



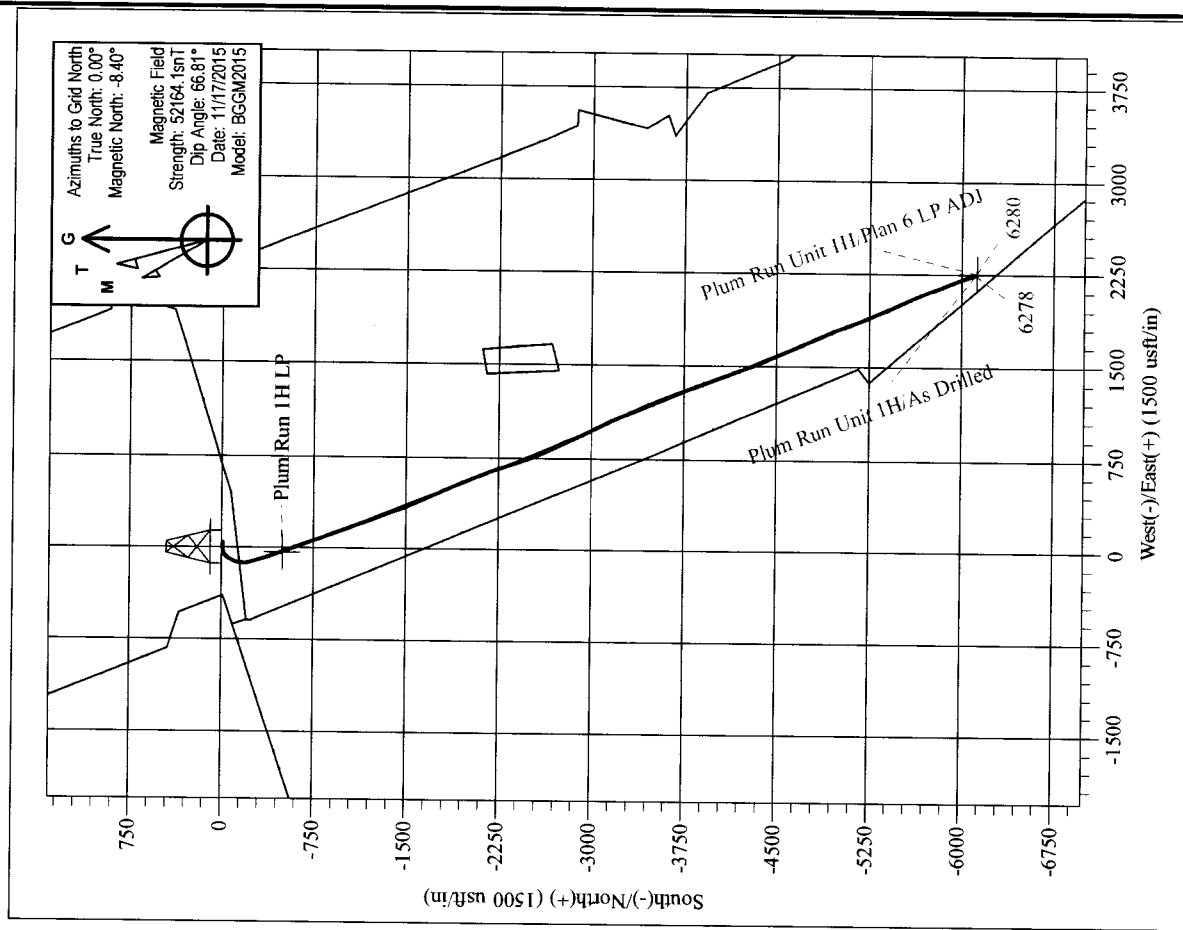
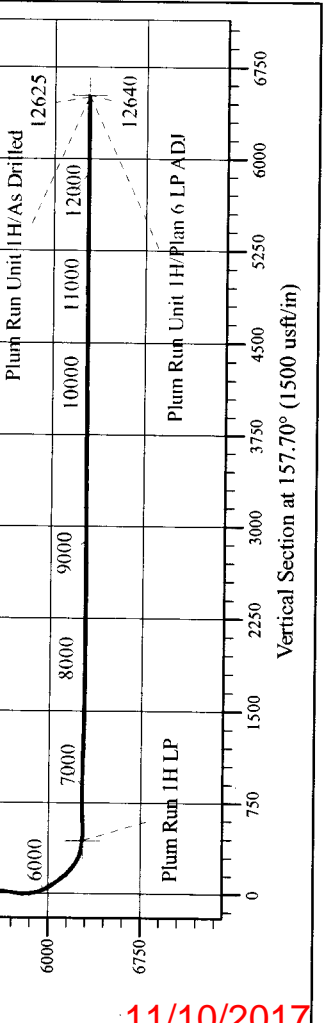
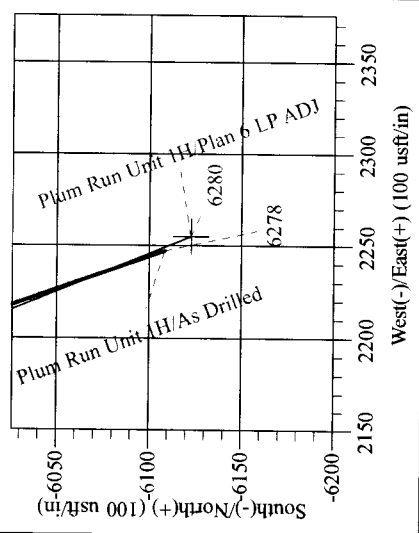
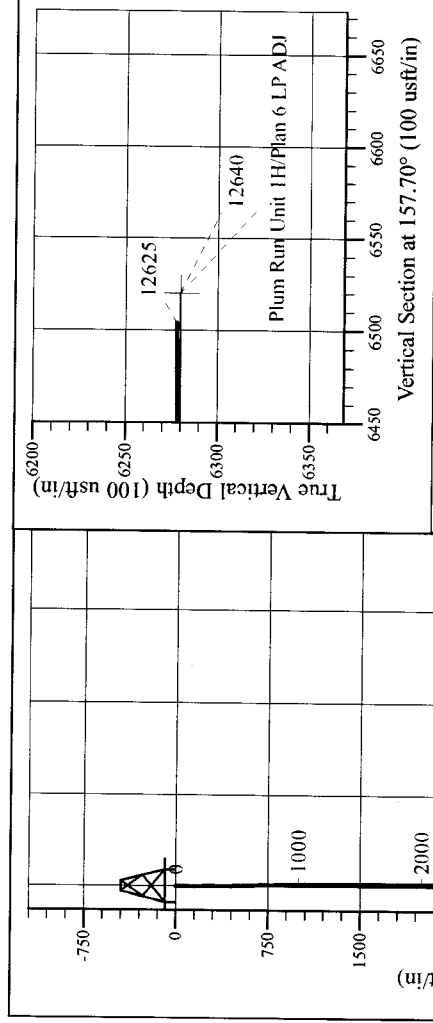
Hartley East Pad-Freeland/Plum Run/Woodworth
 Plum Run Unit 1H
 Plan 6 LP ADJ
 Precision 522: GL 1021 + KB 18' @ 1039.0usft
 Tyler County WV

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: Plum Run Unit 1H SHL

+N/-S	+E/-W	Northing	Latitude	Longitude
0.0	0.0	14294917.12	39° 21' 54.840 N	80° 59' 35.635 W



Plum Run Unit 1H
 Approx. BHL
 39° 20' 54.439 N 80° 59' 07.024 W

Shane Rhodes
 10:26, December 01 2015
 Scientific Drilling International
 124 Vista Drive
 Charteroi, PA 15022

11/10/2017



Scientific Drilling International

Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Hartley East Pad:Freeland/Plum Run/Woodworth
Well: Plum Run Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Plum Run Unit 1H
TVD Reference: Precision 522: GL 1021' + KB 18' @ 1039.0usft
MD Reference: Precision 522: GL 1021' + KB 18' @ 1039.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Antero NE

Project	Tyler County WV, Tyler Co West Virginia		
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	Hartley East Pad:Freeland/Plum Run/Woodworth		
Site Position:		Northing:	14,294,927.15 usft
From:	Map	Easting:	1,642,331.41 usft
Position Uncertainty:	2.0 usft	Slot Radius:	13-3/16 "
		Latitude:	39° 21' 54.939 N
		Longitude:	80° 59' 35.611 W
		Grid Convergence:	0.00 °

Well	Plum Run Unit 1H, Marcellus		
Well Position	+N-S	0.0 usft	Northing: 14,294,917.12 usft
	+E-W	0.0 usft	Easting: 1,642,329.58 usft
Position Uncertainty	2.0 usft	Wellhead Elevation:	1,039.0 usft
		Latitude:	39° 21' 54.840 N
		Longitude:	80° 59' 35.635 W
		Ground Level:	1,021.0 usft

Wellbore	Original Wellpath				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2015	11/17/2015	-8.40	66.81	52,164

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	157.70	

Survey Program	Date	12/1/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
105.0	5,328.7	Survey #6 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
5,437.0	12,625.0	Survey #7 - MWD Surveys (Original Wellp)	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	
105.0	0.21	141.14	105.0	-0.1	0.1	0.2	0.20	0.20	0.00	
First SDI Gyro @ 105										
130.0	0.27	227.34	130.0	-0.2	0.1	0.2	1.32	0.24	344.80	
155.0	0.18	95.01	155.0	-0.3	0.1	0.3	1.65	-0.36	-529.32	
180.0	0.16	145.22	180.0	-0.3	0.2	0.3	0.58	-0.08	200.84	
205.0	0.12	152.00	205.0	-0.4	0.2	0.4	0.17	-0.16	27.12	
230.0	0.29	191.47	230.0	-0.4	0.2	0.5	0.85	0.68	157.88	
255.0	0.05	133.62	255.0	-0.5	0.2	0.5	1.07	-0.96	-231.40	



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
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)
280.0	0.13	185.01	280.0	-0.5	0.2	0.6	0.42	0.32	205.56
305.0	0.15	157.58	305.0	-0.6	0.2	0.6	0.28	0.08	-109.72
330.0	0.24	149.19	330.0	-0.7	0.2	0.7	0.38	0.36	-33.56
355.0	0.35	152.12	355.0	-0.8	0.3	0.8	0.44	0.44	11.72
380.0	0.47	153.32	380.0	-0.9	0.4	1.0	0.48	0.48	4.80
405.0	0.71	150.19	405.0	-1.2	0.5	1.3	0.97	0.96	-12.52
430.0	1.19	141.91	430.0	-1.5	0.7	1.7	1.99	1.92	-33.12
455.0	1.68	131.71	455.0	-2.0	1.2	2.3	2.20	1.96	-40.80
480.0	2.20	119.91	480.0	-2.4	1.9	3.0	2.61	2.08	-47.20
505.0	2.78	111.89	504.9	-2.9	2.8	3.8	2.70	2.32	-32.08
530.0	3.46	105.73	529.9	-3.3	4.1	4.7	3.03	2.72	-24.64
555.0	4.45	100.73	554.9	-3.7	5.8	5.7	4.19	3.96	-20.00
580.0	4.73	100.35	579.8	-4.1	7.8	6.7	1.13	1.12	-1.52
605.0	4.82	100.52	604.7	-4.5	9.8	7.9	0.36	0.36	0.68
630.0	4.90	99.72	629.6	-4.8	11.9	9.0	0.42	0.32	-3.20
655.0	4.82	99.73	654.5	-5.2	14.0	10.1	0.32	-0.32	0.04
680.0	4.30	97.99	679.4	-5.5	16.0	11.2	2.15	-2.08	-6.96
705.0	4.20	97.58	704.4	-5.8	17.8	12.1	0.42	-0.40	-1.64
730.0	3.91	97.00	729.3	-6.0	19.6	13.0	1.17	-1.16	-2.32
755.0	3.53	98.26	754.2	-6.2	21.2	13.8	1.55	-1.52	5.04
780.0	3.34	97.15	779.2	-6.4	22.6	14.5	0.81	-0.76	-4.44
805.0	2.95	97.27	804.2	-6.6	24.0	15.2	1.56	-1.56	0.48
830.0	2.63	98.02	829.1	-6.7	25.2	15.8	1.29	-1.28	3.00
855.0	2.50	97.52	854.1	-6.9	26.3	16.4	0.53	-0.52	-2.00
880.0	2.33	98.87	879.1	-7.0	27.4	16.9	0.72	-0.68	5.40
905.0	2.00	100.13	904.1	-7.2	28.3	17.4	1.33	-1.32	5.04
930.0	1.85	98.26	929.0	-7.3	29.1	17.8	0.65	-0.60	-7.48
955.0	1.71	98.64	954.0	-7.4	29.9	18.2	0.56	-0.56	1.52
980.0	1.48	100.20	979.0	-7.5	30.6	18.6	0.94	-0.92	6.24
1,005.0	1.32	99.04	1,004.0	-7.7	31.2	18.9	0.65	-0.64	-4.64
1,030.0	1.13	100.94	1,029.0	-7.7	31.7	19.2	0.78	-0.76	7.60
1,055.0	1.14	101.17	1,054.0	-7.8	32.2	19.5	0.04	0.04	0.92
1,080.0	0.98	104.66	1,079.0	-7.9	32.6	19.7	0.69	-0.64	13.96
1,105.0	0.75	108.26	1,104.0	-8.0	33.0	20.0	0.94	-0.92	14.40
1,130.0	0.64	117.56	1,129.0	-8.2	33.3	20.2	0.63	-0.44	37.20
1,155.0	0.55	112.72	1,154.0	-8.3	33.5	20.4	0.41	-0.36	-19.36
1,180.0	0.50	113.15	1,179.0	-8.4	33.7	20.5	0.20	-0.20	1.72
1,205.0	0.36	113.31	1,204.0	-8.4	33.9	20.7	0.56	-0.56	0.64
1,230.0	0.42	120.61	1,229.0	-8.5	34.1	20.8	0.31	0.24	29.20
1,255.0	0.42	124.72	1,254.0	-8.6	34.2	20.9	0.12	0.00	16.44



Scientific Drilling International

Survey Report



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MD Reference: Precision 522: GL 1021' + KB 18' @ 1039.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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)
1,280.0	0.26	126.33	1,279.0	-8.7	34.3	21.1	0.64	-0.64	6.44
1,305.0	0.29	135.98	1,304.0	-8.8	34.4	21.2	0.22	0.12	38.60
1,330.0	0.26	128.60	1,329.0	-8.9	34.5	21.3	0.19	-0.12	-29.52
1,355.0	0.36	121.95	1,354.0	-8.9	34.6	21.4	0.42	0.40	-26.60
1,380.0	0.29	131.50	1,379.0	-9.0	34.7	21.5	0.35	-0.28	38.20
1,405.0	0.35	128.77	1,404.0	-9.1	34.8	21.6	0.25	0.24	-10.92
1,430.0	0.24	144.87	1,429.0	-9.2	34.9	21.8	0.55	-0.44	64.40
1,455.0	0.19	143.85	1,454.0	-9.3	35.0	21.9	0.20	-0.20	-4.08
1,480.0	0.16	122.52	1,479.0	-9.3	35.0	21.9	0.28	-0.12	-85.32
1,505.0	0.28	132.11	1,504.0	-9.4	35.1	22.0	0.50	0.48	38.36
1,530.0	0.17	170.86	1,529.0	-9.5	35.2	22.1	0.73	-0.44	155.00
1,555.0	0.17	154.25	1,554.0	-9.5	35.2	22.2	0.20	0.00	-66.44
1,580.0	0.19	144.44	1,579.0	-9.6	35.2	22.3	0.15	0.08	-39.24
1,605.0	0.20	158.08	1,604.0	-9.7	35.3	22.3	0.19	0.04	54.56
1,630.0	0.24	146.25	1,629.0	-9.8	35.3	22.4	0.24	0.16	-47.32
1,655.0	0.20	147.49	1,654.0	-9.8	35.4	22.5	0.16	-0.16	4.96
1,680.0	0.27	132.29	1,679.0	-9.9	35.4	22.6	0.37	0.28	-60.80
1,705.0	0.24	132.82	1,704.0	-10.0	35.5	22.7	0.12	-0.12	2.12
1,730.0	0.24	135.81	1,729.0	-10.1	35.6	22.8	0.05	0.00	11.96
1,755.0	0.21	127.24	1,754.0	-10.1	35.7	22.9	0.18	-0.12	-34.28
1,780.0	0.18	152.54	1,779.0	-10.2	35.7	23.0	0.36	-0.12	101.20
1,805.0	0.20	131.49	1,804.0	-10.3	35.8	23.1	0.29	0.08	-84.20
1,830.0	0.21	130.54	1,829.0	-10.3	35.8	23.1	0.04	0.04	-3.80
1,855.0	0.14	112.43	1,854.0	-10.4	35.9	23.2	0.35	-0.28	-72.44
1,880.0	0.12	141.37	1,879.0	-10.4	35.9	23.3	0.27	-0.08	115.76
1,905.0	0.18	135.49	1,904.0	-10.4	36.0	23.3	0.25	0.24	-23.52
1,930.0	0.07	106.87	1,929.0	-10.5	36.0	23.4	0.49	-0.44	-114.48
1,955.0	0.10	155.63	1,954.0	-10.5	36.1	23.4	0.30	0.12	195.04
1,980.0	0.11	145.22	1,979.0	-10.5	36.1	23.4	0.09	0.04	-41.64
2,005.0	0.02	206.18	2,004.0	-10.6	36.1	23.5	0.41	-0.36	243.84
2,030.0	0.04	88.91	2,029.0	-10.6	36.1	23.5	0.21	0.08	-469.08
2,055.0	0.13	103.40	2,054.0	-10.6	36.1	23.5	0.37	0.36	57.96
2,080.0	0.13	89.89	2,079.0	-10.6	36.2	23.5	0.12	0.00	-54.04
2,105.0	0.15	112.42	2,104.0	-10.6	36.2	23.5	0.23	0.08	90.12
2,130.0	0.11	110.11	2,129.0	-10.6	36.3	23.6	0.16	-0.16	-9.24
2,155.0	0.13	98.55	2,154.0	-10.6	36.3	23.6	0.13	0.08	-46.24
2,180.0	0.05	57.85	2,179.0	-10.6	36.4	23.6	0.39	-0.32	-162.80
2,205.0	0.05	188.07	2,204.0	-10.6	36.4	23.6	0.36	0.00	520.88
2,230.0	0.11	95.69	2,229.0	-10.6	36.4	23.7	0.49	0.24	-369.52
2,255.0	0.10	125.98	2,254.0	-10.7	36.5	23.7	0.22	-0.04	121.16



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Survey Report



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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)
2,280.0	0.19	74.44	2,279.0	-10.7	36.5	23.7	0.60	0.36	-206.16
2,305.0	0.17	145.73	2,304.0	-10.7	36.6	23.8	0.84	-0.08	285.16
2,330.0	0.15	13.55	2,329.0	-10.7	36.6	23.8	1.17	-0.08	-528.72
2,355.0	0.09	23.51	2,354.0	-10.6	36.6	23.7	0.25	-0.24	39.84
2,380.0	0.08	86.74	2,379.0	-10.6	36.6	23.7	0.36	-0.04	252.92
2,405.0	0.12	110.00	2,404.0	-10.6	36.7	23.7	0.22	0.16	93.04
2,430.0	0.21	240.21	2,429.0	-10.6	36.7	23.8	1.21	0.36	520.84
2,455.0	0.07	198.02	2,454.0	-10.7	36.6	23.8	0.66	-0.56	-168.76
2,480.0	0.02	164.49	2,479.0	-10.7	36.6	23.8	0.22	-0.20	-134.12
2,505.0	0.01	216.90	2,504.0	-10.7	36.6	23.8	0.06	-0.04	209.64
2,530.0	0.19	317.22	2,529.0	-10.7	36.6	23.8	0.77	0.72	401.28
2,555.0	0.06	309.12	2,554.0	-10.6	36.6	23.7	0.52	-0.52	-32.40
2,580.0	0.15	323.40	2,579.0	-10.6	36.5	23.7	0.37	0.36	57.12
2,605.0	0.09	319.67	2,604.0	-10.6	36.5	23.6	0.24	-0.24	-14.92
2,630.0	0.11	335.14	2,629.0	-10.5	36.5	23.6	0.13	0.08	61.88
2,655.0	0.08	298.10	2,654.0	-10.5	36.4	23.5	0.27	-0.12	-148.16
2,680.0	0.13	293.59	2,679.0	-10.5	36.4	23.5	0.20	0.20	-18.04
2,705.0	0.04	291.54	2,704.0	-10.5	36.4	23.5	0.36	-0.36	-8.20
2,730.0	0.10	336.07	2,729.0	-10.4	36.4	23.5	0.31	0.24	178.12
2,755.0	0.13	308.26	2,754.0	-10.4	36.3	23.4	0.25	0.12	-111.24
2,780.0	0.14	309.55	2,779.0	-10.4	36.3	23.4	0.04	0.04	5.16
2,805.0	0.12	321.85	2,804.0	-10.3	36.2	23.3	0.14	-0.08	49.20
2,830.0	0.13	330.66	2,829.0	-10.3	36.2	23.2	0.09	0.04	35.24
2,855.0	0.14	324.44	2,854.0	-10.2	36.2	23.2	0.07	0.04	-24.88
2,880.0	0.15	309.48	2,879.0	-10.2	36.1	23.1	0.16	0.04	-59.84
2,905.0	0.31	329.05	2,904.0	-10.1	36.1	23.0	0.70	0.64	78.28
2,930.0	0.11	319.58	2,929.0	-10.0	36.0	22.9	0.81	-0.80	-37.88
2,955.0	0.15	326.44	2,954.0	-10.0	36.0	22.9	0.17	0.16	27.44
2,980.0	0.16	307.18	2,979.0	-9.9	35.9	22.8	0.21	0.04	-77.04
3,005.0	0.14	329.59	3,004.0	-9.9	35.9	22.8	0.25	-0.08	89.64
3,030.0	0.16	325.61	3,029.0	-9.8	35.9	22.7	0.09	0.08	-15.92
3,055.0	0.21	315.59	3,054.0	-9.8	35.8	22.6	0.24	0.20	-40.08
3,080.0	0.13	328.57	3,079.0	-9.7	35.8	22.6	0.35	-0.32	51.92
3,105.0	0.16	334.87	3,104.0	-9.7	35.7	22.5	0.14	0.12	25.20
3,130.0	0.20	332.62	3,129.0	-9.6	35.7	22.4	0.16	0.16	-9.00
3,155.0	0.14	325.64	3,154.0	-9.5	35.7	22.3	0.25	-0.24	-27.92
3,180.0	0.08	330.01	3,179.0	-9.5	35.6	22.3	0.24	-0.24	17.48
3,205.0	0.09	301.73	3,204.0	-9.5	35.6	22.3	0.17	0.04	-113.12
3,230.0	0.08	302.61	3,229.0	-9.4	35.6	22.2	0.04	-0.04	3.52
3,255.0	0.05	326.86	3,254.0	-9.4	35.6	22.2	0.16	-0.12	97.00



Scientific Drilling International

Survey Report



Company: Antero Resources
 Project: Tyler County WV
 Site: Hartley East Pad:Freeland/Plum Run/Woodworth
 Well: Plum Run Unit 1H
 Wellbore: Original Wellpath
 Design: As Drilled

Local Co-ordinate Reference: Well Plum Run Unit 1H
 TVD Reference: Precision 522: GL 1021' + KB 18' @ 1039.0usft
 MD Reference: Precision 522: GL 1021' + KB 18' @ 1039.0usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 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)
3,280.0	0.09	330.47	3,279.0	-9.4	35.5	22.2	0.16	0.16	14.44
3,305.0	0.03	298.97	3,304.0	-9.4	35.5	22.2	0.27	-0.24	-126.00
3,330.0	0.07	341.08	3,329.0	-9.4	35.5	22.1	0.21	0.16	168.44
3,355.0	0.09	337.01	3,354.0	-9.3	35.5	22.1	0.08	0.08	-16.28
3,380.0	0.07	326.12	3,379.0	-9.3	35.5	22.1	0.10	-0.08	-43.56
3,405.0	0.03	352.92	3,404.0	-9.3	35.5	22.0	0.18	-0.16	107.20
3,430.0	0.06	25.48	3,429.0	-9.3	35.5	22.0	0.15	0.12	130.24
3,455.0	0.06	301.40	3,454.0	-9.2	35.5	22.0	0.32	0.00	-336.32
3,480.0	0.09	321.31	3,479.0	-9.2	35.5	22.0	0.16	0.12	79.64
3,505.0	0.04	341.14	3,504.0	-9.2	35.4	21.9	0.22	-0.20	79.32
3,530.0	0.09	333.97	3,529.0	-9.2	35.4	21.9	0.20	0.20	-28.68
3,555.0	0.02	305.64	3,554.0	-9.1	35.4	21.9	0.29	-0.28	-113.32
3,580.0	0.16	313.45	3,579.0	-9.1	35.4	21.9	0.56	0.56	31.24
3,605.0	0.05	87.41	3,604.0	-9.1	35.4	21.8	0.79	-0.44	535.84
3,630.0	0.12	335.90	3,629.0	-9.1	35.4	21.8	0.58	0.28	-446.04
3,655.0	0.08	23.97	3,654.0	-9.0	35.4	21.8	0.36	-0.16	192.28
3,680.0	0.05	67.14	3,679.0	-9.0	35.4	21.8	0.22	-0.12	172.68
3,705.0	0.10	7.14	3,704.0	-9.0	35.4	21.7	0.35	0.20	-240.00
3,730.0	0.05	338.10	3,729.0	-8.9	35.4	21.7	0.25	-0.20	-116.16
3,755.0	0.05	20.09	3,754.0	-8.9	35.4	21.7	0.14	0.00	167.96
3,780.0	0.09	8.33	3,779.0	-8.9	35.4	21.7	0.17	0.16	-47.04
3,805.0	0.09	38.19	3,804.0	-8.9	35.4	21.6	0.19	0.00	119.44
3,830.0	0.08	15.26	3,829.0	-8.8	35.4	21.6	0.14	-0.04	-91.72
3,855.0	0.07	22.17	3,854.0	-8.8	35.4	21.6	0.05	-0.04	27.64
3,880.0	0.13	34.26	3,879.0	-8.8	35.5	21.6	0.25	0.24	48.36
3,905.0	0.04	350.16	3,904.0	-8.7	35.5	21.5	0.42	-0.36	-176.40
3,930.0	0.07	25.85	3,929.0	-8.7	35.5	21.5	0.18	0.12	142.76
3,955.0	0.09	38.15	3,954.0	-8.7	35.5	21.5	0.11	0.08	49.20
3,980.0	0.06	77.56	3,979.0	-8.7	35.5	21.5	0.23	-0.12	157.64
4,005.0	0.13	359.49	4,004.0	-8.6	35.5	21.5	0.53	0.28	-312.28
4,030.0	0.10	92.14	4,029.0	-8.6	35.6	21.5	0.67	-0.12	370.60
4,055.0	0.12	38.61	4,054.0	-8.6	35.6	21.5	0.40	0.08	-214.12
4,080.0	0.08	89.30	4,079.0	-8.6	35.6	21.4	0.37	-0.16	202.76
4,105.0	0.05	42.71	4,104.0	-8.6	35.7	21.4	0.23	-0.12	-186.36
4,130.0	0.07	45.67	4,129.0	-8.5	35.7	21.4	0.08	0.08	11.84
4,155.0	0.09	93.38	4,154.0	-8.5	35.7	21.4	0.27	0.08	190.84
4,180.0	0.09	53.32	4,179.0	-8.5	35.7	21.4	0.25	0.00	-160.24
4,205.0	0.06	76.40	4,204.0	-8.5	35.8	21.4	0.17	-0.12	92.32
4,230.0	0.09	114.45	4,229.0	-8.5	35.8	21.5	0.23	0.12	152.20
4,255.0	0.10	114.19	4,254.0	-8.5	35.8	21.5	0.04	0.04	-1.04



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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)
4,280.0	0.12	147.33	4,279.0	-8.6	35.9	21.5	0.26	0.08	132.56
4,305.0	0.19	134.69	4,304.0	-8.6	35.9	21.6	0.31	0.28	-50.56
4,330.0	0.16	111.97	4,329.0	-8.6	36.0	21.7	0.30	-0.12	-90.88
4,355.0	0.14	129.04	4,354.0	-8.7	36.0	21.7	0.19	-0.08	68.28
4,380.0	0.22	129.86	4,379.0	-8.7	36.1	21.8	0.32	0.32	3.28
4,405.0	0.23	141.47	4,404.0	-8.8	36.2	21.9	0.19	0.04	46.44
4,430.0	0.22	129.41	4,429.0	-8.9	36.2	22.0	0.19	-0.04	-48.24
4,455.0	0.21	126.97	4,454.0	-8.9	36.3	22.0	0.05	-0.04	-9.76
4,480.0	0.13	116.07	4,479.0	-9.0	36.4	22.1	0.34	-0.32	-43.60
4,505.0	0.26	139.19	4,504.0	-9.0	36.4	22.2	0.60	0.52	92.48
4,530.0	0.18	127.89	4,529.0	-9.1	36.5	22.3	0.36	-0.32	-45.20
4,555.0	0.16	127.28	4,554.0	-9.1	36.6	22.3	0.08	-0.08	-2.44
4,580.0	0.25	122.24	4,579.0	-9.2	36.6	22.4	0.37	0.36	-20.16
4,605.0	0.21	139.87	4,604.0	-9.2	36.7	22.5	0.32	-0.16	70.52
4,630.0	0.14	131.91	4,629.0	-9.3	36.8	22.6	0.30	-0.28	-31.84
4,655.0	0.23	130.79	4,654.0	-9.4	36.8	22.6	0.36	0.36	-4.48
4,680.0	0.20	125.85	4,679.0	-9.4	36.9	22.7	0.14	-0.12	-19.76
4,705.0	0.28	131.10	4,704.0	-9.5	37.0	22.8	0.33	0.32	21.00
4,730.0	0.29	136.16	4,729.0	-9.6	37.1	22.9	0.11	0.04	20.24
4,755.0	0.20	133.71	4,754.0	-9.6	37.1	23.0	0.36	-0.36	-9.80
4,780.0	0.25	130.24	4,779.0	-9.7	37.2	23.1	0.21	0.20	-13.88
4,805.0	0.26	132.68	4,804.0	-9.8	37.3	23.2	0.06	0.04	9.76
4,830.0	0.31	135.14	4,829.0	-9.9	37.4	23.3	0.21	0.20	9.84
4,855.0	0.20	118.37	4,854.0	-9.9	37.5	23.4	0.53	-0.44	-67.08
4,880.0	0.21	139.14	4,879.0	-10.0	37.5	23.5	0.30	0.04	83.08
4,905.0	0.19	119.95	4,904.0	-10.0	37.6	23.6	0.28	-0.08	-76.76
4,930.0	0.28	126.95	4,929.0	-10.1	37.7	23.7	0.38	0.36	28.00
4,955.0	0.31	125.45	4,954.0	-10.2	37.8	23.8	0.12	0.12	-6.00
4,980.0	0.18	132.47	4,979.0	-10.2	37.9	23.9	0.53	-0.52	28.08
5,005.0	0.25	124.87	5,004.0	-10.3	38.0	23.9	0.30	0.28	-30.40
5,030.0	0.16	109.31	5,029.0	-10.3	38.0	24.0	0.42	-0.36	-62.24
5,055.0	0.12	131.20	5,054.0	-10.4	38.1	24.1	0.26	-0.16	87.56
5,080.0	0.17	120.31	5,079.0	-10.4	38.1	24.1	0.23	0.20	-43.56
5,105.0	0.17	127.49	5,104.0	-10.5	38.2	24.2	0.09	0.00	28.72
5,130.0	0.14	134.71	5,129.0	-10.5	38.3	24.2	0.14	-0.12	28.88
5,155.0	0.19	140.05	5,154.0	-10.6	38.3	24.3	0.21	0.20	21.36
5,180.0	0.11	132.00	5,179.0	-10.6	38.3	24.4	0.33	-0.32	-32.20
5,205.0	0.13	93.88	5,204.0	-10.6	38.4	24.4	0.32	0.08	-152.48
5,230.0	0.23	128.03	5,229.0	-10.7	38.5	24.4	0.57	0.40	136.60
5,255.0	0.11	347.37	5,254.0	-10.7	38.5	24.5	1.29	-0.48	-562.64



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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)	
5,280.0	0.04	21.73	5,279.0	-10.6	38.5	24.4	0.32	-0.28	137.44	
5,305.0	0.15	102.50	5,304.0	-10.6	38.5	24.4	0.60	0.44	323.08	
5,328.0	0.28	102.70	5,327.0	-10.6	38.6	24.5	0.55	0.55	0.86	
Last SDI Gyro @ 5328										
5,328.7	0.28	102.70	5,327.6	-10.6	38.6	24.5	0.55	0.55	0.46	
5,437.0	0.34	93.53	5,436.0	-10.7	39.2	24.8	0.07	0.06	-8.46	
First SDI MWD @ 5437										
5,468.0	0.57	121.96	5,467.0	-10.8	39.4	25.0	1.02	0.74	91.71	
5,499.0	0.36	122.23	5,498.0	-10.9	39.6	25.2	0.68	-0.68	0.87	
5,530.0	1.05	257.40	5,529.0	-11.1	39.4	25.2	4.29	2.23	436.03	
5,561.0	5.62	266.37	5,559.9	-11.2	37.6	24.7	14.79	14.74	28.94	
5,591.0	9.36	271.30	5,589.7	-11.3	33.7	23.2	12.64	12.47	16.43	
5,622.0	12.35	273.94	5,620.1	-11.0	27.9	20.7	9.78	9.65	8.52	
5,653.0	15.72	273.35	5,650.2	-10.5	20.4	17.5	10.88	10.87	-1.90	
5,684.0	18.88	275.52	5,679.8	-9.8	11.2	13.3	10.40	10.19	7.00	
5,715.0	20.86	274.13	5,708.9	-8.9	0.7	8.5	6.57	6.39	-4.48	
5,746.0	22.73	271.97	5,737.7	-8.3	-10.8	3.6	6.56	6.03	-6.97	
5,777.0	23.94	261.24	5,766.2	-9.0	-23.0	-0.4	14.23	3.90	-34.61	
5,808.0	25.36	252.38	5,794.4	-12.0	-35.5	-2.4	12.76	4.58	-28.58	
5,838.0	26.12	242.61	5,821.4	-17.0	-47.5	-2.3	14.35	2.53	-32.57	
5,869.0	26.78	233.77	5,849.2	-24.3	-59.2	0.0	12.87	2.13	-28.52	
5,900.0	27.80	226.24	5,876.7	-33.4	-70.1	4.3	11.61	3.29	-24.29	
5,931.0	29.73	220.17	5,903.9	-44.3	-80.3	10.5	11.29	6.23	-19.58	
5,962.0	32.65	214.62	5,930.4	-57.0	-90.0	18.6	13.21	9.42	-17.90	
5,993.0	35.35	210.35	5,956.1	-71.7	-99.3	28.6	11.62	8.71	-13.77	
6,024.0	37.50	205.20	5,981.1	-87.9	-107.8	40.4	12.05	6.94	-16.61	
6,055.0	38.85	200.41	6,005.4	-105.6	-115.2	54.0	10.49	4.35	-15.45	
6,085.0	40.46	195.40	6,028.5	-123.8	-121.1	68.6	11.93	5.37	-16.70	
6,116.0	40.64	188.35	6,052.1	-143.5	-125.2	85.2	14.79	0.58	-22.74	
6,147.0	40.67	182.68	6,075.6	-163.6	-127.2	103.1	11.91	0.10	-18.29	
6,178.0	39.96	177.37	6,099.3	-183.6	-127.2	121.6	11.31	-2.29	-17.13	
6,209.0	41.24	171.24	6,122.8	-203.7	-125.2	140.9	13.51	4.13	-19.77	
6,219.0	42.03	169.97	6,130.3	-210.2	-124.1	147.4	11.54	7.86	-12.72	
Middlesex @ 6219										
6,240.0	43.72	167.42	6,145.7	-224.2	-121.3	161.4	11.54	8.07	-12.13	
6,271.0	46.65	164.36	6,167.5	-245.6	-115.9	183.2	11.76	9.45	-9.87	
6,302.0	50.15	162.29	6,188.1	-267.7	-109.2	206.3	12.34	11.29	-6.68	
6,333.0	53.82	161.88	6,207.2	-291.0	-101.7	230.6	11.88	11.84	-1.32	
6,348.0	55.65	161.51	6,215.9	-302.6	-97.9	242.8	12.35	12.19	-2.44	
Burket @ 6348										
6,364.0	57.60	161.14	6,224.7	-315.3	-93.6	256.2	12.35	12.20	-2.34	



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6,373.0	59.34	161.45	6,229.4	-322.5	-91.1	263.8	19.52	19.29	3.47
Tully @ 6373									
6,389.0	62.42	161.98	6,237.2	-335.8	-86.8	277.8	19.52	19.30	3.30
Marcellus @ 6389									
6,394.0	63.39	162.14	6,239.4	-340.0	-85.4	282.2	19.52	19.31	3.18
6,425.0	69.57	160.83	6,251.8	-367.0	-76.4	310.6	20.31	19.94	-4.23
6,456.0	76.59	161.44	6,260.8	-395.0	-66.8	340.1	22.72	22.65	1.97
6,483.0	79.92	160.66	6,266.3	-420.0	-58.2	366.5	12.65	12.33	-2.89
6,513.0	82.88	160.81	6,270.8	-448.0	-48.4	396.1	9.88	9.87	0.50
6,544.0	84.40	160.84	6,274.2	-477.1	-38.3	426.9	4.90	4.90	0.10
6,575.0	86.32	160.67	6,276.7	-506.3	-28.1	457.8	6.22	6.19	-0.55
6,606.0	87.56	159.42	6,278.4	-535.4	-17.5	488.7	5.68	4.00	-4.03
6,637.0	88.73	158.79	6,279.4	-564.3	-6.5	519.7	4.29	3.77	-2.03
6,668.0	91.03	158.81	6,279.5	-593.2	4.7	550.7	7.42	7.42	0.06
6,760.0	91.91	160.26	6,277.1	-679.4	36.9	642.6	1.84	0.96	1.58
6,853.0	90.06	161.54	6,275.5	-767.3	67.3	735.4	2.42	-1.99	1.38
6,946.0	89.76	159.65	6,275.7	-855.0	98.2	828.3	2.06	-0.32	-2.03
7,038.0	89.18	159.49	6,276.5	-941.2	130.3	920.2	0.65	-0.63	-0.17
7,131.0	89.58	158.92	6,277.5	-1,028.1	163.3	1,013.2	0.75	0.43	-0.61
7,223.0	89.68	159.30	6,278.1	-1,114.1	196.1	1,105.2	0.43	0.11	0.41
7,316.0	88.30	159.96	6,279.7	-1,201.2	228.5	1,198.1	1.64	-1.48	0.71
7,409.0	88.13	159.61	6,282.6	-1,288.5	260.6	1,291.0	0.42	-0.18	-0.38
7,501.0	89.03	159.40	6,284.9	-1,374.6	292.8	1,382.9	1.00	0.98	-0.23
7,594.0	89.73	158.32	6,285.9	-1,461.3	326.3	1,475.9	1.38	0.75	-1.16
7,686.0	88.99	157.41	6,287.0	-1,546.6	361.0	1,567.9	1.27	-0.80	-0.99
7,779.0	89.06	155.89	6,288.5	-1,631.9	397.9	1,660.8	1.64	0.08	-1.63
7,872.0	90.04	154.78	6,289.3	-1,716.4	436.7	1,753.8	1.59	1.05	-1.19
7,964.0	88.89	155.05	6,290.1	-1,799.8	475.7	1,845.6	1.28	-1.25	0.29
8,057.0	90.58	157.34	6,290.6	-1,884.8	513.2	1,938.6	3.06	1.82	2.46
8,149.0	90.51	156.97	6,289.7	-1,969.6	548.9	2,030.6	0.41	-0.08	-0.40
8,242.0	89.06	156.77	6,290.0	-2,055.1	585.5	2,123.6	1.57	-1.56	-0.22
8,335.0	90.07	157.96	6,290.7	-2,141.0	621.2	2,216.6	1.68	1.09	1.28
8,427.0	89.53	160.20	6,291.1	-2,226.9	654.1	2,308.5	2.50	-0.59	2.43
8,520.0	90.14	162.32	6,291.3	-2,315.0	684.0	2,401.4	2.37	0.66	2.28
8,612.0	90.30	161.45	6,291.0	-2,402.4	712.6	2,493.1	0.96	0.17	-0.95
8,705.0	89.60	159.23	6,291.1	-2,490.0	743.9	2,586.0	2.50	-0.75	-2.39
8,797.0	90.00	156.72	6,291.4	-2,575.2	778.4	2,678.0	2.76	0.43	-2.73
8,889.0	90.84	156.61	6,290.7	-2,659.7	814.8	2,770.0	0.92	0.91	-0.12
8,982.0	91.14	155.66	6,289.1	-2,744.8	852.4	2,862.9	1.07	0.32	-1.02
9,074.0	90.70	155.13	6,287.6	-2,828.4	890.7	2,954.8	0.75	-0.48	-0.58



Scientific Drilling International

Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Hartley East Pad:Freeland/Plum Run/Woodworth
Well: Plum Run Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Plum Run Unit 1H
TVD Reference: Precision 522: GL 1021' + KB 18' @ 1039.0usft
MD Reference: Precision 522: GL 1021' + KB 18' @ 1039.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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)
9,166.0	90.10	155.22	6,287.0	-2,911.9	929.3	3,046.7	0.66	-0.65	0.10
9,259.0	89.83	154.12	6,287.0	-2,995.9	969.1	3,139.6	1.22	-0.29	-1.18
9,352.0	90.16	154.29	6,287.0	-3,079.7	1,009.6	3,232.4	0.40	0.35	0.18
9,444.0	91.17	154.87	6,286.0	-3,162.8	1,049.1	3,324.3	1.27	1.10	0.63
9,537.0	90.80	156.98	6,284.4	-3,247.7	1,087.0	3,417.2	2.30	-0.40	2.27
9,629.0	90.53	156.86	6,283.3	-3,332.3	1,123.1	3,509.2	0.32	-0.29	-0.13
9,722.0	89.62	156.13	6,283.2	-3,417.6	1,160.2	3,602.2	1.25	-0.98	-0.78
9,814.0	89.18	157.64	6,284.1	-3,502.2	1,196.3	3,694.2	1.71	-0.48	1.64
9,907.0	89.52	158.45	6,285.2	-3,588.4	1,231.1	3,787.2	0.94	0.37	0.87
10,000.0	90.72	159.38	6,285.0	-3,675.2	1,264.5	3,880.1	1.63	1.29	1.00
10,092.0	90.69	159.47	6,283.9	-3,761.3	1,296.8	3,972.1	0.10	-0.03	0.10
10,185.0	90.02	158.97	6,283.3	-3,848.3	1,329.8	4,065.1	0.90	-0.72	-0.54
10,277.0	91.36	159.24	6,282.2	-3,934.2	1,362.6	4,157.0	1.49	1.46	0.29
10,370.0	89.75	160.41	6,281.3	-4,021.5	1,394.7	4,250.0	2.14	-1.73	1.26
10,463.0	89.58	160.96	6,281.8	-4,109.3	1,425.5	4,342.8	0.62	-0.18	0.59
10,555.0	89.41	158.52	6,282.6	-4,195.6	1,457.3	4,434.8	2.66	-0.18	-2.65
10,648.0	89.98	157.66	6,283.1	-4,281.8	1,492.0	4,527.8	1.11	0.61	-0.92
10,740.0	90.18	157.51	6,283.0	-4,366.9	1,527.1	4,619.8	0.27	0.22	-0.16
10,833.0	90.58	158.15	6,282.4	-4,453.0	1,562.2	4,712.7	0.81	0.43	0.69
10,925.0	90.01	156.88	6,281.9	-4,538.0	1,597.4	4,804.7	1.51	-0.62	-1.38
11,018.0	89.98	157.01	6,281.9	-4,623.6	1,633.8	4,897.7	0.14	-0.03	0.14
11,110.0	90.28	157.35	6,281.7	-4,708.4	1,669.5	4,989.7	0.49	0.33	0.37
11,203.0	89.95	156.38	6,281.5	-4,793.9	1,706.0	5,082.7	1.10	-0.35	-1.04
11,296.0	90.15	155.55	6,281.5	-4,878.8	1,743.9	5,175.7	0.92	0.22	-0.89
11,388.0	90.51	158.08	6,280.9	-4,963.4	1,780.1	5,267.7	2.78	0.39	2.75
11,481.0	89.61	158.26	6,280.8	-5,049.7	1,814.7	5,360.7	0.99	-0.97	0.19
11,573.0	90.04	158.10	6,281.1	-5,135.1	1,848.9	5,452.6	0.50	0.47	-0.17
11,666.0	90.14	157.07	6,281.0	-5,221.1	1,884.4	5,545.6	1.11	0.11	-1.11
11,758.0	90.21	156.09	6,280.7	-5,305.5	1,920.9	5,637.6	1.07	0.08	-1.07
11,851.0	90.45	156.73	6,280.1	-5,390.7	1,958.1	5,730.6	0.73	0.26	0.69
11,944.0	90.38	155.95	6,279.5	-5,475.9	1,995.5	5,823.6	0.84	-0.08	-0.84
12,036.0	90.11	155.85	6,279.1	-5,559.9	2,033.0	5,915.5	0.31	-0.29	-0.11
12,129.0	90.48	158.03	6,278.6	-5,645.5	2,069.5	6,008.5	2.38	0.40	2.34
12,221.0	90.41	158.26	6,277.9	-5,730.9	2,103.7	6,100.5	0.26	-0.08	0.25
12,314.0	89.60	159.00	6,277.9	-5,817.5	2,137.6	6,193.5	1.18	-0.87	0.80
12,406.0	89.54	158.70	6,278.6	-5,903.3	2,170.8	6,285.5	0.33	-0.07	-0.33
12,499.0	90.04	158.98	6,278.9	-5,990.0	2,204.4	6,378.5	0.62	0.54	0.30
12,561.0	90.71	160.50	6,278.5	-6,048.2	2,225.8	6,440.4	2.68	1.08	2.45
Last SDI MWD @ 12561									
12,625.0	90.71	160.50	6,277.7	-6,108.5	2,247.2	6,504.3	0.00	0.00	0.00



Scientific Drilling International
Survey Report



Company:	Antero Resources	Local Co-ordinate Reference:	Well Plum Run Unit 1H
Project:	Tyler County WV	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Plum Run Unit 1H	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)
Projection To Bit @ 12625 MD / 6277 TVD									

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
6,219.0	6,130.3	Middlesex @ 6219		0.00	
6,348.0	6,215.9	Burket @ 6348		0.00	
6,373.0	6,229.4	Tully @ 6373		0.00	
6,389.0	6,237.2	Marcellus @ 6389		0.00	

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
105.0	105.0	-0.1	0.1	First SDI Gyro @ 105
5,328.0	5,327.0	-10.6	38.6	Last SDI Gyro @ 5328
5,437.0	5,436.0	-10.7	39.2	First SDI MWD @ 5437
12,561.0	6,278.5	-6,048.2	2,225.8	Last SDI MWD @ 12561
12,625.0	6,277.7	-6,108.5	2,247.2	Projection To Bit @ 12625 MD / 6277 TVD

Checked By: _____ Approved By: _____ Date: _____