.46
9,185.0	90.91	337.02	6,417.3	2,816.9	-1,103.7	3,025.2	0.59
9,281.0	90.34	336.32	6,416.3	2,905.1	-1,141.7	3,121.2	0.94
9,377.0	89.76	336.37	6,416.2	2,993.0	-1,180.2	3,217.2	0.61
9,474.0	90.50	339.36	6,416.0	3,082.9	-1,216.8	3,314.2	3.18
9,570.0	89.80	337.75	6,415.7	3,172.2	-1,251.9	3,410.2	1.83
9,665.0	90.13	339.17	6,415.8	3,260.6	-1,286.7	3,505.1	1.53
9,760.0	89.46	338.44	6,416.1	3,349.1	-1,321.1	3,600.1	1.04
9,856.0	91.04	339.53	6,415.7	3,438.8	-1,355.5	3,696.1	2.00
9,953.0	90.24	340.22	6,414.6	3,529.8	-1,388.9	3,793.0	1.09
10,048.0	89.23	341.00	6,415.0	3,619.4	-1,420.4	3,887.9	1.34
10,144.0	88.59	339.91	6,416.9	3,709.9	-1,452.5	3,983.8	1.32
10,240.0	88.69	337.82	6,419.1	3,799.4	-1,487.1	4,079.8	2.18
10,334.0	90.07	337.13	6,420.2	3,886.2	-1,523.1	4,173.8	1.64
10,430.0	89.09	335.93	6,420.9	3,974.3	-1,561.4	4,269.7	1.61
10,527.0	91.47	338.30	6,420.4	4,063.6	-1,599.1	4,366.7	3.46
10,623.0	89.90	338.39	6,419.2	4,152.8	-1,634.5	4,462.7	1.64
10,719.0	90.24	337.49	6,419.1	4,241.8	-1,670.6	4,558.7	1.00
10,815.0	90.13	337.49	6,418.8	4,330.5	-1,707.3	4,654.7	0.11
10,911.0	89.87	338.15	6,418.8	4,419.4	-1,743.6	4,750.7	0.74
11,007.0	90.30	338.38	6,418.7	4,508.6	-1,779.1	4,846.7	0.51
11,102.0	89.97	338.13	6,418.5	4,596.8	-1,814.3	4,941.7	0.44
11,199.0	91.21	337.49	6,417.5	4,686.6	-1,850.9	5,038.7	1.44
11,295.0	90.13	336.07	6,416.3	4,774.8	-1,888.8	5,134.7	1.86
11,390.0	90.54	336.32	6,415.8	4,861.7	-1,927.1	5,229.6	0.51
11,486.0	90.74	337.34	6,414.7	4,950.0	-1,964.9	5,325.6	1.08
11,581.0	90.17	336.99	6,414.0	5,037.5	-2,001.8	5,420.6	0.70
11,677.0	91.28	337.36	6,412.7	5,126.0	-2,039.0	5,516.6	1.22
11,773.0	88.99	337.08	6,412.5	5,214.5	-2,076.2	5,612.5	2.40



Company: Antero	Local Co-ordinate Reference: Well Penns Park Unit 2H
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Site: Noland Pad Penns Park/Knoll/Piper/Western	MD Reference: Frontier 22 GL 1143' + 25' @ 1168.0usft
Well: Penns Park Unit 2H	North Reference: Grid
Wellbore: Original Wellpath	Survey Calculation Method: Minimum Curvature
Design: As Drilled	Database: Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
11,869.0	90.80	339.17	6,412.7	5,303.6	-2,111.9	5,708.5	2.88
11,965.0	90.57	338.42	6,411.5	5,393.1	-2,146.7	5,804.5	0.82
12,060.0	89.60	337.82	6,411.4	5,481.2	-2,182.1	5,899.5	1.20
12,156.0	91.08	338.02	6,410.8	5,570.2	-2,218.1	5,995.5	1.56
12,251.0	89.83	336.03	6,410.1	5,657.7	-2,255.2	6,090.5	2.47
12,347.0	90.00	336.53	6,410.2	5,745.5	-2,293.8	6,186.4	0.55
12,443.0	90.57	340.47	6,409.7	5,834.8	-2,329.0	6,282.4	4.15
12,539.0	89.87	339.86	6,409.4	5,925.2	-2,361.6	6,378.3	0.97
12,636.0	91.01	338.88	6,408.6	6,015.9	-2,395.8	6,475.3	1.55
12,731.0	89.73	337.49	6,408.0	6,104.1	-2,431.1	6,570.3	1.99
12,827.0	90.54	336.68	6,407.8	6,192.5	-2,468.4	6,666.3	1.19
12,922.0	89.97	336.39	6,407.4	6,279.7	-2,506.3	6,761.3	0.67
13,018.0	90.20	337.61	6,407.2	6,368.0	-2,543.8	6,857.2	1.29
13,114.0	89.56	337.31	6,407.4	6,456.7	-2,580.6	6,953.2	0.74
13,210.0	90.17	338.67	6,407.6	6,545.7	-2,616.6	7,049.2	1.55
13,307.0	89.13	337.89	6,408.2	6,635.8	-2,652.5	7,146.2	1.34
13,344.0	88.86	337.72	6,408.9	6,670.1	-2,666.4	7,183.2	0.86
13,402.0	88.86	337.72	6,410.0	6,723.7	-2,688.4	7,241.2	0.00

PTB

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
6,308.0	6,230.3	192.1	-38.7	Middlesex
6,454.0	6,320.4	298.1	-81.6	Burkett
6,545.0	6,357.0	376.1	-110.4	Tully
6,830.0	6,393.9	640.3	-208.8	Marcellus
13,402.0	6,410.0	6,723.7	-2,688.4	PTB

Checked By: _____	Approved By: _____	Date: _____
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