



Scientific Drilling International
Survey Report



Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

RECEIVED
Office of Oil and Gas

JUL 17 2017

WV Department of
Environmental Protection

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	Mackay Pad - Caldwell/Greenback/McNabb				
Site Position:	Northing:	14,248,714.78 usft	Latitude:	39° 14' 17.843 N	
From:	Map	Easting:	1,669,498.15 usft	Longitude:	80° 53' 50.274 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.06 °

Well	McNabb Unit 4H, Marcellus					
Well Position	+N/-S	0.0 usft	Northing:	14,248,730.91 usft	Latitude:	39° 14' 18.002 N
	+E/-W	0.0 usft	Easting:	1,669,563.86 usft	Longitude:	80° 53' 49.413 W
Position Uncertainty		2.0 usft	Wellhead Elevation:	1,118.0 usft	Ground Level:	1,099.0 usft

Wellbore	Original Wellpath				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2015	7/22/2015	-8.44	66.73	52,125

Design	As Drilled				
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	156.90	

Survey Program	Date	8/12/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
106.0	5,819.0	Survey #6 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
5,835.0	19,334.0	Survey #7 MWD (Original Wellpath)	SDI MWD	Scientific Drilling Intl. MWD - Standard ver 1.0.1	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
106.0	0.11	251.20	106.0	0.0	-0.1	0.0	0.10	0.10	0.00	
First SDI Gyro @ 106 MD										
131.0	0.09	325.51	131.0	0.0	-0.1	0.0	0.49	-0.08	297.24	
156.0	0.05	18.05	156.0	0.0	-0.1	-0.1	0.29	-0.16	210.16	
181.0	0.06	13.89	181.0	0.0	-0.1	-0.1	0.04	0.04	-16.64	
206.0	0.10	355.07	206.0	0.1	-0.1	-0.1	0.19	0.16	-75.28	
231.0	0.13	40.06	231.0	0.1	-0.1	-0.1	0.37	0.12	179.96	

JUL 17 2017



Scientific Drilling International
Survey Report

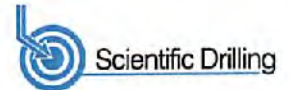
WV Department of
Environmental Protection

Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
256.0	0.10	94.13	256.0	0.1	-0.1	-0.1	0.43	-0.12	216.28
281.0	0.18	156.22	281.0	0.1	0.0	-0.1	0.54	0.32	248.36
306.0	0.16	179.33	306.0	0.0	0.0	0.0	0.29	0.00	92.44
331.0	0.15	186.35	331.0	-0.1	0.0	0.0	0.14	-0.12	28.12
356.0	0.28	180.90	356.0	-0.2	0.0	0.1	0.53	0.52	-21.84
381.0	0.17	215.44	381.0	-0.2	-0.1	0.2	0.68	-0.44	138.16
406.0	0.09	257.60	406.0	-0.3	-0.1	0.2	0.48	-0.32	168.64
431.0	0.10	212.39	431.0	-0.3	-0.1	0.2	0.29	0.04	-180.84
456.0	0.14	182.70	456.0	-0.4	-0.1	0.3	0.29	0.16	-118.76
481.0	0.13	189.21	481.0	-0.4	-0.1	0.3	0.07	-0.04	26.04
506.0	0.12	189.52	506.0	-0.5	-0.1	0.4	0.04	-0.04	1.24
531.0	0.17	180.09	531.0	-0.5	-0.2	0.4	0.22	0.20	-37.72
556.0	0.52	132.43	556.0	-0.6	-0.1	0.6	1.70	1.40	-190.64
581.0	0.76	124.59	581.0	-0.8	0.1	0.8	1.02	0.96	-31.36
606.0	1.26	113.13	606.0	-1.0	0.5	1.1	2.15	2.00	-45.84
631.0	1.88	105.75	631.0	-1.2	1.2	1.6	2.60	2.48	-29.52
656.0	2.24	100.84	656.0	-1.4	2.1	2.1	1.60	1.44	-19.64
681.0	2.57	96.30	680.9	-1.6	3.1	2.7	1.52	1.32	-18.16
706.0	3.16	90.38	705.9	-1.7	4.3	3.2	2.64	2.36	-23.66
731.0	3.71	86.25	730.9	-1.6	5.8	3.8	2.41	2.20	-16.52
756.0	4.25	84.08	755.8	-1.5	7.6	4.3	2.24	2.16	-8.66
781.0	4.82	82.74	780.7	-1.2	9.5	4.9	2.32	2.28	-5.36
806.0	5.48	81.95	805.6	-0.9	11.8	5.5	2.66	2.64	-3.16
831.0	6.10	82.10	830.5	-0.6	14.3	6.1	2.48	2.48	0.60
856.0	6.89	82.77	855.3	-0.2	17.1	6.9	3.17	3.16	2.68
881.0	7.52	82.42	880.1	0.2	20.2	7.7	2.53	2.52	-1.40
906.0	8.29	82.28	904.9	0.7	23.6	8.6	3.08	3.08	-0.56
931.0	8.91	81.56	929.6	1.2	27.3	9.6	2.52	2.48	-2.88
956.0	9.41	81.24	954.3	1.8	31.2	10.6	2.01	2.00	-1.28
981.0	10.10	80.53	978.9	2.4	35.4	11.6	2.80	2.76	-2.84
1,006.0	10.36	80.14	1,003.5	3.2	39.8	12.7	1.08	1.04	-1.56
1,031.0	10.52	79.77	1,028.1	4.0	44.2	13.7	0.89	0.84	-1.48
1,056.0	10.62	79.15	1,052.7	4.8	48.7	14.7	0.81	0.40	-2.46
1,081.0	10.74	78.07	1,077.3	5.7	53.3	15.6	0.93	0.48	-4.32
1,106.0	10.86	77.85	1,101.8	6.7	57.9	16.5	0.49	0.48	-0.48
1,131.0	10.98	77.67	1,126.4	7.7	62.5	17.4	0.52	0.48	-1.12
1,156.0	11.14	77.84	1,150.9	8.7	67.2	18.3	0.65	0.64	0.68
1,181.0	11.15	78.47	1,175.4	9.7	71.9	19.3	0.49	0.04	2.52
1,206.0	11.01	78.90	1,200.0	10.7	76.6	20.3	0.65	-0.56	1.72
1,231.0	10.94	79.90	1,224.5	11.5	81.3	21.3	0.81	-0.28	4.00
1,256.0	10.93	80.56	1,249.1	12.3	86.0	22.4	0.50	-0.04	2.64
1,281.0	10.78	81.56	1,273.6	13.1	90.6	23.5	0.96	-0.60	4.00



JUL 17 2017



Company:	Antero	Local Co-ordinate Reference:	WV Department of Environmental Protection
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,306.0	10.74	83.24	1,298.2	13.7	95.2	24.8	1.26	-0.16	6.72
1,331.0	10.75	84.00	1,322.7	14.2	99.9	26.1	0.57	0.04	3.04
1,356.0	10.67	84.35	1,347.3	14.7	104.5	27.5	0.41	-0.32	1.40
1,381.0	10.42	85.12	1,371.9	15.1	109.1	28.9	1.15	-1.00	3.08
1,406.0	10.18	85.16	1,396.5	15.5	113.5	30.3	0.98	-0.96	0.16
1,431.0	10.18	84.93	1,421.1	15.9	117.9	31.7	0.18	0.00	-0.92
1,456.0	10.27	85.24	1,445.7	16.2	122.3	33.1	0.42	0.36	1.24
1,481.0	10.38	85.12	1,470.3	16.6	126.8	34.5	0.45	0.44	-0.48
1,506.0	10.31	84.39	1,494.9	17.0	131.3	35.8	0.59	-0.28	-2.92
1,531.0	10.38	84.10	1,519.5	17.5	135.7	37.2	0.35	0.28	-1.16
1,556.0	10.60	83.69	1,544.1	18.0	140.3	38.5	0.93	0.88	-1.64
1,581.0	10.74	83.85	1,568.6	18.5	144.9	39.9	0.57	0.56	0.64
1,606.0	10.86	83.55	1,593.2	19.0	149.5	41.2	0.60	0.56	-1.20
1,631.0	11.00	83.49	1,617.7	19.5	154.2	42.6	0.48	0.48	-0.24
1,656.0	11.10	83.59	1,642.3	20.1	159.0	43.9	0.41	0.40	0.40
1,681.0	11.17	83.21	1,666.8	20.6	163.6	45.3	0.41	0.28	-1.52
1,706.0	11.19	82.50	1,691.3	21.2	168.6	46.6	0.56	0.08	-2.84
1,731.0	11.29	82.17	1,715.8	21.9	173.4	47.9	0.48	0.40	-1.32
1,756.0	11.43	82.38	1,740.3	22.5	178.3	49.2	0.58	0.56	0.84
1,781.0	11.55	82.40	1,764.8	23.2	183.3	50.6	0.48	0.48	0.08
1,806.0	11.46	83.62	1,789.3	23.8	188.2	52.0	1.04	-0.36	4.88
1,831.0	11.47	84.16	1,813.8	24.3	193.1	53.4	0.43	0.04	2.16
1,856.0	11.60	84.00	1,838.3	24.8	198.1	54.9	0.54	0.52	-0.64
1,881.0	11.71	84.25	1,862.8	25.4	203.1	56.4	0.48	0.44	1.00
1,906.0	11.59	83.81	1,887.3	25.9	208.2	57.9	0.60	-0.48	-1.76
1,931.0	11.34	83.79	1,911.8	26.4	213.1	59.3	1.00	-1.00	-0.08
1,956.0	10.89	83.43	1,936.3	26.9	217.9	60.7	1.82	-1.80	-1.44
1,981.0	10.52	82.72	1,960.9	27.5	222.5	62.0	1.57	-1.48	-2.84
2,006.0	10.57	82.61	1,985.5	28.1	227.0	63.2	0.22	0.20	-0.44
2,031.0	10.62	82.77	2,010.1	28.7	231.6	64.5	0.23	0.20	0.64
2,056.0	10.70	82.39	2,034.6	29.3	236.2	65.7	0.43	0.32	-1.52
2,081.0	10.88	82.84	2,059.2	29.9	240.8	67.0	0.79	0.72	1.60
2,106.0	11.20	83.12	2,083.7	30.5	245.6	68.3	1.30	1.28	1.12
2,131.0	11.43	82.69	2,108.2	31.1	250.4	69.7	0.98	0.92	-1.72
2,156.0	11.75	82.39	2,132.7	31.7	255.4	71.0	1.30	1.28	-1.20
2,181.0	11.96	81.96	2,157.2	32.4	260.5	72.4	0.91	0.84	-1.72
2,206.0	12.02	81.49	2,181.6	33.2	265.6	73.7	0.46	0.24	-1.88
2,231.0	11.95	80.48	2,206.1	34.0	270.8	75.0	0.88	-0.28	-4.04
2,256.0	11.85	79.56	2,230.6	34.9	275.9	76.1	0.86	-0.40	-3.68
2,281.0	11.85	78.87	2,255.0	35.8	280.9	77.2	0.57	0.00	-2.76
2,306.0	11.87	77.93	2,279.5	36.9	285.9	78.3	0.78	0.08	-3.76
2,331.0	12.02	77.87	2,304.0	38.0	291.0	79.3	0.60	0.60	-0.24



Scientific Drilling International
Survey Report

RECEIVED
Office of Oil and Gas

JUL 17 2017



Company:	Antero	Local Co-ordinate Reference:	WV Department of Environmental Protection Well McNabb Unit 4H
Project:	Ritchie County WW	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mckay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,356.0	12.26	76.59	2,328.4	39.1	296.1	80.2	1.44	0.96	-5.12
2,381.0	12.41	76.29	2,352.8	40.4	301.3	81.1	0.65	0.80	-1.20
2,406.0	12.30	76.81	2,377.2	41.6	306.5	82.0	0.63	-0.44	2.08
2,431.0	12.47	76.43	2,401.7	42.9	311.7	82.9	0.75	0.68	-1.52
2,456.0	12.48	75.97	2,426.1	44.1	317.0	83.8	0.40	0.04	-1.84
2,481.0	12.66	76.15	2,450.5	45.5	322.2	84.6	0.74	0.72	0.72
2,506.0	12.51	76.01	2,474.9	46.8	327.5	85.5	0.61	-0.60	-0.56
2,531.0	12.50	75.25	2,499.3	48.1	332.8	86.3	0.66	-0.04	-3.04
2,556.0	12.10	74.54	2,523.7	49.5	337.9	87.1	1.71	-1.60	-2.84
2,581.0	11.95	73.09	2,548.2	50.9	342.9	87.7	1.35	-0.60	-5.80
2,606.0	11.91	71.15	2,572.6	52.5	347.8	88.2	1.61	-0.16	-7.76
2,631.0	11.71	65.24	2,597.1	54.4	352.6	88.3	4.90	-0.80	-23.64
2,656.0	11.65	59.61	2,621.6	56.8	357.1	87.9	4.56	-0.24	-22.52
2,681.0	11.84	52.17	2,646.0	59.6	361.3	86.9	6.10	0.76	-29.76
2,706.0	11.78	51.28	2,670.5	62.8	365.3	85.6	0.77	-0.24	-3.56
2,731.0	12.00	51.48	2,695.0	66.0	369.3	84.2	0.90	0.86	0.60
2,756.0	12.01	51.77	2,719.4	69.2	373.4	82.8	0.24	0.04	1.16
2,781.0	12.59	52.49	2,743.9	72.5	377.6	81.5	2.40	2.32	2.68
2,806.0	13.14	53.76	2,768.2	75.8	382.0	80.1	2.47	2.20	5.08
2,831.0	13.88	55.08	2,792.5	79.2	386.8	78.9	3.21	2.96	5.28
2,856.0	14.75	57.15	2,816.8	82.7	391.9	77.7	4.04	3.48	6.28
2,881.0	15.56	58.32	2,840.9	86.2	397.5	76.7	3.46	3.24	4.68
2,906.0	15.96	58.44	2,865.0	89.7	403.2	75.7	1.61	1.60	0.48
2,931.0	15.80	58.47	2,889.0	93.3	409.1	74.7	0.64	-0.64	0.12
2,956.0	15.89	58.41	2,913.1	96.9	414.9	73.7	0.37	0.36	-0.24
2,981.0	15.83	58.79	2,937.1	100.4	420.7	72.7	0.48	-0.24	1.52
3,006.0	15.81	59.02	2,961.2	104.0	426.6	71.7	0.26	-0.08	0.92
3,031.0	15.81	59.54	2,985.2	107.4	432.4	70.8	0.57	0.00	2.08
3,056.0	15.64	60.43	3,009.3	110.8	438.3	70.0	1.18	-0.68	3.56
3,081.0	15.69	61.00	3,033.3	114.1	444.2	69.3	0.65	0.20	2.28
3,106.0	15.80	61.02	3,057.4	117.4	450.1	68.6	0.44	0.44	0.08
3,131.0	16.22	62.84	3,081.4	120.7	456.2	68.0	2.62	1.68	7.28
3,156.0	16.59	65.29	3,105.4	123.7	462.5	67.6	3.14	1.48	9.80
3,181.0	17.00	66.19	3,129.4	126.7	469.1	67.5	1.94	1.64	3.60
3,206.0	17.18	66.49	3,153.2	129.7	475.8	67.4	0.80	0.72	1.20
3,231.0	17.14	66.15	3,177.1	132.6	482.6	67.4	0.43	-0.16	-1.36
3,256.0	17.57	65.57	3,201.0	135.7	489.4	67.2	1.85	1.72	-2.32
3,281.0	17.89	64.63	3,224.8	138.9	496.3	67.0	1.72	1.28	-3.76
3,306.0	18.16	64.51	3,248.6	142.2	503.3	66.7	1.09	1.08	-0.48
3,331.0	18.28	64.42	3,272.3	145.6	510.3	66.3	0.49	0.48	-0.36
3,356.0	18.61	64.41	3,296.0	149.0	517.5	66.0	1.32	1.32	-0.04
3,381.0	18.85	65.29	3,319.7	152.4	524.7	65.7	1.48	0.96	3.52



JUL 17 2017



Company:	Antero	Local Co-ordinate Reference:	WV Department of Environmental Protection
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,406.0	19.32	65.78	3,343.3	155.8	532.2	65.5	1.99	1.88	1.96
3,431.0	19.63	66.31	3,366.9	159.2	539.8	65.4	1.43	1.24	2.12
3,456.0	20.30	66.56	3,380.4	162.6	547.6	65.3	2.70	2.68	1.00
3,481.0	20.67	66.49	3,413.8	166.1	555.7	65.3	1.48	1.48	-0.28
3,506.0	21.35	66.07	3,437.2	169.7	563.9	65.2	2.79	2.72	-1.68
3,531.0	22.12	65.98	3,460.4	173.4	572.3	65.0	3.08	3.08	-0.36
3,556.0	22.72	65.81	3,483.5	177.3	581.0	64.9	2.41	2.40	-0.68
3,581.0	23.83	65.95	3,508.5	181.4	590.0	64.7	4.45	4.44	0.56
3,606.0	24.59	66.88	3,529.3	185.5	599.4	64.6	3.40	3.04	3.72
3,631.0	24.76	67.48	3,552.0	189.5	609.1	64.6	1.21	0.88	2.40
3,656.0	25.07	68.29	3,574.7	193.5	618.8	64.8	1.84	1.24	3.24
3,681.0	25.24	68.87	3,597.3	197.4	628.7	65.1	1.20	0.88	2.32
3,706.0	24.86	68.86	3,619.9	201.2	638.6	65.5	1.52	-1.52	-0.04
3,731.0	25.18	68.80	3,642.6	205.0	648.4	65.9	1.28	1.28	-0.24
3,756.0	25.05	68.54	3,665.2	208.8	658.3	66.2	0.68	-0.52	-1.04
3,781.0	24.32	67.36	3,687.9	212.8	668.0	66.4	3.52	-2.92	-4.72
3,806.0	24.18	66.29	3,710.7	216.8	677.4	66.4	1.84	-0.56	-4.28
3,831.0	24.34	65.90	3,733.5	221.0	686.8	66.2	0.91	0.64	-1.56
3,856.0	24.14	65.50	3,756.3	225.2	696.2	66.0	1.04	-0.80	-1.60
3,881.0	24.05	64.30	3,779.1	229.5	705.4	65.6	1.99	-0.36	-4.80
3,906.0	24.09	63.51	3,802.0	234.0	714.6	65.1	1.30	0.16	-3.16
3,931.0	24.28	63.33	3,824.8	238.6	723.7	64.5	0.82	0.76	-0.72
3,956.0	24.85	62.59	3,847.5	243.3	733.0	63.8	2.59	2.28	-2.96
3,981.0	24.71	62.32	3,870.2	248.2	742.3	63.0	0.72	-0.56	-1.08
4,006.0	25.05	62.40	3,892.9	253.0	751.6	62.1	1.37	1.36	0.32
4,031.0	25.26	62.58	3,915.5	257.9	761.0	61.3	0.89	0.84	0.72
4,056.0	26.30	63.12	3,938.0	262.9	770.7	60.6	4.26	4.16	2.16
4,081.0	26.52	63.87	3,960.4	267.9	780.7	59.9	1.60	0.88	3.00
4,106.0	26.72	64.54	3,982.8	272.7	790.7	59.4	1.44	0.80	2.68
4,131.0	26.79	65.11	4,005.1	277.5	800.9	59.0	1.06	0.28	2.28
4,156.0	27.19	65.45	4,027.4	282.3	811.2	58.6	1.71	1.60	1.36
4,181.0	26.88	65.41	4,049.6	287.0	821.6	58.3	1.24	-1.24	-0.16
4,206.0	26.98	65.53	4,071.9	291.7	831.9	58.1	0.46	0.40	0.48
4,231.0	26.90	65.67	4,094.2	296.4	842.2	57.8	0.41	-0.32	0.56
4,256.0	26.56	65.82	4,116.5	301.0	852.4	57.6	1.39	-1.36	0.60
4,281.0	27.03	65.94	4,138.9	305.6	862.7	57.4	1.89	1.88	0.48
4,306.0	26.34	65.94	4,161.2	310.2	873.0	57.2	2.76	-2.76	0.00
4,331.0	26.20	65.98	4,183.6	314.7	883.1	57.0	0.56	-0.56	0.16
4,356.0	25.92	66.07	4,206.1	319.2	893.1	56.8	1.13	-1.12	0.36
4,381.0	25.78	66.17	4,228.6	323.6	903.1	56.7	0.66	-0.64	0.40
4,406.0	26.00	66.18	4,251.1	328.0	913.1	56.6	0.96	0.96	0.04
4,431.0	25.82	66.09	4,273.5	332.4	923.1	56.4	0.36	-0.32	-0.36



JUL 17 2017

WV Department of
Environmental Protection

Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118 Duseft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118 Duseft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,456.0	25.84	65.83	4,296.0	336.8	933.0	56.2	0.56	-0.32	-1.04
4,481.0	26.20	65.60	4,318.5	341.4	943.0	56.0	1.50	1.44	-0.92
4,506.0	25.65	65.15	4,341.0	345.9	953.0	55.7	2.34	-2.20	-1.80
4,531.0	26.36	65.04	4,363.5	350.5	962.9	55.4	2.85	2.84	-0.44
4,556.0	26.09	64.62	4,385.9	355.2	972.9	55.0	1.31	-1.03	-1.66
4,581.0	25.73	63.97	4,408.4	360.0	982.8	54.5	1.83	-1.44	-2.60
4,606.0	25.82	63.48	4,430.9	364.8	992.5	53.9	0.93	0.36	-1.96
4,631.0	25.69	62.21	4,453.4	369.7	1,002.2	53.1	2.27	-0.52	-5.06
4,656.0	25.96	62.15	4,475.9	374.8	1,011.8	52.2	1.09	1.03	-0.24
4,681.0	25.82	61.75	4,498.4	379.9	1,021.4	51.3	0.90	-0.56	-1.60
4,706.0	26.52	61.03	4,520.8	385.2	1,031.1	50.2	3.07	2.80	-2.88
4,731.0	26.10	60.53	4,543.2	390.6	1,040.8	49.0	1.90	-1.68	-2.00
4,756.0	26.06	60.23	4,565.7	396.1	1,050.3	47.8	0.55	-0.16	-1.20
4,781.0	26.37	60.27	4,588.1	401.5	1,059.9	46.5	1.24	1.24	0.16
4,806.0	26.81	60.31	4,610.5	407.1	1,069.6	45.2	1.76	1.76	0.16
4,831.0	27.15	60.26	4,632.8	412.7	1,079.5	43.9	1.36	1.36	-0.20
4,856.0	27.15	60.24	4,655.0	418.4	1,089.4	42.6	0.04	0.00	-0.08
4,881.0	26.52	59.72	4,677.3	424.0	1,099.2	41.2	2.69	-2.52	-2.06
4,906.0	26.14	59.70	4,699.7	429.6	1,108.7	39.8	1.52	-1.52	-0.08
4,931.0	26.04	60.03	4,722.2	435.1	1,118.3	38.5	0.70	-0.40	1.32
4,956.0	26.21	60.70	4,744.6	440.6	1,127.8	37.2	1.36	0.68	2.68
4,981.0	26.13	62.41	4,767.1	445.9	1,137.5	36.2	3.03	-0.32	6.84
5,006.0	26.25	63.14	4,789.5	450.9	1,147.3	35.4	1.36	0.48	2.92
5,031.0	25.64	63.37	4,812.0	455.8	1,157.1	34.7	1.69	-1.64	0.92
5,056.0	25.70	63.49	4,834.5	460.7	1,166.8	34.1	0.60	-0.56	0.48
5,081.0	25.45	63.70	4,857.0	465.5	1,176.5	33.4	1.06	-1.00	0.84
5,106.0	25.34	63.95	4,879.6	470.2	1,186.1	32.9	0.61	-0.44	1.00
5,131.0	24.86	64.36	4,902.2	474.8	1,195.7	32.4	2.04	-1.92	1.64
5,156.0	25.11	64.73	4,924.9	479.4	1,205.2	31.9	1.18	1.00	1.48
5,181.0	25.33	65.22	4,947.5	483.9	1,214.9	31.6	1.21	0.88	1.96
5,206.0	25.50	65.51	4,970.1	488.3	1,224.6	31.3	0.84	0.68	1.16
5,231.0	25.77	65.41	4,992.6	492.8	1,234.5	31.0	1.09	1.08	-0.40
5,256.0	26.33	65.62	5,015.1	497.4	1,244.5	30.7	2.27	2.24	0.84
5,281.0	27.52	65.49	5,037.4	502.1	1,254.8	30.5	4.77	4.76	-0.52
5,306.0	26.05	65.47	5,059.5	506.9	1,265.4	30.2	2.12	2.12	-0.06
5,331.0	28.42	65.40	5,081.5	511.8	1,276.1	29.9	1.49	1.48	-0.28
5,356.0	27.91	64.67	5,103.6	516.8	1,286.8	29.5	2.46	-2.04	-2.92
5,381.0	28.33	64.45	5,125.6	521.9	1,297.5	29.0	1.73	1.68	-0.88
5,406.0	27.72	63.83	5,147.7	527.0	1,308.0	28.4	2.70	-2.44	-2.48
5,431.0	27.42	62.84	5,169.8	532.2	1,318.4	27.7	2.19	-1.20	-3.96
5,456.0	26.38	61.66	5,192.1	537.4	1,328.4	26.8	4.68	-4.16	-4.72
5,481.0	26.87	61.54	5,214.5	542.8	1,338.2	25.8	1.97	1.96	-0.48



RECEIVED
Office of Oil and Gas

JUL 17 2017

Scientific Drilling International

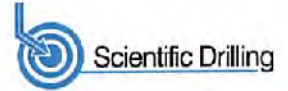
Survey Report



WV Department of
Environmental Protection

Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5.506.0	27.21	61.45	5,236.8	548.2	1,348.2	24.7	1.37	1.38	-0.36	
5.531.0	28.29	61.43	5,258.9	553.8	1,358.4	23.6	4.32	4.32	-0.08	
5.556.0	27.84	61.42	5,280.9	559.4	1,368.8	22.5	1.80	-1.80	-0.04	
5.581.0	27.96	61.74	5,303.0	565.0	1,379.1	21.4	0.77	0.48	1.28	
5.606.0	28.19	62.03	5,325.1	570.5	1,389.4	20.4	1.07	0.92	1.16	
5.631.0	27.93	62.83	5,347.2	575.9	1,399.9	19.5	1.83	-1.04	3.20	
5.656.0	27.20	63.47	5,369.3	581.2	1,410.2	18.7	3.15	-2.92	2.56	
5.681.0	26.92	63.78	5,391.6	586.2	1,420.4	18.0	1.25	-1.12	1.24	
5.706.0	27.07	64.25	5,413.9	591.2	1,430.6	17.5	1.04	0.60	1.88	
5.731.0	27.28	65.45	5,436.1	596.0	1,440.9	17.1	2.35	0.84	4.80	
5.756.0	27.72	66.88	5,458.3	600.7	1,451.5	16.9	3.17	1.76	5.72	
5.781.0	27.24	65.03	5,480.5	605.4	1,462.0	16.7	3.92	-1.92	-7.40	
5.806.0	26.69	64.24	5,502.7	610.3	1,472.2	16.3	2.83	-2.20	-3.16	
5.819.0	26.23	64.14	5,514.4	612.8	1,477.5	16.0	3.56	-3.54	-0.77	
Last SDI Gyro @ 5819 MD										
5.835.0	25.80	62.02	5,528.8	616.0	1,483.7	15.5	6.40	-2.69	-13.25	
First SDI MWD @ 5835 MD										
5.865.0	24.66	61.01	5,555.9	622.1	1,495.0	14.3	4.06	-3.80	-3.37	
5.895.0	24.84	59.64	5,583.1	628.3	1,505.9	12.9	2.00	0.60	-4.57	
5.925.0	24.89	58.61	5,610.4	634.7	1,516.7	11.2	1.45	0.17	-3.43	
5.955.0	24.65	57.46	5,637.6	641.4	1,527.4	9.3	1.79	-0.60	-3.83	
5.985.0	25.50	60.60	5,664.8	647.9	1,538.3	7.5	5.26	2.83	10.47	
6.015.0	26.22	64.01	5,691.8	654.0	1,549.8	6.5	5.51	2.40	11.37	
6.045.0	26.16	64.71	5,718.7	659.7	1,561.8	5.9	1.05	-0.20	2.33	
6.075.0	26.46	63.69	5,745.6	665.5	1,573.7	5.3	1.81	1.00	-3.40	
6.104.0	26.75	64.36	5,771.5	671.2	1,585.4	4.6	1.44	1.00	2.31	
6.134.0	26.50	66.33	5,798.3	676.8	1,597.6	4.3	3.06	-0.83	6.57	
6.164.0	26.45	67.84	5,825.2	682.0	1,610.0	4.3	2.25	-0.17	5.03	
6.194.0	26.18	68.80	5,852.1	686.9	1,622.3	4.6	1.88	-0.90	3.20	
6.224.0	26.34	68.27	5,879.0	691.8	1,634.7	5.0	0.95	0.53	-1.77	
6.254.0	26.35	65.85	5,905.9	697.0	1,646.9	5.0	3.58	0.03	-8.07	
6.283.0	26.39	64.01	5,931.8	702.5	1,658.6	4.6	2.82	0.14	-6.34	
6.313.0	26.06	64.07	5,958.8	708.3	1,670.5	3.9	1.10	-1.10	0.20	
6.343.0	25.96	63.77	5,985.7	714.0	1,682.3	3.3	0.55	-0.33	-1.00	
6.373.0	25.86	63.64	6,012.7	719.8	1,694.1	2.5	0.38	-0.33	-0.43	
6.403.0	25.41	65.26	6,039.8	725.4	1,705.8	2.0	2.78	-1.50	5.40	
6.433.0	25.10	65.87	6,066.9	730.7	1,717.4	1.7	1.35	-1.03	2.03	
6.462.0	24.72	72.05	6,093.2	735.1	1,728.8	2.1	9.07	-1.31	21.31	
6.492.0	24.96	81.16	6,120.4	738.0	1,741.1	4.2	12.77	0.80	30.37	
6.522.0	25.83	88.96	6,147.5	739.1	1,753.8	8.2	11.51	2.90	26.00	
6.552.0	26.89	94.37	6,174.4	738.7	1,767.1	13.8	8.75	3.53	18.03	
6.582.0	28.71	101.11	6,201.0	735.8	1,781.0	21.0	12.10	6.07	22.47	



JUL 17 2017

WV Department of
Environmental Protection

Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118 Ousft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118 Ousft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

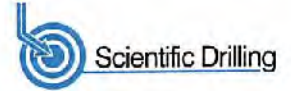
Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
6,601.0	30.12	105.25	6,217.5	734.7	1,780.1	26.5	13.01	7.42	21.77	
Sycamore @ 6601 MD										
6,612.0	30.99	107.48	6,227.0	733.1	1,795.4	30.1	13.01	7.92	20.30	
6,642.0	32.65	111.89	6,252.5	727.8	1,810.3	40.8	9.52	5.53	14.70	
6,672.0	34.32	115.62	6,277.5	721.1	1,825.4	52.9	8.83	5.57	12.43	
6,702.0	35.61	120.75	6,302.1	713.0	1,840.6	66.3	10.70	4.30	17.10	
6,731.0	36.87	123.61	6,325.5	703.8	1,855.1	80.4	7.27	4.34	9.86	
6,761.0	36.89	125.82	6,349.5	693.6	1,869.9	95.7	4.42	0.07	7.37	
6,791.0	36.51	126.95	6,373.2	682.7	1,884.6	111.5	5.87	5.40	3.77	
6,798.0	39.24	127.30	6,376.7	680.0	1,888.1	115.3	10.94	10.48	5.01	
Middlesex @ 6798 MD										
6,821.0	41.66	128.38	6,396.2	670.9	1,899.9	128.3	10.94	10.51	4.69	
6,851.0	44.82	130.32	6,418.0	657.9	1,915.8	146.5	11.43	10.53	6.47	
6,881.0	46.55	132.97	6,439.0	643.8	1,931.8	165.9	8.55	5.77	8.83	
6,910.0	48.74	135.88	6,458.5	628.6	1,947.1	185.7	10.58	7.55	10.03	
6,940.0	52.47	137.57	6,477.6	611.7	1,963.0	207.5	13.17	12.43	5.63	
6,961.0	55.39	137.79	6,489.9	599.2	1,974.4	223.5	13.93	13.90	1.05	
Burkett @ 6961 MD										
6,970.0	56.64	137.88	6,494.9	593.6	1,979.5	230.6	13.93	13.90	1.00	
7,000.0	60.49	138.48	6,510.6	574.5	1,996.5	254.8	12.95	12.83	2.00	
7,030.0	64.89	139.44	6,524.4	554.4	2,014.0	280.2	14.94	14.67	3.20	
Tully @ 7030 MD										
7,060.0	69.27	140.34	6,536.0	533.3	2,031.8	306.6	14.86	14.60	3.00	
7,090.0	73.48	140.86	6,545.6	511.3	2,049.8	333.9	14.17	14.03	2.07	
7,105.0	75.73	141.42	6,549.6	500.1	2,058.9	347.8	15.29	15.00	3.06	
MRCL_HOT @ 7105 MD										
7,120.0	77.98	141.87	6,553.0	488.6	2,068.0	361.9	15.29	15.00	3.00	
7,150.0	80.46	142.57	6,558.6	465.3	2,086.0	390.4	8.58	8.27	2.33	
7,179.0	81.74	143.22	6,563.1	442.5	2,103.3	418.2	4.94	4.41	2.24	
7,209.0	83.85	145.20	6,566.9	418.3	2,120.7	447.2	9.61	7.03	6.60	
7,239.0	88.03	145.90	6,569.0	393.7	2,137.6	476.6	14.13	13.93	2.33	
7,261.0	89.33	145.91	6,569.5	375.4	2,149.9	498.2	5.91	5.91	0.05	
7,358.0	89.50	148.23	6,570.5	294.0	2,202.7	593.7	2.40	0.18	2.39	
7,448.0	89.40	149.15	6,571.4	217.2	2,249.4	682.8	1.03	-0.11	1.02	
7,538.0	88.86	150.84	6,572.9	139.2	2,294.4	772.1	2.05	-0.82	1.88	
7,628.0	88.76	154.88	6,574.9	59.2	2,335.5	861.9	4.49	0.11	4.49	
7,717.0	89.93	157.94	6,575.9	-22.4	2,371.1	950.8	3.68	1.31	3.44	
7,807.0	89.80	157.41	6,576.3	-105.6	2,405.3	1,040.8	0.69	-0.37	-0.59	
7,896.0	88.76	158.86	6,577.6	-187.6	2,440.0	1,129.8	1.27	-0.94	-0.84	
7,986.0	88.49	156.70	6,579.7	-270.2	2,475.6	1,219.8	0.30	-0.30	0.04	
8,076.0	88.99	156.99	6,581.7	-352.9	2,511.0	1,309.8	0.64	0.56	0.32	
8,166.0	88.86	157.13	6,583.4	-435.8	2,546.1	1,399.8	0.21	-0.14	0.16	
8,255.0	88.52	156.80	6,585.4	-517.7	2,580.9	1,488.7	0.53	-0.38	-0.37	



JUL 17 2017

WV Department of
Environmental Protection



Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118 Dusst
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118 Dusst
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,345.0	89.56	157.65	6,586.9	-600.6	2,615.7	1,578.7	1.49	1.16	0.94
8,434.0	89.80	157.68	6,587.4	-683.0	2,649.5	1,667.7	0.27	0.27	0.03
8,524.0	90.00	156.71	6,587.6	-765.9	2,684.4	1,757.7	1.10	0.22	-1.06
8,613.0	88.76	157.28	6,588.5	-847.8	2,719.2	1,846.7	1.53	-1.39	0.64
8,702.0	88.76	156.73	6,590.5	-929.7	2,754.0	1,935.7	0.82	0.00	-0.62
8,792.0	89.06	156.42	6,592.2	-1,012.3	2,789.7	2,025.7	0.48	0.33	-0.34
8,881.0	89.23	156.04	6,593.5	-1,093.8	2,825.6	2,114.6	0.47	0.19	-0.43
8,971.0	88.09	154.86	6,595.6	-1,175.6	2,863.0	2,204.6	1.82	-1.27	-1.31
9,060.0	88.49	157.08	6,598.3	-1,256.8	2,899.2	2,293.5	2.53	0.45	2.49
9,150.0	89.63	157.35	6,599.6	-1,339.8	2,934.1	2,383.5	1.52	1.49	0.30
9,239.0	90.13	157.79	6,599.6	-1,422.1	2,968.0	2,472.5	0.60	0.34	0.49
9,329.0	90.30	156.30	6,599.3	-1,504.9	3,003.1	2,562.5	1.67	0.19	-1.66
9,418.0	88.62	157.01	6,600.1	-1,586.6	3,038.4	2,651.5	2.05	-1.89	0.80
9,508.0	89.60	156.61	6,601.5	-1,669.4	3,073.8	2,741.5	1.18	1.09	-0.44
9,597.0	89.33	156.12	6,602.4	-1,750.9	3,109.5	2,830.5	0.63	-0.30	-0.55
9,686.0	89.16	156.85	6,603.5	-1,832.5	3,145.0	2,919.5	0.34	-0.19	0.82
9,776.0	89.77	157.40	6,604.4	-1,915.4	3,180.0	3,009.5	0.91	0.68	0.61
9,865.0	90.50	157.37	6,604.2	-1,997.6	3,214.2	3,098.5	0.82	0.82	-0.03
9,955.0	91.11	158.25	6,602.9	-2,080.9	3,248.2	3,188.4	1.19	0.68	0.98
10,044.0	89.77	156.62	6,602.2	-2,163.1	3,282.3	3,277.4	2.37	-1.51	-1.83
10,134.0	91.14	156.31	6,601.5	-2,245.6	3,318.3	3,367.4	1.56	1.52	-0.34
10,224.0	90.97	155.11	6,599.8	-2,327.6	3,355.3	3,457.4	1.35	-0.19	-1.33
10,313.0	90.71	156.26	6,598.5	-2,408.7	3,391.9	3,546.3	1.32	-0.29	1.29
10,403.0	91.31	156.35	6,596.9	-2,491.1	3,428.1	3,636.3	0.67	0.67	0.10
10,492.0	91.01	157.28	6,595.1	-2,572.9	3,463.1	3,725.3	1.10	-0.34	1.04
10,582.0	91.54	154.95	6,593.1	-2,655.2	3,499.8	3,815.3	2.85	0.59	-2.59
10,671.0	91.37	157.90	6,590.9	-2,736.7	3,535.1	3,904.2	3.32	-0.19	3.31
10,761.0	90.60	159.39	6,589.3	-2,820.5	3,567.9	3,994.2	1.86	-0.86	1.66
10,850.0	89.46	157.83	6,589.3	-2,903.3	3,600.5	4,083.1	2.36	-1.28	-1.96
10,939.0	89.43	157.17	6,590.2	-2,985.5	3,634.7	4,172.1	0.52	-0.03	-0.52
11,029.0	91.48	157.57	6,589.4	-3,068.5	3,669.3	4,262.1	2.32	2.28	0.44
11,119.0	89.73	158.88	6,588.5	-3,150.5	3,703.9	4,351.1	2.21	-1.97	-1.00
11,209.0	89.90	156.65	6,588.8	-3,233.2	3,739.6	4,441.1	0.19	0.19	-0.03
11,297.0	91.04	155.78	6,588.1	-3,314.6	3,775.5	4,530.1	1.61	1.28	-0.96
11,387.0	90.71	156.92	6,586.7	-3,397.0	3,811.6	4,620.1	1.32	-0.37	1.27
11,476.0	90.57	155.61	6,585.7	-3,478.5	3,847.4	4,709.1	1.48	-0.16	-1.47
11,566.0	90.17	157.57	6,585.1	-3,561.1	3,883.1	4,799.1	2.22	-0.44	2.18
11,655.0	90.81	156.65	6,584.3	-3,643.1	3,917.8	4,888.0	1.26	0.72	-1.03
11,745.0	91.71	157.24	6,582.4	-3,725.9	3,953.0	4,978.0	1.20	1.00	0.66
11,834.0	90.37	156.80	6,580.8	-3,807.8	3,987.7	5,067.0	1.58	-1.51	-0.49
11,924.0	90.24	159.14	6,580.3	-3,891.2	4,021.5	5,157.0	2.60	-0.14	2.60
12,014.0	89.36	156.92	6,580.6	-3,974.7	4,055.2	5,247.0	2.65	-0.96	-2.47



JUL 17 2017
WV Department of Environmental Protection
Erickson/McNabb

Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mackay Pad - Caldwell/Greentree/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,103.0	89.40	157.09	6,581.6	-4,056.6	4,089.9	5,336.0	0.20	0.04	0.19
12,193.0	88.92	156.50	6,582.9	-4,139.3	4,125.4	5,425.9	0.85	-0.53	-0.66
12,282.0	89.68	156.43	6,584.0	-4,220.9	4,160.9	5,514.9	0.84	0.83	-0.08
12,372.0	89.66	156.62	6,584.5	-4,303.4	4,196.8	5,604.9	0.21	0.00	0.21
12,461.0	89.48	156.31	6,585.2	-4,385.0	4,232.3	5,693.9	0.41	-0.22	-0.35
12,551.0	88.92	156.47	6,586.5	-4,467.5	4,268.3	5,783.9	0.83	-0.60	0.18
12,640.0	89.43	157.12	6,587.7	-4,549.3	4,303.4	5,872.9	0.93	0.57	0.73
12,730.0	89.26	157.56	6,588.8	-4,632.3	4,338.1	5,962.9	0.52	-0.19	0.49
12,819.0	89.06	157.08	6,590.1	-4,714.4	4,372.4	6,051.9	0.58	-0.22	-0.54
12,909.0	86.52	157.03	6,592.0	-4,797.3	4,407.5	6,141.9	0.50	-0.60	-0.06
12,998.0	89.80	157.63	6,593.3	-4,879.4	4,441.8	6,230.8	1.59	1.44	0.87
13,088.0	89.97	156.80	6,593.5	-4,962.4	4,476.6	6,320.8	0.94	0.19	-0.92
13,177.0	91.14	156.21	6,592.6	-5,044.0	4,512.1	6,409.8	1.47	1.31	-0.86
13,267.0	90.54	156.33	6,591.3	-5,126.4	4,546.3	6,499.8	0.68	-0.67	0.13
13,356.0	89.53	156.08	6,591.2	-5,207.8	4,584.2	6,588.8	1.17	-1.13	-0.28
13,446.0	89.16	156.56	6,592.3	-5,290.2	4,620.4	6,678.8	0.67	-0.41	0.53
13,535.0	89.93	158.14	6,593.0	-5,372.4	4,654.6	6,767.8	1.97	0.87	1.78
13,625.0	89.30	156.83	6,593.6	-5,455.5	4,689.1	6,857.8	1.62	-0.70	-1.46
13,714.0	87.82	154.83	6,595.8	-5,536.7	4,725.5	6,946.7	2.79	-1.66	-2.25
13,804.0	90.00	157.10	6,597.5	-5,618.8	4,762.2	7,036.7	3.50	2.42	2.52
13,894.0	90.64	157.14	6,597.0	-5,701.7	4,797.2	7,126.7	0.71	0.71	0.04
13,983.0	90.87	156.86	6,595.8	-5,783.7	4,831.9	7,215.7	0.33	0.26	-0.20
14,073.0	89.63	157.66	6,595.5	-5,866.7	4,866.6	7,305.7	1.58	-1.38	0.78
14,162.0	89.83	157.50	6,595.9	-5,949.0	4,900.5	7,394.7	0.29	0.22	-0.18
14,252.0	90.57	158.25	6,595.6	-6,032.4	4,934.4	7,484.7	1.17	0.82	0.83
14,341.0	90.81	157.49	6,594.5	-6,114.8	4,967.9	7,573.6	0.90	0.27	-0.85
14,431.0	90.34	156.79	6,593.6	-6,197.7	5,002.9	7,663.6	0.94	-0.52	-0.78
14,520.0	88.79	156.21	6,594.3	-6,279.3	5,038.4	7,752.6	1.86	-1.74	-0.65
14,610.0	90.60	157.15	6,594.7	-6,362.0	5,074.0	7,842.6	2.27	2.01	1.04
14,699.0	90.50	156.90	6,593.9	-6,443.9	5,108.8	7,931.6	0.30	-0.11	-0.28
14,789.0	90.50	156.52	6,593.1	-6,526.6	5,144.3	8,021.6	0.42	0.00	-0.42
14,878.0	90.57	156.07	6,592.3	-6,608.1	5,180.1	8,110.6	0.51	0.08	-0.51
14,968.0	90.50	157.27	6,591.4	-6,690.7	5,215.8	8,200.6	1.34	-0.08	1.33
15,057.0	90.74	156.68	6,590.5	-6,772.6	5,250.8	8,289.6	0.72	0.27	-0.66
15,147.0	90.07	157.81	6,589.8	-6,855.5	5,285.5	8,379.6	1.27	-0.74	1.03
15,236.0	90.03	156.67	6,589.7	-6,937.5	5,320.1	8,468.6	1.06	-0.04	-1.06
15,326.0	90.13	156.61	6,589.6	-7,020.2	5,355.8	8,558.6	0.13	0.11	-0.07
15,415.0	90.47	156.76	6,589.2	-7,101.9	5,391.0	8,647.6	0.42	0.38	0.17
15,505.0	90.67	157.18	6,588.3	-7,184.7	5,426.2	8,737.6	0.52	0.22	0.47
15,594.0	90.07	155.46	6,587.7	-7,266.2	5,462.0	8,826.6	2.05	-0.67	-1.93
15,684.0	89.46	157.06	6,588.1	-7,348.6	5,498.2	8,916.5	1.90	-0.68	1.78
15,773.0	90.00	157.52	6,588.5	-7,430.7	5,532.5	9,005.5	0.80	0.61	0.52



RECEIVED
Office of Oil and Gas

Scientific Drilling International

Survey Report



JUL 17 2017
WV Department of
Environmental Protection

Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
15,863.0	90.60	159.17	6,588.0	-7,514.3	5,565.8	9,095.5	1.95	0.67	1.83	
15,952.0	91.04	159.00	6,586.7	-7,597.5	5,597.5	9,184.4	0.53	0.49	-0.19	
16,042.0	89.06	157.29	6,586.7	-7,681.0	5,631.0	9,274.4	2.91	-2.20	-1.90	
16,131.0	89.63	156.21	6,587.7	-7,762.8	5,666.2	9,363.4	1.37	0.64	-1.21	
16,221.0	90.07	156.54	6,587.9	-7,845.2	5,702.2	9,453.4	0.61	0.49	0.37	
16,311.0	90.74	157.27	6,587.3	-7,928.0	5,737.5	9,543.4	1.10	0.74	0.81	
16,400.0	90.94	156.54	6,586.0	-8,009.9	5,772.4	9,632.4	0.85	0.22	-0.82	
16,490.0	90.13	155.90	6,585.1	-8,092.2	5,808.7	9,722.4	1.15	-0.90	-0.71	
16,579.0	90.30	156.50	6,584.8	-8,173.6	5,844.6	9,811.4	0.70	0.19	0.67	
16,669.0	89.93	156.77	6,584.6	-8,256.3	5,880.3	9,901.4	0.51	-0.41	0.30	
16,758.0	90.23	156.99	6,584.5	-8,338.1	5,915.3	9,990.4	0.42	0.34	0.25	
16,848.0	89.70	157.01	6,584.5	-8,421.0	5,950.4	10,080.4	0.59	-0.59	0.02	
16,938.0	89.63	156.58	6,585.1	-8,503.7	5,985.9	10,170.4	0.48	-0.08	-0.48	
17,027.0	89.73	156.34	6,585.6	-8,585.3	6,021.4	10,259.4	0.29	0.11	-0.27	
17,117.0	90.50	157.84	6,585.4	-8,668.2	6,056.5	10,349.4	1.87	0.86	1.67	
17,206.0	90.77	157.32	6,584.4	-8,750.4	6,090.4	10,438.3	0.66	0.30	-0.58	
17,296.0	89.30	155.49	6,584.3	-8,832.9	6,126.4	10,528.3	2.61	-1.63	-2.03	
17,385.0	89.40	156.00	6,585.3	-8,914.0	6,163.0	10,617.3	0.58	0.11	0.57	
17,475.0	89.56	155.40	6,586.2	-8,996.1	6,200.0	10,707.3	0.69	0.18	-0.67	
17,564.0	89.77	154.50	6,586.7	-9,076.7	6,237.7	10,796.2	1.04	0.24	-1.01	
17,654.0	89.66	156.44	6,587.1	-9,158.6	6,275.1	10,886.2	2.16	-0.12	2.16	
17,743.0	90.37	158.59	6,587.1	-9,240.8	6,309.1	10,975.2	2.54	0.80	2.42	
17,832.0	90.80	158.32	6,586.2	-9,323.6	6,341.8	11,064.1	0.57	0.48	-0.30	
17,922.0	90.97	158.28	6,584.8	-9,407.2	6,375.1	11,154.1	0.19	0.19	-0.04	
18,011.0	90.03	157.33	6,584.0	-9,489.6	6,408.7	11,243.1	1.50	-1.06	-1.07	
18,101.0	89.83	156.46	6,584.1	-9,572.4	6,444.0	11,333.1	0.99	-0.22	-0.97	
18,190.0	90.20	155.96	6,584.1	-9,653.8	6,479.9	11,422.1	0.68	0.42	-0.54	
18,279.0	89.83	157.01	6,584.1	-9,735.4	6,515.4	11,511.1	1.23	-0.42	1.16	
18,369.0	90.60	157.79	6,583.8	-9,816.5	6,550.0	11,601.1	1.22	0.86	0.87	
18,458.0	89.60	157.66	6,583.6	-9,900.9	6,583.7	11,690.1	1.13	-1.12	-0.12	
18,548.0	89.90	157.55	6,584.0	-9,984.1	6,618.0	11,780.1	0.36	0.33	-0.14	
18,638.0	90.20	157.46	6,583.9	-10,067.2	6,652.4	11,870.1	0.35	0.33	-0.10	
18,727.0	90.33	157.75	6,583.5	-10,149.5	6,686.3	11,959.0	0.36	0.15	0.33	
18,817.0	90.84	158.15	6,582.6	-10,232.9	6,720.1	12,049.0	0.72	0.57	0.44	
18,906.0	89.70	156.72	6,582.2	-10,315.1	6,754.2	12,138.0	2.05	-1.28	-1.61	
18,996.0	90.00	156.96	6,582.4	-10,397.9	6,789.6	12,228.0	0.43	0.33	0.27	
19,086.0	90.03	155.19	6,582.4	-10,480.1	6,826.1	12,318.0	1.97	0.03	-1.97	
19,175.0	90.67	154.80	6,581.8	-10,560.8	6,863.8	12,407.0	0.84	0.72	-0.44	
19,265.0	91.14	154.62	6,580.4	-10,642.2	6,902.2	12,496.9	0.56	0.52	-0.20	
19,277.0	91.21	154.47	6,580.2	-10,653.0	6,907.4	12,508.9	1.38	0.58	-1.25	
Last SDI MWD @ 19277 MD										
19,334.0	91.21	154.47	6,579.0	-10,704.4	6,931.9	12,565.8	0.00	0.00	0.00	



Company:	Antero	Local Co-ordinate Reference:	Well McNabb Unit 4H
Project:	Ritchie County WV	TVD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Site:	Mackay Pad - Caldwell/Greenback/McNabb	MD Reference:	Precision 523: 1099' GL + 19' KB @ 1118 usft @ 1118.0usft
Well:	McNabb Unit 4H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
Projection To Bit @ 19334 MD / 6579 TVD									

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
6,601.0	6,217.5	Sycamore @ 6601 MD		0.00	
6,798.0	6,378.7	Middlesex @ 6798 MD		0.00	
6,961.0	6,489.9	Burkett @ 6961 MD		0.00	
7,030.0	6,524.4	Tully @ 7030 MD		0.00	
7,105.0	6,549.6	MRCL_HOT @ 7105 MD		0.00	

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
106.0	106.0	0.0	-0.1	First SDI Gyro @ 106 MD
5,819.0	5,514.4	612.8	1,477.5	Last SDI Gyro @ 5819 MD
5,835.0	5,528.8	616.0	1,483.7	First SDI MWD @ 5835 MD
19,277.0	6,580.2	-10,653.0	6,907.4	Last SDI MWD @ 19277 MD
19,334.0	6,579.0	-10,704.4	6,931.9	Projection To Bit @ 19334 MD / 6579 TVD

Checked By: _____ Approved By: _____ Date: _____

RECEIVED
Office of Oil and Gas

JUL 17 2017

WV Department of
Environmental Protection