



Knoll Unit 1H
Ritchie County WV
Northing: 14270745.19
Easting: 1646573.37
As Drilled



Genie Lightfoot
 10:58, July 06 2015
 Scientific Drilling
 11220 NW 10th Street
 Yukon OK 73098

WELL DETAILS		Knoll Unit 1H	
+N/-S	+E/-W	Northing	Ground Level
0.0	0.0	14270745.19	1143.0
		Easting	Longitude
		1646573.37	80° 58' 41.854 W
			39° 17' 55.830 N

PROJECT DETAILS Ritchie County WV

Geoidetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD 1983 (NAD83 CONUS)
 Ellipsoid: Clarke 1866
 Zone: Zone 17N (84 W to 78 W)
 System Datum: Mean Sea Level

SITE DETAILS: Noland Pad: Penns Park/Knoll/Piper/Western

Site Centre Northing: 14270759.74
 Easting: 1646547.13

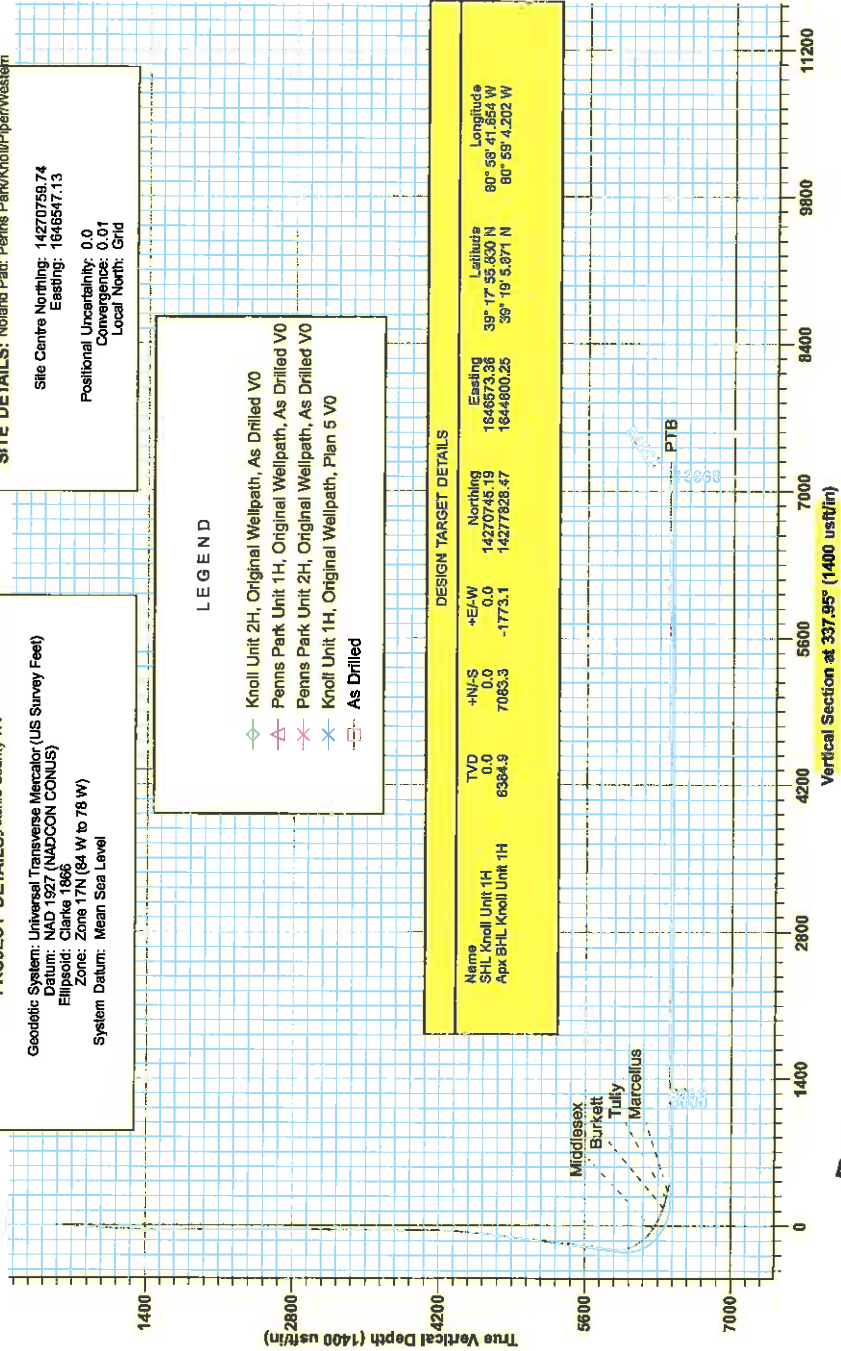
Positional Uncertainty: 0.0
 Convergence: 0.01
 Local North: Grid

LEGEND

- ◇ Knoll Unit 2H, Original Wellpath, As Drilled V0
- △ Penns Park Unit 1H, Original Wellpath, As Drilled V0
- × Penns Park Unit 2H, Original Wellpath, As Drilled V0
- ☆ Knoll Unit 1H, Original Wellpath, Plan 5 V0
- As Drilled

DESIGN TARGET DETAILS

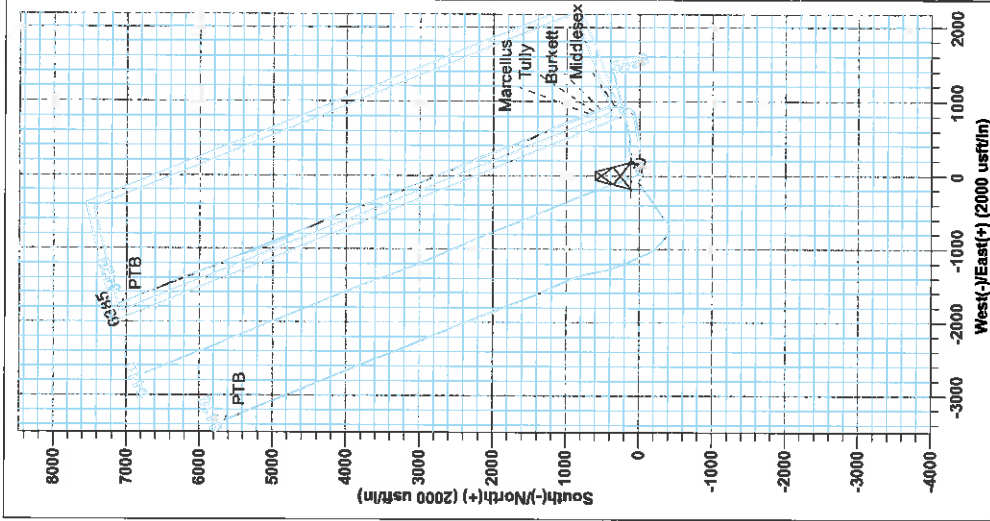
Name	TVD	+N/-S	+E/W	Northing	Easting	Latitude	Longitude
SHL Knoll Unit 1H	0.0	0.0	0.0	14270745.19	1646573.36	39° 17' 55.830 N	80° 58' 41.854 W
Apx BHL Knoll Unit 1H	6384.9	7083.3	-1773.1	14277828.47	1644800.25	39° 19' 5.071 N	80° 58' 4.202 W



Azimuths to Grid North
 True North: -0.01°
 Magnetic North: -8.37°

Magnetic Field
 Strength: 52157.4nT
 Dip Angle: 66.82°
 Date: 6/19/2015
 Model: BGGM2014

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



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Antero

Ritchie County WV

Noland Pad: Penns Park/Knoll/Piper/Western

Knoll Unit 1H

Original Wellpath

Design: As Drilled

EOW Completion Report

06 July, 2015

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Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Well:	Knoll Unit 1H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Project	Ritchie County WV, Ritchie County WV, WV North		
Map System:	Universal Transverse Mercator (US Survey Fee	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		
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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	Knoll Unit 1H, Marcellus				
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Well Position	+N/-S	0.0 usft	Northing:	14,270,745.19 usft	Latitude:	39° 17' 55.830 N
	+E/-W	0.0 usft	Easting:	1,646,573.37 usft	Longitude:	80° 58' 41.654 W
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	6/19/2015	-8.36	66.82	52,157

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 7/6/2015				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
112.0	5,061.3	Survey #6 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
5,204.0	13,878.0	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	0.17	330.46	112.0	0.1	-0.1	0.2	0.15
137.0	0.06	69.45	137.0	0.2	-0.1	0.2	0.76
162.0	0.06	36.22	162.0	0.2	-0.1	0.2	0.14
187.0	0.14	220.22	187.0	0.2	-0.1	0.2	0.80
212.0	0.17	307.95	212.0	0.2	-0.1	0.2	0.86
237.0	0.08	340.54	237.0	0.2	-0.2	0.3	0.45
262.0	0.10	53.84	262.0	0.3	-0.2	0.3	0.43
287.0	0.06	73.36	287.0	0.3	-0.1	0.3	0.28
312.0	0.12	100.43	312.0	0.3	-0.1	0.3	0.28
337.0	0.24	83.21	337.0	0.3	0.0	0.3	0.52

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Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Well:	Knoll Unit 1H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

MD (usft)	Inc (")	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
362.0	0.09	7.11	362.0	0.3	0.0	0.3	0.94
387.0	0.06	126.19	387.0	0.3	0.1	0.3	0.52
412.0	0.09	85.82	412.0	0.3	0.1	0.2	0.24
437.0	0.22	49.11	437.0	0.3	0.1	0.3	0.63
462.0	0.21	85.34	462.0	0.4	0.2	0.3	0.54
487.0	0.19	75.10	487.0	0.4	0.3	0.2	0.16
512.0	0.18	38.47	512.0	0.4	0.4	0.3	0.47
537.0	0.06	263.18	537.0	0.5	0.4	0.3	0.91
562.0	0.09	81.17	562.0	0.5	0.4	0.3	0.60
587.0	0.27	100.62	587.0	0.4	0.5	0.2	0.75
612.0	0.37	146.64	612.0	0.4	0.6	0.1	1.07
637.0	1.12	182.95	637.0	0.1	0.6	-0.2	3.40
662.0	1.74	189.20	662.0	-0.6	0.5	-0.7	2.55
687.0	2.36	190.64	687.0	-1.4	0.4	-1.5	2.49
712.0	2.94	187.86	711.9	-2.6	0.2	-2.5	2.38
737.0	3.87	184.26	736.9	-4.1	0.0	-3.8	3.82
762.0	4.58	183.64	761.8	-5.9	-0.1	-5.4	2.85
787.0	5.04	183.14	786.7	-8.0	-0.2	-7.3	1.85
812.0	5.07	183.58	811.6	-10.2	-0.3	-9.3	0.20
837.0	5.19	183.91	836.5	-12.4	-0.5	-11.3	0.49
862.0	5.17	185.76	861.4	-14.7	-0.7	-13.3	0.67
887.0	5.25	187.35	886.3	-16.9	-0.9	-15.3	0.66
912.0	5.18	188.65	911.2	-19.2	-1.2	-17.3	0.55
937.0	5.28	189.55	936.1	-21.4	-1.6	-19.3	0.52
962.0	4.95	189.58	961.0	-23.6	-2.0	-21.2	1.32
987.0	4.70	188.80	985.9	-25.7	-2.3	-23.0	1.03
1,012.0	4.57	187.93	1,010.9	-27.7	-2.6	-24.7	0.59
1,037.0	4.31	188.57	1,035.8	-29.6	-2.9	-26.4	1.06
1,062.0	3.88	188.68	1,060.7	-31.4	-3.1	-27.9	1.72
1,087.0	3.58	189.37	1,085.7	-33.0	-3.4	-29.3	1.21
1,112.0	3.35	190.89	1,110.6	-34.5	-3.7	-30.6	0.99
1,137.0	3.04	192.52	1,135.6	-35.8	-4.0	-31.7	1.29
1,162.0	2.64	191.63	1,160.6	-37.0	-4.2	-32.8	1.61
1,187.0	2.39	190.60	1,185.5	-38.1	-4.4	-33.7	1.02
1,212.0	2.31	189.88	1,210.5	-39.1	-4.6	-34.5	0.34
1,237.0	2.12	191.71	1,235.5	-40.1	-4.8	-35.4	0.81
1,262.0	1.98	193.60	1,260.5	-41.0	-5.0	-36.1	0.62
1,287.0	1.51	194.04	1,285.5	-41.7	-5.2	-36.7	1.88
1,312.0	1.37	192.13	1,310.5	-42.3	-5.3	-37.2	0.59
1,337.0	1.21	194.22	1,335.5	-42.9	-5.4	-37.7	0.67
1,362.0	1.05	189.73	1,360.4	-43.3	-5.5	-38.1	0.73
1,387.0	0.98	182.24	1,385.4	-43.8	-5.6	-38.5	0.60
1,412.0	0.96	182.57	1,410.4	-44.2	-5.6	-38.9	0.08
1,437.0	1.07	187.81	1,435.4	-44.6	-5.6	-39.3	0.58



Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Site:	Noland Pad: Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Well:	Knoll Unit 1H	North Reference:	Gnd
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,462.0	0.85	183.94	1,460.4	-45.1	-5.7	-39.6	0.92
1,487.0	0.78	192.05	1,485.4	-45.4	-5.7	-39.9	0.54
1,512.0	0.54	195.02	1,510.4	-45.7	-5.8	-40.2	0.97
1,537.0	0.52	191.47	1,535.4	-45.9	-5.9	-40.4	0.15
1,562.0	0.47	176.85	1,560.4	-46.1	-5.9	-40.5	0.54
1,587.0	0.36	170.88	1,585.4	-46.3	-5.9	-40.7	0.47
1,612.0	0.44	162.38	1,610.4	-46.5	-5.8	-40.9	0.40
1,637.0	0.40	166.50	1,635.4	-46.6	-5.8	-41.1	0.20
1,662.0	0.44	165.65	1,660.4	-46.8	-5.7	-41.3	0.16
1,687.0	0.40	165.62	1,685.4	-47.0	-5.7	-41.4	0.16
1,712.0	0.41	162.69	1,710.4	-47.2	-5.6	-41.6	0.09
1,737.0	0.36	168.58	1,735.4	-47.3	-5.6	-41.8	0.25
1,762.0	0.25	178.48	1,760.4	-47.5	-5.6	-41.9	0.49
1,787.0	0.36	168.31	1,785.4	-47.6	-5.5	-42.0	0.49
1,812.0	0.25	172.34	1,810.4	-47.7	-5.5	-42.2	0.45
1,837.0	0.19	177.70	1,835.4	-47.8	-5.5	-42.3	0.25
1,862.0	0.22	176.87	1,860.4	-47.9	-5.5	-42.3	0.12
1,887.0	0.20	194.56	1,885.4	-48.0	-5.5	-42.4	0.27
1,912.0	0.17	166.28	1,910.4	-48.1	-5.5	-42.5	0.38
1,937.0	0.13	172.11	1,935.4	-48.1	-5.5	-42.6	0.17
1,962.0	0.11	157.05	1,960.4	-48.2	-5.5	-42.6	0.15
1,987.0	0.11	174.97	1,985.4	-48.2	-5.5	-42.7	0.14
2,012.0	0.10	175.10	2,010.4	-48.3	-5.5	-42.7	0.04
2,037.0	0.21	136.28	2,035.4	-48.3	-5.4	-42.8	0.58
2,062.0	0.14	180.20	2,060.4	-48.4	-5.4	-42.8	0.58
2,087.0	0.08	204.15	2,085.4	-48.5	-5.4	-42.9	0.30
2,112.0	0.08	59.11	2,110.4	-48.5	-5.4	-42.9	0.61
2,137.0	0.05	149.14	2,135.4	-48.5	-5.4	-42.9	0.38
2,162.0	0.07	174.41	2,160.4	-48.5	-5.4	-42.9	0.13
2,187.0	0.08	342.25	2,185.4	-48.5	-5.4	-42.9	0.60
2,212.0	0.03	219.65	2,210.4	-48.5	-5.4	-42.9	0.40
2,237.0	0.12	353.44	2,235.4	-48.5	-5.4	-42.9	0.57
2,262.0	0.09	162.04	2,260.4	-48.4	-5.4	-42.9	0.84
2,287.0	0.02	88.47	2,285.4	-48.5	-5.4	-42.9	0.35
2,312.0	0.07	203.64	2,310.4	-48.5	-5.4	-42.9	0.32
2,337.0	0.11	153.59	2,335.4	-48.5	-5.4	-42.9	0.34
2,362.0	0.10	205.30	2,360.4	-48.6	-5.4	-43.0	0.37
2,387.0	0.12	120.57	2,385.4	-48.6	-5.4	-43.0	0.60
2,412.0	0.08	98.04	2,410.4	-48.6	-5.3	-43.0	0.22
2,437.0	0.11	21.01	2,435.4	-48.6	-5.3	-43.0	0.48
2,462.0	0.21	71.29	2,460.4	-48.5	-5.3	-43.0	0.65
2,487.0	0.17	48.56	2,485.4	-48.5	-5.2	-43.0	0.34
2,512.0	0.09	351.23	2,510.4	-48.5	-5.2	-43.0	0.57
2,537.0	0.12	18.44	2,535.4	-48.4	-5.2	-42.9	0.23
2,562.0	0.07	358.85	2,560.4	-48.4	-5.1	-42.9	0.24

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Office of Oil & Gas
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Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168 0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168 0usft
Well:	Knoll Unit 1H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
2,587.0	0.07	47.08	2,585.4	-48.4	-5.1	-42.9	0.23
2,612.0	0.09	84.02	2,610.4	-48.3	-5.1	-42.9	0.22
2,637.0	0.03	312.06	2,635.4	-48.3	-5.1	-42.9	0.45
2,662.0	0.07	104.32	2,660.4	-48.3	-5.1	-42.9	0.39
2,687.0	0.11	189.97	2,685.4	-48.4	-5.1	-42.9	0.50
2,712.0	0.10	267.70	2,710.4	-48.4	-5.1	-42.9	0.53
2,737.0	0.14	271.65	2,735.4	-48.4	-5.2	-42.9	0.16
2,762.0	0.11	307.28	2,760.4	-48.4	-5.2	-42.9	0.33
2,787.0	0.14	314.74	2,785.4	-48.3	-5.2	-42.8	0.14
2,812.0	0.17	329.89	2,810.4	-48.3	-5.3	-42.8	0.20
2,837.0	0.19	325.85	2,835.4	-48.2	-5.3	-42.7	0.09
2,862.0	0.19	328.45	2,860.4	-48.1	-5.4	-42.6	0.03
2,887.0	0.19	352.56	2,885.4	-48.1	-5.4	-42.5	0.32
2,912.0	0.16	343.72	2,910.4	-48.0	-5.4	-42.4	0.16
2,937.0	0.12	352.51	2,935.4	-47.9	-5.4	-42.4	0.18
2,962.0	0.18	344.73	2,960.4	-47.9	-5.4	-42.3	0.25
2,987.0	0.12	346.52	2,985.4	-47.8	-5.5	-42.3	0.24
3,012.0	0.07	340.00	3,010.4	-47.8	-5.5	-42.2	0.20
3,037.0	0.10	322.73	3,035.4	-47.7	-5.5	-42.2	0.16
3,062.0	0.05	314.69	3,060.4	-47.7	-5.5	-42.2	0.20
3,087.0	0.15	286.14	3,085.4	-47.7	-5.5	-42.1	0.43
3,112.0	0.16	267.48	3,110.4	-47.7	-5.6	-42.1	0.20
3,137.0	0.15	290.67	3,135.4	-47.7	-5.7	-42.1	0.25
3,162.0	0.24	293.99	3,160.4	-47.6	-5.8	-42.0	0.36
3,187.0	0.22	308.29	3,185.4	-47.6	-5.8	-41.9	0.24
3,212.0	0.31	308.49	3,210.4	-47.5	-5.9	-41.8	0.36
3,237.0	0.28	328.95	3,235.4	-47.4	-6.0	-41.7	0.44
3,262.0	0.26	323.75	3,260.4	-47.3	-6.1	-41.6	0.13
3,287.0	0.17	349.95	3,285.4	-47.2	-6.1	-41.5	0.52
3,312.0	0.08	4.73	3,310.4	-47.2	-6.1	-41.4	0.38
3,337.0	0.13	46.29	3,335.4	-47.2	-6.1	-41.4	0.35
3,362.0	0.04	49.22	3,360.4	-47.1	-6.1	-41.4	0.36
3,387.0	0.08	61.49	3,385.4	-47.1	-6.1	-41.4	0.17
3,412.0	0.03	304.76	3,410.4	-47.1	-6.0	-41.4	0.39
3,437.0	0.10	280.96	3,435.4	-47.1	-6.1	-41.4	0.29
3,462.0	0.12	309.54	3,460.4	-47.1	-6.1	-41.3	0.23
3,487.0	0.17	309.39	3,485.4	-47.0	-6.2	-41.3	0.20
3,512.0	0.12	344.75	3,510.4	-47.0	-6.2	-41.2	0.40
3,537.0	0.20	336.51	3,535.4	-46.9	-6.2	-41.2	0.33
3,562.0	0.16	354.76	3,560.4	-46.8	-6.2	-41.1	0.28
3,587.0	0.18	0.85	3,585.4	-46.8	-6.2	-41.0	0.11
3,612.0	0.20	342.69	3,610.4	-46.7	-6.3	-40.9	0.25
3,637.0	0.14	4.45	3,635.4	-46.6	-6.3	-40.9	0.35
3,662.0	0.19	14.67	3,660.4	-46.5	-6.3	-40.8	0.23



Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Well:	Knoll Unit 1H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
3,687.0	0.18	33.99	3,685.4	-46.5	-6.2	-40.7	0.25
3,712.0	0.20	23.62	3,710.4	-46.4	-6.2	-40.7	0.16
3,737.0	0.25	53.99	3,735.4	-46.3	-6.1	-40.6	0.51
3,762.0	0.52	69.78	3,760.4	-46.3	-6.0	-40.6	1.15
3,787.0	1.13	79.28	3,785.4	-46.2	-5.6	-40.7	2.49
3,812.0	1.66	77.60	3,810.4	-46.0	-5.0	-40.8	2.13
3,837.0	2.18	77.09	3,835.4	-45.9	-4.2	-40.9	2.08
3,862.0	2.61	75.98	3,860.4	-45.6	-3.2	-41.1	1.73
3,887.0	3.19	76.39	3,885.3	-45.3	-2.0	-41.3	2.32
3,912.0	3.72	75.77	3,910.3	-45.0	-0.5	-41.5	2.13
3,937.0	4.39	75.72	3,935.2	-44.5	1.2	-41.7	2.68
3,962.0	4.89	74.92	3,960.1	-44.0	3.2	-42.0	2.02
3,987.0	5.67	73.66	3,985.0	-43.4	5.4	-42.2	3.15
4,012.0	6.14	74.10	4,009.9	-42.7	7.9	-42.5	1.89
4,037.0	6.63	74.52	4,034.8	-41.9	10.5	-42.8	1.97
4,062.0	7.05	74.88	4,059.6	-41.1	13.4	-43.2	1.69
4,087.0	7.34	75.01	4,084.4	-40.3	16.4	-43.5	1.16
4,112.0	7.65	75.17	4,109.2	-39.5	19.6	-43.9	1.24
4,137.0	8.02	75.96	4,133.9	-38.6	22.9	-44.4	1.54
4,162.0	8.28	76.52	4,158.7	-37.8	26.3	-44.9	1.09
4,187.0	8.48	78.85	4,183.4	-37.0	29.9	-45.5	1.58
4,212.0	8.85	80.57	4,208.1	-36.3	33.6	-46.3	1.81
4,237.0	9.24	82.64	4,232.8	-35.8	37.5	-47.2	2.03
4,262.0	9.71	84.48	4,257.5	-35.3	41.6	-48.3	2.24
4,287.0	10.18	86.11	4,282.1	-35.0	45.9	-49.6	2.19
4,312.0	10.73	87.26	4,306.7	-34.7	50.4	-51.1	2.35
4,337.0	11.34	87.41	4,331.2	-34.5	55.2	-52.7	2.44
4,362.0	12.13	87.28	4,355.7	-34.2	60.3	-54.4	3.16
4,387.0	12.59	86.83	4,380.1	-34.0	65.6	-56.1	1.88
4,412.0	13.11	85.46	4,404.5	-33.6	71.1	-57.8	2.41
4,437.0	13.69	83.64	4,428.8	-33.0	76.9	-59.5	2.87
4,462.0	14.26	82.06	4,453.1	-32.3	82.9	-61.0	2.74
4,487.0	14.65	81.33	4,477.3	-31.4	89.1	-62.5	1.72
4,512.0	15.05	81.36	4,501.4	-30.4	95.4	-64.0	1.60
4,537.0	15.30	81.46	4,525.6	-29.4	101.9	-65.5	1.01
4,562.0	15.75	81.47	4,549.7	-28.4	108.5	-67.1	1.80
4,587.0	16.62	81.96	4,573.7	-27.4	115.4	-68.8	3.52
4,612.0	17.60	83.15	4,597.6	-26.5	122.7	-70.6	4.16
4,637.0	18.51	83.47	4,621.3	-25.6	130.4	-72.7	3.66
4,662.0	19.83	83.58	4,644.9	-24.7	138.5	-74.9	5.28
4,687.0	20.97	83.69	4,668.4	-23.7	147.2	-77.2	4.56
4,712.0	21.59	84.22	4,691.7	-22.7	156.2	-79.7	2.60
4,737.0	22.00	84.19	4,714.9	-21.8	165.5	-82.3	1.64
4,762.0	22.39	84.14	4,738.0	-20.8	174.8	-85.0	1.56

Received
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JUL 18 2016
COMPASS 5000.1 Build 74



Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168 Ousft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168 Ousft
Well:	Knoll Unit 1H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
4,787.0	22.43	84.03	4,761.1	-19.9	184.3	-87.6	0.23
4,812.0	22.67	83.79	4,784.2	-18.8	193.9	-90.2	1.03
4,837.0	23.15	83.83	4,807.3	-17.8	203.5	-92.9	1.92
4,862.0	23.58	83.72	4,830.2	-16.7	213.4	-95.6	1.73
4,887.0	24.25	83.11	4,853.1	-15.6	223.5	-98.3	2.86
4,912.0	24.94	83.15	4,875.8	-14.3	233.8	-101.0	2.76
4,937.0	25.45	83.11	4,898.4	-13.0	244.4	-103.8	2.04
4,962.0	26.23	83.01	4,920.9	-11.7	255.2	-106.7	3.12
4,987.0	26.19	82.50	4,943.3	-10.3	266.1	-109.5	0.92
5,012.0	26.78	82.44	4,965.7	-8.9	277.2	-112.3	2.36
5,037.0	27.61	82.71	4,988.0	-7.4	288.5	-115.2	3.36
5,061.3	28.36	82.56	5,009.4	-5.9	299.8	-118.1	3.10
5,204.0	28.70	81.91	5,134.8	3.3	367.3	-134.9	0.32
5,227.0	28.31	81.50	5,155.0	4.9	378.2	-137.5	1.90
5,259.0	27.90	80.91	5,183.2	7.2	393.1	-140.9	1.55
5,291.0	27.69	79.64	5,211.5	9.7	407.8	-144.1	1.96
5,386.0	29.39	79.41	5,295.0	17.9	452.4	-153.2	1.79
5,482.0	29.71	76.44	5,378.5	27.8	498.7	-161.4	1.56
5,579.0	29.03	78.45	5,463.0	38.2	545.2	-169.3	1.23
5,674.0	28.18	82.80	5,546.5	45.6	590.0	-179.2	2.37
5,770.0	29.47	82.37	5,630.6	51.6	635.9	-190.9	1.36
5,866.0	28.43	78.88	5,714.6	59.1	681.7	-201.1	2.07
5,961.0	28.79	80.85	5,798.0	67.1	726.5	-210.5	1.06
6,057.0	34.40	76.58	5,879.7	77.1	775.7	-219.7	6.29
6,089.0	36.83	77.64	5,905.7	81.3	793.9	-222.7	7.83
6,121.0	37.65	73.36	5,931.2	86.1	812.7	-225.3	8.49
6,153.0	39.26	66.02	5,956.3	93.0	831.3	-225.8	15.12
6,185.0	40.58	58.69	5,980.8	102.6	849.4	-223.8	15.26
6,217.0	41.70	50.95	6,004.9	114.7	866.6	-219.0	16.29
6,249.0	42.67	45.11	6,028.7	129.1	882.6	-211.7	12.62
6,281.0	43.26	39.91	6,052.1	145.1	897.3	-202.3	11.23
6,313.0	43.79	35.04	6,075.3	162.6	910.7	-191.2	10.61
6,346.0	43.84	29.33	6,099.1	181.9	922.8	-177.8	11.98
6,378.0	43.74	21.81	6,122.2	201.9	932.4	-162.9	16.26
6,410.0	45.03	14.14	6,145.1	223.1	939.3	-145.8	17.24
6,442.0	46.14	9.51	6,167.5	245.5	943.9	-126.8	10.90
6,474.0	47.66	5.40	6,189.4	268.7	947.0	-106.5	10.51
6,505.0	50.51	1.04	6,209.7	292.0	948.2	-85.3	14.05
6,537.0	52.89	357.43	6,229.5	317.1	947.9	-61.9	11.56
6,569.0	54.92	354.33	6,248.4	342.9	946.0	-37.3	10.07
6,576.0	55.35	353.46	6,252.4	348.6	945.4	-31.8	11.87
Middlesex							
6,601.0	56.92	350.43	6,266.3	369.2	942.5	-11.7	11.87
6,633.0	59.59	347.68	6,283.2	395.9	937.3	15.0	11.09

Received
Office of Oil & Gas
JUL 18 2016
COMPASS 5000.1 Build 74



Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168.0usft
Well:	Knoll Unit 1H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
6,665.0	62.25	345.71	6,298.7	423.1	930.9	42.7	9.90
6,697.0	63.26	344.88	6,313.4	450.6	923.7	70.9	3.91
6,730.0	66.00	344.16	6,327.5	479.4	915.7	100.5	8.53
6,762.0	69.32	341.87	6,339.7	507.7	907.1	130.0	12.31
6,794.0	71.66	341.11	6,350.4	536.3	897.5	160.1	7.65
6,798.0	71.79	341.03	6,351.6	539.8	896.3	163.9	3.63
Burkett							
6,826.0	72.67	340.51	6,360.2	565.0	887.5	190.5	3.63
6,858.0	74.89	339.98	6,369.1	593.9	877.1	221.2	7.12
6,890.0	77.36	339.11	6,376.8	623.0	866.2	252.3	8.16
6,896.0	77.39	339.12	6,378.1	628.5	864.1	258.1	0.44
Tully							
6,921.0	77.49	339.15	6,383.5	651.3	855.5	282.5	0.44
6,953.0	77.87	338.85	6,390.3	680.5	844.2	313.8	1.50
6,966.0	78.10	338.59	6,393.0	692.3	839.6	326.5	2.65
Marcellus							
6,985.0	78.43	338.20	6,396.9	709.6	832.8	345.1	2.65
7,018.0	78.74	337.85	6,403.4	739.6	820.7	377.4	1.40
7,050.0	80.30	337.74	6,409.3	768.8	808.8	408.9	4.89
7,082.0	84.04	337.54	6,413.6	798.1	796.7	440.6	11.70
7,105.0	86.72	338.25	6,415.5	819.3	788.1	463.5	12.05
7,137.0	89.56	338.68	6,416.5	849.1	776.4	495.5	8.98
7,169.0	90.20	338.16	6,416.6	878.8	764.6	527.5	2.58
7,265.0	91.44	338.90	6,415.2	968.2	729.5	623.5	1.50
7,361.0	91.14	337.86	6,413.0	1,057.4	694.1	719.5	1.13
7,457.0	91.04	337.47	6,411.2	1,146.2	657.6	815.4	0.42
7,554.0	90.07	335.60	6,410.3	1,235.1	619.0	912.4	2.17
7,650.0	90.74	334.56	6,409.6	1,322.2	578.6	1,008.3	1.29
7,746.0	90.64	334.42	6,408.4	1,408.8	537.2	1,104.1	0.18
7,842.0	90.30	333.96	6,407.7	1,495.2	495.4	1,199.9	0.60
7,937.0	91.04	336.85	6,406.5	1,581.6	455.9	1,294.8	3.14
8,033.0	90.94	340.02	6,404.9	1,670.9	420.6	1,390.7	3.30
8,129.0	90.60	341.29	6,403.6	1,761.4	388.8	1,486.6	1.37
8,225.0	88.72	341.92	6,404.2	1,852.5	358.5	1,582.4	2.07
8,321.0	89.36	341.34	6,405.8	1,943.6	328.3	1,678.2	0.90
8,418.0	88.49	341.05	6,407.6	2,035.4	297.0	1,775.0	0.95
8,514.0	88.39	338.43	6,410.2	2,125.4	263.8	1,870.9	2.73
8,610.0	89.56	338.53	6,411.9	2,214.7	228.6	1,966.9	1.22
8,706.0	90.47	338.68	6,411.9	2,304.1	193.6	2,062.9	0.96
8,802.0	90.54	337.29	6,411.1	2,393.1	157.6	2,158.9	1.45
8,898.0	89.90	336.15	6,410.7	2,481.3	119.6	2,254.9	1.36
8,994.0	90.70	336.18	6,410.2	2,569.1	80.8	2,350.8	0.83
9,089.0	90.13	337.05	6,409.5	2,656.3	43.1	2,445.8	1.09
9,185.0	89.03	336.57	6,410.2	2,744.5	5.3	2,541.8	1.25
9,281.0	89.43	336.90	6,411.5	2,832.7	-32.6	2,637.8	0.54

Received
Office of Oil & Gas
JUL 18 2015



Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22. GL 1143' + KB 25' @ 1168.0usft
Site:	Noland Pad Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22. GL 1143' + KB 25' @ 1168.0usft
Well:	Knoll Unit 1H	North Reference:	Gnd
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
9,377.0	90.57	336.84	6,411.5	2,921.0	-70.3	2,733.7	1.19
9,472.0	88.56	336.98	6,412.2	3,008.4	-107.5	2,828.7	2.12
9,568.0	88.62	336.73	6,414.6	3,096.6	-145.3	2,924.7	0.27
9,663.0	89.19	336.61	6,416.4	3,183.8	-182.9	3,019.6	0.61
9,758.0	91.75	338.21	6,415.6	3,271.5	-219.4	3,114.6	3.18
9,854.0	90.77	339.55	6,413.5	3,361.1	-254.0	3,210.6	1.73
9,891.0	90.64	339.82	6,413.0	3,395.8	-266.8	3,247.5	0.81
9,949.0	89.09	338.62	6,413.2	3,450.0	-287.4	3,305.5	3.38
9,991.0	89.83	338.94	6,413.6	3,489.1	-302.6	3,347.5	1.92
10,045.0	90.81	338.97	6,413.3	3,539.5	-322.0	3,401.5	1.82
10,141.0	89.33	338.87	6,413.2	3,629.1	-356.5	3,497.5	1.55
10,237.0	89.13	339.31	6,414.4	3,718.8	-390.8	3,593.5	0.50
10,333.0	91.68	340.56	6,413.8	3,808.9	-423.7	3,689.4	2.96
10,430.0	89.87	339.63	6,412.5	3,900.1	-456.7	3,786.3	2.10
10,526.0	90.44	338.85	6,412.2	3,989.9	-490.7	3,882.3	1.01
10,622.0	89.39	339.04	6,412.3	4,079.5	-525.2	3,978.3	1.11
10,718.0	90.64	339.28	6,412.3	4,169.2	-559.4	4,074.3	1.33
10,814.0	90.17	336.62	6,411.6	4,258.2	-595.4	4,170.2	2.81
10,911.0	91.41	335.85	6,410.3	4,346.9	-634.5	4,267.2	1.50
11,007.0	91.94	335.39	6,407.5	4,434.3	-674.1	4,363.1	0.73
11,102.0	90.64	335.36	6,405.4	4,520.7	-713.7	4,457.9	1.37
11,199.0	90.37	332.24	6,404.5	4,607.7	-756.5	4,554.7	3.23
11,294.0	91.11	330.89	6,403.3	4,691.2	-801.7	4,649.1	1.62
11,390.0	91.28	333.14	6,401.3	4,776.0	-846.8	4,744.5	2.35
11,486.0	91.45	335.88	6,399.0	4,862.6	-888.1	4,840.3	2.86
11,582.0	91.65	337.32	6,396.4	4,950.7	-926.2	4,936.3	1.51
11,678.0	90.03	338.76	6,395.0	5,039.7	-962.1	5,032.2	2.26
11,775.0	90.47	338.83	6,394.6	5,130.1	-997.2	5,129.2	0.46
11,869.0	89.77	340.82	6,394.4	5,218.3	-1,029.6	5,223.2	2.24
11,966.0	89.50	342.05	6,395.0	5,310.3	-1,060.5	5,320.0	1.30
12,062.0	88.38	340.90	6,396.8	5,401.3	-1,090.9	5,415.8	1.67
12,157.0	89.19	341.03	6,398.8	5,491.1	-1,121.9	5,510.6	0.86
12,253.0	89.93	340.09	6,399.5	5,581.6	-1,153.9	5,606.5	1.25
12,349.0	90.67	338.55	6,399.0	5,671.4	-1,187.8	5,702.5	1.78
12,445.0	90.40	338.78	6,398.1	5,760.8	-1,222.7	5,798.5	0.37
12,542.0	91.11	339.52	6,396.8	5,851.5	-1,257.2	5,895.5	1.06
12,638.0	90.07	338.76	6,395.8	5,941.2	-1,291.4	5,991.4	1.34
12,734.0	90.71	339.50	6,395.2	6,030.9	-1,325.6	6,087.4	1.02
12,831.0	90.91	339.63	6,393.8	6,121.8	-1,359.5	6,184.4	0.25
12,926.0	90.54	338.75	6,392.6	6,210.6	-1,393.2	6,279.3	1.00
13,023.0	89.46	336.78	6,392.6	6,300.3	-1,429.9	6,376.3	2.32
13,119.0	90.91	337.49	6,392.3	6,388.8	-1,467.2	6,472.3	1.68
13,215.0	89.66	336.94	6,391.8	6,477.3	-1,504.4	6,568.3	1.42
13,311.0	90.24	336.97	6,391.9	6,565.6	-1,542.0	6,664.3	0.60

Received
Office of Oil & Gas
JUL 18 2016
COMPASS 5000.1 Build 74



Company:	Antero	Local Co-ordinate Reference:	Well Knoll Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168 0usft
Site:	Noland Pad: Penns Park/Knoll/Piper/Western	MD Reference:	Frontier 22 GL 1143' + KB 25' @ 1168 0usft
Well:	Knoll Unit 1H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
13,406.0	91.38	336.43	6,390.6	6,652.9	-1,579.5	6,759.2	1.33
13,465.0	90.79	336.43	6,389.4	6,706.9	-1,603.1	6,818.2	1.00
13,501.0	89.97	334.85	6,389.2	6,739.7	-1,618.0	6,854.2	4.94
13,597.0	90.94	335.13	6,388.4	6,826.7	-1,658.6	6,950.0	1.05
13,692.0	91.04	335.96	6,386.8	6,913.2	-1,697.9	7,044.9	0.88
13,788.0	90.34	336.27	6,385.6	7,001.0	-1,736.8	7,140.9	0.80
13,819.0	90.50	336.15	6,385.4	7,029.3	-1,749.3	7,171.9	0.65
13,878.0	90.50	336.15	6,384.9	7,083.3	-1,773.1	7,230.8	0.00

PTB

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
6,576.0	6,252.4	348.6	945.4	Middlesex
6,798.0	6,351.6	539.8	896.3	Burkett
6,896.0	6,378.1	628.5	864.1	Tully
6,966.0	6,393.0	692.3	839.6	Marcellus
13,878.0	6,384.9	7,083.3	-1,773.1	PTB

Checked By: _____	Approved By: _____	Date: _____
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