



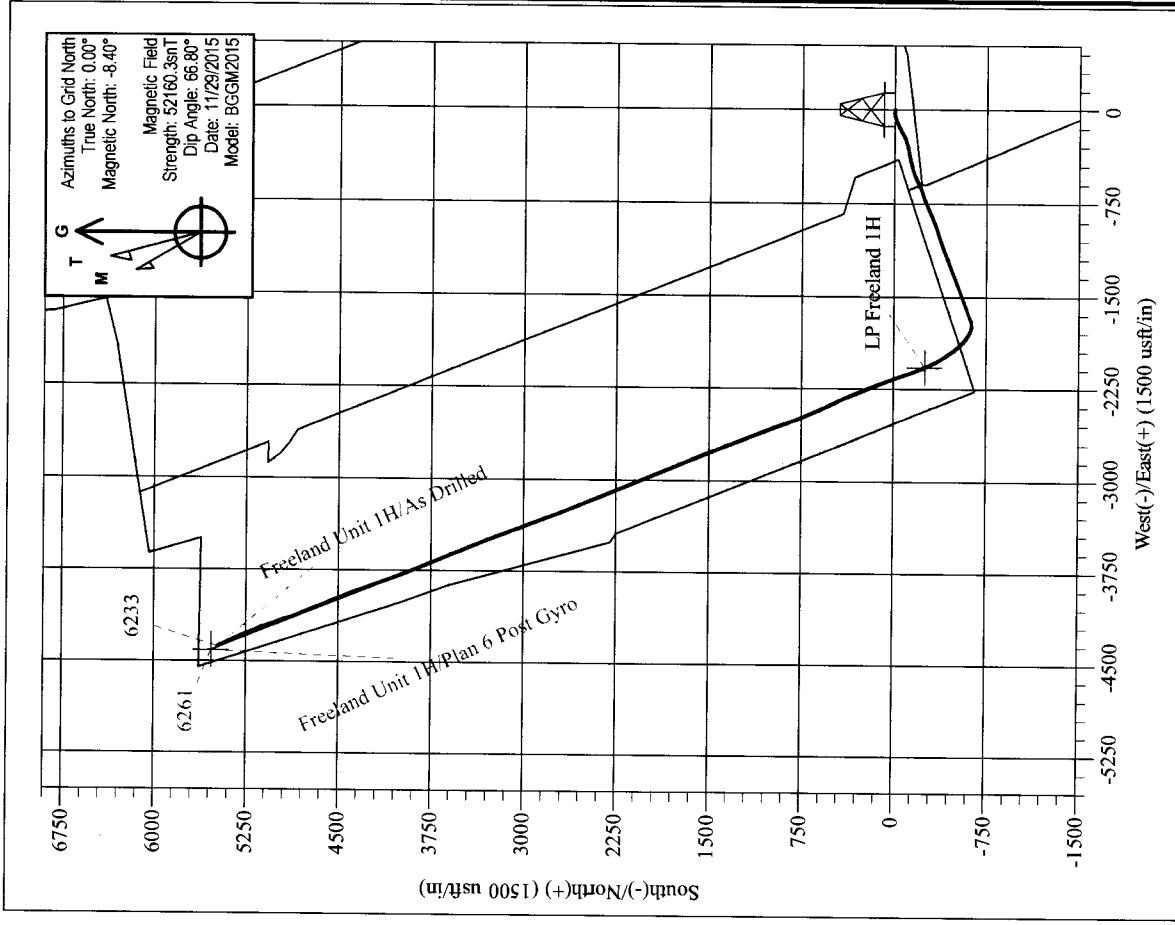
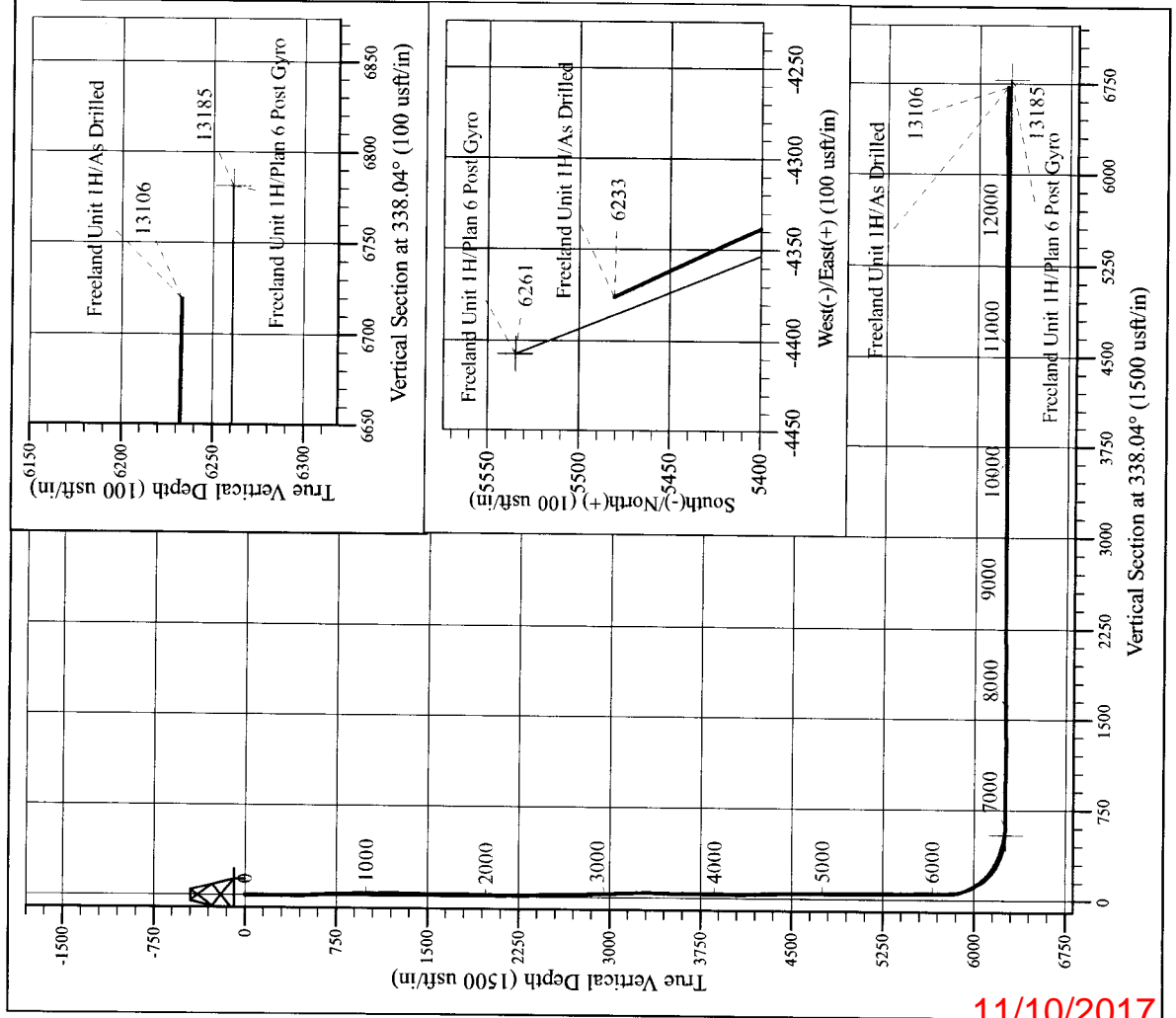
Hartley East Pad: Freeland/Plum Run/Woodworth
 Freeland Unit 1H
 Plan 6 Post Gyro
 Precision 522: GL 1021' + KB 18' @ 1039.0usft
 Tyler County WV

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: Freeland Unit 1H SHL

+N/-S	+E/-W	Northing	Latitude	Longitude
0.0	0.0	1642333.26	39° 21' 55.028 N	80° 59' 35.588 W



Shane Rhodes
 10:54, December 15 2015
 Scientific Drilling International
 124 Vista Drive
 Charleroi, PA 15022

Freeland Unit 1H
 Approx. BHL
 39° 21' 55.028 N 80° 59' 35.588 W

11/10/2017



Scientific Drilling International
Survey Report



Company: Antero Resources	Local Co-ordinate Reference: Well Freeland 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: Freeland Unit 1H	North Reference: Grid
Wellbore: Original Wellpath	Survey Calculation Method: Minimum Curvature
Design: As Drilled	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	Latitude:	39° 21' 54.939 N	
From: Map	Easting:	1,642,331.42 usft	Longitude:	80° 59' 35.611 W	
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.00 °

Well	Freeland Unit 1H, Marcellus			
Well Position	+N/-S	0.0 usft	Northing:	14,294,936.18 usft
	+E/-W	0.0 usft	Easting:	1,642,333.26 usft
Position Uncertainty	2.0 usft		Wellhead Elevation:	1,039.0 usft
			Ground Level:	1,021.0 usft

Wellbore	Original Wellpath				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	4/22/2015	-8.36	66.88	52,213
	BGGM2015	11/29/2015	-8.40	66.80	52,160

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	338.04	

Survey Program	Date	12/15/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
105.0	5,551.4	Survey #6 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
5,622.0	13,106.0	Survey #7 Final 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	
105.0	0.02	261.44	105.0	0.0	0.0	0.0	0.02	0.02	0.00	
First SDI Gyro @ 105										
130.0	0.08	335.35	130.0	0.0	0.0	0.0	0.31	0.24	295.64	
155.0	0.14	301.59	155.0	0.0	-0.1	0.1	0.34	0.24	-135.04	
180.0	0.21	6.70	180.0	0.1	-0.1	0.1	0.79	0.28	260.44	
205.0	0.14	330.34	205.0	0.2	-0.1	0.2	0.51	-0.28	-145.44	
230.0	0.14	11.40	230.0	0.2	-0.1	0.3	0.39	0.00	164.24	



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Design: As Drilled

Local Co-ordinate Reference: Well Freeland Unit 1H
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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)
255.0	0.06	318.62	255.0	0.3	-0.1	0.3	0.46	-0.32	-211.12
280.0	0.21	341.92	280.0	0.3	-0.1	0.4	0.63	0.60	93.20
305.0	0.14	25.00	305.0	0.4	-0.1	0.4	0.58	-0.28	172.32
330.0	0.14	33.51	330.0	0.5	-0.1	0.5	0.08	0.00	34.04
355.0	0.14	0.96	355.0	0.5	-0.1	0.5	0.31	0.00	-130.20
380.0	0.19	333.59	380.0	0.6	-0.1	0.6	0.37	0.20	-109.48
405.0	0.41	291.79	405.0	0.6	-0.2	0.7	1.19	0.88	-167.20
430.0	1.26	279.11	430.0	0.7	-0.6	0.9	3.46	3.40	-50.72
455.0	2.14	279.59	455.0	0.8	-1.3	1.3	3.52	3.52	1.92
480.0	3.24	282.65	480.0	1.1	-2.4	1.9	4.44	4.40	12.24
505.0	3.94	282.42	504.9	1.4	-4.0	2.8	2.80	2.80	-0.92
530.0	4.58	282.79	529.8	1.8	-5.8	3.8	2.56	2.56	1.48
555.0	5.44	283.41	554.7	2.3	-7.9	5.1	3.45	3.44	2.48
580.0	5.88	282.79	579.6	2.9	-10.3	6.5	1.78	1.76	-2.48
605.0	6.04	283.15	604.5	3.5	-12.8	8.0	0.66	0.64	1.44
630.0	6.15	284.13	629.3	4.1	-15.4	9.6	0.61	0.44	3.92
655.0	6.05	284.97	654.2	4.8	-18.0	11.1	0.54	-0.40	3.36
680.0	6.11	283.88	679.1	5.4	-20.6	12.7	0.52	0.24	-4.36
705.0	6.32	276.49	703.9	5.9	-23.2	14.1	3.31	0.84	-29.56
730.0	6.87	269.59	728.8	6.0	-26.1	15.3	3.85	2.20	-27.60
755.0	7.33	265.27	753.6	5.9	-29.2	16.4	2.82	1.84	-17.28
780.0	7.47	264.24	778.4	5.6	-32.4	17.3	0.77	0.56	-4.12
805.0	7.47	261.86	803.1	5.2	-35.6	18.1	1.24	0.00	-9.52
830.0	7.48	260.50	827.9	4.7	-38.8	18.9	0.71	0.04	-5.44
855.0	7.70	255.97	852.7	4.0	-42.0	19.5	2.55	0.88	-18.12
880.0	7.80	253.55	877.5	3.1	-45.3	19.8	1.37	0.40	-9.68
905.0	8.00	252.71	902.2	2.1	-48.6	20.2	0.92	0.80	-3.36
930.0	8.18	252.18	927.0	1.1	-51.9	20.4	0.78	0.72	-2.12
955.0	8.32	252.89	951.7	0.0	-55.3	20.7	0.69	0.56	2.84
980.0	8.44	253.44	976.5	-1.0	-58.8	21.0	0.58	0.48	2.20
1,005.0	8.30	253.86	1,001.2	-2.1	-62.3	21.4	0.61	-0.56	1.68
1,030.0	8.10	253.20	1,025.9	-3.1	-65.7	21.7	0.88	-0.80	-2.64
1,055.0	8.11	251.63	1,050.7	-4.1	-69.1	22.0	0.89	0.04	-6.28
1,080.0	8.19	251.80	1,075.4	-5.3	-72.5	22.2	0.33	0.32	0.68
1,105.0	8.35	251.94	1,100.2	-6.4	-75.9	22.5	0.65	0.64	0.56
1,130.0	8.60	250.64	1,124.9	-7.6	-79.4	22.7	1.26	1.00	-5.20
1,155.0	8.97	247.35	1,149.6	-8.9	-82.9	22.7	2.50	1.48	-13.16
1,180.0	9.00	246.82	1,174.3	-10.5	-86.5	22.7	0.35	0.12	-2.12
1,205.0	9.05	246.17	1,199.0	-12.0	-90.1	22.6	0.45	0.20	-2.60
1,230.0	9.19	245.80	1,223.7	-13.6	-93.8	22.4	0.61	0.56	-1.48
1,255.0	9.26	245.24	1,248.4	-15.3	-97.4	22.2	0.46	0.28	-2.24
1,280.0	9.15	244.87	1,273.0	-17.0	-101.0	22.0	0.50	-0.44	-1.48
1,305.0	9.12	244.43	1,297.7	-18.7	-104.6	21.8	0.30	-0.12	-1.76



Scientific Drilling International

Survey Report



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Site: Hartley East Pad:Freeland/Plum Run/Woodworth
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Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Freeland Unit 1H
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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)
1,330.0	9.06	244.08	1,322.4	-20.4	-108.2	21.5	0.33	-0.24	-1.40
1,355.0	8.94	243.78	1,347.1	-22.1	-111.7	21.3	0.52	-0.48	-1.20
1,380.0	8.82	243.08	1,371.8	-23.8	-115.1	20.9	0.65	-0.48	-2.80
1,405.0	8.99	242.06	1,396.5	-25.6	-118.6	20.6	0.93	0.68	-4.08
1,430.0	9.19	241.37	1,421.2	-27.5	-122.0	20.1	0.91	0.80	-2.76
1,455.0	9.32	240.73	1,445.9	-29.4	-125.6	19.7	0.66	0.52	-2.56
1,480.0	9.44	240.38	1,470.5	-31.4	-129.1	19.1	0.53	0.48	-1.40
1,505.0	9.64	240.79	1,495.2	-33.5	-132.7	18.6	0.84	0.80	1.64
1,530.0	9.91	243.19	1,519.8	-35.5	-136.5	18.1	1.96	1.08	9.60
1,555.0	10.13	244.09	1,544.4	-37.4	-140.4	17.8	1.08	0.88	3.60
1,580.0	10.21	243.99	1,569.0	-39.3	-144.3	17.5	0.33	0.32	-0.40
1,605.0	10.31	244.01	1,593.6	-41.3	-148.3	17.2	0.40	0.40	0.08
1,630.0	10.36	244.93	1,618.2	-43.2	-152.4	16.9	0.69	0.20	3.68
1,655.0	10.34	246.95	1,642.8	-45.0	-156.5	16.7	1.45	-0.08	8.08
1,680.0	10.55	248.16	1,667.4	-46.8	-160.7	16.7	1.21	0.84	4.84
1,705.0	10.41	247.93	1,692.0	-48.5	-164.9	16.7	0.58	-0.56	-0.92
1,730.0	10.34	246.98	1,716.6	-50.2	-169.1	16.7	0.74	-0.28	-3.80
1,755.0	10.37	245.77	1,741.2	-52.0	-173.2	16.5	0.88	0.12	-4.84
1,780.0	10.62	244.11	1,765.8	-53.9	-177.3	16.3	1.57	1.00	-6.64
1,805.0	10.67	243.45	1,790.3	-56.0	-181.4	15.9	0.53	0.20	-2.64
1,830.0	10.66	242.16	1,814.9	-58.1	-185.5	15.5	0.96	-0.04	-5.16
1,855.0	10.72	240.92	1,839.5	-60.3	-189.6	15.0	0.95	0.24	-4.96
1,880.0	10.84	240.55	1,864.0	-62.6	-193.7	14.4	0.55	0.48	-1.48
1,905.0	10.98	239.02	1,888.6	-65.0	-197.8	13.7	1.29	0.56	-6.12
1,930.0	11.17	238.66	1,913.1	-67.4	-201.9	12.9	0.81	0.76	-1.44
1,955.0	11.46	239.39	1,937.6	-70.0	-206.1	12.2	1.29	1.16	2.92
1,980.0	11.89	239.33	1,962.1	-72.6	-210.5	11.4	1.72	1.72	-0.24
2,005.0	12.34	240.90	1,986.6	-75.2	-215.0	10.7	2.23	1.80	6.28
2,030.0	12.77	240.87	2,011.0	-77.8	-219.8	10.0	1.72	1.72	-0.12
2,055.0	13.20	241.75	2,035.3	-80.5	-224.7	9.4	1.89	1.72	3.52
2,080.0	13.41	243.71	2,059.6	-83.1	-229.8	8.8	1.99	0.84	7.84
2,105.0	13.38	247.52	2,084.0	-85.5	-235.1	8.6	3.53	-0.12	15.24
2,130.0	13.71	250.05	2,108.3	-87.6	-240.5	8.7	2.71	1.32	10.12
2,155.0	14.02	251.60	2,132.5	-89.6	-246.2	9.0	1.94	1.24	6.20
2,180.0	13.70	254.02	2,156.8	-91.4	-251.9	9.4	2.65	-1.28	9.68
2,205.0	13.04	255.39	2,181.1	-92.9	-257.5	10.1	2.93	-2.64	5.48
2,230.0	12.24	255.63	2,205.5	-94.3	-262.8	10.8	3.21	-3.20	0.96
2,255.0	11.53	254.18	2,230.0	-95.6	-267.8	11.4	3.08	-2.84	-5.80
2,280.0	11.17	252.21	2,254.5	-97.0	-272.5	11.9	2.12	-1.44	-7.88
2,305.0	10.36	250.26	2,279.1	-98.5	-276.9	12.2	3.55	-3.24	-7.80
2,330.0	9.63	249.38	2,303.7	-100.0	-281.0	12.3	2.98	-2.92	-3.52
2,355.0	9.63	250.14	2,328.3	-101.5	-284.9	12.4	0.51	0.00	3.04



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Design: As Drilled

Local Co-ordinate Reference: Well Freeland Unit 1H
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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)
2,380.0	9.08	251.42	2,353.0	-102.8	-288.7	12.6	2.35	-2.20	5.12
2,405.0	8.71	252.39	2,377.7	-104.0	-292.4	12.9	1.60	-1.48	3.88
2,430.0	8.91	256.96	2,402.4	-105.0	-296.1	13.3	2.91	0.80	18.28
2,455.0	8.77	257.46	2,427.1	-105.9	-299.8	13.9	0.64	-0.56	2.00
2,480.0	8.64	257.97	2,451.8	-106.7	-303.5	14.6	0.60	-0.52	2.04
2,505.0	8.68	257.88	2,476.5	-107.5	-307.2	15.2	0.17	0.16	-0.36
2,530.0	8.46	257.15	2,501.3	-108.3	-310.8	15.8	0.98	-0.88	-2.92
2,555.0	8.24	256.60	2,526.0	-109.1	-314.4	16.4	0.94	-0.88	-2.20
2,580.0	8.17	256.23	2,550.7	-109.9	-317.8	16.9	0.35	-0.28	-1.48
2,605.0	7.93	255.64	2,575.5	-110.8	-321.2	17.4	1.02	-0.96	-2.36
2,630.0	8.00	255.07	2,600.2	-111.7	-324.6	17.8	0.42	0.28	-2.28
2,655.0	8.16	255.98	2,625.0	-112.5	-328.0	18.3	0.82	0.64	3.64
2,680.0	8.48	257.68	2,649.7	-113.4	-331.5	18.8	1.61	1.28	6.80
2,705.0	8.70	259.32	2,674.5	-114.1	-335.2	19.5	1.32	0.88	6.56
2,730.0	9.02	259.96	2,699.2	-114.8	-339.0	20.3	1.34	1.28	2.56
2,755.0	9.22	261.35	2,723.8	-115.4	-342.9	21.1	1.19	0.80	5.56
2,780.0	9.42	263.06	2,748.5	-116.0	-346.9	22.1	1.37	0.80	6.84
2,805.0	9.80	263.77	2,773.2	-116.5	-351.0	23.2	1.59	1.52	2.84
2,830.0	10.12	263.21	2,797.8	-117.0	-355.3	24.4	1.34	1.28	-2.24
2,855.0	10.98	263.36	2,822.4	-117.5	-359.9	25.6	3.44	3.44	0.60
2,880.0	11.77	262.10	2,846.9	-118.1	-364.8	26.9	3.31	3.16	-5.04
2,905.0	12.65	259.88	2,871.3	-119.0	-370.0	28.0	3.99	3.52	-8.88
2,930.0	13.35	258.46	2,895.7	-120.0	-375.5	29.1	3.08	2.80	-5.68
2,955.0	14.33	257.02	2,919.9	-121.3	-381.3	30.1	4.15	3.92	-5.76
2,980.0	15.39	255.01	2,944.1	-122.8	-387.6	31.0	4.71	4.24	-8.04
3,005.0	16.31	254.21	2,968.1	-124.7	-394.2	31.8	3.78	3.68	-3.20
3,030.0	17.19	253.88	2,992.1	-126.6	-401.1	32.5	3.54	3.52	-1.32
3,055.0	18.67	253.72	3,015.9	-128.8	-408.5	33.3	5.92	5.92	-0.64
3,080.0	19.53	254.71	3,039.5	-131.0	-416.3	34.2	3.68	3.44	3.96
3,105.0	20.60	254.83	3,063.0	-133.3	-424.6	35.2	4.28	4.28	0.48
3,130.0	21.54	255.07	3,086.3	-135.6	-433.3	36.3	3.78	3.76	0.96
3,155.0	22.23	255.32	3,109.5	-138.0	-442.3	37.4	2.79	2.76	1.00
3,180.0	23.15	254.86	3,132.6	-140.5	-451.6	38.6	3.75	3.68	-1.84
3,205.0	24.11	252.89	3,155.5	-143.2	-461.2	39.6	4.97	3.84	-7.88
3,230.0	24.78	251.65	3,178.2	-146.4	-471.1	40.4	3.38	2.68	-4.96
3,255.0	25.52	250.70	3,200.9	-149.8	-481.2	41.0	3.37	2.96	-3.80
3,280.0	26.29	249.99	3,223.4	-153.5	-491.4	41.4	3.32	3.08	-2.84
3,305.0	27.01	250.25	3,245.7	-157.3	-502.0	41.8	2.92	2.88	1.04
3,330.0	27.37	250.33	3,267.9	-161.2	-512.7	42.3	1.45	1.44	0.32
3,355.0	27.35	249.92	3,290.1	-165.1	-523.5	42.7	0.76	-0.08	-1.64
3,380.0	27.14	248.63	3,312.4	-169.1	-534.2	42.9	2.51	-0.84	-5.16
3,405.0	26.39	245.96	3,334.7	-173.5	-544.6	42.8	5.67	-3.00	-10.68
3,430.0	26.01	244.07	3,357.1	-178.1	-554.6	42.2	3.67	-1.52	-7.56



Scientific Drilling International

Survey Report



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

Local Co-ordinate Reference: Well Freeland 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)
3,455.0	25.47	242.78	3,379.6	-183.0	-564.3	41.3	3.11	-2.16	-5.16
3,480.0	25.68	242.50	3,402.2	-187.9	-573.9	40.3	0.97	0.84	-1.12
3,505.0	25.41	242.97	3,424.7	-192.9	-583.5	39.3	1.35	-1.08	1.88
3,530.0	25.02	244.07	3,447.4	-197.6	-593.0	38.5	2.44	-1.56	4.40
3,555.0	25.08	244.34	3,470.0	-202.2	-602.6	37.8	0.52	0.24	1.08
3,580.0	25.04	245.53	3,492.7	-206.7	-612.2	37.2	2.02	-0.16	4.76
3,605.0	25.13	247.02	3,515.3	-211.0	-621.9	36.9	2.55	0.36	5.96
3,630.0	25.77	248.40	3,537.9	-215.1	-631.8	36.8	3.49	2.56	5.52
3,655.0	26.06	249.44	3,560.4	-219.0	-642.0	37.0	2.16	1.16	4.16
3,680.0	26.52	250.08	3,582.8	-222.8	-652.4	37.3	2.16	1.84	2.56
3,705.0	27.15	250.30	3,605.1	-226.6	-663.0	37.7	2.55	2.52	0.88
3,730.0	27.82	250.08	3,627.3	-230.5	-673.9	38.2	2.71	2.68	-0.88
3,755.0	28.18	249.63	3,649.3	-234.6	-684.9	38.6	1.67	1.44	-1.80
3,780.0	28.61	249.67	3,671.3	-238.7	-696.0	38.9	1.72	1.72	0.16
3,805.0	28.88	249.32	3,693.2	-242.9	-707.3	39.2	1.27	1.08	-1.40
3,830.0	28.89	248.69	3,715.1	-247.3	-718.6	39.4	1.22	0.04	-2.52
3,855.0	29.21	247.92	3,737.0	-251.7	-729.8	39.4	1.97	1.28	-3.08
3,880.0	29.03	246.95	3,758.8	-256.4	-741.1	39.3	2.02	-0.72	-3.88
3,905.0	28.89	246.85	3,780.7	-261.2	-752.2	39.1	0.59	-0.56	-0.40
3,930.0	28.56	246.12	3,802.6	-266.0	-763.2	38.8	1.93	-1.32	-2.92
3,955.0	28.62	245.84	3,824.6	-270.8	-774.2	38.3	0.59	0.24	-1.12
3,980.0	28.83	245.58	3,846.5	-275.8	-785.1	37.8	0.98	0.84	-1.04
4,005.0	28.14	244.86	3,868.5	-280.8	-795.9	37.3	3.08	-2.76	-2.88
4,030.0	28.41	244.59	3,890.5	-285.8	-806.6	36.6	1.20	1.08	-1.08
4,055.0	28.06	244.59	3,912.5	-290.9	-817.3	35.9	1.40	-1.40	0.00
4,080.0	27.57	244.71	3,934.6	-295.9	-827.9	35.2	1.97	-1.96	0.48
4,105.0	28.37	245.21	3,956.7	-300.9	-838.5	34.5	3.33	3.20	2.00
4,130.0	27.93	246.10	3,978.8	-305.7	-849.2	34.0	2.43	-1.76	3.56
4,155.0	27.11	246.62	4,000.9	-310.4	-859.8	33.7	3.42	-3.28	2.08
4,180.0	27.42	247.91	4,023.1	-314.8	-870.4	33.5	2.67	1.24	5.16
4,205.0	26.66	249.00	4,045.4	-319.0	-881.0	33.6	3.63	-3.04	4.36
4,230.0	26.57	249.64	4,067.8	-322.9	-891.4	33.9	1.20	-0.36	2.56
4,255.0	25.08	249.95	4,090.3	-326.7	-901.7	34.2	5.98	-5.96	1.24
4,280.0	25.78	250.43	4,112.8	-330.3	-911.8	34.6	2.92	2.80	1.92
4,305.0	25.62	250.53	4,135.4	-333.9	-922.0	35.1	0.66	-0.64	0.40
4,330.0	25.73	250.75	4,157.9	-337.5	-932.2	35.6	0.58	0.44	0.88
4,355.0	25.43	251.08	4,180.5	-341.1	-942.4	36.1	1.33	-1.20	1.32
4,380.0	25.22	251.40	4,203.0	-344.5	-952.5	36.7	1.00	-0.84	1.28
4,405.0	26.05	252.25	4,225.6	-347.9	-962.8	37.4	3.63	3.32	3.40
4,430.0	25.66	252.52	4,248.1	-351.2	-973.2	38.2	1.63	-1.56	1.08
4,455.0	25.71	252.34	4,270.6	-354.4	-983.5	39.1	0.37	0.20	-0.72
4,480.0	26.42	252.22	4,293.1	-357.8	-994.0	39.9	2.85	2.84	-0.48



Scientific Drilling International

Survey Report



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

Local Co-ordinate Reference: Well Freeland 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)
4,505.0	26.87	251.76	4,315.4	-361.2	-1,004.6	40.7	1.98	1.80	-1.84
4,530.0	26.27	250.96	4,337.8	-364.8	-1,015.2	41.3	2.79	-2.40	-3.20
4,555.0	26.29	250.74	4,360.2	-368.4	-1,025.7	41.9	0.40	0.08	-0.88
4,580.0	25.98	250.57	4,382.6	-372.1	-1,036.1	42.4	1.28	-1.24	-0.68
4,605.0	26.66	250.55	4,405.0	-375.8	-1,046.5	42.8	2.72	2.72	-0.08
4,630.0	27.38	250.68	4,427.3	-379.6	-1,057.3	43.4	2.89	2.88	0.52
4,655.0	26.70	251.08	4,449.6	-383.3	-1,068.0	43.9	2.82	-2.72	1.60
4,680.0	27.08	251.19	4,471.9	-386.9	-1,078.7	44.5	1.53	1.52	0.44
4,705.0	27.31	251.15	4,494.1	-390.6	-1,089.5	45.2	0.92	0.92	-0.16
4,730.0	27.62	251.07	4,516.3	-394.4	-1,100.4	45.8	1.25	1.24	-0.32
4,755.0	27.78	250.71	4,538.4	-398.2	-1,111.4	46.3	0.93	0.64	-1.44
4,780.0	27.96	250.19	4,560.5	-402.1	-1,122.4	46.8	1.21	0.72	-2.08
4,805.0	28.29	250.07	4,582.6	-406.1	-1,133.5	47.3	1.34	1.32	-0.48
4,830.0	28.75	249.73	4,604.5	-410.2	-1,144.7	47.7	1.95	1.84	-1.36
4,855.0	29.07	248.91	4,626.4	-414.4	-1,156.0	47.9	2.04	1.28	-3.28
4,880.0	29.20	248.51	4,648.3	-418.9	-1,167.3	48.1	0.94	0.52	-1.60
4,905.0	28.39	248.08	4,670.2	-423.3	-1,178.5	48.1	3.34	-3.24	-1.72
4,930.0	27.87	247.43	4,692.2	-427.8	-1,189.4	48.1	2.41	-2.08	-2.60
4,955.0	27.95	247.11	4,714.3	-432.3	-1,200.2	47.9	0.68	0.32	-1.28
4,980.0	27.29	246.57	4,736.5	-436.9	-1,210.9	47.7	2.82	-2.64	-2.16
5,005.0	26.99	246.38	4,758.7	-441.4	-1,221.3	47.4	1.25	-1.20	-0.76
5,030.0	26.80	246.67	4,781.0	-445.9	-1,231.7	47.1	0.92	-0.76	1.16
5,055.0	26.59	246.93	4,803.3	-450.3	-1,242.0	46.8	0.96	-0.84	1.04
5,080.0	25.69	247.50	4,825.8	-454.6	-1,252.2	46.6	3.74	-3.60	2.28
5,105.0	25.01	248.59	4,848.4	-458.6	-1,262.1	46.6	3.30	-2.72	4.36
5,130.0	24.98	248.83	4,871.0	-462.4	-1,272.0	46.8	0.42	-0.12	0.96
5,155.0	25.13	248.72	4,893.7	-466.3	-1,281.8	46.9	0.63	0.60	-0.44
5,180.0	25.36	248.90	4,916.3	-470.1	-1,291.8	47.1	0.97	0.92	0.72
5,205.0	25.35	249.03	4,938.9	-474.0	-1,301.8	47.2	0.23	-0.04	0.52
5,230.0	25.71	249.15	4,961.5	-477.8	-1,311.8	47.4	1.45	1.44	0.48
5,255.0	25.70	249.52	4,984.0	-481.6	-1,322.0	47.7	0.64	-0.04	1.48
5,280.0	25.69	249.51	5,006.5	-485.4	-1,332.1	47.9	0.04	-0.04	-0.04
5,305.0	25.53	249.31	5,029.0	-489.2	-1,342.3	48.2	0.73	-0.64	-0.80
5,330.0	25.67	248.84	5,051.6	-493.1	-1,352.3	48.4	0.99	0.56	-1.88
5,355.0	25.35	247.94	5,074.2	-497.1	-1,362.3	48.5	2.01	-1.28	-3.60
5,380.0	25.39	247.72	5,096.7	-501.1	-1,372.3	48.4	0.41	0.16	-0.88
5,405.0	25.21	247.19	5,119.3	-505.2	-1,382.1	48.3	1.16	-0.72	-2.12
5,430.0	25.10	247.41	5,142.0	-509.3	-1,391.9	48.2	0.58	-0.44	0.88
5,455.0	25.52	247.44	5,164.6	-513.4	-1,401.8	48.1	1.68	1.68	0.12
5,480.0	25.58	247.63	5,187.1	-517.5	-1,411.8	48.0	0.41	0.24	0.76
5,505.0	25.43	248.10	5,209.7	-521.6	-1,421.7	47.9	1.01	-0.60	1.88
5,530.0	25.19	248.58	5,232.3	-525.5	-1,431.7	48.0	1.26	-0.96	1.92
5,551.0	25.34	248.69	5,251.3	-528.8	-1,440.0	48.1	0.73	0.70	0.51



Scientific Drilling International

Survey Report



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

Local Co-ordinate Reference: Well Freeland 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)
Last SDI Gyro @ 5551									
5,551.4	25.34	248.69	5,251.7	-528.9	-1,440.2	48.1	0.73	0.70	0.51
5,622.0	25.01	249.86	5,315.5	-539.5	-1,468.3	48.7	0.85	-0.47	1.66
First SDI MWD @ 5622									
5,715.0	24.21	249.95	5,400.1	-552.8	-1,504.6	50.0	0.86	-0.86	0.10
5,808.0	24.00	248.98	5,485.0	-566.1	-1,540.2	50.9	0.48	-0.23	-1.04
5,900.0	26.14	248.84	5,568.3	-580.1	-1,576.6	51.5	2.33	2.33	-0.15
5,993.0	25.89	249.37	5,651.9	-594.7	-1,614.7	52.3	0.37	-0.27	0.57
6,085.0	25.91	249.39	5,734.7	-608.8	-1,652.3	53.2	0.02	0.02	0.02
6,116.0	25.47	249.55	5,762.6	-613.6	-1,664.9	53.6	1.44	-1.42	0.52
6,147.0	25.80	250.60	5,790.5	-618.1	-1,677.5	54.0	1.81	1.06	3.39
6,178.0	28.11	252.95	5,818.2	-622.5	-1,690.8	55.0	8.20	7.45	7.58
6,209.0	30.08	259.84	5,845.3	-626.0	-1,705.5	57.2	12.53	6.35	22.23
6,240.0	31.63	267.77	5,871.9	-627.7	-1,721.2	61.5	14.03	5.00	25.58
6,271.0	33.15	274.03	5,898.1	-627.4	-1,737.8	68.0	11.87	4.90	20.19
6,301.0	34.20	280.96	5,923.0	-625.2	-1,754.3	76.2	13.27	3.50	23.10
6,332.0	35.29	287.27	5,948.5	-620.9	-1,771.4	86.6	12.12	3.52	20.35
6,363.0	36.08	292.98	5,973.7	-614.7	-1,788.4	98.7	11.04	2.55	18.42
6,394.0	36.92	299.80	5,998.6	-606.5	-1,804.9	112.4	13.36	2.71	22.00
6,425.0	39.21	303.89	6,023.0	-596.4	-1,821.1	127.9	10.99	7.39	13.19
6,456.0	41.85	307.39	6,046.6	-584.7	-1,837.4	144.9	11.24	8.52	11.29
6,486.0	44.98	310.72	6,068.4	-571.7	-1,853.4	162.9	12.92	10.43	11.10
6,517.0	48.17	313.24	6,089.7	-556.6	-1,870.1	183.1	11.86	10.29	8.13
6,548.0	51.43	314.84	6,109.7	-540.1	-1,887.2	204.8	11.23	10.52	5.16
6,553.0	51.93	315.25	6,112.8	-537.4	-1,889.9	208.4	11.99	10.09	8.25
Middlesex @ 6553									
6,579.0	54.58	317.31	6,128.4	-522.3	-1,904.3	227.7	11.99	10.17	7.91
6,610.0	57.63	319.82	6,145.7	-503.0	-1,921.3	252.0	11.91	9.84	8.10
6,640.0	60.32	321.60	6,161.1	-483.1	-1,937.6	276.5	10.31	8.97	5.93
6,671.0	63.37	324.25	6,175.7	-461.3	-1,954.1	302.9	12.39	9.84	8.55
6,702.0	65.91	325.99	6,189.0	-438.3	-1,970.1	330.2	9.64	8.19	5.61
6,729.0	67.53	326.77	6,199.7	-417.7	-1,983.8	354.5	6.55	6.00	2.88
Burket @ 6729									
6,733.0	67.77	326.88	6,201.2	-414.6	-1,985.9	358.1	6.55	6.01	2.84
6,763.0	69.53	328.11	6,212.1	-391.0	-2,000.9	385.6	7.00	5.87	4.10
Tully @ 6763									
6,783.0	70.79	329.13	6,218.9	-375.0	-2,010.7	404.2	7.94	6.31	5.12
Marcellus @ 6783									
6,794.0	71.49	329.69	6,222.5	-366.0	-2,016.0	414.4	7.94	6.34	5.06
6,825.0	74.34	331.64	6,231.6	-340.2	-2,030.5	443.8	10.98	9.19	6.29
6,856.0	76.69	332.86	6,239.3	-313.6	-2,044.4	473.7	8.48	7.58	3.94
6,887.0	78.58	334.76	6,246.0	-286.4	-2,057.8	503.9	8.54	6.10	6.13
6,917.0	81.26	336.08	6,251.2	-259.6	-2,070.1	533.4	9.93	8.93	4.40



Scientific Drilling International

Survey Report



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Site: Hartley East Pad:Freeland/Plum Run/Woodworth
Well: Freeland Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Freeland 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)
6,948.0	83.67	337.59	6,255.3	-231.3	-2,082.2	564.1	9.15	7.77	4.87
6,979.0	86.42	338.33	6,258.0	-202.7	-2,093.8	595.0	9.18	8.87	2.39
7,006.0	89.53	339.78	6,258.9	-177.5	-2,103.4	622.0	12.71	11.52	5.37
7,068.0	91.58	339.48	6,258.3	-119.4	-2,125.0	683.9	3.34	3.31	-0.48
7,098.0	91.65	340.41	6,257.5	-91.2	-2,135.3	713.9	3.11	0.23	3.10
7,129.0	91.38	340.26	6,256.7	-62.0	-2,145.7	744.9	1.00	-0.87	-0.48
7,222.0	89.03	340.48	6,256.3	25.6	-2,176.9	837.8	2.54	-2.53	0.24
7,315.0	89.19	338.63	6,257.8	112.7	-2,209.4	930.7	2.00	0.17	-1.99
7,407.0	88.85	338.63	6,259.4	198.3	-2,242.9	1,022.7	0.37	-0.37	0.00
7,500.0	89.48	337.75	6,260.7	284.7	-2,277.5	1,115.7	1.16	0.68	-0.95
7,592.0	90.42	335.16	6,260.8	369.0	-2,314.2	1,207.7	2.99	1.02	-2.82
7,685.0	90.29	334.07	6,260.2	453.0	-2,354.1	1,300.5	1.18	-0.14	-1.17
7,778.0	90.76	335.05	6,259.4	537.0	-2,394.0	1,393.3	1.17	0.51	1.05
7,870.0	89.66	335.43	6,259.0	620.5	-2,432.6	1,485.2	1.26	-1.20	0.41
7,963.0	89.92	336.57	6,259.4	705.5	-2,470.4	1,578.1	1.26	0.28	1.23
8,055.0	90.53	340.46	6,259.0	791.1	-2,504.1	1,670.1	4.28	0.66	4.23
8,148.0	90.06	339.91	6,258.5	878.6	-2,535.6	1,763.1	0.78	-0.51	-0.59
8,241.0	90.43	340.54	6,258.1	966.1	-2,567.1	1,856.0	0.79	0.40	0.68
8,333.0	90.93	339.19	6,257.0	1,052.5	-2,598.7	1,947.9	1.56	0.54	-1.47
8,426.0	90.70	338.43	6,255.7	1,139.2	-2,632.4	2,040.9	0.85	-0.25	-0.82
8,518.0	90.53	338.87	6,254.7	1,224.8	-2,665.8	2,132.9	0.51	-0.18	0.48
8,611.0	89.93	339.38	6,254.3	1,311.7	-2,699.0	2,225.9	0.85	-0.65	0.55
8,703.0	89.73	338.87	6,254.6	1,397.7	-2,731.8	2,317.9	0.60	-0.22	-0.55
8,796.0	90.50	338.58	6,254.4	1,484.4	-2,765.5	2,410.9	0.88	0.83	-0.31
8,888.0	90.00	338.15	6,254.0	1,569.9	-2,799.4	2,502.9	0.72	-0.54	-0.47
8,980.0	90.67	337.94	6,253.5	1,655.2	-2,833.8	2,594.9	0.76	0.73	-0.23
9,073.0	90.97	337.08	6,252.2	1,741.1	-2,869.4	2,687.8	0.98	0.32	-0.92
9,165.0	90.77	337.19	6,250.8	1,825.9	-2,905.1	2,779.8	0.25	-0.22	0.12
9,258.0	90.23	337.49	6,250.0	1,911.7	-2,941.0	2,872.8	0.66	-0.58	0.32
9,350.0	90.64	337.08	6,249.3	1,996.6	-2,976.5	2,964.8	0.63	0.45	-0.45
9,443.0	90.54	337.05	6,248.3	2,082.2	-3,012.7	3,057.8	0.11	-0.11	-0.03
9,535.0	90.10	336.59	6,247.8	2,166.8	-3,048.9	3,149.8	0.69	-0.48	-0.50
9,628.0	90.00	336.09	6,247.7	2,252.0	-3,086.3	3,242.7	0.55	-0.11	-0.54
9,720.0	89.46	337.81	6,248.1	2,336.6	-3,122.3	3,334.7	1.96	-0.59	1.87
9,813.0	89.70	338.13	6,248.8	2,422.8	-3,157.2	3,427.7	0.43	0.26	0.34
9,906.0	90.30	338.86	6,248.8	2,509.3	-3,191.3	3,520.7	1.02	0.65	0.78
9,998.0	89.87	337.47	6,248.7	2,594.7	-3,225.5	3,612.7	1.58	-0.47	-1.51
10,091.0	90.07	338.53	6,248.7	2,681.0	-3,260.3	3,705.7	1.16	0.22	1.14
10,184.0	90.07	338.95	6,248.6	2,767.6	-3,294.0	3,798.7	0.45	0.00	0.45
10,276.0	90.20	338.17	6,248.4	2,853.3	-3,327.7	3,890.7	0.86	0.14	-0.85
10,369.0	90.87	339.62	6,247.5	2,940.0	-3,361.1	3,983.6	1.72	0.72	1.56
10,461.0	90.13	338.87	6,246.7	3,026.1	-3,393.8	4,075.6	1.15	-0.80	-0.82
10,554.0	89.83	338.78	6,246.8	3,112.8	-3,427.3	4,168.6	0.34	-0.32	-0.10



Scientific Drilling International

Survey Report



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

Local Co-ordinate Reference: Well Freeland 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)
10,646.0	91.98	340.05	6,245.3	3,198.9	-3,459.7	4,260.6	2.71	2.34	1.38
10,739.0	91.68	338.07	6,242.3	3,285.7	-3,492.9	4,353.5	2.15	-0.32	-2.13
10,831.0	90.64	337.82	6,240.5	3,370.9	-3,527.4	4,445.5	1.16	-1.13	-0.27
10,924.0	90.47	337.19	6,239.6	3,456.9	-3,563.0	4,538.5	0.70	-0.18	-0.68
11,017.0	90.27	336.90	6,239.0	3,542.5	-3,599.3	4,631.5	0.38	-0.22	-0.31
11,109.0	90.60	337.33	6,238.3	3,627.2	-3,635.1	4,723.4	0.59	0.36	0.47
11,202.0	90.27	337.36	6,237.6	3,713.1	-3,670.9	4,816.4	0.36	-0.35	0.03
11,294.0	90.97	337.01	6,236.6	3,797.9	-3,706.6	4,908.4	0.85	0.76	-0.38
11,387.0	90.60	339.08	6,235.3	3,884.1	-3,741.3	5,001.4	2.26	-0.40	2.23
11,480.0	89.97	339.57	6,234.8	3,971.1	-3,774.2	5,094.4	0.86	-0.68	0.53
11,572.0	90.54	339.19	6,234.4	4,057.2	-3,806.6	5,186.3	0.74	0.62	-0.41
11,665.0	90.00	339.35	6,234.0	4,144.2	-3,839.5	5,279.3	0.61	-0.58	0.17
11,757.0	90.27	339.29	6,233.8	4,230.3	-3,872.0	5,371.3	0.30	0.29	-0.07
11,850.0	89.36	339.41	6,234.1	4,317.3	-3,904.8	5,464.3	0.99	-0.98	0.13
11,942.0	89.63	339.32	6,234.9	4,403.4	-3,937.2	5,556.2	0.31	0.29	-0.10
12,035.0	89.46	338.29	6,235.6	4,490.1	-3,970.8	5,649.2	1.12	-0.18	-1.11
12,127.0	90.44	337.67	6,235.7	4,575.4	-4,005.3	5,741.2	1.26	1.07	-0.67
12,220.0	89.26	336.78	6,235.9	4,661.1	-4,041.3	5,834.2	1.59	-1.27	-0.96
12,312.0	89.16	336.55	6,237.2	4,745.6	-4,077.7	5,926.2	0.27	-0.11	-0.25
12,405.0	90.00	337.52	6,237.9	4,831.2	-4,114.0	6,019.2	1.38	0.90	1.04
12,497.0	92.15	342.07	6,236.2	4,917.5	-4,145.8	6,111.1	5.47	2.34	4.95
12,590.0	91.82	340.61	6,232.9	5,005.6	-4,175.5	6,203.9	1.61	-0.35	-1.57
12,682.0	90.81	339.14	6,230.8	5,091.9	-4,207.2	6,295.8	1.94	-1.10	-1.60
12,775.0	89.94	337.99	6,230.2	5,178.5	-4,241.1	6,388.8	1.55	-0.94	-1.24
12,868.0	89.27	336.17	6,230.9	5,264.1	-4,277.4	6,481.8	2.09	-0.72	-1.96
12,960.0	89.53	335.77	6,231.8	5,348.2	-4,314.8	6,573.7	0.52	0.28	-0.43
13,040.0	89.40	335.12	6,232.6	5,420.9	-4,348.1	6,653.6	0.83	-0.16	-0.81
Last SDI MWD @ 13040									
13,106.0	89.40	335.12	6,233.3	5,480.8	-4,375.8	6,719.5	0.00	0.00	0.00
Projection To Bit @ 13106 MD / 6233 TVD									

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
6,553.0	6,112.8	Middlesex @ 6553		0.00	
6,729.0	6,199.7	Burket @ 6729		0.00	
6,763.0	6,212.1	Tully @ 6763		0.00	
6,783.0	6,218.9	Marcellus @ 6783		0.00	



Scientific Drilling International

Survey Report



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

Local Co-ordinate Reference: Well Freeland 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

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
105.0	105.0	0.0	0.0	First SDI Gyro @ 105
5,551.0	5,251.3	-528.8	-1,440.0	Last SDI Gyro @ 5551
5,622.0	5,315.5	-539.5	-1,468.3	First SDI MWD @ 5622
13,040.0	6,232.6	5,420.9	-4,348.1	Last SDI MWD @ 13040
13,106.0	6,233.3	5,480.8	-4,375.8	Projection To Bit @ 13106 MD / 6233 TVD

Checked By: _____ Approved By: _____ Date: _____