



Estlack Pad: Hare/Jujabee/Lucy/Mathews/Melvin
 Lucy Unit 1H
 Plan 5 LP ADJ
 Frontier 32: 1141' GL + 32' KB @ 1173.0usft
 Tyler County WV

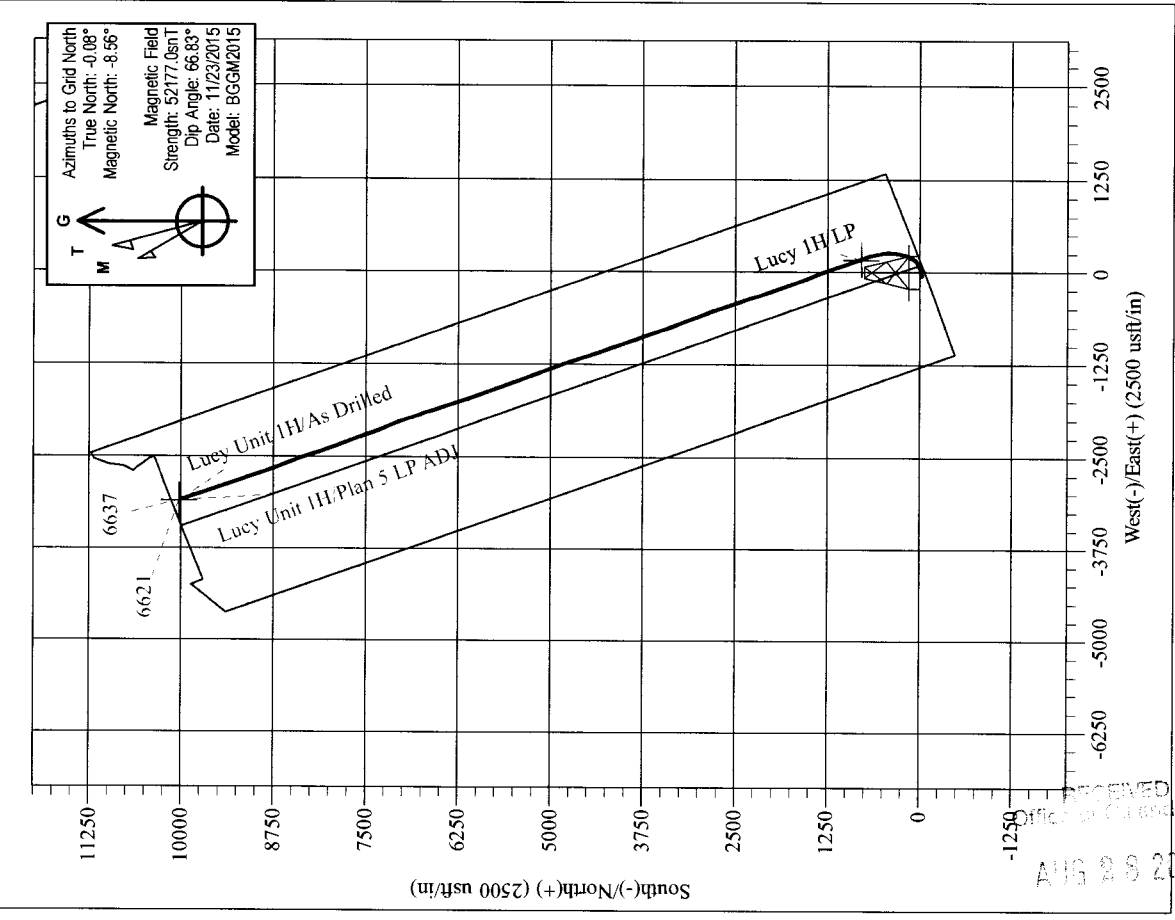
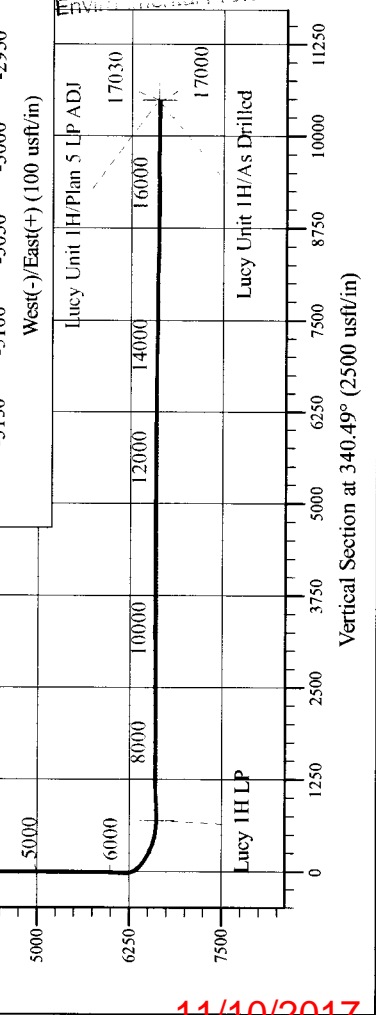
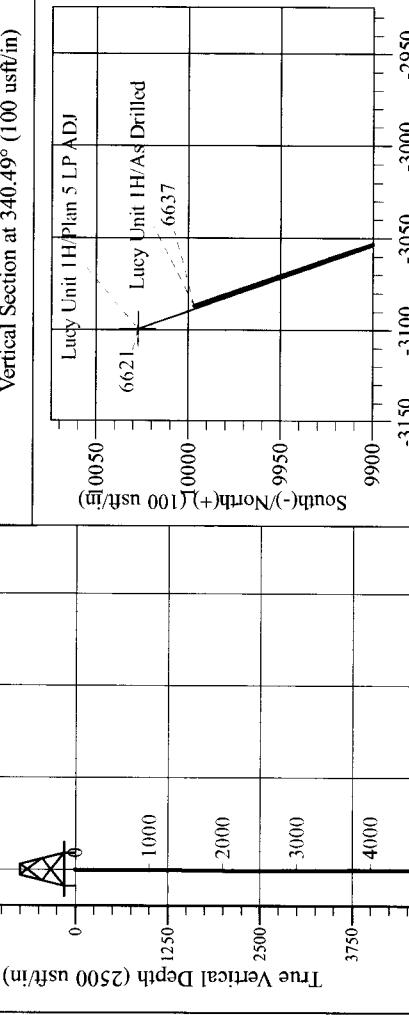
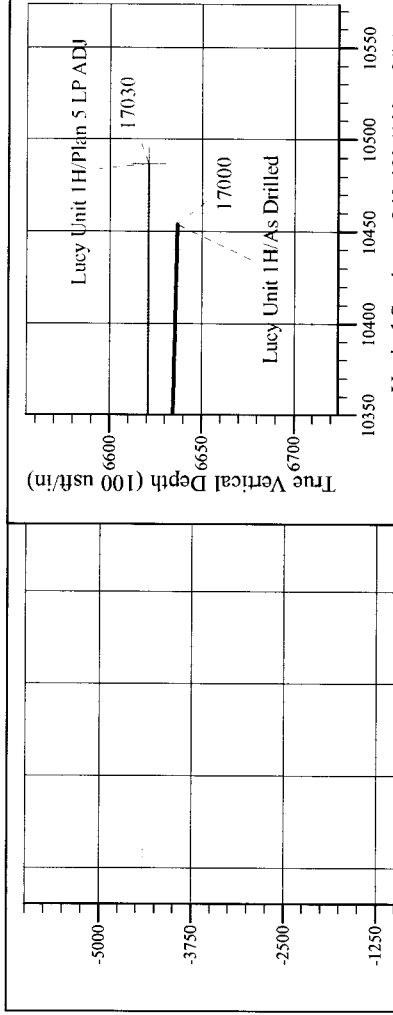
PROJECT DETAILS:
 Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone: Zone 17N (84 W to 78 W)
 System Datum: Mean Sea Level



WELL DETAILS: Lucy Unit 1H SHL

| +N/-S | +E/-W | Northing | Easting | Latitude | Longitude |
|-------|-------|-------------|------------|------------------|------------------|
| 0.0 | 0.0 | 14312867.32 | 1674785.04 | 39° 24' 52.094 N | 80° 52' 41.931 W |

Magnetic Field
 Strength: 52177.0gnT
 Dip Angle: 66.83°
 Date: 11/23/2015
 Model: BGGM2015



Shane Rhodes
 14:26, December 18 2015
 Scientific Drilling International
 124 Vista Drive
 Charleroi, PA 15022

Lucy Unit 1H
 Approx. BHL
 39° 26' 30.976 N 80° 53' 21.121 W

11/10/2017



Scientific Drilling International

Survey Report



| | | | |
|------------------|---|-------------------------------------|---|
| Company: | Antero Resources | Local Co-ordinate Reference: | Well Lucy Unit 1H |
| Project: | Tyler County WV | TVD Reference: | Frontier 32: 1141' GL + 32' KB @ 1173.0usft |
| Site: | Estlack Pad: Hare/Jujubee/Lucy/Matthews/Melvin | MD Reference: | Frontier 32: 1141' GL + 32' KB @ 1173.0usft |
| Well: | Lucy 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 | Estlack Pad: Hare/Jujubee/Lucy/Matthews/Melvin, Site Center: Hare Unit 1H, Lucy 2H | | | | |
| Site Position: | Northing: | 14,312,858.39 usft | Latitude: | 39° 24' 52.006 N | |
| From: | Map | Easting: | 1,674,789.19 usft | Longitude: | 80° 52' 41.879 W |
| Position Uncertainty: | 0.0 usft | Slot Radius: | 13-3/16 " | Grid Convergence: | 0.08 ° |

| | | | | | | |
|-----------------------------|-------------------------|----------------------------|------------------|----------------------|-------------------|------------------|
| Well | Lucy Unit 1H, Marcellus | | | | | |
| Well Position | +N/-S | 0.0 usft | Northing: | 14,312,867.32 usft | Latitude: | 39° 24' 52.094 N |
| | +E/-W | 0.0 usft | Easting: | 1,674,785.04 usft | Longitude: | 80° 52' 41.931 W |
| Position Uncertainty | 2.0 usft | Wellhead Elevation: | 1,173.0 usft | Ground Level: | 1,141.0 usft | |

| | | | | | |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| Wellbore | Original Wellpath | | | | |
| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
| | BGGM2015 | 11/23/2015 | -8.48 | 66.83 | 52,177 |

| | | | | | |
|--------------------------|--------------------------------|---------------------|---------------------|----------------------|-----|
| 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 | 340.49 | |

| | | | | | |
|-----------------------|------------------|--|---------------------|--|--|
| Survey Program | Date | 12/18/2015 | | | |
| From (usft) | To (usft) | Survey (Wellbore) | Tool Name | Description | |
| 25.0 | 5,626.0 | Survey #6 - Final Def Gyro (Original Wellp | Standard Keeper 104 | Standard Wireline Keeper ver 1.0.4 | |
| 5,758.0 | 17,000.0 | 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 | |
| 25.0 | 0.08 | 112.43 | 25.0 | 0.0 | 0.0 | 0.0 | 0.32 | 0.32 | 0.00 | |
| First Gyro @ 25 | | | | | | | | | | |
| 50.0 | 0.15 | 112.43 | 50.0 | 0.0 | 0.1 | 0.0 | 0.28 | 0.28 | 0.00 | |
| 75.0 | 0.23 | 112.43 | 75.0 | -0.1 | 0.1 | -0.1 | 0.32 | 0.32 | 0.00 | |
| 100.0 | 0.31 | 112.65 | 100.0 | -0.1 | 0.2 | -0.2 | 0.32 | 0.32 | 0.88 | |
| 125.0 | 0.39 | 123.15 | 125.0 | -0.2 | 0.4 | -0.3 | 0.41 | 0.32 | 42.00 | |
| 150.0 | 0.46 | 94.28 | 150.0 | -0.2 | 0.6 | -0.4 | 0.89 | 0.28 | -115.48 | |
| 175.0 | 0.36 | 93.31 | 175.0 | -0.2 | 0.7 | -0.5 | 0.40 | -0.40 | -3.88 | |

RECEIVED
Office of Oil and Gas
AUG 28 2017
WV Department of Environmental Protection



Scientific Drilling International
Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Matthews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 200.0 | 0.31 | 92.22 | 200.0 | -0.2 | 0.9 | -0.5 | 0.20 | -0.20 | -4.36 |
| 225.0 | 0.23 | 104.76 | 225.0 | -0.3 | 1.0 | -0.6 | 0.40 | -0.32 | 50.16 |
| 250.0 | 0.18 | 110.18 | 250.0 | -0.3 | 1.1 | -0.6 | 0.21 | -0.20 | 21.68 |
| 275.0 | 0.19 | 104.51 | 275.0 | -0.3 | 1.2 | -0.7 | 0.08 | 0.04 | -22.68 |
| 300.0 | 0.17 | 134.85 | 300.0 | -0.4 | 1.2 | -0.7 | 0.38 | -0.08 | 121.36 |
| 325.0 | 0.13 | 129.38 | 325.0 | -0.4 | 1.3 | -0.8 | 0.17 | -0.16 | -21.88 |
| 350.0 | 0.17 | 172.71 | 350.0 | -0.4 | 1.3 | -0.9 | 0.47 | 0.16 | 173.32 |
| 375.0 | 0.15 | 159.41 | 375.0 | -0.5 | 1.3 | -0.9 | 0.17 | -0.08 | -53.20 |
| 400.0 | 0.16 | 187.73 | 400.0 | -0.6 | 1.3 | -1.0 | 0.31 | 0.04 | 113.28 |
| 425.0 | 0.17 | 187.34 | 425.0 | -0.7 | 1.3 | -1.1 | 0.04 | 0.04 | -1.56 |
| 450.0 | 0.41 | 214.96 | 450.0 | -0.8 | 1.3 | -1.1 | 1.08 | 0.96 | 110.48 |
| 475.0 | 0.87 | 226.62 | 475.0 | -1.0 | 1.1 | -1.3 | 1.90 | 1.84 | 46.64 |
| 500.0 | 1.49 | 234.15 | 500.0 | -1.3 | 0.7 | -1.4 | 2.55 | 2.48 | 30.12 |
| 525.0 | 1.56 | 240.59 | 525.0 | -1.6 | 0.1 | -1.6 | 0.74 | 0.28 | 25.76 |
| 550.0 | 2.01 | 240.85 | 550.0 | -2.0 | -0.6 | -1.7 | 1.80 | 1.80 | 1.04 |
| 575.0 | 2.51 | 241.00 | 574.9 | -2.5 | -1.4 | -1.9 | 2.00 | 2.00 | 0.60 |
| 600.0 | 2.88 | 241.35 | 599.9 | -3.1 | -2.5 | -2.1 | 1.48 | 1.48 | 1.40 |
| 625.0 | 3.12 | 241.56 | 624.9 | -3.7 | -3.6 | -2.3 | 0.96 | 0.96 | 0.84 |
| 650.0 | 3.89 | 244.07 | 649.8 | -4.4 | -5.0 | -2.5 | 3.14 | 3.08 | 10.04 |
| 675.0 | 4.18 | 245.14 | 674.8 | -5.1 | -6.6 | -2.7 | 1.20 | 1.16 | 4.28 |
| 700.0 | 4.41 | 245.10 | 699.7 | -5.9 | -8.3 | -2.8 | 0.92 | 0.92 | -0.16 |
| 725.0 | 4.57 | 244.53 | 724.6 | -6.8 | -10.0 | -3.0 | 0.66 | 0.64 | -2.28 |
| 750.0 | 4.59 | 244.35 | 749.6 | -7.6 | -11.8 | -3.2 | 0.10 | 0.08 | -0.72 |
| 775.0 | 4.37 | 243.80 | 774.5 | -8.5 | -13.6 | -3.5 | 0.90 | -0.88 | -2.20 |
| 800.0 | 4.28 | 242.46 | 799.4 | -9.3 | -15.3 | -3.7 | 0.54 | -0.36 | -5.36 |
| 825.0 | 3.96 | 242.52 | 824.3 | -10.2 | -16.9 | -3.9 | 1.28 | -1.28 | 0.24 |
| 850.0 | 3.56 | 241.17 | 849.3 | -10.9 | -18.3 | -4.2 | 1.64 | -1.60 | -5.40 |
| 875.0 | 3.27 | 242.12 | 874.2 | -11.6 | -19.6 | -4.4 | 1.18 | -1.16 | 3.80 |
| 900.0 | 3.04 | 242.87 | 899.2 | -12.3 | -20.8 | -4.6 | 0.93 | -0.92 | 3.00 |
| 925.0 | 2.67 | 242.88 | 924.2 | -12.8 | -22.0 | -4.8 | 1.48 | -1.48 | 0.04 |
| 950.0 | 2.59 | 243.61 | 949.1 | -13.4 | -23.0 | -4.9 | 0.35 | -0.32 | 2.92 |
| 975.0 | 2.37 | 243.07 | 974.1 | -13.8 | -23.9 | -5.1 | 0.88 | -0.88 | -2.16 |
| 1,000.0 | 2.23 | 244.05 | 999.1 | -14.3 | -24.8 | -5.2 | 0.58 | -0.56 | 3.92 |
| 1,025.0 | 2.13 | 244.32 | 1,024.1 | -14.7 | -25.7 | -5.3 | 0.40 | -0.40 | 1.08 |
| 1,050.0 | 1.88 | 246.90 | 1,049.1 | -15.1 | -26.5 | -5.4 | 1.06 | -1.00 | 10.32 |
| 1,075.0 | 2.00 | 243.94 | 1,074.1 | -15.4 | -27.3 | -5.4 | 0.63 | 0.48 | -11.84 |
| 1,100.0 | 1.86 | 242.83 | 1,099.0 | -15.8 | -28.0 | -5.5 | 0.58 | -0.56 | -4.44 |
| 1,125.0 | 1.69 | 244.47 | 1,124.0 | -16.1 | -28.7 | -5.6 | 0.71 | -0.68 | 6.56 |
| 1,150.0 | 1.54 | 244.78 | 1,149.0 | -16.4 | -29.3 | -5.7 | 0.60 | -0.60 | 1.24 |
| 1,175.0 | 1.35 | 241.33 | 1,174.0 | -16.7 | -29.9 | -5.8 | 0.84 | -0.76 | -13.80 |
| 1,200.0 | 1.21 | 247.15 | 1,199.0 | -17.0 | -30.4 | -5.8 | 0.76 | -0.56 | 23.28 |
| 1,225.0 | 1.27 | 247.49 | 1,224.0 | -17.2 | -30.9 | -5.9 | 0.24 | 0.24 | 1.36 |

RECEIVED
Office of Oil and Gas

AUG 9 8 2017

WV Dept. of Environmental Protection



Scientific Drilling International
Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Mathews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 1,250.0 | 1.09 | 243.67 | 1,249.0 | -17.4 | -31.4 | -5.9 | 0.79 | -0.72 | -15.28 |
| 1,275.0 | 1.02 | 239.17 | 1,274.0 | -17.6 | -31.8 | -6.0 | 0.43 | -0.28 | -18.00 |
| 1,300.0 | 0.94 | 239.65 | 1,299.0 | -17.8 | -32.2 | -6.1 | 0.32 | -0.32 | 1.92 |
| 1,325.0 | 0.91 | 241.67 | 1,324.0 | -18.0 | -32.5 | -6.1 | 0.18 | -0.12 | 8.08 |
| 1,350.0 | 0.87 | 240.29 | 1,349.0 | -18.2 | -32.8 | -6.2 | 0.18 | -0.16 | -5.52 |
| 1,375.0 | 0.86 | 236.32 | 1,374.0 | -18.4 | -33.2 | -6.3 | 0.24 | -0.04 | -15.88 |
| 1,400.0 | 0.83 | 234.34 | 1,399.0 | -18.6 | -33.5 | -6.4 | 0.17 | -0.12 | -7.92 |
| 1,425.0 | 0.80 | 226.47 | 1,424.0 | -18.9 | -33.7 | -6.5 | 0.46 | -0.12 | -31.48 |
| 1,450.0 | 0.62 | 225.63 | 1,449.0 | -19.1 | -34.0 | -6.6 | 0.72 | -0.72 | -3.36 |
| 1,475.0 | 0.56 | 223.34 | 1,474.0 | -19.3 | -34.1 | -6.7 | 0.26 | -0.24 | -9.16 |
| 1,500.0 | 0.63 | 220.28 | 1,499.0 | -19.4 | -34.3 | -6.9 | 0.31 | 0.28 | -12.24 |
| 1,525.0 | 0.48 | 225.18 | 1,524.0 | -19.6 | -34.5 | -7.0 | 0.63 | -0.60 | 19.60 |
| 1,550.0 | 0.46 | 212.65 | 1,549.0 | -19.8 | -34.6 | -7.1 | 0.42 | -0.08 | -50.12 |
| 1,575.0 | 0.39 | 235.31 | 1,574.0 | -19.9 | -34.7 | -7.2 | 0.72 | -0.28 | 90.64 |
| 1,600.0 | 0.35 | 216.24 | 1,599.0 | -20.0 | -34.8 | -7.2 | 0.52 | -0.16 | -76.28 |
| 1,625.0 | 0.34 | 214.01 | 1,624.0 | -20.1 | -34.9 | -7.3 | 0.07 | -0.04 | -8.92 |
| 1,650.0 | 0.35 | 218.82 | 1,649.0 | -20.3 | -35.0 | -7.4 | 0.12 | 0.04 | 19.24 |
| 1,675.0 | 0.33 | 220.14 | 1,674.0 | -20.4 | -35.1 | -7.5 | 0.09 | -0.08 | 5.28 |
| 1,700.0 | 0.37 | 211.22 | 1,699.0 | -20.5 | -35.2 | -7.6 | 0.27 | 0.16 | -35.68 |
| 1,725.0 | 0.32 | 211.18 | 1,724.0 | -20.6 | -35.3 | -7.7 | 0.20 | -0.20 | -0.16 |
| 1,750.0 | 0.29 | 210.57 | 1,749.0 | -20.7 | -35.4 | -7.8 | 0.12 | -0.12 | -2.44 |
| 1,775.0 | 0.31 | 202.86 | 1,774.0 | -20.9 | -35.4 | -7.8 | 0.18 | 0.08 | -30.84 |
| 1,800.0 | 0.29 | 203.25 | 1,799.0 | -21.0 | -35.5 | -7.9 | 0.08 | -0.08 | 1.56 |
| 1,825.0 | 0.38 | 199.40 | 1,824.0 | -21.1 | -35.5 | -8.0 | 0.37 | 0.36 | -15.40 |
| 1,850.0 | 0.42 | 186.00 | 1,849.0 | -21.3 | -35.6 | -8.2 | 0.41 | 0.16 | -53.60 |
| 1,875.0 | 0.34 | 177.36 | 1,874.0 | -21.5 | -35.6 | -8.4 | 0.39 | -0.32 | -34.56 |
| 1,900.0 | 0.32 | 180.04 | 1,899.0 | -21.6 | -35.6 | -8.5 | 0.10 | -0.08 | 10.72 |
| 1,925.0 | 0.37 | 165.81 | 1,924.0 | -21.7 | -35.5 | -8.6 | 0.40 | 0.20 | -56.92 |
| 1,950.0 | 0.42 | 174.40 | 1,949.0 | -21.9 | -35.5 | -8.8 | 0.31 | 0.20 | 34.36 |
| 1,975.0 | 0.36 | 175.55 | 1,974.0 | -22.1 | -35.5 | -9.0 | 0.24 | -0.24 | 4.60 |
| 2,000.0 | 0.32 | 159.18 | 1,999.0 | -22.2 | -35.5 | -9.1 | 0.42 | -0.16 | -65.48 |
| 2,025.0 | 0.29 | 184.87 | 2,024.0 | -22.4 | -35.4 | -9.2 | 0.55 | -0.12 | 102.76 |
| 2,050.0 | 0.23 | 174.86 | 2,049.0 | -22.5 | -35.4 | -9.3 | 0.30 | -0.24 | -40.04 |
| 2,075.0 | 0.26 | 181.07 | 2,074.0 | -22.6 | -35.4 | -9.4 | 0.16 | 0.12 | 24.84 |
| 2,100.0 | 0.18 | 177.91 | 2,099.0 | -22.7 | -35.4 | -9.5 | 0.32 | -0.32 | -12.64 |
| 2,125.0 | 0.14 | 189.11 | 2,124.0 | -22.7 | -35.4 | -9.6 | 0.20 | -0.16 | 44.80 |
| 2,150.0 | 0.16 | 186.16 | 2,149.0 | -22.8 | -35.4 | -9.7 | 0.09 | 0.08 | -11.80 |
| 2,175.0 | 0.23 | 168.01 | 2,174.0 | -22.9 | -35.4 | -9.7 | 0.37 | 0.28 | -72.60 |
| 2,200.0 | 0.20 | 198.62 | 2,199.0 | -23.0 | -35.4 | -9.8 | 0.47 | -0.12 | 122.44 |
| 2,225.0 | 0.22 | 192.05 | 2,224.0 | -23.1 | -35.5 | -9.9 | 0.13 | 0.08 | -26.28 |
| 2,250.0 | 0.19 | 169.66 | 2,249.0 | -23.2 | -35.5 | -10.0 | 0.34 | -0.12 | -89.56 |
| 2,275.0 | 0.12 | 194.14 | 2,274.0 | -23.2 | -35.5 | -10.0 | 0.38 | 0.28 | 97.92 |
| 2,300.0 | 0.08 | 178.05 | 2,299.0 | -23.3 | -35.5 | -10.1 | 0.19 | -0.16 | -64.36 |

RECEIVED
 AUG 03 2017
 Scientific Drilling



Scientific Drilling International
Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Matthews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 2,325.0 | 0.15 | 217.73 | 2,324.0 | -23.3 | -35.5 | -10.1 | 0.41 | 0.28 | 158.72 |
| 2,350.0 | 0.11 | 214.90 | 2,349.0 | -23.4 | -35.5 | -10.2 | 0.16 | -0.16 | -11.32 |
| 2,375.0 | 0.18 | 205.79 | 2,374.0 | -23.4 | -35.6 | -10.2 | 0.29 | 0.28 | -36.44 |
| 2,400.0 | 0.16 | 197.91 | 2,399.0 | -23.5 | -35.6 | -10.2 | 0.12 | -0.08 | -31.52 |
| 2,425.0 | 0.04 | 275.01 | 2,424.0 | -23.5 | -35.6 | -10.3 | 0.62 | -0.48 | 308.40 |
| 2,450.0 | 0.22 | 202.58 | 2,449.0 | -23.6 | -35.6 | -10.3 | 0.85 | 0.72 | -289.72 |
| 2,475.0 | 0.15 | 218.65 | 2,474.0 | -23.6 | -35.7 | -10.4 | 0.35 | -0.28 | 64.28 |
| 2,500.0 | 0.21 | 218.73 | 2,499.0 | -23.7 | -35.7 | -10.4 | 0.24 | 0.24 | 0.32 |
| 2,525.0 | 0.10 | 231.05 | 2,524.0 | -23.7 | -35.8 | -10.4 | 0.46 | -0.44 | 49.28 |
| 2,550.0 | 0.18 | 248.87 | 2,549.0 | -23.8 | -35.8 | -10.4 | 0.36 | 0.32 | 71.28 |
| 2,575.0 | 0.24 | 238.87 | 2,574.0 | -23.8 | -35.9 | -10.4 | 0.28 | 0.24 | -40.00 |
| 2,600.0 | 0.25 | 261.24 | 2,599.0 | -23.8 | -36.0 | -10.5 | 0.38 | 0.04 | 89.48 |
| 2,625.0 | 0.28 | 261.47 | 2,624.0 | -23.9 | -36.1 | -10.4 | 0.12 | 0.12 | 0.92 |
| 2,650.0 | 0.31 | 284.38 | 2,649.0 | -23.9 | -36.2 | -10.4 | 0.48 | 0.12 | 91.64 |
| 2,675.0 | 0.26 | 280.97 | 2,674.0 | -23.8 | -36.4 | -10.3 | 0.21 | -0.20 | -13.64 |
| 2,700.0 | 0.21 | 256.85 | 2,699.0 | -23.8 | -36.5 | -10.3 | 0.44 | -0.20 | -96.48 |
| 2,725.0 | 0.27 | 280.55 | 2,724.0 | -23.8 | -36.6 | -10.2 | 0.46 | 0.24 | 94.80 |
| 2,750.0 | 0.33 | 283.98 | 2,748.9 | -23.8 | -36.7 | -10.2 | 0.25 | 0.24 | 13.72 |
| 2,775.0 | 0.23 | 221.73 | 2,773.9 | -23.8 | -36.8 | -10.2 | 1.21 | -0.40 | -249.00 |
| 2,800.0 | 0.33 | 246.51 | 2,798.9 | -23.9 | -36.9 | -10.2 | 0.62 | 0.40 | 99.12 |
| 2,825.0 | 0.37 | 276.70 | 2,823.9 | -23.9 | -37.0 | -10.2 | 0.75 | 0.16 | 120.76 |
| 2,850.0 | 0.29 | 242.00 | 2,848.9 | -23.9 | -37.2 | -10.1 | 0.84 | -0.32 | -138.80 |
| 2,875.0 | 0.35 | 270.38 | 2,873.9 | -24.0 | -37.3 | -10.1 | 0.67 | 0.24 | 113.52 |
| 2,900.0 | 0.27 | 245.59 | 2,898.9 | -24.0 | -37.4 | -10.1 | 0.62 | -0.32 | -99.16 |
| 2,925.0 | 0.45 | 292.00 | 2,923.9 | -24.0 | -37.6 | -10.0 | 1.31 | 0.72 | 185.64 |
| 2,950.0 | 0.37 | 286.75 | 2,948.9 | -23.9 | -37.8 | -9.9 | 0.35 | -0.32 | -21.00 |
| 2,975.0 | 0.38 | 262.46 | 2,973.9 | -23.9 | -37.9 | -9.9 | 0.63 | 0.04 | -57.16 |
| 3,000.0 | 0.31 | 275.79 | 2,998.9 | -23.9 | -38.1 | -9.8 | 0.42 | -0.28 | 53.32 |
| 3,025.0 | 0.38 | 272.03 | 3,023.9 | -23.9 | -38.2 | -9.8 | 0.29 | 0.28 | -15.04 |
| 3,050.0 | 0.43 | 272.80 | 3,048.9 | -23.9 | -38.4 | -9.7 | 0.20 | 0.20 | 3.08 |
| 3,075.0 | 0.46 | 279.27 | 3,073.9 | -23.9 | -38.6 | -9.6 | 0.23 | 0.12 | 25.88 |
| 3,100.0 | 0.47 | 255.23 | 3,098.9 | -23.9 | -38.8 | -9.5 | 0.78 | 0.04 | -96.16 |
| 3,125.0 | 0.53 | 257.20 | 3,123.9 | -23.9 | -39.0 | -9.5 | 0.25 | 0.24 | 7.88 |
| 3,150.0 | 0.65 | 281.39 | 3,148.9 | -23.9 | -39.2 | -9.4 | 1.09 | 0.48 | 96.76 |
| 3,175.0 | 0.64 | 277.22 | 3,173.9 | -23.9 | -39.5 | -9.3 | 0.19 | -0.04 | -16.68 |
| 3,200.0 | 0.53 | 264.14 | 3,198.9 | -23.9 | -39.8 | -9.2 | 0.69 | -0.44 | -52.32 |
| 3,225.0 | 0.58 | 264.94 | 3,223.9 | -23.9 | -40.0 | -9.2 | 0.20 | 0.20 | 3.20 |
| 3,250.0 | 0.59 | 264.29 | 3,248.9 | -23.9 | -40.3 | -9.1 | 0.05 | 0.04 | -2.60 |
| 3,275.0 | 0.61 | 262.86 | 3,273.9 | -23.9 | -40.5 | -9.0 | 0.10 | 0.08 | -5.72 |
| 3,300.0 | 0.59 | 256.53 | 3,298.9 | -24.0 | -40.8 | -9.0 | 0.28 | -0.08 | -25.32 |
| 3,325.0 | 0.56 | 264.18 | 3,323.9 | -24.0 | -41.0 | -8.9 | 0.33 | -0.12 | 30.60 |
| 3,350.0 | 0.51 | 276.82 | 3,348.9 | -24.0 | -41.3 | -8.9 | 0.51 | -0.20 | 50.56 |

RECEIVED
 Office of Oil and Gas
 AUG 28 2017
 Department of
 Geological Protection



Scientific Drilling International

Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Mathews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 3,375.0 | 0.43 | 278.13 | 3,373.9 | -24.0 | -41.5 | -8.8 | 0.32 | -0.32 | 5.24 |
| 3,400.0 | 0.50 | 265.49 | 3,398.9 | -24.0 | -41.7 | -8.7 | 0.50 | 0.28 | -50.56 |
| 3,425.0 | 0.47 | 274.63 | 3,423.9 | -24.0 | -41.9 | -8.6 | 0.33 | -0.12 | 36.56 |
| 3,450.0 | 0.39 | 272.89 | 3,448.9 | -24.0 | -42.1 | -8.6 | 0.32 | -0.32 | -6.96 |
| 3,475.0 | 0.40 | 276.63 | 3,473.9 | -24.0 | -42.2 | -8.5 | 0.11 | 0.04 | 14.96 |
| 3,500.0 | 0.39 | 287.35 | 3,498.9 | -23.9 | -42.4 | -8.4 | 0.30 | -0.04 | 42.88 |
| 3,525.0 | 0.41 | 277.96 | 3,523.9 | -23.9 | -42.6 | -8.3 | 0.27 | 0.08 | -37.56 |
| 3,550.0 | 0.41 | 283.73 | 3,548.9 | -23.9 | -42.8 | -8.2 | 0.17 | 0.00 | 23.08 |
| 3,575.0 | 0.45 | 282.44 | 3,573.9 | -23.8 | -42.9 | -8.1 | 0.16 | 0.16 | -5.16 |
| 3,600.0 | 0.39 | 280.91 | 3,598.9 | -23.8 | -43.1 | -8.0 | 0.24 | -0.24 | -6.12 |
| 3,625.0 | 0.46 | 297.23 | 3,623.9 | -23.7 | -43.3 | -7.9 | 0.56 | 0.28 | 65.28 |
| 3,650.0 | 0.41 | 285.44 | 3,648.9 | -23.7 | -43.5 | -7.8 | 0.41 | -0.20 | -47.16 |
| 3,675.0 | 0.45 | 294.02 | 3,673.9 | -23.6 | -43.6 | -7.7 | 0.30 | 0.16 | 34.32 |
| 3,700.0 | 0.40 | 296.60 | 3,698.9 | -23.5 | -43.8 | -7.5 | 0.21 | -0.20 | 10.32 |
| 3,725.0 | 0.35 | 293.91 | 3,723.9 | -23.4 | -44.0 | -7.4 | 0.21 | -0.20 | -10.76 |
| 3,750.0 | 0.36 | 287.45 | 3,748.9 | -23.4 | -44.1 | -7.3 | 0.16 | 0.04 | -25.84 |
| 3,775.0 | 0.36 | 281.31 | 3,773.9 | -23.3 | -44.3 | -7.2 | 0.15 | 0.00 | -24.56 |
| 3,800.0 | 0.40 | 278.30 | 3,798.9 | -23.3 | -44.4 | -7.1 | 0.18 | 0.16 | -12.04 |
| 3,825.0 | 0.43 | 285.14 | 3,823.9 | -23.3 | -44.6 | -7.1 | 0.23 | 0.12 | 27.36 |
| 3,850.0 | 0.47 | 299.12 | 3,848.9 | -23.2 | -44.8 | -6.9 | 0.47 | 0.16 | 55.92 |
| 3,875.0 | 0.48 | 291.19 | 3,873.9 | -23.1 | -45.0 | -6.8 | 0.27 | 0.04 | -31.72 |
| 3,900.0 | 0.32 | 288.95 | 3,898.9 | -23.1 | -45.1 | -6.7 | 0.64 | -0.64 | -8.96 |
| 3,925.0 | 0.39 | 304.34 | 3,923.9 | -23.0 | -45.3 | -6.6 | 0.47 | 0.28 | 61.56 |
| 3,950.0 | 0.25 | 299.11 | 3,948.9 | -22.9 | -45.4 | -6.4 | 0.57 | -0.56 | -20.92 |
| 3,975.0 | 0.24 | 274.64 | 3,973.9 | -22.9 | -45.5 | -6.4 | 0.42 | -0.04 | -97.88 |
| 4,000.0 | 0.38 | 308.57 | 3,998.9 | -22.8 | -45.6 | -6.3 | 0.90 | 0.56 | 135.72 |
| 4,025.0 | 0.35 | 291.75 | 4,023.9 | -22.7 | -45.7 | -6.2 | 0.44 | -0.12 | -67.28 |
| 4,050.0 | 0.23 | 269.05 | 4,048.9 | -22.7 | -45.9 | -6.1 | 0.66 | -0.48 | -90.80 |
| 4,075.0 | 0.25 | 289.77 | 4,073.9 | -22.7 | -46.0 | -6.1 | 0.35 | 0.08 | 82.88 |
| 4,100.0 | 0.30 | 283.78 | 4,098.9 | -22.7 | -46.1 | -6.0 | 0.23 | 0.20 | -23.96 |
| 4,125.0 | 0.27 | 290.35 | 4,123.9 | -22.6 | -46.2 | -5.9 | 0.18 | -0.12 | 26.28 |
| 4,150.0 | 0.25 | 296.40 | 4,148.9 | -22.6 | -46.3 | -5.8 | 0.14 | -0.08 | 24.20 |
| 4,175.0 | 0.24 | 292.20 | 4,173.9 | -22.5 | -46.4 | -5.8 | 0.08 | -0.04 | -16.80 |
| 4,200.0 | 0.30 | 280.21 | 4,198.9 | -22.5 | -46.5 | -5.7 | 0.33 | 0.24 | -47.96 |
| 4,225.0 | 0.24 | 268.48 | 4,223.9 | -22.5 | -46.6 | -5.6 | 0.33 | -0.24 | -46.92 |
| 4,250.0 | 0.38 | 287.22 | 4,248.9 | -22.5 | -46.8 | -5.6 | 0.68 | 0.56 | 74.96 |
| 4,275.0 | 0.27 | 291.15 | 4,273.9 | -22.4 | -46.9 | -5.5 | 0.45 | -0.44 | 15.72 |
| 4,300.0 | 0.26 | 273.25 | 4,298.9 | -22.4 | -47.0 | -5.4 | 0.33 | -0.04 | -71.60 |
| 4,325.0 | 0.33 | 268.76 | 4,323.9 | -22.4 | -47.1 | -5.4 | 0.29 | 0.28 | -17.96 |
| 4,350.0 | 0.26 | 267.65 | 4,348.9 | -22.4 | -47.3 | -5.3 | 0.28 | -0.28 | -4.44 |
| 4,375.0 | 0.32 | 290.57 | 4,373.9 | -22.4 | -47.4 | -5.3 | 0.52 | 0.24 | 91.68 |
| 4,400.0 | 0.17 | 254.01 | 4,398.9 | -22.4 | -47.5 | -5.2 | 0.84 | -0.60 | -146.24 |
| 4,425.0 | 0.26 | 250.79 | 4,423.9 | -22.4 | -47.6 | -5.2 | 0.36 | 0.36 | -12.88 |

RECEIVED
Office of Oil and Gas

AUG 28 2017

WV Department of Environmental Protection



Scientific Drilling International
Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Mathews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 4,450.0 | 0.23 | 251.99 | 4,448.9 | -22.4 | -47.7 | -5.2 | 0.12 | -0.12 | 4.80 |
| 4,475.0 | 0.29 | 248.69 | 4,473.9 | -22.5 | -47.8 | -5.2 | 0.25 | 0.24 | -13.20 |
| 4,500.0 | 0.27 | 250.34 | 4,498.9 | -22.5 | -47.9 | -5.2 | 0.09 | -0.08 | 6.60 |
| 4,525.0 | 0.28 | 267.57 | 4,523.9 | -22.5 | -48.0 | -5.2 | 0.33 | 0.04 | 68.92 |
| 4,550.0 | 0.28 | 247.64 | 4,548.9 | -22.6 | -48.1 | -5.2 | 0.39 | 0.00 | -79.72 |
| 4,575.0 | 0.16 | 257.29 | 4,573.9 | -22.6 | -48.2 | -5.2 | 0.50 | -0.48 | 38.60 |
| 4,600.0 | 0.26 | 279.01 | 4,598.9 | -22.6 | -48.3 | -5.2 | 0.50 | 0.40 | 86.88 |
| 4,625.0 | 0.15 | 274.63 | 4,623.9 | -22.6 | -48.4 | -5.1 | 0.44 | -0.44 | -17.52 |
| 4,650.0 | 0.03 | 347.60 | 4,648.9 | -22.6 | -48.4 | -5.1 | 0.58 | -0.48 | 291.88 |
| 4,675.0 | 0.09 | 275.83 | 4,673.9 | -22.6 | -48.4 | -5.1 | 0.34 | 0.24 | -287.08 |
| 4,700.0 | 0.19 | 266.68 | 4,698.9 | -22.6 | -48.5 | -5.1 | 0.41 | 0.40 | -36.60 |
| 4,725.0 | 0.17 | 254.93 | 4,723.9 | -22.6 | -48.6 | -5.1 | 0.17 | -0.08 | -47.00 |
| 4,750.0 | 0.25 | 295.20 | 4,748.9 | -22.6 | -48.7 | -5.0 | 0.65 | 0.32 | 161.08 |
| 4,775.0 | 0.19 | 289.82 | 4,773.9 | -22.5 | -48.8 | -5.0 | 0.25 | -0.24 | -21.52 |
| 4,800.0 | 0.10 | 197.54 | 4,798.9 | -22.5 | -48.8 | -4.9 | 0.87 | -0.36 | -369.12 |
| 4,825.0 | 0.21 | 278.05 | 4,823.9 | -22.5 | -48.9 | -4.9 | 0.87 | 0.44 | 322.04 |
| 4,850.0 | 0.21 | 277.65 | 4,848.9 | -22.5 | -48.9 | -4.9 | 0.01 | 0.00 | -1.60 |
| 4,875.0 | 0.29 | 276.88 | 4,873.9 | -22.5 | -49.1 | -4.8 | 0.32 | 0.32 | -3.08 |
| 4,900.0 | 0.19 | 231.32 | 4,898.9 | -22.5 | -49.1 | -4.8 | 0.83 | -0.40 | -182.24 |
| 4,925.0 | 0.22 | 239.35 | 4,923.9 | -22.6 | -49.2 | -4.9 | 0.17 | 0.12 | 32.12 |
| 4,950.0 | 0.26 | 279.62 | 4,948.9 | -22.6 | -49.3 | -4.8 | 0.68 | 0.16 | 161.08 |
| 4,975.0 | 0.23 | 260.40 | 4,973.9 | -22.6 | -49.4 | -4.8 | 0.35 | -0.12 | -76.88 |
| 5,000.0 | 0.22 | 276.69 | 4,998.9 | -22.6 | -49.5 | -4.8 | 0.26 | -0.04 | 65.16 |
| 5,025.0 | 0.19 | 215.46 | 5,023.9 | -22.6 | -49.6 | -4.8 | 0.84 | -0.12 | -244.92 |
| 5,050.0 | 0.19 | 253.64 | 5,048.9 | -22.7 | -49.7 | -4.8 | 0.50 | 0.00 | 152.72 |
| 5,075.0 | 0.31 | 267.75 | 5,073.9 | -22.7 | -49.8 | -4.8 | 0.54 | 0.48 | 56.44 |
| 5,100.0 | 0.20 | 272.85 | 5,098.9 | -22.7 | -49.9 | -4.7 | 0.45 | -0.44 | 20.40 |
| 5,125.0 | 0.28 | 269.44 | 5,123.9 | -22.7 | -50.0 | -4.7 | 0.32 | 0.32 | -13.64 |
| 5,150.0 | 0.16 | 252.87 | 5,148.9 | -22.7 | -50.1 | -4.7 | 0.54 | -0.48 | -66.28 |
| 5,175.0 | 0.19 | 296.22 | 5,173.9 | -22.7 | -50.1 | -4.6 | 0.53 | 0.12 | 173.40 |
| 5,200.0 | 0.24 | 265.45 | 5,198.9 | -22.7 | -50.2 | -4.6 | 0.50 | 0.20 | -123.08 |
| 5,225.0 | 0.13 | 262.68 | 5,223.9 | -22.7 | -50.3 | -4.6 | 0.44 | -0.44 | -11.08 |
| 5,250.0 | 0.11 | 275.73 | 5,248.9 | -22.7 | -50.4 | -4.6 | 0.13 | -0.08 | 52.20 |
| 5,275.0 | 0.17 | 288.35 | 5,273.9 | -22.7 | -50.4 | -4.5 | 0.27 | 0.24 | 50.48 |
| 5,300.0 | 0.10 | 285.98 | 5,298.9 | -22.7 | -50.5 | -4.5 | 0.28 | -0.28 | -9.48 |
| 5,325.0 | 0.18 | 316.98 | 5,323.9 | -22.6 | -50.5 | -4.5 | 0.43 | 0.32 | 124.00 |
| 5,350.0 | 0.08 | 305.57 | 5,348.9 | -22.6 | -50.6 | -4.4 | 0.41 | -0.40 | -45.64 |
| 5,375.0 | 0.24 | 292.08 | 5,373.9 | -22.6 | -50.6 | -4.4 | 0.65 | 0.64 | -53.96 |
| 5,400.0 | 0.16 | 274.09 | 5,398.9 | -22.5 | -50.7 | -4.3 | 0.40 | -0.32 | -71.96 |
| 5,425.0 | 0.19 | 283.99 | 5,423.9 | -22.5 | -50.8 | -4.3 | 0.17 | 0.12 | 39.60 |
| 5,450.0 | 0.24 | 269.63 | 5,448.9 | -22.5 | -50.9 | -4.2 | 0.29 | 0.20 | -57.44 |
| 5,475.0 | 0.26 | 271.94 | 5,473.9 | -22.5 | -51.0 | -4.2 | 0.09 | 0.08 | 9.24 |

RECEIVED
Office of Oil and Gas

AUG 28 2017

WV Department of Environmental Protection



Scientific Drilling International
Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Matthews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Antero NE

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | |
|-----------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|--|
| 5,500.0 | 0.30 | 267.79 | 5,498.9 | -22.5 | -51.1 | -4.1 | 0.18 | 0.16 | -16.60 | |
| 5,525.0 | 0.26 | 249.83 | 5,523.9 | -22.5 | -51.2 | -4.1 | 0.38 | -0.16 | -71.84 | |
| 5,550.0 | 0.32 | 234.30 | 5,548.9 | -22.6 | -51.3 | -4.1 | 0.39 | 0.24 | -62.12 | |
| 5,575.0 | 0.31 | 219.11 | 5,573.9 | -22.7 | -51.4 | -4.2 | 0.34 | -0.04 | -60.76 | |
| 5,600.0 | 0.20 | 226.17 | 5,598.9 | -22.8 | -51.5 | -4.3 | 0.46 | -0.44 | 28.24 | |
| 5,626.0 | 0.28 | 149.23 | 5,624.9 | -22.9 | -51.5 | -4.3 | 1.17 | 0.31 | -295.92 | |
| Last Gyro @ 5626 | | | | | | | | | | |
| 5,758.0 | 0.48 | 256.84 | 5,756.9 | -23.3 | -51.9 | -4.6 | 0.47 | 0.15 | 81.52 | |
| First SDI MWD @ 5758 | | | | | | | | | | |
| 5,789.0 | 0.57 | 235.07 | 5,787.9 | -23.4 | -52.1 | -4.6 | 0.70 | 0.29 | -70.23 | |
| 5,821.0 | 0.44 | 256.42 | 5,819.9 | -23.5 | -52.4 | -4.6 | 0.71 | -0.41 | 66.72 | |
| 5,852.0 | 1.08 | 237.44 | 5,850.9 | -23.7 | -52.8 | -4.7 | 2.19 | 2.06 | -61.23 | |
| 5,884.0 | 1.13 | 61.61 | 5,882.9 | -23.7 | -52.7 | -4.7 | 6.90 | 0.16 | -549.47 | |
| 5,916.0 | 5.83 | 85.48 | 5,914.8 | -23.4 | -50.8 | -5.1 | 15.06 | 14.69 | 74.59 | |
| 5,948.0 | 9.92 | 84.59 | 5,946.5 | -23.0 | -46.5 | -6.2 | 12.79 | 12.78 | -2.78 | |
| 5,980.0 | 13.82 | 81.78 | 5,977.8 | -22.2 | -39.9 | -7.6 | 12.32 | 12.19 | -8.78 | |
| 6,011.0 | 15.16 | 82.49 | 6,007.8 | -21.2 | -32.3 | -9.2 | 4.36 | 4.32 | 2.29 | |
| 6,043.0 | 17.62 | 82.12 | 6,038.5 | -20.0 | -23.3 | -11.0 | 7.69 | 7.69 | -1.16 | |
| 6,074.0 | 21.21 | 79.71 | 6,067.8 | -18.3 | -13.1 | -12.9 | 11.86 | 11.58 | -7.77 | |
| 6,106.0 | 24.95 | 77.61 | 6,097.2 | -15.8 | -0.8 | -14.6 | 11.97 | 11.69 | -6.56 | |
| 6,137.0 | 28.54 | 75.01 | 6,124.9 | -12.5 | 12.7 | -16.0 | 12.18 | 11.58 | -8.39 | |
| 6,169.0 | 32.46 | 73.77 | 6,152.5 | -8.1 | 28.3 | -17.1 | 12.41 | 12.25 | -3.88 | |
| 6,201.0 | 36.55 | 74.10 | 6,178.8 | -3.1 | 45.7 | -18.2 | 12.79 | 12.78 | 1.03 | |
| 6,233.0 | 40.07 | 72.34 | 6,203.9 | 2.6 | 64.7 | -19.1 | 11.52 | 11.00 | -5.50 | |
| 6,264.0 | 41.87 | 66.72 | 6,227.3 | 9.7 | 83.8 | -18.8 | 13.22 | 5.81 | -18.13 | |
| 6,296.0 | 43.93 | 60.65 | 6,250.8 | 19.4 | 103.2 | -16.2 | 14.42 | 6.44 | -18.97 | |
| 6,311.0 | 44.95 | 57.98 | 6,261.5 | 24.8 | 112.3 | -14.1 | 14.19 | 6.79 | -17.79 | |
| Sycamore @ 6311 | | | | | | | | | | |
| 6,327.0 | 46.10 | 55.24 | 6,272.7 | 31.1 | 121.8 | -11.4 | 14.19 | 7.20 | -17.13 | |
| 6,359.0 | 48.54 | 50.13 | 6,294.4 | 45.3 | 140.5 | -4.2 | 13.99 | 7.63 | -15.97 | |
| 6,390.0 | 49.93 | 44.42 | 6,314.7 | 61.2 | 157.7 | 5.1 | 14.65 | 4.48 | -18.42 | |
| 6,422.0 | 50.86 | 38.63 | 6,335.1 | 79.7 | 174.0 | 17.0 | 14.24 | 2.91 | -18.09 | |
| 6,454.0 | 51.63 | 32.37 | 6,355.1 | 100.0 | 188.5 | 31.3 | 15.44 | 2.41 | -19.56 | |
| 6,486.0 | 53.77 | 27.66 | 6,374.5 | 122.0 | 201.2 | 47.8 | 13.48 | 6.69 | -14.72 | |
| 6,518.0 | 55.51 | 24.67 | 6,393.0 | 145.5 | 212.7 | 66.1 | 9.36 | 5.44 | -9.34 | |
| 6,549.0 | 57.34 | 22.15 | 6,410.2 | 169.2 | 223.0 | 85.0 | 8.98 | 5.90 | -8.13 | |
| 6,580.0 | 59.20 | 18.46 | 6,426.5 | 193.9 | 232.1 | 105.2 | 11.77 | 6.00 | -11.90 | |
| 6,594.0 | 59.63 | 16.85 | 6,433.6 | 205.4 | 235.8 | 114.8 | 10.38 | 3.10 | -11.50 | |
| Middlesex @ 6594 | | | | | | | | | | |
| 6,612.0 | 60.22 | 14.80 | 6,442.6 | 220.4 | 240.0 | 127.5 | 10.38 | 3.26 | -11.39 | |
| 6,644.0 | 60.95 | 12.70 | 6,458.3 | 247.4 | 246.6 | 150.8 | 6.15 | 2.28 | -6.56 | |
| 6,676.0 | 61.91 | 11.01 | 6,473.6 | 274.9 | 252.4 | 174.8 | 5.52 | 3.00 | -5.28 | |
| 6,707.0 | 62.74 | 8.34 | 6,488.0 | 302.0 | 257.0 | 198.8 | 8.08 | 2.68 | -8.61 | |
| 6,739.0 | 64.28 | 5.54 | 6,502.3 | 330.4 | 260.5 | 224.4 | 9.19 | 4.81 | -8.75 | |

RECEIVED
Office of Oil and Gas

AUG 28 2017



Scientific Drilling International

Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Matthews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
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) |
|------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 6,770.0 | 65.79 | 2.65 | 6,515.4 | 358.4 | 262.5 | 250.2 | 9.75 | 4.87 | -9.32 |
| 6,802.0 | 67.33 | 1.02 | 6,528.1 | 387.8 | 263.4 | 277.5 | 6.71 | 4.81 | -5.09 |
| 6,818.0 | 67.84 | 0.00 | 6,534.2 | 402.6 | 263.6 | 291.4 | 6.67 | 3.18 | -6.34 |
| Burkett @ 6818 | | | | | | | | | |
| 6,833.0 | 68.32 | 359.06 | 6,539.8 | 416.5 | 263.4 | 304.6 | 6.67 | 3.21 | -6.30 |
| 6,865.0 | 69.85 | 356.74 | 6,551.3 | 446.4 | 262.3 | 333.1 | 8.29 | 4.78 | -7.25 |
| 6,896.0 | 71.03 | 354.40 | 6,561.6 | 475.5 | 260.1 | 361.3 | 8.07 | 3.81 | -7.55 |
| 6,902.0 | 71.35 | 353.99 | 6,563.6 | 481.1 | 259.5 | 366.8 | 8.31 | 5.28 | -6.77 |
| Tully @ 6902 | | | | | | | | | |
| 6,928.0 | 72.73 | 352.25 | 6,571.6 | 505.7 | 256.5 | 391.0 | 8.31 | 5.32 | -6.71 |
| 6,959.0 | 75.17 | 350.39 | 6,580.2 | 535.1 | 252.0 | 420.2 | 9.76 | 7.87 | -6.00 |
| 6,991.0 | 76.81 | 348.76 | 6,587.9 | 565.7 | 246.4 | 450.9 | 7.12 | 5.13 | -5.09 |
| 7,017.0 | 77.74 | 347.69 | 6,593.6 | 590.5 | 241.3 | 476.0 | 5.37 | 3.59 | -4.10 |
| MRCL_HOT @ 7017 | | | | | | | | | |
| 7,023.0 | 77.96 | 347.45 | 6,594.9 | 596.2 | 240.0 | 481.8 | 5.37 | 3.60 | -4.08 |
| 7,055.0 | 79.71 | 346.23 | 6,601.1 | 626.8 | 232.8 | 513.0 | 6.63 | 5.47 | -3.81 |
| 7,086.0 | 81.44 | 344.41 | 6,606.2 | 656.4 | 225.1 | 543.5 | 8.04 | 5.58 | -5.87 |
| 7,117.0 | 82.98 | 343.03 | 6,610.4 | 685.8 | 216.5 | 574.2 | 6.64 | 4.97 | -4.45 |
| 7,149.0 | 84.16 | 340.83 | 6,614.0 | 716.1 | 206.6 | 606.0 | 7.76 | 3.69 | -6.88 |
| 7,181.0 | 85.97 | 339.53 | 6,616.7 | 746.1 | 195.8 | 637.8 | 6.96 | 5.66 | -4.06 |
| 7,207.0 | 87.32 | 338.27 | 6,618.2 | 770.3 | 186.5 | 663.8 | 7.10 | 5.19 | -4.85 |
| 7,239.0 | 88.96 | 338.23 | 6,619.3 | 800.0 | 174.6 | 695.7 | 5.13 | 5.13 | -0.13 |
| 7,334.0 | 90.64 | 340.86 | 6,619.6 | 889.0 | 141.4 | 790.7 | 3.28 | 1.77 | 2.77 |
| 7,429.0 | 92.18 | 341.32 | 6,617.3 | 978.8 | 110.6 | 885.7 | 1.69 | 1.62 | 0.48 |
| 7,523.0 | 93.19 | 341.37 | 6,612.9 | 1,067.8 | 80.6 | 979.6 | 1.08 | 1.07 | 0.05 |
| 7,618.0 | 92.18 | 339.87 | 6,608.4 | 1,157.3 | 49.1 | 1,074.4 | 1.90 | -1.06 | -1.58 |
| 7,714.0 | 92.55 | 339.91 | 6,604.5 | 1,247.4 | 16.1 | 1,170.4 | 0.39 | 0.39 | 0.04 |
| 7,809.0 | 90.40 | 339.45 | 6,602.0 | 1,336.4 | -16.8 | 1,265.3 | 2.31 | -2.26 | -0.48 |
| 7,905.0 | 89.93 | 338.16 | 6,601.7 | 1,425.9 | -51.5 | 1,361.3 | 1.43 | -0.49 | -1.34 |
| 7,999.0 | 89.87 | 336.43 | 6,601.9 | 1,512.6 | -87.8 | 1,455.1 | 1.84 | -0.06 | -1.84 |
| 8,094.0 | 89.60 | 339.71 | 6,602.3 | 1,600.8 | -123.3 | 1,550.0 | 3.46 | -0.28 | 3.45 |
| 8,191.0 | 90.24 | 340.08 | 6,602.5 | 1,691.8 | -156.6 | 1,647.0 | 0.76 | 0.66 | 0.38 |
| 8,285.0 | 90.03 | 341.64 | 6,602.2 | 1,780.6 | -187.5 | 1,741.0 | 1.67 | -0.22 | 1.66 |
| 8,380.0 | 90.64 | 340.54 | 6,601.7 | 1,870.5 | -218.3 | 1,836.0 | 1.32 | 0.64 | -1.16 |
| 8,474.0 | 90.07 | 340.78 | 6,601.1 | 1,959.2 | -249.4 | 1,930.0 | 0.66 | -0.61 | 0.28 |
| 8,570.0 | 89.13 | 339.45 | 6,601.8 | 2,049.5 | -282.0 | 2,026.0 | 1.70 | -0.98 | -1.39 |
| 8,664.0 | 91.07 | 341.23 | 6,601.6 | 2,138.0 | -313.7 | 2,120.0 | 2.80 | 2.06 | 1.89 |
| 8,759.0 | 90.20 | 341.83 | 6,600.6 | 2,228.1 | -343.8 | 2,215.0 | 1.11 | -0.92 | 0.63 |
| 8,853.0 | 90.54 | 342.57 | 6,600.0 | 2,317.6 | -372.5 | 2,308.9 | 0.87 | 0.36 | 0.79 |
| 8,947.0 | 90.37 | 342.37 | 6,599.2 | 2,407.2 | -400.8 | 2,402.9 | 0.28 | -0.18 | -0.21 |
| 9,042.0 | 90.03 | 341.75 | 6,598.9 | 2,497.6 | -430.1 | 2,497.8 | 0.74 | -0.36 | -0.65 |
| 9,137.0 | 90.50 | 341.36 | 6,598.4 | 2,587.7 | -460.1 | 2,592.8 | 0.64 | 0.49 | -0.41 |
| 9,232.0 | 89.83 | 340.82 | 6,598.2 | 2,677.6 | -490.9 | 2,687.8 | 0.91 | -0.71 | -0.57 |

AUG 28 2017
 W. J. Boring, Dept of Environmental Protection
 Chief of Bureau



Scientific Drilling International

Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Matthews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 9,327.0 | 90.30 | 341.46 | 6,598.1 | 2,767.5 | -521.6 | 2,782.8 | 0.84 | 0.49 | 0.67 |
| 9,421.0 | 90.03 | 339.84 | 6,597.8 | 2,856.2 | -552.8 | 2,876.8 | 1.75 | -0.29 | -1.72 |
| 9,516.0 | 90.00 | 339.08 | 6,597.8 | 2,945.1 | -586.1 | 2,971.8 | 0.80 | -0.03 | -0.80 |
| 9,611.0 | 89.73 | 339.30 | 6,598.0 | 3,033.9 | -619.8 | 3,066.7 | 0.37 | -0.28 | 0.23 |
| 9,705.0 | 90.13 | 339.37 | 6,598.1 | 3,121.9 | -653.0 | 3,160.7 | 0.43 | 0.43 | 0.07 |
| 9,800.0 | 90.77 | 340.07 | 6,597.4 | 3,211.0 | -685.9 | 3,255.7 | 1.00 | 0.67 | 0.74 |
| 9,894.0 | 89.23 | 338.22 | 6,597.4 | 3,298.8 | -719.4 | 3,349.7 | 2.56 | -1.64 | -1.97 |
| 9,989.0 | 90.13 | 338.72 | 6,597.9 | 3,387.2 | -754.3 | 3,444.6 | 1.08 | 0.95 | 0.53 |
| 10,084.0 | 89.97 | 341.28 | 6,597.8 | 3,476.5 | -786.8 | 3,539.6 | 2.70 | -0.17 | 2.69 |
| 10,180.0 | 90.47 | 341.87 | 6,597.4 | 3,567.5 | -817.1 | 3,635.6 | 0.81 | 0.52 | 0.61 |
| 10,275.0 | 90.50 | 341.30 | 6,596.6 | 3,657.7 | -847.1 | 3,730.6 | 0.60 | 0.03 | -0.60 |
| 10,370.0 | 89.73 | 340.42 | 6,596.4 | 3,747.4 | -878.3 | 3,825.6 | 1.23 | -0.81 | -0.93 |
| 10,467.0 | 90.54 | 341.07 | 6,596.2 | 3,839.0 | -910.2 | 3,922.6 | 1.07 | 0.84 | 0.67 |
| 10,562.0 | 90.77 | 341.15 | 6,595.1 | 3,928.9 | -941.0 | 4,017.5 | 0.26 | 0.24 | 0.08 |
| 10,657.0 | 90.94 | 340.17 | 6,593.7 | 4,018.5 | -972.5 | 4,112.5 | 1.05 | 0.18 | -1.03 |
| 10,752.0 | 89.46 | 339.93 | 6,593.4 | 4,107.8 | -1,004.9 | 4,207.5 | 1.58 | -1.56 | -0.25 |
| 10,847.0 | 90.24 | 339.53 | 6,593.6 | 4,196.9 | -1,037.8 | 4,302.5 | 0.92 | 0.82 | -0.42 |
| 10,942.0 | 89.73 | 341.34 | 6,593.6 | 4,286.4 | -1,069.6 | 4,397.5 | 1.98 | -0.54 | 1.91 |
| 11,037.0 | 90.60 | 340.66 | 6,593.4 | 4,376.2 | -1,100.5 | 4,492.5 | 1.16 | 0.92 | -0.72 |
| 11,132.0 | 88.89 | 342.72 | 6,593.8 | 4,466.4 | -1,130.4 | 4,587.5 | 2.82 | -1.80 | 2.17 |
| 11,227.0 | 89.33 | 342.70 | 6,595.3 | 4,557.1 | -1,158.6 | 4,682.4 | 0.46 | 0.46 | -0.02 |
| 11,322.0 | 88.96 | 341.35 | 6,596.7 | 4,647.5 | -1,187.9 | 4,777.3 | 1.47 | -0.39 | -1.42 |
| 11,416.0 | 90.10 | 341.74 | 6,597.5 | 4,736.6 | -1,217.7 | 4,871.3 | 1.28 | 1.21 | 0.41 |
| 11,510.0 | 90.20 | 340.90 | 6,597.2 | 4,825.7 | -1,247.8 | 4,965.3 | 0.90 | 0.11 | -0.89 |
| 11,604.0 | 89.43 | 339.90 | 6,597.5 | 4,914.2 | -1,279.3 | 5,059.3 | 1.34 | -0.82 | -1.06 |
| 11,698.0 | 89.93 | 340.29 | 6,598.0 | 5,002.6 | -1,311.3 | 5,153.3 | 0.67 | 0.53 | 0.41 |
| 11,792.0 | 89.60 | 339.56 | 6,598.4 | 5,090.9 | -1,343.6 | 5,247.3 | 0.85 | -0.35 | -0.78 |
| 11,886.0 | 89.97 | 339.74 | 6,598.8 | 5,179.0 | -1,376.3 | 5,341.3 | 0.44 | 0.39 | 0.19 |
| 11,980.0 | 90.34 | 339.46 | 6,598.5 | 5,267.1 | -1,409.0 | 5,435.3 | 0.49 | 0.39 | -0.30 |
| 12,074.0 | 89.63 | 340.51 | 6,598.6 | 5,355.5 | -1,441.2 | 5,529.3 | 1.35 | -0.76 | 1.12 |
| 12,169.0 | 89.87 | 340.16 | 6,599.0 | 5,444.9 | -1,473.2 | 5,624.3 | 0.45 | 0.25 | -0.37 |
| 12,264.0 | 89.26 | 338.86 | 6,599.7 | 5,533.9 | -1,506.4 | 5,719.3 | 1.51 | -0.64 | -1.37 |
| 12,359.0 | 89.26 | 338.42 | 6,600.9 | 5,622.4 | -1,541.0 | 5,814.2 | 0.46 | 0.00 | -0.46 |
| 12,453.0 | 90.10 | 339.63 | 6,601.4 | 5,710.1 | -1,574.7 | 5,908.2 | 1.57 | 0.89 | 1.29 |
| 12,548.0 | 90.07 | 339.64 | 6,601.3 | 5,799.2 | -1,607.7 | 6,003.1 | 0.03 | -0.03 | 0.01 |
| 12,644.0 | 89.87 | 340.99 | 6,601.4 | 5,889.6 | -1,640.1 | 6,099.1 | 1.42 | -0.21 | 1.41 |
| 12,739.0 | 89.83 | 340.52 | 6,601.6 | 5,979.3 | -1,671.4 | 6,194.1 | 0.50 | -0.04 | -0.49 |
| 12,835.0 | 88.99 | 341.61 | 6,602.6 | 6,070.1 | -1,702.5 | 6,290.1 | 1.43 | -0.88 | 1.14 |
| 12,929.0 | 89.76 | 341.54 | 6,603.6 | 6,159.2 | -1,732.2 | 6,384.1 | 0.82 | 0.42 | -0.07 |
| 13,024.0 | 90.27 | 341.29 | 6,603.6 | 6,249.3 | -1,762.5 | 6,479.1 | 0.60 | 0.54 | -0.26 |
| 13,120.0 | 88.52 | 342.11 | 6,604.6 | 6,340.4 | -1,792.6 | 6,575.1 | 2.01 | -1.32 | 0.85 |
| 13,214.0 | 88.93 | 341.63 | 6,606.7 | 6,429.7 | -1,821.9 | 6,669.0 | 0.67 | 0.44 | -0.51 |

WV Department of Environmental Protection
 AUG 28 2015
 06:04



Scientific Drilling International

Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Matthews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
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) |
|--|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 13,309.0 | 89.53 | 341.87 | 6,608.0 | 6,519.9 | -1,851.6 | 6,764.0 | 0.68 | 0.63 | 0.25 |
| 13,405.0 | 90.20 | 342.28 | 6,608.2 | 6,611.3 | -1,881.2 | 6,859.9 | 0.82 | 0.70 | 0.43 |
| 13,499.0 | 89.36 | 341.74 | 6,608.6 | 6,700.7 | -1,910.2 | 6,953.9 | 1.06 | -0.89 | -0.57 |
| 13,593.0 | 88.99 | 339.95 | 6,609.9 | 6,789.5 | -1,941.0 | 7,047.9 | 1.94 | -0.39 | -1.90 |
| 13,688.0 | 89.97 | 342.24 | 6,610.8 | 6,879.3 | -1,971.8 | 7,142.9 | 2.62 | 1.03 | 2.41 |
| 13,782.0 | 89.09 | 341.29 | 6,611.5 | 6,968.6 | -2,001.2 | 7,236.8 | 1.38 | -0.94 | -1.01 |
| 13,877.0 | 89.43 | 339.63 | 6,612.8 | 7,058.1 | -2,033.0 | 7,331.8 | 1.78 | 0.36 | -1.75 |
| 13,972.0 | 89.33 | 337.55 | 6,613.8 | 7,146.6 | -2,067.7 | 7,426.8 | 2.19 | -0.11 | -2.19 |
| 14,067.0 | 90.03 | 336.68 | 6,614.3 | 7,234.1 | -2,104.6 | 7,521.6 | 1.18 | 0.74 | -0.92 |
| 14,161.0 | 89.50 | 339.97 | 6,614.7 | 7,321.4 | -2,139.3 | 7,615.5 | 3.55 | -0.56 | 3.50 |
| 14,255.0 | 90.10 | 342.71 | 6,615.0 | 7,410.5 | -2,169.4 | 7,709.5 | 2.98 | 0.64 | 2.91 |
| 14,350.0 | 89.46 | 341.27 | 6,615.4 | 7,500.8 | -2,198.8 | 7,804.5 | 1.66 | -0.67 | -1.52 |
| 14,446.0 | 89.23 | 339.35 | 6,616.5 | 7,591.2 | -2,231.1 | 7,900.5 | 2.01 | -0.24 | -2.00 |
| 14,540.0 | 88.49 | 338.17 | 6,618.4 | 7,678.8 | -2,265.2 | 7,994.4 | 1.48 | -0.79 | -1.26 |
| 14,636.0 | 89.19 | 338.31 | 6,620.3 | 7,767.9 | -2,300.8 | 8,090.3 | 0.74 | 0.73 | 0.15 |
| 14,731.0 | 89.73 | 339.33 | 6,621.2 | 7,856.5 | -2,335.1 | 8,185.3 | 1.21 | 0.57 | 1.07 |
| 14,826.0 | 88.69 | 340.30 | 6,622.5 | 7,945.7 | -2,367.8 | 8,280.2 | 1.50 | -1.09 | 1.02 |
| 14,921.0 | 88.99 | 341.13 | 6,624.4 | 8,035.3 | -2,399.2 | 8,375.2 | 0.93 | 0.32 | 0.87 |
| 15,016.0 | 89.23 | 340.79 | 6,625.9 | 8,125.1 | -2,430.2 | 8,470.2 | 0.44 | 0.25 | -0.36 |
| 15,110.0 | 89.83 | 341.23 | 6,626.7 | 8,214.0 | -2,460.8 | 8,564.2 | 0.79 | 0.64 | 0.47 |
| 15,206.0 | 89.03 | 342.26 | 6,627.6 | 8,305.1 | -2,490.9 | 8,660.2 | 1.36 | -0.83 | 1.07 |
| 15,301.0 | 88.76 | 339.77 | 6,629.5 | 8,394.9 | -2,521.8 | 8,755.1 | 2.64 | -0.28 | -2.62 |
| 15,396.0 | 88.96 | 338.57 | 6,631.4 | 8,483.7 | -2,555.5 | 8,850.1 | 1.28 | 0.21 | -1.26 |
| 15,491.0 | 90.27 | 338.93 | 6,632.0 | 8,572.3 | -2,590.0 | 8,945.0 | 1.43 | 1.38 | 0.38 |
| 15,585.0 | 90.10 | 338.88 | 6,631.7 | 8,660.0 | -2,623.8 | 9,039.0 | 0.19 | -0.18 | -0.05 |
| 15,679.0 | 90.03 | 340.39 | 6,631.6 | 8,748.1 | -2,656.5 | 9,133.0 | 1.61 | -0.07 | 1.61 |
| 15,773.0 | 90.10 | 340.24 | 6,631.5 | 8,836.6 | -2,688.2 | 9,227.0 | 0.18 | 0.07 | -0.16 |
| 15,869.0 | 90.64 | 340.95 | 6,630.9 | 8,927.1 | -2,720.1 | 9,323.0 | 0.93 | 0.56 | 0.74 |
| 15,964.0 | 90.07 | 341.07 | 6,630.3 | 9,017.0 | -2,751.0 | 9,418.0 | 0.61 | -0.60 | 0.13 |
| 16,058.0 | 90.81 | 340.46 | 6,629.6 | 9,105.7 | -2,781.9 | 9,512.0 | 1.02 | 0.79 | -0.65 |
| 16,153.0 | 91.51 | 340.14 | 6,627.6 | 9,195.1 | -2,814.0 | 9,607.0 | 0.81 | 0.74 | -0.34 |
| 16,247.0 | 90.34 | 340.94 | 6,626.1 | 9,283.7 | -2,845.3 | 9,700.9 | 1.51 | -1.24 | 0.85 |
| 16,340.0 | 87.58 | 342.72 | 6,627.8 | 9,372.1 | -2,874.3 | 9,793.9 | 3.53 | -2.97 | 1.91 |
| 16,435.0 | 88.96 | 341.05 | 6,630.7 | 9,462.3 | -2,903.8 | 9,888.8 | 2.28 | 1.45 | -1.76 |
| 16,530.0 | 89.36 | 340.34 | 6,632.1 | 9,552.0 | -2,935.2 | 9,983.8 | 0.86 | 0.42 | -0.75 |
| 16,624.0 | 88.86 | 340.89 | 6,633.5 | 9,640.6 | -2,966.4 | 10,077.8 | 0.79 | -0.53 | 0.59 |
| 16,718.0 | 89.73 | 341.53 | 6,634.7 | 9,729.6 | -2,996.7 | 10,171.8 | 1.15 | 0.93 | 0.68 |
| 16,813.0 | 90.71 | 341.73 | 6,634.3 | 9,819.8 | -3,026.6 | 10,266.7 | 1.05 | 1.03 | 0.21 |
| 16,907.0 | 88.76 | 341.25 | 6,634.8 | 9,908.9 | -3,056.4 | 10,360.7 | 2.14 | -2.07 | -0.51 |
| 16,938.0 | 88.76 | 340.84 | 6,635.4 | 9,938.2 | -3,066.5 | 10,391.7 | 1.32 | 0.00 | -1.32 |
| Last SDI MWD @ 16938 | | | | | | | | | |
| 17,000.0 | 88.76 | 340.84 | 6,636.8 | 9,996.8 | -3,086.9 | 10,453.7 | 0.00 | 0.00 | 0.00 |
| Projection To Bit @ 17000 MD / 6636 TVD | | | | | | | | | |

RECEIVED
Office of Oil and Gas



Scientific Drilling International

Survey Report



Company: Antero Resources
Project: Tyler County WV
Site: Estlack Pad:
 Hare/Jujubee/Lucy/Matthews/Melvin
Well: Lucy Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Lucy Unit 1H
TVD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
MD Reference: Frontier 32: 1141' GL + 32' KB @ 1173.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Antero NE

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|

| Measured Depth (usft) | Vertical Depth (usft) | Name | Lithology | Dip (°) | Dip Direction (°) |
|-----------------------|-----------------------|------------------|-----------|---------|-------------------|
| 6,311.0 | 6,261.5 | Sycamore @ 6311 | | 0.00 | |
| 6,594.0 | 6,433.6 | Middlesex @ 6594 | | 0.00 | |
| 6,818.0 | 6,534.2 | Burkett @ 6818 | | 0.00 | |
| 6,902.0 | 6,563.6 | Tully @ 6902 | | 0.00 | |
| 7,017.0 | 6,593.6 | MRCL_HOT @ 7017 | | 0.00 | |

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates | | Comment |
|-----------------------|-----------------------|-------------------|--------------|---|
| | | +N/-S (usft) | +E/-W (usft) | |
| 25.0 | 25.0 | 0.0 | 0.0 | First Gyro @ 25 |
| 5,626.0 | 5,624.9 | -22.9 | -51.5 | Last Gyro @ 5626 |
| 5,758.0 | 5,756.9 | -23.3 | -51.9 | First SDI MWD @ 5758 |
| 16,938.0 | 6,635.4 | 9,938.2 | -3,066.5 | Last SDI MWD @ 16938 |
| 17,000.0 | 6,636.8 | 9,996.8 | -3,086.9 | Projection To Bit @ 17000 MD / 6636 TVD |

Checked By: _____ Approved By: _____ Date: _____

RECEIVED
 Office of Oil and Gas
 AUG 28 2017
 WV Department of
 Environmental Protection