



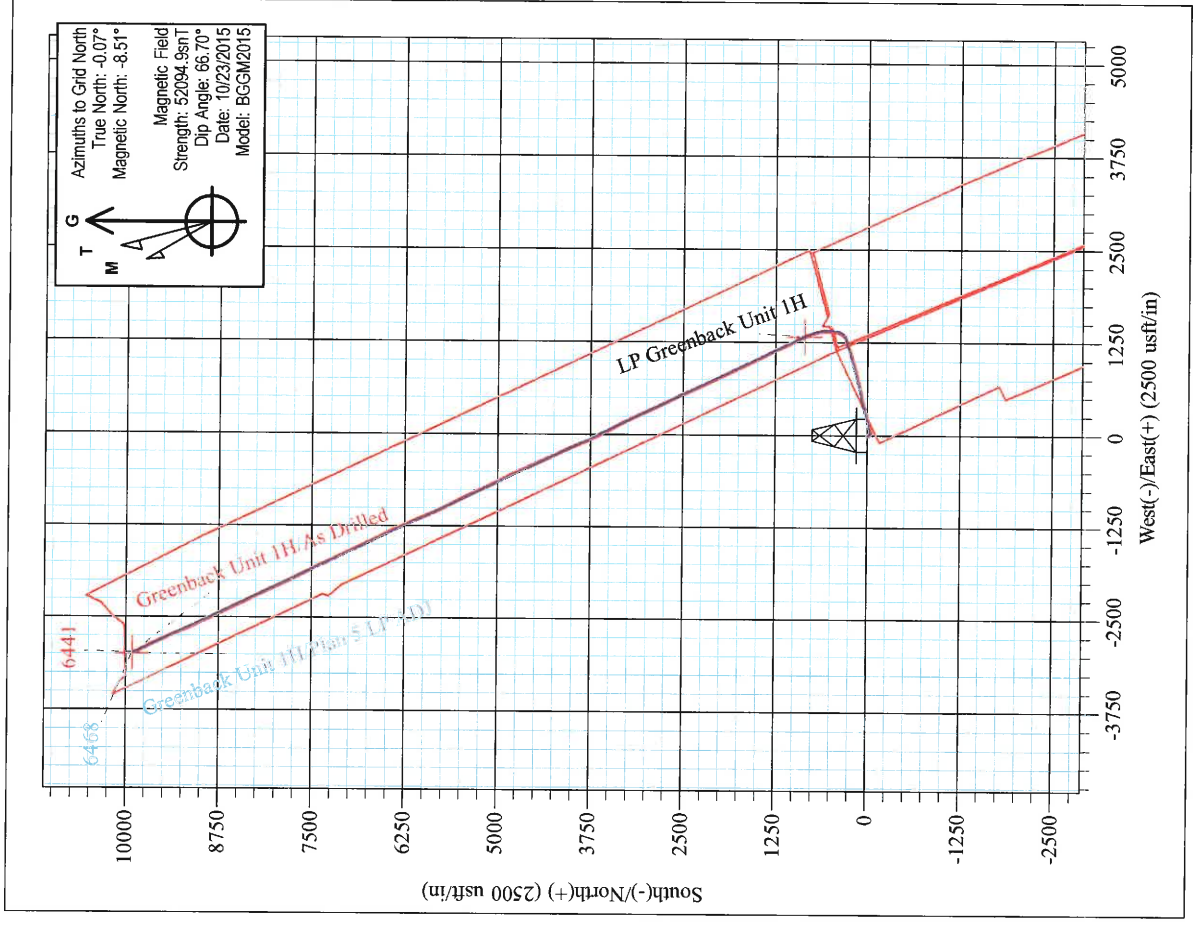
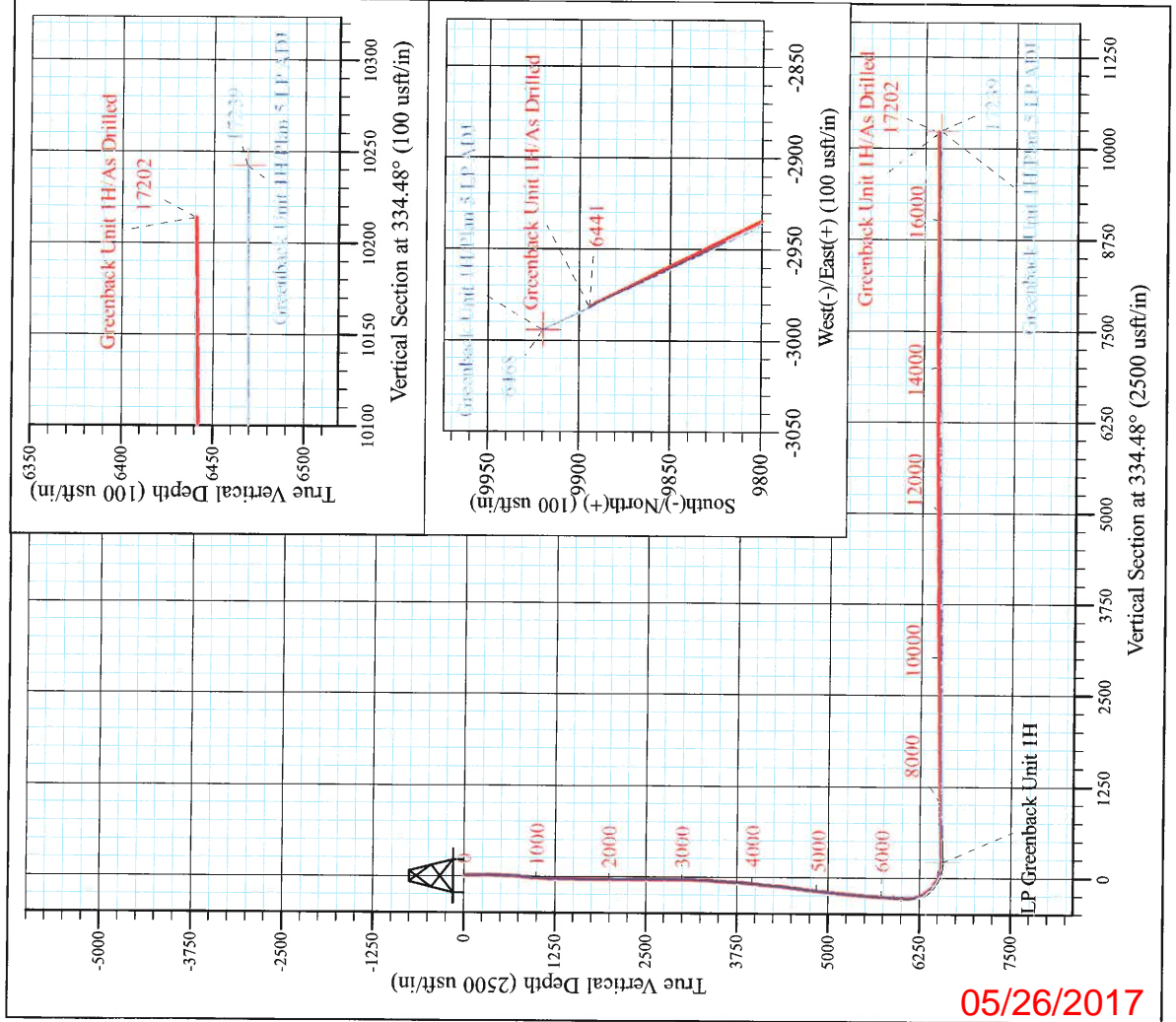
Mackay Pad - Caldwell/Greenback/McNabb  
 Greenback Unit 1H  
 Plan 5 LP ADJ  
 Precision 523: GL 1099 + KB 19 @ 1118.0usft  
 Ritchie County WV

**PROJECT DETAILS:**  
 Geodetic System: Universal Transverse Mercator (US Survey Feet)  
 Datum: NAD 1927 (NADCON CONUS)  
 Ellipsoid: Clarke 1866  
 Zone: Zone 17N (84 W to 78 W)  
 System Datum: Mean Sea Level



**WELL DETAILS: Greenback Unit 1H SHL**

+N/-S	0.0	+E/-W	0.0	Northing	14248720.11	Latitude	39° 14' 17.896 N	Longitude	80° 53' 50.021 W
True Vertical Depth (2500 usft/in)		True Vertical Depth (100 usft/in)		True Vertical Depth (100 usft/in)		True Vertical Depth (100 usft/in)		True Vertical Depth (100 usft/in)	



**Greenback Unit 1H**  
 Approx. **BHL**  
 39° 15' 55.762 N 80° 54' 27.803 W

Shane Rhodes  
 13:42, November 09 2015  
 Scientific Drilling International  
 124 Vista Drive  
 Charleroi, PA 15022

11/09/2017



## **Antero Resources**

**Ritchie County WV**

**Mackay Pad - Caldwell/Greenback/McNabb**

**Greenback Unit 1H**

**Original Wellpath**

**Design: As Drilled**

## **Standard Survey Report**

**09 November, 2015**



[www.scientificdrilling.com](http://www.scientificdrilling.com)

05/26/2017



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	Antero NE

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

<b>Site</b>	Mackay Pad - Caldwell/Greenback/McNabb				
<b>Site Position:</b>		<b>Northing:</b>	14,248,714.78 usft	<b>Latitude:</b>	39° 14' 17.843 N
<b>From:</b>	Map	<b>Easting:</b>	1,669,496.15 usft	<b>Longitude:</b>	80° 53' 50.274 W
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.06 °

<b>Well</b>	Greenback Unit 1H, Marcellus					
<b>Well Position</b>	<b>+N/-S</b>	0.0 usft	<b>Northing:</b>	14,248,720.11 usft	<b>Latitude:</b>	39° 14' 17.896 N
	<b>+E/-W</b>	0.0 usft	<b>Easting:</b>	1,669,516.05 usft	<b>Longitude:</b>	80° 53' 50.021 W
<b>Position Uncertainty</b>		2.0 usft	<b>Wellhead Elevation:</b>	1,118.0 usft	<b>Ground Level:</b>	1,099.0 usft

<b>Wellbore</b>	Original Wellpath				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	BGGM2015	10/23/2015	-8.45	66.70	52,095

<b>Design</b>	As Drilled				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	334.48	

<b>Survey Program</b>	<b>Date</b>	11/9/2015			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
106.0	6,166.0	Survey #6 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
6,166.0	17,202.0	Survey #7 SDI 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	0.18	250.13	106.0	-0.1	-0.2	0.0	0.17	0.17	0.00	
<b>First Gyro @ 106 MD</b>										
131.0	0.17	267.79	131.0	-0.1	-0.2	0.0	0.22	-0.04	70.64	
156.0	0.17	287.61	156.0	-0.1	-0.3	0.1	0.23	0.00	79.28	
181.0	0.22	311.28	181.0	0.0	-0.4	0.1	0.38	0.20	94.68	
206.0	0.11	264.41	206.0	0.0	-0.4	0.2	0.66	-0.44	-187.48	
231.0	0.17	226.26	231.0	0.0	-0.5	0.2	0.43	0.24	-152.60	
256.0	0.13	235.46	256.0	-0.1	-0.5	0.2	0.19	-0.16	36.80	
281.0	0.24	238.56	281.0	-0.1	-0.6	0.2	0.44	0.44	12.40	



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WW	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)
306.0	0.27	229.82	306.0	-0.2	-0.7	0.1	0.20	0.12	-34.96
331.0	0.26	235.20	331.0	-0.2	-0.8	0.1	0.11	-0.04	21.52
356.0	0.22	259.34	356.0	-0.3	-0.9	0.1	0.43	-0.16	96.56
381.0	0.24	258.48	381.0	-0.3	-1.0	0.2	0.08	0.08	-3.44
406.0	0.03	127.14	406.0	-0.3	-1.0	0.2	1.04	-0.84	-525.36
431.0	0.20	265.02	431.0	-0.3	-1.1	0.2	0.89	0.68	551.52
456.0	0.26	249.98	456.0	-0.3	-1.2	0.2	0.34	0.24	-60.16
481.0	0.20	230.09	481.0	-0.4	-1.2	0.2	0.40	-0.24	-79.56
506.0	0.19	231.07	506.0	-0.4	-1.3	0.2	0.04	-0.04	3.92
531.0	0.26	200.96	531.0	-0.5	-1.4	0.1	0.54	0.28	-120.44
556.0	0.93	167.30	556.0	-0.8	-1.3	-0.1	2.91	2.68	-134.64
581.0	1.57	162.57	581.0	-1.3	-1.2	-0.7	2.59	2.56	-18.92
606.0	2.24	159.50	606.0	-2.1	-0.9	-1.5	2.71	2.68	-12.28
631.0	2.98	154.44	630.9	-3.1	-0.5	-2.6	3.10	2.96	-20.24
656.0	3.68	149.89	655.9	-4.4	0.2	-4.1	2.99	2.80	-18.20
681.0	4.20	148.38	680.8	-5.9	1.1	-5.8	2.12	2.08	-6.04
706.0	4.53	147.59	705.8	-7.5	2.1	-7.7	1.34	1.32	-3.16
731.0	4.85	146.90	730.7	-9.2	3.2	-9.7	1.30	1.28	-2.76
756.0	4.94	147.83	755.6	-11.0	4.4	-11.8	0.48	0.36	3.72
781.0	4.93	148.10	780.5	-12.8	5.5	-14.0	0.10	-0.04	1.08
806.0	4.93	148.20	805.4	-14.7	6.6	-16.1	0.03	0.00	0.40
831.0	4.94	146.92	830.3	-16.5	7.8	-18.2	0.44	0.04	-5.12
856.0	4.81	146.33	855.2	-18.2	9.0	-20.3	0.56	-0.52	-2.36
881.0	4.58	144.97	880.1	-19.9	10.1	-22.4	1.02	-0.92	-5.44
906.0	4.46	144.92	905.1	-21.6	11.2	-24.3	0.48	-0.48	-0.20
931.0	4.11	145.35	930.0	-23.1	12.3	-26.1	1.41	-1.40	1.72
956.0	3.86	146.23	954.9	-24.5	13.3	-27.9	1.03	-1.00	3.52
981.0	3.56	146.91	979.9	-25.9	14.2	-29.5	1.21	-1.20	2.72
1,006.0	3.55	146.39	1,004.8	-27.2	15.0	-31.0	0.14	-0.04	-2.08
1,031.0	3.30	147.81	1,029.8	-28.4	15.8	-32.5	1.06	-1.00	5.68
1,056.0	3.09	148.65	1,054.8	-29.6	16.6	-33.9	0.86	-0.84	3.36
1,081.0	2.77	149.21	1,079.7	-30.7	17.2	-35.1	1.29	-1.28	2.24
1,106.0	2.45	149.54	1,104.7	-31.7	17.8	-36.3	1.28	-1.28	1.32
1,131.0	2.12	149.44	1,129.7	-32.5	18.3	-37.3	1.32	-1.32	-0.40
1,156.0	1.94	145.04	1,154.7	-33.3	18.8	-38.1	0.95	-0.72	-17.60
1,181.0	1.86	145.23	1,179.6	-34.0	19.3	-39.0	0.32	-0.32	0.76
1,206.0	1.56	146.83	1,204.6	-34.6	19.7	-39.7	1.21	-1.20	6.40
1,231.0	1.52	147.49	1,229.6	-35.1	20.1	-40.4	0.18	-0.16	2.64
1,256.0	1.47	148.45	1,254.6	-35.7	20.4	-41.0	0.22	-0.20	3.84
1,281.0	1.14	154.09	1,279.6	-36.2	20.7	-41.6	1.41	-1.32	22.56
1,306.0	0.89	157.46	1,304.6	-36.6	20.9	-42.0	1.03	-1.00	13.48
1,331.0	0.83	158.68	1,329.6	-36.9	21.0	-42.4	0.25	-0.24	4.88
1,356.0	0.78	160.75	1,354.6	-37.3	21.1	-42.7	0.23	-0.20	8.28



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)
1,381.0	0.75	158.25	1,379.6	-37.6	21.2	-43.1	0.18	-0.12	-10.00
1,406.0	0.64	161.28	1,404.6	-37.9	21.4	-43.4	0.46	-0.44	12.12
1,431.0	0.60	159.22	1,429.6	-38.1	21.4	-43.6	0.18	-0.16	-8.24
1,456.0	0.46	160.78	1,454.6	-38.3	21.5	-43.9	0.56	-0.56	6.24
1,481.0	0.38	157.51	1,479.6	-38.5	21.6	-44.1	0.33	-0.32	-13.08
1,506.0	0.28	153.78	1,504.6	-38.6	21.6	-44.2	0.41	-0.40	-14.92
1,531.0	0.48	142.85	1,529.6	-38.8	21.7	-44.4	0.85	0.80	-43.72
1,556.0	0.38	144.87	1,554.6	-38.9	21.8	-44.5	0.40	-0.40	8.08
1,581.0	0.44	141.36	1,579.6	-39.1	22.0	-44.7	0.26	0.24	-14.04
1,606.0	0.30	151.08	1,604.6	-39.2	22.0	-44.9	0.61	-0.56	38.88
1,631.0	0.41	154.20	1,629.6	-39.3	22.1	-45.0	0.45	0.44	12.48
1,656.0	0.51	151.56	1,654.6	-39.5	22.2	-45.2	0.41	0.40	-10.56
1,681.0	0.37	160.12	1,679.6	-39.7	22.3	-45.4	0.62	-0.56	34.24
1,706.0	0.33	169.85	1,704.6	-39.8	22.3	-45.6	0.29	-0.16	38.92
1,731.0	0.35	162.40	1,729.6	-40.0	22.4	-45.7	0.19	0.08	-29.80
1,756.0	0.20	150.51	1,754.6	-40.1	22.4	-45.8	0.64	-0.60	-47.56
1,781.0	0.34	139.02	1,779.6	-40.2	22.5	-46.0	0.60	0.56	-45.96
1,806.0	0.34	137.97	1,804.6	-40.3	22.6	-46.1	0.02	0.00	-4.20
1,831.0	0.45	149.74	1,829.6	-40.4	22.7	-46.3	0.54	0.44	47.08
1,856.0	0.39	156.43	1,854.6	-40.6	22.8	-46.5	0.31	-0.24	26.76
1,881.0	0.38	160.72	1,879.6	-40.8	22.8	-46.6	0.12	-0.04	17.16
1,906.0	0.36	160.59	1,904.6	-40.9	22.9	-46.8	0.08	-0.08	-0.52
1,931.0	0.42	141.24	1,929.6	-41.1	23.0	-46.9	0.58	0.24	-77.40
1,956.0	0.42	144.93	1,954.6	-41.2	23.1	-47.1	0.11	0.00	14.76
1,981.0	0.53	145.44	1,979.6	-41.4	23.2	-47.3	0.44	0.44	2.04
2,006.0	0.46	147.34	2,004.6	-41.6	23.3	-47.5	0.29	-0.28	7.60
2,031.0	0.54	148.66	2,029.6	-41.7	23.4	-47.8	0.32	0.32	5.28
2,056.0	0.43	156.85	2,054.6	-41.9	23.5	-48.0	0.52	-0.44	32.76
2,081.0	0.38	150.30	2,079.6	-42.1	23.6	-48.1	0.27	-0.20	-26.20
2,106.0	0.36	143.64	2,104.6	-42.2	23.7	-48.3	0.19	-0.08	-26.64
2,131.0	0.47	152.37	2,129.6	-42.4	23.8	-48.5	0.51	0.44	34.92
2,156.0	0.46	158.09	2,154.6	-42.6	23.9	-48.7	0.19	-0.04	22.88
2,181.0	0.38	157.34	2,179.6	-42.7	23.9	-48.9	0.32	-0.32	-3.00
2,206.0	0.31	174.88	2,204.6	-42.9	24.0	-49.0	0.50	-0.28	70.16
2,231.0	0.29	180.09	2,229.6	-43.0	24.0	-49.1	0.14	-0.08	20.84
2,256.0	0.25	198.42	2,254.6	-43.1	24.0	-49.2	0.38	-0.16	73.32
2,281.0	0.24	189.47	2,279.6	-43.2	23.9	-49.3	0.16	-0.04	-35.80
2,306.0	0.25	165.67	2,304.6	-43.3	23.9	-49.4	0.41	0.04	-95.20
2,331.0	0.28	177.86	2,329.6	-43.4	24.0	-49.5	0.25	0.12	48.76
2,356.0	0.25	194.99	2,354.6	-43.6	23.9	-49.6	0.34	-0.12	68.52
2,381.0	0.20	230.41	2,379.6	-43.6	23.9	-49.7	0.58	-0.20	141.68
2,406.0	0.23	238.16	2,404.6	-43.7	23.8	-49.7	0.17	0.12	31.00
2,431.0	0.29	247.81	2,429.6	-43.7	23.7	-49.7	0.30	0.24	38.60



Scientific Drilling International  
Survey Report



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)
2,456.0	0.23	226.62	2,454.6	-43.8	23.6	-49.7	0.45	-0.24	-84.76
2,481.0	0.26	234.08	2,479.6	-43.9	23.5	-49.7	0.17	0.12	29.84
2,506.0	0.27	245.90	2,504.6	-43.9	23.4	-49.7	0.22	0.04	47.28
2,531.0	0.21	269.89	2,529.6	-43.9	23.3	-49.7	0.46	-0.24	95.96
2,556.0	0.26	264.31	2,554.6	-44.0	23.2	-49.7	0.22	0.20	-22.32
2,581.0	0.30	264.17	2,579.6	-44.0	23.1	-49.6	0.16	0.16	-0.56
2,606.0	0.27	244.51	2,604.6	-44.0	23.0	-49.6	0.41	-0.12	-78.64
2,631.0	0.30	281.70	2,629.6	-44.0	22.9	-49.6	0.74	0.12	148.76
2,656.0	0.26	246.82	2,654.6	-44.0	22.8	-49.5	0.69	-0.16	-139.52
2,681.0	0.23	252.82	2,679.6	-44.1	22.7	-49.5	0.16	-0.12	24.00
2,706.0	0.35	259.44	2,704.6	-44.1	22.5	-49.5	0.50	0.48	26.48
2,731.0	0.36	280.84	2,729.6	-44.1	22.4	-49.4	0.53	0.04	85.60
2,756.0	0.40	284.50	2,754.6	-44.0	22.2	-49.3	0.19	0.16	14.64
2,781.0	0.40	278.80	2,779.6	-44.0	22.1	-49.2	0.16	0.00	-22.80
2,806.0	0.65	289.00	2,804.6	-44.0	21.8	-49.1	1.06	1.00	40.80
2,831.0	0.54	293.50	2,829.6	-43.9	21.6	-48.9	0.48	-0.44	18.00
2,856.0	0.43	300.35	2,854.6	-43.8	21.4	-48.7	0.50	-0.44	27.40
2,881.0	0.46	304.27	2,879.6	-43.7	21.2	-48.6	0.17	0.12	15.68
2,906.0	0.37	9.20	2,904.6	-43.5	21.2	-48.4	1.81	-0.36	259.72
2,931.0	0.66	36.62	2,929.6	-43.3	21.3	-48.3	1.49	1.16	109.68
2,956.0	1.72	57.25	2,954.6	-43.0	21.7	-48.2	4.51	4.24	82.52
2,981.0	2.97	60.71	2,979.5	-42.5	22.6	-48.1	5.03	5.00	13.84
3,006.0	4.17	63.36	3,004.5	-41.8	23.9	-48.0	4.84	4.80	10.60
3,031.0	5.26	66.19	3,029.4	-40.9	25.8	-48.0	4.46	4.36	11.32
3,056.0	6.64	68.20	3,054.3	-39.9	28.2	-48.1	5.58	5.52	8.04
3,081.0	7.72	68.58	3,079.1	-38.7	31.1	-48.4	4.32	4.32	1.52
3,106.0	8.73	70.27	3,103.8	-37.5	34.4	-48.7	4.15	4.04	6.76
3,131.0	9.62	72.43	3,128.5	-36.2	38.2	-49.2	3.82	3.56	8.64
3,156.0	10.37	72.88	3,153.1	-34.9	42.4	-49.8	3.02	3.00	1.80
3,181.0	11.23	73.66	3,177.7	-33.6	46.8	-50.5	3.49	3.44	3.12
3,206.0	11.84	74.09	3,202.2	-32.2	51.6	-51.3	2.46	2.44	1.72
3,231.0	12.52	74.68	3,226.6	-30.8	56.7	-52.2	2.77	2.72	2.36
3,256.0	13.02	75.35	3,251.0	-29.3	62.1	-53.2	2.09	2.00	2.68
3,281.0	13.14	75.51	3,275.3	-27.9	67.5	-54.3	0.50	0.48	0.64
3,306.0	13.33	75.81	3,299.7	-26.5	73.1	-55.4	0.81	0.76	1.20
3,331.0	13.52	76.84	3,324.0	-25.1	78.7	-56.6	1.22	0.76	4.12
3,356.0	13.72	77.49	3,348.3	-23.8	84.5	-57.9	1.01	0.80	2.60
3,381.0	13.75	77.47	3,372.6	-22.5	90.3	-59.2	0.12	0.12	-0.08
3,406.0	13.87	78.16	3,396.9	-21.3	96.1	-60.6	0.82	0.48	2.76
3,431.0	14.02	78.45	3,421.1	-20.1	102.0	-62.0	0.66	0.60	1.16
3,456.0	14.50	78.56	3,445.3	-18.8	108.0	-63.5	1.92	1.92	0.44
3,481.0	15.18	78.43	3,469.5	-17.6	114.3	-65.1	2.72	2.72	-0.52
3,506.0	15.52	77.75	3,493.6	-16.2	120.8	-66.6	1.54	1.36	-2.72
3,531.0	15.42	77.99	3,517.7	-14.8	127.3	-68.2	0.47	-0.40	0.96



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)
3,556.0	16.25	76.63	3,541.8	-13.3	133.9	-69.7	3.64	3.32	-5.44
3,581.0	16.86	75.94	3,565.7	-11.6	140.9	-71.2	2.56	2.44	-2.76
3,606.0	17.10	75.18	3,589.6	-9.8	147.9	-72.6	1.31	0.96	-3.04
3,631.0	17.08	74.79	3,613.5	-7.9	155.0	-73.9	0.47	-0.08	-1.56
3,656.0	17.24	74.64	3,637.4	-5.9	162.2	-75.2	0.66	0.64	-0.60
3,681.0	17.35	74.60	3,661.3	-4.0	169.3	-76.5	0.44	0.44	-0.16
3,706.0	17.61	74.67	3,685.1	-2.0	176.6	-77.8	1.04	1.04	0.28
3,731.0	17.67	74.64	3,709.0	0.0	183.9	-79.2	0.24	0.24	-0.12
3,756.0	18.12	74.54	3,732.8	2.1	191.3	-80.5	1.80	1.80	-0.40
3,781.0	18.62	74.49	3,756.5	4.2	198.9	-81.9	2.00	2.00	-0.20
3,806.0	19.46	74.61	3,780.1	6.4	206.7	-83.3	3.36	3.36	0.48
3,831.0	20.31	74.81	3,803.6	8.6	214.9	-84.8	3.41	3.40	0.80
3,856.0	20.80	75.50	3,827.0	10.8	223.4	-86.5	2.19	1.96	2.76
3,881.0	21.40	76.27	3,850.3	13.0	232.1	-88.2	2.64	2.40	3.08
3,906.0	21.97	76.58	3,873.6	15.2	241.1	-90.2	2.33	2.28	1.24
3,931.0	22.98	77.37	3,896.7	17.4	250.4	-92.2	4.22	4.04	3.16
3,956.0	23.55	77.89	3,919.6	19.5	260.1	-94.5	2.42	2.28	2.08
3,981.0	24.88	78.03	3,942.4	21.6	270.1	-96.9	5.32	5.32	0.56
4,006.0	25.63	77.92	3,965.1	23.8	280.5	-99.4	3.01	3.00	-0.44
4,031.0	27.00	77.50	3,987.5	26.2	291.4	-101.9	5.53	5.48	-1.68
4,056.0	27.48	77.35	4,009.7	28.7	302.5	-104.5	1.94	1.92	-0.60
4,081.0	27.55	77.06	4,031.9	31.2	313.8	-107.0	0.60	0.28	-1.16
4,106.0	27.90	76.60	4,054.0	33.9	325.1	-109.5	1.64	1.40	-1.84
4,131.0	28.71	76.08	4,076.0	36.7	336.6	-111.9	3.39	3.24	-2.08
4,156.0	28.52	75.46	4,098.0	39.6	348.2	-114.3	1.41	-0.76	-2.48
4,181.0	27.80	74.15	4,120.0	42.7	359.6	-116.4	3.80	-2.88	-5.24
4,206.0	27.41	73.71	4,142.1	45.9	370.8	-118.3	1.76	-1.56	-1.76
4,231.0	27.53	73.46	4,164.3	49.2	381.8	-120.1	0.67	0.48	-1.00
4,256.0	27.61	73.34	4,186.5	52.5	392.9	-121.9	0.39	0.32	-0.48
4,281.0	27.82	73.38	4,208.6	55.8	404.0	-123.7	0.84	0.84	0.16
4,306.0	27.41	73.23	4,230.8	59.2	415.1	-125.5	1.66	-1.64	-0.60
4,331.0	27.44	72.87	4,253.0	62.5	426.2	-127.2	0.67	0.12	-1.44
4,356.0	26.62	72.76	4,275.2	65.9	437.0	-128.8	3.29	-3.28	-0.44
4,381.0	27.05	72.88	4,297.5	69.2	447.8	-130.5	1.73	1.72	0.48
4,406.0	26.42	73.40	4,319.9	72.5	458.6	-132.2	2.69	-2.52	2.08
4,431.0	26.28	74.34	4,342.3	75.5	469.2	-134.0	1.76	-0.56	3.76
4,456.0	25.77	75.11	4,364.7	78.4	479.8	-135.9	2.45	-2.04	3.08
4,481.0	25.74	75.89	4,387.3	81.2	490.3	-138.0	1.36	-0.12	3.12
4,506.0	25.92	77.11	4,409.8	83.7	500.9	-140.3	2.24	0.72	4.88
4,531.0	26.39	78.72	4,432.2	86.0	511.7	-142.8	3.40	1.88	6.44
4,556.0	26.03	79.63	4,454.6	88.1	522.5	-145.6	2.16	-1.44	3.64
4,581.0	26.68	79.70	4,477.0	90.1	533.4	-148.5	2.60	2.60	0.28
4,606.0	27.07	79.59	4,499.3	92.1	544.6	-151.5	1.57	1.56	-0.44



Scientific Drilling International  
Survey Report



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)
4,631.0	28.11	79.60	4,521.5	94.2	556.0	-154.5	4.16	4.16	0.04
4,656.0	28.92	79.24	4,543.5	96.4	567.7	-157.6	3.31	3.24	-1.44
4,681.0	30.18	78.76	4,565.2	98.7	579.8	-160.7	5.13	5.04	-1.92
4,706.0	30.49	78.70	4,586.8	101.2	592.2	-163.8	1.25	1.24	-0.24
4,731.0	30.84	78.46	4,608.3	103.7	604.7	-166.9	1.48	1.40	-0.96
4,756.0	30.03	77.50	4,629.8	106.4	617.1	-169.9	3.78	-3.24	-3.84
4,781.0	29.78	76.98	4,651.5	109.1	629.2	-172.6	1.44	-1.00	-2.08
4,806.0	29.89	76.60	4,673.2	112.0	641.3	-175.3	0.87	0.44	-1.52
4,831.0	30.33	76.37	4,694.8	114.9	653.5	-177.9	1.82	1.76	-0.92
4,856.0	30.24	76.22	4,716.4	117.9	665.8	-180.4	0.47	-0.36	-0.60
4,881.0	29.70	75.63	4,738.1	120.9	677.9	-182.9	2.46	-2.16	-2.36
4,906.0	29.79	75.52	4,759.8	124.0	689.9	-185.3	0.42	0.36	-0.44
4,931.0	29.61	75.71	4,781.5	127.1	701.9	-187.7	0.81	-0.72	0.76
4,956.0	29.42	75.84	4,803.2	130.1	713.8	-190.1	0.80	-0.76	0.52
4,981.0	28.62	75.56	4,825.1	133.1	725.6	-192.5	3.25	-3.20	-1.12
5,006.0	28.57	75.86	4,847.1	136.1	737.2	-194.8	0.61	-0.20	1.20
5,031.0	27.91	76.45	4,869.1	138.9	748.7	-197.2	2.87	-2.64	2.36
5,056.0	27.73	76.62	4,891.2	141.6	760.0	-199.6	0.79	-0.72	0.68
5,081.0	27.40	76.60	4,913.4	144.3	771.3	-202.1	1.32	-1.32	-0.08
5,106.0	27.34	77.08	4,935.6	146.9	782.4	-204.5	0.91	-0.24	1.92
5,131.0	27.32	77.60	4,957.8	149.4	793.6	-207.1	0.96	-0.08	2.08
5,156.0	26.85	77.16	4,980.0	151.9	804.8	-209.6	2.04	-1.88	-1.76
5,181.0	27.33	76.75	5,002.3	154.5	815.8	-212.1	2.06	1.92	-1.64
5,206.0	27.43	76.69	5,024.5	157.1	827.0	-214.5	0.41	0.40	-0.24
5,231.0	27.40	76.65	5,046.7	159.8	838.2	-217.0	0.14	-0.12	-0.16
5,256.0	28.55	76.43	5,068.7	162.5	849.6	-219.4	4.62	4.60	-0.88
5,281.0	28.46	76.33	5,090.7	165.3	861.2	-221.9	0.41	-0.36	-0.40
5,306.0	28.20	75.80	5,112.7	168.2	872.8	-224.2	1.45	-1.04	-2.12
5,331.0	27.57	74.91	5,134.8	171.1	884.1	-226.5	3.02	-2.52	-3.56
5,356.0	26.34	74.19	5,157.1	174.1	895.0	-228.4	5.09	-4.92	-2.88
5,381.0	26.72	74.18	5,179.5	177.2	905.7	-230.3	1.52	1.52	-0.04
5,406.0	27.15	74.02	5,201.8	180.3	916.6	-232.2	1.74	1.72	-0.64
5,431.0	26.66	73.55	5,224.1	183.4	927.5	-234.0	2.14	-1.96	-1.88
5,456.0	26.76	73.20	5,246.4	186.7	938.3	-235.8	0.75	0.40	-1.40
5,481.0	26.74	73.01	5,268.7	189.9	949.0	-237.5	0.35	-0.08	-0.76
5,506.0	26.56	73.43	5,291.1	193.2	959.8	-239.2	1.04	-0.72	1.68
5,531.0	27.21	73.57	5,313.4	196.4	970.6	-240.9	2.61	2.60	0.56
5,556.0	26.99	73.89	5,335.6	199.6	981.5	-242.8	1.06	-0.88	1.28
5,581.0	27.34	74.05	5,357.8	202.7	992.5	-244.7	1.43	1.40	0.64
5,606.0	26.67	73.78	5,380.1	205.9	1,003.4	-246.5	2.72	-2.68	-1.08
5,631.0	26.53	73.88	5,402.5	209.0	1,014.2	-248.3	0.59	-0.56	0.40
5,656.0	27.05	74.51	5,424.8	212.1	1,025.0	-250.2	2.37	2.08	2.52
5,681.0	26.32	74.88	5,447.1	215.0	1,035.8	-252.2	2.99	-2.92	1.48





<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)	
5,706.0	26.09	74.78	5,469.6	217.9	1,046.5	-254.2	0.94	-0.92	-0.40	
5,731.0	25.91	74.77	5,492.0	220.8	1,057.1	-256.2	0.72	-0.72	-0.04	
5,756.0	25.97	74.79	5,514.5	223.7	1,067.6	-258.1	0.24	0.24	0.08	
5,781.0	25.09	74.29	5,537.1	226.5	1,078.0	-260.0	3.62	-3.52	-2.00	
5,806.0	24.68	73.49	5,559.8	229.4	1,088.1	-261.7	2.12	-1.64	-3.20	
5,831.0	24.78	72.64	5,582.5	232.5	1,098.1	-263.3	1.48	0.40	-3.40	
5,856.0	25.16	72.58	5,605.1	235.6	1,108.2	-264.8	1.52	1.52	-0.24	
5,881.0	25.53	72.76	5,627.7	238.8	1,118.4	-266.3	1.51	1.48	0.72	
5,906.0	25.57	72.91	5,650.3	242.0	1,128.7	-267.9	0.30	0.16	0.60	
5,931.0	25.39	72.47	5,672.8	245.2	1,139.0	-269.4	1.04	-0.72	-1.76	
5,956.0	24.66	71.12	5,695.5	248.5	1,149.0	-270.8	3.71	-2.92	-5.40	
5,981.0	24.42	70.78	5,718.2	251.9	1,158.8	-271.9	1.11	-0.96	-1.36	
6,006.0	24.42	70.71	5,741.0	255.3	1,168.6	-273.1	0.12	0.00	-0.28	
6,031.0	24.09	69.99	5,763.8	258.8	1,178.3	-274.1	1.77	-1.32	-2.88	
6,056.0	24.59	70.11	5,786.6	262.3	1,187.9	-275.1	2.01	2.00	0.48	
6,081.0	25.15	70.70	5,809.2	265.8	1,197.8	-276.2	2.45	2.24	2.36	
6,106.0	25.28	72.14	5,831.9	269.2	1,207.9	-277.5	2.51	0.52	5.76	
6,131.0	25.82	73.30	5,854.4	272.4	1,218.2	-279.0	2.94	2.16	4.64	
6,156.0	25.10	73.18	5,877.0	275.5	1,228.5	-280.7	2.89	-2.88	-0.48	
6,166.0	25.52	73.16	5,886.0	276.7	1,232.6	-281.3	4.20	4.20	-0.20	
6,213.0	24.44	70.11	5,928.6	283.0	1,251.4	-283.8	3.58	-2.30	-6.49	
<b>First SDI MWD @ 6213 MD</b>										
6,243.0	23.98	68.87	5,956.0	287.3	1,263.0	-284.9	2.29	-1.53	-4.13	
6,273.0	23.57	68.17	5,983.5	291.7	1,274.2	-285.7	1.66	-1.37	-2.33	
6,303.0	23.96	69.09	6,010.9	296.1	1,285.5	-286.6	1.79	1.30	3.07	
6,333.0	24.85	71.43	6,038.2	300.3	1,297.2	-287.8	4.38	2.97	7.80	
6,363.0	24.88	71.12	6,065.4	304.4	1,309.1	-289.3	0.45	0.10	-1.03	
6,393.0	24.59	64.45	6,092.7	309.1	1,320.7	-290.1	9.35	-0.97	-22.23	
6,423.0	24.78	54.81	6,120.0	315.4	1,331.5	-289.0	13.42	0.63	-32.13	
6,452.0	25.60	47.34	6,146.2	323.2	1,341.1	-286.1	11.31	2.83	-25.76	
6,482.0	27.53	41.64	6,173.1	332.7	1,350.4	-281.5	10.65	6.43	-19.00	
6,512.0	29.20	39.09	6,199.5	343.6	1,359.7	-275.7	6.88	5.57	-8.50	
6,520.0	29.61	38.30	6,206.4	346.7	1,362.1	-274.0	7.05	5.09	-9.93	
<b>Sycamore @ 6520 MD</b>										
6,542.0	30.75	36.21	6,225.4	355.5	1,368.8	-268.9	7.05	5.19	-9.48	
6,572.0	33.07	30.71	6,250.9	368.7	1,377.5	-260.7	12.39	7.73	-18.33	
6,602.0	35.40	23.37	6,275.7	383.7	1,385.1	-250.5	15.79	7.77	-24.47	
6,631.0	37.39	18.18	6,299.1	399.8	1,391.2	-238.6	12.64	6.86	-17.90	
6,661.0	39.26	13.72	6,322.6	417.7	1,396.3	-224.6	11.13	6.23	-14.87	
6,691.0	41.56	9.54	6,345.5	436.7	1,400.2	-209.1	11.84	7.67	-13.93	
6,721.0	44.83	6.15	6,367.3	457.1	1,403.0	-192.0	13.36	10.90	-11.30	
6,726.0	45.25	5.72	6,370.9	460.6	1,403.4	-189.0	10.43	8.46	-8.64	
<b>Middlesex @ 6726 MD</b>										
6,751.0	47.39	3.65	6,388.1	478.6	1,404.8	-173.3	10.43	8.55	-8.27	



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)	
6,781.0	49.35	2.46	6,408.1	501.0	1,406.0	-153.7	7.17	6.53	-3.97	
6,811.0	51.07	1.92	6,427.3	524.0	1,406.9	-133.2	5.90	5.73	-1.80	
6,841.0	53.82	0.22	6,445.5	547.8	1,407.3	-112.0	10.21	9.17	-5.67	
6,871.0	57.90	357.75	6,462.4	572.6	1,406.9	-89.4	15.21	13.60	-8.23	
6,901.0	61.75	355.61	6,477.5	598.5	1,405.4	-65.4	14.24	12.83	-7.13	
6,904.0	62.00	355.31	6,478.9	601.1	1,405.2	-62.9	12.21	8.41	-10.04	
<b>Burkett @ 6904 MD</b>										
6,931.0	64.30	352.66	6,491.1	625.1	1,402.6	-40.2	12.21	8.51	-9.81	
6,961.0	66.20	350.84	6,503.6	652.0	1,398.7	-14.2	8.39	6.33	-6.07	
6,975.0	67.43	349.67	6,509.1	664.7	1,396.6	-1.8	11.70	8.80	-8.39	
<b>Tully @ 6975 MD</b>										
6,990.0	68.76	348.43	6,514.7	678.4	1,393.9	11.7	11.70	8.86	-8.24	
7,020.0	71.93	345.63	6,524.8	705.9	1,387.6	39.2	13.74	10.57	-9.33	
7,047.0	74.02	343.69	6,532.7	730.8	1,380.7	64.6	10.33	7.73	-7.18	
<b>MRCL_HOT @ 7047 MD</b>										
7,050.0	74.25	343.48	6,533.5	733.6	1,379.9	67.5	10.33	7.77	-7.09	
7,079.0	76.81	341.83	6,540.8	760.4	1,371.5	95.3	10.41	8.83	-5.69	
7,109.0	80.13	339.79	6,546.8	788.1	1,361.9	124.5	12.92	11.07	-6.80	
7,139.0	83.22	337.30	6,551.1	815.7	1,351.0	154.1	13.17	10.30	-8.30	
7,169.0	86.51	335.22	6,553.8	843.1	1,339.0	184.0	12.96	10.97	-6.93	
7,206.0	90.17	334.05	6,554.9	876.5	1,323.2	220.9	10.38	9.89	-3.16	
7,233.0	90.61	334.53	6,554.7	900.8	1,311.4	247.9	2.41	1.63	1.78	
7,258.0	90.74	334.27	6,554.4	923.4	1,300.6	272.9	1.16	0.52	-1.04	
7,347.0	91.69	334.24	6,552.5	1,003.5	1,262.0	361.9	1.07	1.07	-0.03	
7,437.0	92.59	334.18	6,549.2	1,084.5	1,222.9	451.8	1.00	1.00	-0.07	
7,526.0	91.01	334.78	6,546.4	1,164.8	1,184.5	540.8	1.90	-1.78	0.67	
7,616.0	90.97	333.61	6,544.8	1,245.8	1,145.4	630.8	1.30	-0.04	-1.30	
7,705.0	91.85	333.96	6,542.6	1,325.6	1,106.1	719.7	1.06	0.99	0.39	
7,795.0	90.23	333.53	6,541.0	1,406.3	1,066.3	809.7	1.86	-1.80	-0.48	
7,884.0	90.57	333.13	6,540.4	1,485.8	1,026.3	898.7	0.59	0.38	-0.45	
7,974.0	91.57	334.55	6,538.7	1,566.6	986.6	988.7	1.93	1.11	1.58	
8,063.0	92.52	334.40	6,535.5	1,646.9	948.3	1,077.6	1.08	1.07	-0.17	
8,153.0	91.61	334.41	6,532.3	1,728.0	909.5	1,167.6	1.01	-1.01	0.01	
8,242.0	91.07	335.42	6,530.2	1,808.6	871.7	1,256.5	1.29	-0.61	1.13	
8,332.0	91.85	335.58	6,527.9	1,890.4	834.4	1,346.5	0.88	0.87	0.18	
8,421.0	91.14	335.01	6,525.6	1,971.2	797.2	1,435.4	1.02	-0.80	-0.64	
8,511.0	90.44	334.89	6,524.3	2,052.8	759.1	1,525.4	0.79	-0.78	-0.13	
8,600.0	91.21	334.45	6,523.0	2,133.2	721.1	1,614.4	1.00	0.87	-0.49	
8,690.0	90.58	333.66	6,521.6	2,214.1	681.7	1,704.4	1.12	-0.70	-0.88	
8,779.0	91.28	333.52	6,520.2	2,293.8	642.1	1,793.4	0.80	0.79	-0.16	
8,869.0	90.71	334.60	6,518.6	2,374.7	602.8	1,883.4	1.36	-0.63	1.20	
8,959.0	91.65	335.11	6,516.8	2,456.2	564.5	1,973.3	1.19	1.04	0.57	
9,048.0	90.88	335.32	6,514.8	2,537.0	527.2	2,062.3	0.90	-0.87	0.24	
9,138.0	89.74	336.04	6,514.3	2,619.0	490.2	2,152.3	1.50	-1.27	0.80	

<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)
9,227.0	89.47	334.16	6,514.9	2,699.7	452.7	2,241.3	2.13	-0.30	-2.11
9,317.0	90.88	334.55	6,514.7	2,780.8	413.7	2,331.3	1.63	1.57	0.43
9,406.0	91.62	333.87	6,512.7	2,861.0	375.0	2,420.3	1.13	0.83	-0.76
9,495.0	91.52	334.98	6,510.3	2,941.2	336.6	2,509.2	1.25	-0.11	1.25
9,585.0	90.91	335.97	6,508.4	3,023.1	299.3	2,599.2	1.29	-0.68	1.10
9,674.0	91.88	336.26	6,506.2	3,104.4	263.2	2,688.1	1.14	1.09	0.33
9,764.0	90.34	333.13	6,504.5	3,185.8	224.8	2,778.1	3.88	-1.71	-3.48
9,853.0	90.24	332.03	6,504.0	3,264.8	183.8	2,867.0	1.24	-0.11	-1.24
9,943.0	91.68	334.09	6,502.5	3,345.0	143.0	2,957.0	2.79	1.60	2.29
10,032.0	91.89	333.08	6,499.7	3,424.6	103.5	3,045.9	1.16	0.24	-1.13
10,122.0	90.11	330.71	6,498.2	3,504.0	61.1	3,135.8	3.29	-1.98	-2.63
10,211.0	90.74	331.89	6,497.5	3,582.1	18.3	3,224.7	1.50	0.71	1.33
10,301.0	91.25	335.34	6,495.9	3,662.7	-21.6	3,314.6	3.87	0.57	3.83
10,390.0	91.78	335.01	6,493.6	3,743.4	-59.0	3,403.6	0.70	0.60	-0.37
10,480.0	90.91	336.68	6,491.5	3,825.5	-95.8	3,493.6	2.09	-0.97	1.86
10,570.0	91.75	336.30	6,489.4	3,908.0	-131.7	3,583.5	1.02	0.93	-0.42
10,659.0	90.14	336.14	6,487.9	3,989.4	-167.6	3,672.4	1.82	-1.81	-0.18
10,749.0	90.64	335.94	6,487.3	4,071.7	-204.1	3,762.4	0.60	0.56	-0.22
10,838.0	89.03	335.62	6,487.6	4,152.8	-240.6	3,851.4	1.84	-1.81	-0.36
10,928.0	88.52	334.72	6,489.5	4,234.5	-278.4	3,941.3	1.15	-0.57	-1.00
11,017.0	90.37	334.61	6,490.4	4,314.9	-316.5	4,030.3	2.08	2.08	-0.12
11,107.0	91.41	334.25	6,489.0	4,396.1	-355.3	4,120.3	1.22	1.16	-0.40
11,196.0	91.71	335.44	6,486.5	4,476.6	-393.2	4,209.3	1.38	0.34	1.34
11,286.0	90.91	335.58	6,484.5	4,558.5	-430.5	4,299.2	0.90	-0.89	0.16
11,375.0	90.03	335.77	6,483.7	4,639.6	-467.1	4,388.2	1.01	-0.99	0.21
11,465.0	90.77	335.24	6,483.1	4,721.5	-504.4	4,478.2	1.01	0.82	-0.59
11,554.0	91.75	334.70	6,481.2	4,802.1	-542.1	4,567.2	1.26	1.10	-0.61
11,644.0	90.57	334.49	6,479.3	4,883.4	-580.7	4,657.1	1.33	-1.31	-0.23
11,733.0	89.36	331.58	6,479.4	4,962.7	-621.0	4,746.1	3.54	-1.36	-3.27
11,823.0	90.81	334.28	6,479.3	5,042.9	-662.0	4,836.1	3.41	1.61	3.00
11,912.0	91.38	334.46	6,477.6	5,123.1	-700.5	4,925.0	0.67	0.64	0.20
12,002.0	91.68	334.14	6,475.2	5,204.2	-739.5	5,015.0	0.49	0.33	-0.36
12,092.0	91.28	334.31	6,472.8	5,285.2	-778.6	5,105.0	0.48	-0.44	0.19
12,181.0	89.26	333.87	6,472.4	5,365.2	-817.5	5,194.0	2.32	-2.27	-0.49
12,271.0	89.93	334.49	6,473.0	5,446.2	-856.7	5,284.0	1.01	0.74	0.69
12,360.0	90.67	334.45	6,472.6	5,526.5	-895.1	5,373.0	0.83	0.83	-0.04
12,449.0	90.84	332.55	6,471.4	5,606.2	-934.8	5,461.9	2.14	0.19	-2.13
12,538.0	91.31	332.44	6,469.7	5,685.1	-975.9	5,550.9	0.54	0.53	-0.12
12,628.0	91.51	334.79	6,467.5	5,765.7	-1,015.8	5,640.8	2.62	0.22	2.61
12,717.0	90.57	336.15	6,465.9	5,846.7	-1,052.8	5,729.8	1.86	-1.06	1.53
12,807.0	91.11	336.52	6,464.6	5,929.1	-1,088.9	5,819.7	0.73	0.60	0.41
12,896.0	91.34	336.64	6,462.7	6,010.7	-1,124.3	5,908.7	0.29	0.26	0.13
12,986.0	92.08	336.67	6,460.0	6,093.3	-1,159.9	5,998.6	0.82	0.82	0.03



Scientific Drilling International  
Survey Report



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)
13,075.0	90.60	335.35	6,457.9	6,174.6	-1,196.1	6,087.5	2.23	-1.66	-1.48
13,165.0	89.60	334.92	6,457.8	6,256.3	-1,233.9	6,177.5	1.21	-1.11	-0.48
13,254.0	89.70	334.77	6,458.3	6,336.8	-1,271.8	6,266.5	0.20	0.11	-0.17
13,344.0	90.27	335.13	6,458.3	6,418.4	-1,309.9	6,356.5	0.75	0.63	0.40
13,433.0	90.81	334.76	6,457.5	6,499.0	-1,347.6	6,445.5	0.74	0.61	-0.42
13,523.0	90.13	333.15	6,456.8	6,579.8	-1,387.1	6,535.5	1.94	-0.76	-1.79
13,612.0	90.47	333.36	6,456.3	6,659.3	-1,427.1	6,624.4	0.45	0.38	0.24
13,702.0	90.84	333.58	6,455.3	6,739.8	-1,467.3	6,714.4	0.48	0.41	0.24
13,791.0	89.60	333.97	6,454.9	6,819.7	-1,506.6	6,803.4	1.46	-1.39	0.44
13,881.0	89.46	333.68	6,455.7	6,900.4	-1,546.3	6,893.4	0.36	-0.16	-0.32
13,971.0	90.17	334.33	6,455.9	6,981.3	-1,585.8	6,983.4	1.07	0.79	0.72
14,061.0	90.64	334.97	6,455.3	7,062.7	-1,624.3	7,073.4	0.88	0.52	0.71
14,150.0	91.01	334.32	6,454.0	7,143.1	-1,662.4	7,162.4	0.84	0.42	-0.73
14,240.0	90.47	334.84	6,452.9	7,224.4	-1,701.1	7,252.4	0.83	-0.60	0.58
14,329.0	90.57	335.41	6,452.1	7,305.1	-1,738.5	7,341.4	0.65	0.11	0.64
14,419.0	89.19	333.48	6,452.2	7,386.3	-1,777.3	7,431.4	2.64	-1.53	-2.14
14,509.0	89.30	333.43	6,453.4	7,466.8	-1,817.5	7,521.3	0.13	0.12	-0.06
14,598.0	89.53	333.28	6,454.3	7,546.3	-1,857.4	7,610.3	0.31	0.26	-0.17
14,687.0	89.87	333.29	6,454.8	7,625.8	-1,897.5	7,699.3	0.38	0.38	0.01
14,777.0	90.97	332.66	6,454.1	7,706.0	-1,938.3	7,789.3	1.41	1.22	-0.70
14,866.0	91.34	332.52	6,452.4	7,785.0	-1,979.3	7,878.2	0.44	0.42	-0.16
14,956.0	90.57	334.65	6,450.8	7,865.6	-2,019.3	7,968.2	2.52	-0.86	2.37
15,045.0	89.03	335.38	6,451.2	7,946.2	-2,056.9	8,057.2	1.91	-1.73	0.82
15,135.0	89.60	336.01	6,452.2	8,028.3	-2,094.0	8,147.1	0.94	0.63	0.70
15,224.0	88.45	333.69	6,453.8	8,108.8	-2,131.8	8,236.1	2.91	-1.29	-2.61
15,314.0	89.53	334.89	6,455.3	8,189.9	-2,170.8	8,326.1	1.79	1.20	1.33
15,404.0	90.23	334.21	6,455.5	8,271.1	-2,209.5	8,416.1	1.08	0.78	-0.76
15,493.0	91.04	333.46	6,454.5	8,351.0	-2,248.7	8,505.1	1.24	0.91	-0.84
15,583.0	90.20	334.37	6,453.6	8,431.8	-2,288.3	8,595.1	1.38	-0.93	1.01
15,672.0	90.60	334.20	6,452.9	8,512.0	-2,326.9	8,684.1	0.49	0.45	-0.19
15,762.0	91.07	333.59	6,451.6	8,592.8	-2,366.5	8,774.0	0.86	0.52	-0.68
15,851.0	90.54	334.71	6,450.4	8,672.9	-2,405.3	8,863.0	1.39	-0.60	1.26
15,941.0	90.57	333.72	6,449.5	8,754.0	-2,444.5	8,953.0	1.10	0.03	-1.10
16,030.0	89.73	334.65	6,449.3	8,834.1	-2,483.2	9,042.0	1.41	-0.94	1.04
16,120.0	89.19	332.90	6,450.1	8,914.8	-2,523.0	9,132.0	2.03	-0.60	-1.94
16,209.0	90.30	335.04	6,450.5	8,994.8	-2,562.0	9,221.0	2.71	1.25	2.40
16,299.0	89.66	336.34	6,450.6	9,076.8	-2,599.1	9,311.0	1.61	-0.71	1.44
16,388.0	90.27	335.81	6,450.6	9,158.1	-2,635.2	9,399.9	0.91	0.69	-0.60
16,478.0	91.04	335.26	6,449.6	9,240.1	-2,672.5	9,489.9	1.05	0.86	-0.61
16,568.0	91.48	334.65	6,447.6	9,321.6	-2,710.6	9,579.9	0.84	0.49	-0.68
16,657.0	90.94	335.27	6,445.7	9,402.2	-2,748.2	9,668.9	0.92	-0.61	0.70
16,747.0	89.83	335.60	6,445.1	9,484.0	-2,785.6	9,758.8	1.29	-1.23	0.37
16,836.0	90.67	335.48	6,444.7	9,565.0	-2,822.5	9,847.8	0.95	0.94	-0.13
16,925.0	91.27	335.03	6,443.2	9,645.9	-2,859.7	9,936.8	0.84	0.67	-0.51



<b>Company:</b>	Antero Resources	<b>Local Co-ordinate Reference:</b>	Well Greenback Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Site:</b>	Mackay Pad - Caldwell/Greenback/McNabb	<b>MD Reference:</b>	Precision 523: GL 1099' + KB 19 @ 1118.0usft
<b>Well:</b>	Greenback Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	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)	
17,015.0	90.10	333.84	6,442.1	9,727.0	-2,898.6	10,026.8	1.85	-1.30	-1.32	
17,104.0	90.47	333.57	6,441.7	9,806.8	-2,938.0	10,115.8	0.51	0.42	-0.30	
17,140.0	90.70	333.46	6,441.3	9,839.1	-2,954.0	10,151.8	0.71	0.64	-0.31	
<b>Last SDI MWD @ 17140 MD</b>										
17,202.0	90.70	333.46	6,440.6	9,894.5	-2,981.7	10,213.8	0.00	0.00	0.00	
<b>Projection To Bit @ 17202 MD / 6440 TVD</b>										

**Formations**

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
6,520.0	6,206.4	Sycamore @ 6520 MD		0.00	
6,726.0	6,370.9	Middlesex @ 6726 MD		0.00	
6,904.0	6,478.9	Burkett @ 6904 MD		0.00	
6,975.0	6,509.1	Tully @ 6975 MD		0.00	
7,047.0	6,532.7	MRCL_HOT @ 7047 MD		0.00	

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
106.0	106.0	-0.1	-0.2	First Gyro @ 106 MD
6,213.0	5,928.6	283.0	1,251.4	First SDI MWD @ 6213 MD
17,140.0	6,441.3	9,839.1	-2,954.0	Last SDI MWD @ 17140 MD
17,202.0	6,440.6	9,894.5	-2,981.7	Projection To Bit @ 17202 MD / 6440 TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_