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WV GEOLOGICAL SURVEY  
MORGANTOWN, WV



Antero  
Bow Unit 1H  
Ritchie County WV  
Northing: 14271061.20  
Easting: 1650650.20  
As Drilled

**WELL DETAILS:** Bow Unit 1H

+N-S	+E-W	Northing	Easting	Latitude	Longitude	Spot
0.0	0.0	14271061.20	1650650.20	39° 17' 58.942" N	80° 57' 49.774" W	

**REFERENCE INFORMATION**

Coordinate System: Universal Transverse Mercator (US Survey Feet)  
Datum: NAD 1983 (NAD80 CONUS)  
Ellipsoid: Clarke 1886  
Zone: Zone 17N (84 W to 78 W)  
System Datum: Mean Sea Level

**PROJECT DETAILS:** Ritchie County WV

Genie Lightfoot  
9/4/6, December 16 2014

Scientific Drilling  
11220 N.W. 10th Street  
Yukon, OK 73099

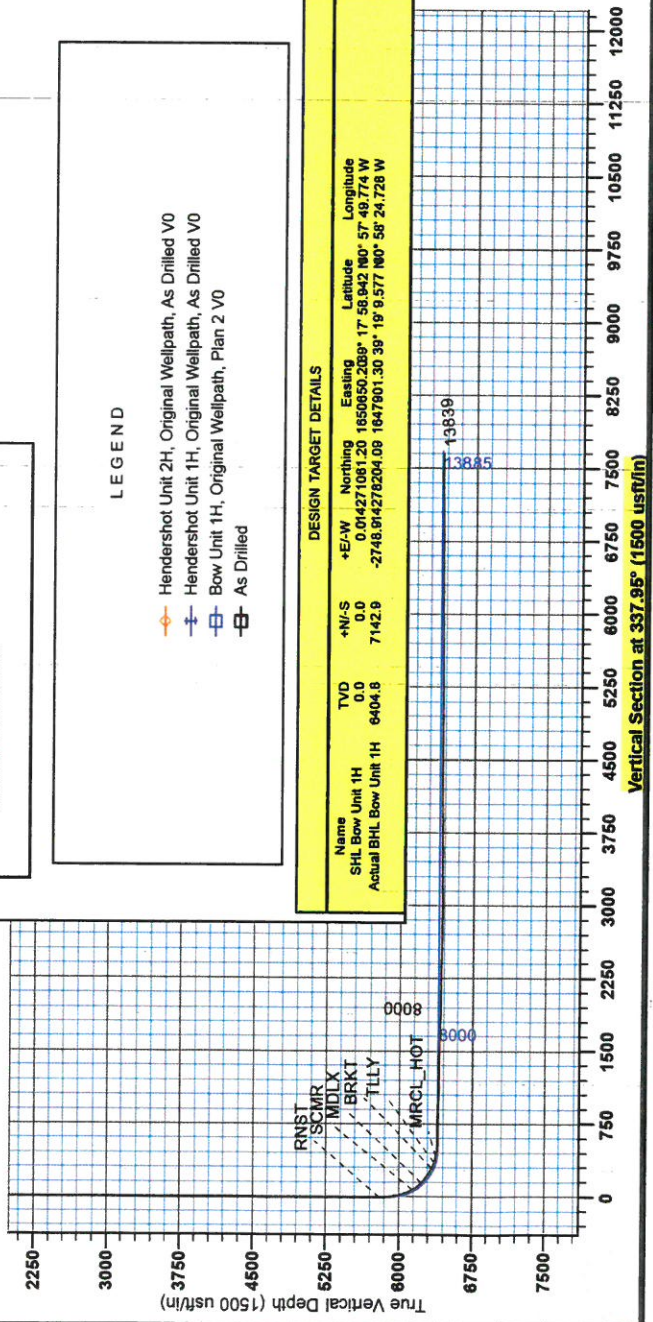


**LEGEND**

- Hendershot Unit 2H, Original Wellpath, As Drilled V0
- Hendershot Unit 1H, Original Wellpath, As Drilled V0
- Bow Unit 1H, Original Wellpath, Plan 2 V0
- As Drilled

**DESIGN TARGET DETAILS**

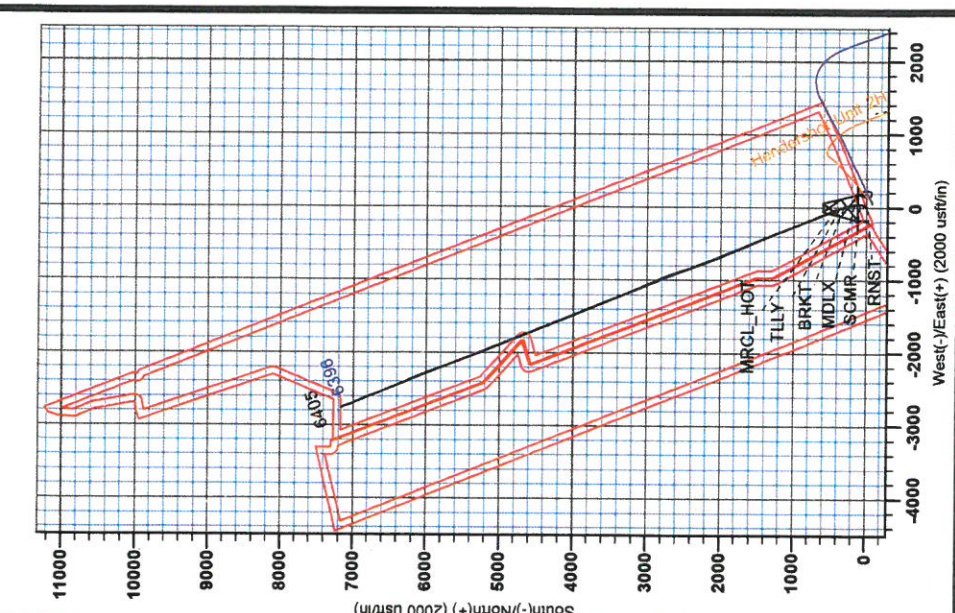
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
SHL Bow Unit 1H	0.0	0.0	0.0	0.01427106120	1650650.2039	17° 58.942' N	80° 57' 49.774" W
Actual BHL Bow Unit 1H	6404.8	7142.9	-2748.8	14271061.20	1647801.3039	19° 9.377' N	80° 58' 24.728" W



To convert Magnetic North to Grid, Subtract 2.39°  
To convert True North to Grid, Subtract 0.02°

**Azimuths to Grid North**  
True North: -0.02°  
Magnetic North: -3.38°

**Magnetic Field**  
Strength: 52244.8nT  
Dip Angle: 68.88°  
Date: 10/9/2014  
Model: EGM2014





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MORGANTOWN, WV

## **Antero**

**Ritchie County WV**

**Charlene Pad: Hendershot/Paige/Eppard/Brook/Bow**

**Bow Unit 1H**

**Original Wellpath**

**Design: As Drilled**

# **EOW Completion Report**

**16 December, 2014**



**Scientific Drilling**





<b>Company:</b>	Antero	<b>Local Co-ordinate Reference:</b>	Well Bow Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Patterson 325: GL 1118' + KB 24' @ 1142.0usft
<b>Site:</b>	Charlene Pad: Hendershot/Paige/Eppard/Brook/E	<b>MD Reference:</b>	Patterson 325: GL 1118' + KB 24' @ 1142.0usft
<b>Well:</b>	Bow Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	Oklahoma District

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

<b>Site</b>	Charlene Pad: Hendershot/Paige/Eppard/Brook/Bow, SHL Hendershot Unit 1H				
<b>Site Position:</b>	<b>Northing:</b>	14,270,988.12 usft	<b>Latitude:</b>	39° 17' 58.219 N	
<b>From:</b>	<b>Easting:</b>	1,650,704.41 usft	<b>Longitude:</b>	80° 57' 49.084 W	
<b>Position Uncertainty:</b>	2.0 usft	<b>Slot Radius:</b>	13-3/16"	<b>Grid Convergence:</b>	0.02 °

<b>Well</b>	Bow Unit 1H, Marcellus					
<b>Well Position</b>	<b>+N/-S</b>	0.0 usft	<b>Northing:</b>	14,271,061.20 usft	<b>Latitude:</b>	39° 17' 58.942 N
	<b>+E/-W</b>	0.0 usft	<b>Easting:</b>	1,650,650.20 usft	<b>Longitude:</b>	80° 57' 49.774 W
<b>Position Uncertainty</b>	2.0 usft	<b>Wellhead Elevation:</b>	1,142.0 usft	<b>Ground Level:</b>	1,118.0 usft	

<b>Wellbore</b>	Original Wellpath				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	BGGM2014	10/9/2014	-8.36	66.88	52,245

<b>Design</b>	As Drilled							
<b>Audit Notes:</b>	<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0		
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	0.0	<b>+N/-S (usft)</b>	0.0	<b>+E/-W (usft)</b>	0.0	<b>Direction (°)</b>	337.95

<b>Survey Program</b>	<b>Date</b>	12/16/2014			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
36.0	5,736.0	Survey #4 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
5,750.0	13,839.0	Survey #5 SDI MWD (Original Wellpath)	SDI MWD	Scientific Drilling Intl. MWD - Standard ver 1.0.1	

<b>Survey</b>	<b>MD (usft)</b>	<b>Inc (°)</b>	<b>Azi (azimuth) (°)</b>	<b>TVD (usft)</b>	<b>N/S (usft)</b>	<b>E/W (usft)</b>	<b>V. Sec (usft)</b>	<b>DLeg (°/100usft)</b>
	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
	36.0	0.07	79.48	36.0	0.0	0.0	0.0	0.19
	61.0	0.14	79.48	61.0	0.0	0.1	0.0	0.28
	86.0	0.22	79.48	86.0	0.0	0.1	0.0	0.32
	111.0	0.29	79.48	111.0	0.0	0.3	-0.1	0.28
	136.0	0.35	118.24	136.0	0.0	0.4	-0.1	0.88
	161.0	0.24	90.94	161.0	0.0	0.5	-0.2	0.70
	186.0	0.32	127.26	186.0	-0.1	0.6	-0.3	0.76
	211.0	0.24	102.00	211.0	-0.1	0.7	-0.4	0.58
	236.0	0.20	99.14	236.0	-0.1	0.8	-0.4	0.17
	261.0	0.28	109.48	261.0	-0.2	0.9	-0.5	0.36



**Company:** Antero  
**Project:** Ritchie County WV  
**Site:** Charlene Pad: Hendershot/Paige/Eppard/Brook/E  
**Well:** Bow Unit 1H  
**Wellbore:** Original Wellpath  
**Design:** As Drilled

**Local Co-ordinate Reference:** Well Bow Unit 1H  
**TVD Reference:** Patterson 325: GL 1118' + KB 24' @ 1142.0usft  
**MD Reference:** Patterson 325: GL 1118' + KB 24' @ 1142.0usft  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
286.0	0.31	122.23	286.0	-0.2	1.0	-0.6	0.29
311.0	0.24	122.66	311.0	-0.3	1.1	-0.7	0.28
336.0	0.32	132.13	336.0	-0.4	1.2	-0.8	0.37
361.0	0.26	128.79	361.0	-0.4	1.3	-0.9	0.25
386.0	0.27	127.83	386.0	-0.5	1.4	-1.0	0.04
411.0	0.25	116.59	411.0	-0.6	1.5	-1.1	0.22
436.0	0.25	114.28	436.0	-0.6	1.6	-1.2	0.04
461.0	0.16	103.44	461.0	-0.6	1.7	-1.2	0.39
486.0	0.15	118.52	486.0	-0.7	1.8	-1.3	0.17
511.0	0.20	127.61	511.0	-0.7	1.8	-1.3	0.23
536.0	0.18	124.00	536.0	-0.8	1.9	-1.4	0.09
561.0	0.20	131.53	561.0	-0.8	1.9	-1.5	0.13
586.0	0.24	132.90	586.0	-0.9	2.0	-1.6	0.16
611.0	0.24	118.84	611.0	-0.9	2.1	-1.7	0.23
636.0	0.22	130.18	636.0	-1.0	2.2	-1.7	0.20
661.0	0.26	137.54	661.0	-1.1	2.3	-1.8	0.20
686.0	0.25	135.98	686.0	-1.1	2.3	-1.9	0.05
711.0	0.20	155.29	711.0	-1.2	2.4	-2.0	0.36
736.0	0.20	152.04	736.0	-1.3	2.4	-2.1	0.05
761.0	0.29	141.17	761.0	-1.4	2.5	-2.2	0.40
786.0	0.25	128.31	786.0	-1.5	2.6	-2.3	0.29
811.0	0.31	152.03	811.0	-1.6	2.6	-2.4	0.52
836.0	0.28	149.76	836.0	-1.7	2.7	-2.6	0.13
861.0	0.25	149.36	861.0	-1.8	2.8	-2.7	0.12
886.0	0.24	151.61	886.0	-1.9	2.8	-2.8	0.06
911.0	0.26	155.64	911.0	-2.0	2.9	-2.9	0.11
936.0	0.31	156.15	936.0	-2.1	2.9	-3.0	0.20
961.0	0.22	146.75	961.0	-2.2	3.0	-3.1	0.40
986.0	0.18	157.95	986.0	-2.3	3.0	-3.2	0.22
1,011.0	0.21	168.06	1,011.0	-2.3	3.0	-3.3	0.18
1,036.0	0.29	157.75	1,036.0	-2.4	3.1	-3.4	0.37
1,061.0	0.23	153.87	1,061.0	-2.5	3.1	-3.5	0.25
1,086.0	0.16	164.37	1,086.0	-2.6	3.2	-3.6	0.31
1,111.0	0.21	149.82	1,111.0	-2.7	3.2	-3.7	0.27
1,136.0	0.21	152.68	1,136.0	-2.8	3.2	-3.8	0.04
1,161.0	0.26	155.75	1,161.0	-2.9	3.3	-3.9	0.21
1,186.0	0.18	160.04	1,186.0	-3.0	3.3	-4.0	0.33
1,211.0	0.17	141.34	1,211.0	-3.0	3.3	-4.1	0.23
1,236.0	0.18	135.55	1,236.0	-3.1	3.4	-4.1	0.08
1,261.0	0.21	130.18	1,261.0	-3.1	3.5	-4.2	0.14
1,286.0	0.22	143.53	1,286.0	-3.2	3.5	-4.3	0.20
1,311.0	0.24	141.24	1,311.0	-3.3	3.6	-4.4	0.09
1,336.0	0.21	142.28	1,336.0	-3.4	3.6	-4.5	0.12
1,361.0	0.25	137.55	1,361.0	-3.4	3.7	-4.6	0.18



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EOW Completion Report



<b>Company:</b>	Antero	<b>Local Co-ordinate Reference:</b>	Well Bow Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Patterson 325: GL 1118' + KB 24' @ 1142.0usft
<b>Site:</b>	Charlene Pad: Hendershot/Paige/Eppard/Brook/E	<b>MD Reference:</b>	Patterson 325: GL 1118' + KB 24' @ 1142.0usft
<b>Well:</b>	Bow Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,386.0	0.19	145.81	1,386.0	-3.5	3.8	-4.7	0.27
1,411.0	0.25	145.26	1,411.0	-3.6	3.8	-4.8	0.24
1,436.0	0.22	130.17	1,436.0	-3.7	3.9	-4.9	0.27
1,461.0	0.22	124.46	1,461.0	-3.7	4.0	-4.9	0.09
1,486.0	0.34	143.93	1,486.0	-3.8	4.0	-5.1	0.61
1,511.0	0.24	142.66	1,511.0	-3.9	4.1	-5.2	0.40
1,536.0	0.24	137.56	1,536.0	-4.0	4.2	-5.3	0.09
1,561.0	0.33	158.53	1,561.0	-4.1	4.3	-5.4	0.55
1,586.0	0.20	140.74	1,586.0	-4.2	4.3	-5.5	0.61
1,611.0	0.20	162.75	1,611.0	-4.3	4.3	-5.6	0.31
1,636.0	0.28	162.82	1,636.0	-4.4	4.4	-5.7	0.32
1,661.0	0.18	173.52	1,661.0	-4.5	4.4	-5.8	0.43
1,686.0	0.18	176.23	1,686.0	-4.6	4.4	-5.9	0.03
1,711.0	0.16	170.73	1,711.0	-4.6	4.4	-6.0	0.10
1,736.0	0.17	180.62	1,736.0	-4.7	4.4	-6.0	0.12
1,761.0	0.14	161.20	1,761.0	-4.8	4.4	-6.1	0.24
1,786.0	0.24	171.10	1,786.0	-4.9	4.4	-6.2	0.42
1,811.0	0.18	161.89	1,811.0	-4.9	4.5	-6.3	0.27
1,836.0	0.12	167.21	1,836.0	-5.0	4.5	-6.3	0.25
1,861.0	0.15	186.47	1,861.0	-5.1	4.5	-6.4	0.22
1,886.0	0.18	170.54	1,886.0	-5.1	4.5	-6.4	0.22
1,911.0	0.13	159.60	1,911.0	-5.2	4.5	-6.5	0.23
1,936.0	0.16	165.27	1,936.0	-5.3	4.5	-6.6	0.13
1,961.0	0.14	165.79	1,961.0	-5.3	4.5	-6.6	0.08
1,986.0	0.07	162.26	1,986.0	-5.4	4.6	-6.7	0.28
2,011.0	0.16	146.54	2,011.0	-5.4	4.6	-6.7	0.38
2,036.0	0.12	126.26	2,036.0	-5.5	4.6	-6.8	0.25
2,061.0	0.17	137.87	2,061.0	-5.5	4.7	-6.8	0.23
2,086.0	0.09	135.47	2,086.0	-5.5	4.7	-6.9	0.32
2,111.0	0.13	144.52	2,111.0	-5.6	4.7	-6.9	0.17
2,136.0	0.17	124.27	2,136.0	-5.6	4.8	-7.0	0.26
2,161.0	0.19	117.96	2,161.0	-5.7	4.8	-7.1	0.11
2,186.0	0.20	123.13	2,186.0	-5.7	4.9	-7.1	0.08
2,211.0	0.19	155.00	2,211.0	-5.8	5.0	-7.2	0.43
2,236.0	0.27	151.99	2,236.0	-5.9	5.0	-7.3	0.32
2,261.0	0.16	155.49	2,261.0	-5.9	5.1	-7.4	0.44
2,286.0	0.15	126.70	2,286.0	-6.0	5.1	-7.5	0.31
2,311.0	0.21	162.67	2,311.0	-6.1	5.1	-7.5	0.50
2,336.0	0.23	146.16	2,336.0	-6.1	5.2	-7.6	0.26
2,361.0	0.22	163.66	2,361.0	-6.2	5.2	-7.7	0.28
2,386.0	0.24	147.64	2,386.0	-6.3	5.3	-7.8	0.27
2,411.0	0.07	107.19	2,411.0	-6.4	5.3	-7.9	0.77
2,436.0	0.09	113.33	2,436.0	-6.4	5.3	-7.9	0.09
2,461.0	0.05	113.93	2,461.0	-6.4	5.4	-7.9	0.16
2,486.0	0.03	86.47	2,486.0	-6.4	5.4	-7.9	0.11

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MORGANTOWN, WV



<b>Company:</b> Antero	<b>Local Co-ordinate Reference:</b> Well Bow Unit 1H
<b>Project:</b> Ritchie County WV	<b>TVD Reference:</b> Patterson 325: GL 1118' + KB 24' @ 1142.0usft
<b>Site:</b> Charlene Pad: Hendershot/Paige/Eppard/Brook/E	<b>MD Reference:</b> Patterson 325: GL 1118' + KB 24' @ 1142.0usft
<b>Well:</b> Bow Unit 1H	<b>North Reference:</b> Grid
<b>Wellbore:</b> Original Wellpath	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> As Drilled	<b>Database:</b> Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
2,511.0	0.09	106.58	2,511.0	-6.4	5.4	-8.0	0.25
2,536.0	0.08	103.68	2,536.0	-6.4	5.5	-8.0	0.04
2,561.0	0.01	74.59	2,561.0	-6.4	5.5	-8.0	0.29
2,586.0	0.06	135.32	2,586.0	-6.4	5.5	-8.0	0.22
2,611.0	0.07	140.96	2,611.0	-6.4	5.5	-8.0	0.05
2,636.0	0.07	116.87	2,636.0	-6.5	5.5	-8.1	0.12
2,661.0	0.04	220.07	2,661.0	-6.5	5.5	-8.1	0.35
2,686.0	0.07	148.99	2,686.0	-6.5	5.5	-8.1	0.27
2,711.0	0.02	167.13	2,711.0	-6.5	5.5	-8.1	0.21
2,736.0	0.01	270.41	2,736.0	-6.5	5.5	-8.1	0.10
2,761.0	0.04	117.91	2,761.0	-6.5	5.5	-8.1	0.20
2,786.0	0.03	141.94	2,786.0	-6.5	5.6	-8.1	0.07
2,811.0	0.06	258.77	2,811.0	-6.5	5.5	-8.1	0.31
2,836.0	0.07	316.69	2,836.0	-6.5	5.5	-8.1	0.25
2,861.0	0.09	301.19	2,861.0	-6.5	5.5	-8.1	0.12
2,886.0	0.03	155.65	2,886.0	-6.5	5.5	-8.1	0.46
2,911.0	0.03	37.28	2,911.0	-6.5	5.5	-8.1	0.21
2,936.0	0.03	236.05	2,936.0	-6.5	5.5	-8.1	0.24
2,961.0	0.03	307.58	2,961.0	-6.5	5.5	-8.1	0.14
2,986.0	0.05	59.84	2,986.0	-6.5	5.5	-8.1	0.27
3,011.0	0.07	143.81	3,011.0	-6.5	5.5	-8.1	0.33
3,036.0	0.05	251.09	3,036.0	-6.5	5.5	-8.1	0.39
3,061.0	0.13	115.72	3,061.0	-6.5	5.5	-8.1	0.68
3,086.0	0.06	112.82	3,086.0	-6.5	5.6	-8.2	0.28
3,111.0	0.07	52.17	3,111.0	-6.5	5.6	-8.2	0.26
3,136.0	0.04	66.06	3,136.0	-6.5	5.6	-8.2	0.13
3,161.0	0.04	63.13	3,161.0	-6.5	5.6	-8.2	0.01
3,186.0	0.03	100.99	3,186.0	-6.5	5.6	-8.2	0.10
3,211.0	0.10	94.79	3,211.0	-6.5	5.7	-8.2	0.28
3,236.0	0.05	113.95	3,236.0	-6.5	5.7	-8.2	0.22
3,261.0	0.09	102.85	3,261.0	-6.5	5.7	-8.2	0.17
3,286.0	0.10	99.19	3,286.0	-6.5	5.8	-8.2	0.05
3,311.0	0.09	125.33	3,311.0	-6.6	5.8	-8.3	0.18
3,336.0	0.09	116.15	3,336.0	-6.6	5.8	-8.3	0.06
3,361.0	0.09	108.31	3,361.0	-6.6	5.9	-8.3	0.05
3,386.0	0.08	113.84	3,386.0	-6.6	5.9	-8.3	0.05
3,411.0	0.08	152.41	3,411.0	-6.6	5.9	-8.4	0.21
3,436.0	0.14	112.64	3,436.0	-6.7	6.0	-8.4	0.37
3,461.0	0.09	113.77	3,461.0	-6.7	6.0	-8.4	0.20
3,486.0	0.08	142.67	3,486.0	-6.7	6.0	-8.5	0.17
3,511.0	0.14	141.22	3,511.0	-6.7	6.1	-8.5	0.24
3,536.0	0.14	115.46	3,536.0	-6.8	6.1	-8.6	0.25
3,561.0	0.12	122.42	3,561.0	-6.8	6.2	-8.6	0.10
3,586.0	0.10	132.48	3,586.0	-6.8	6.2	-8.7	0.11



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EOW Completion Report



**Company:** Antero  
**Project:** Ritchie County WV  
**Site:** Charlene Pad: Hendershot/Paige/Eppard/Brook/E  
**Well:** Bow Unit 1H  
**Wellbore:** Original Wellpath  
**Design:** As Drilled

**Local Co-ordinate Reference:** Well Bow Unit 1H  
**TVD Reference:** Patterson 325: GL 1118' + KB 24' @ 1142.0usft  
**MD Reference:** Patterson 325: GL 1118' + KB 24' @ 1142.0usft  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Oklahoma District

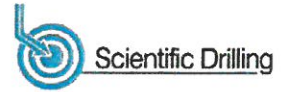
Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	DLeg (°/100usft)
3,611.0	0.09	145.48	3,611.0	-6.9	6.2	-8.7	0.09
3,636.0	0.21	145.78	3,636.0	-6.9	6.3	-8.8	0.48
3,661.0	0.09	128.92	3,661.0	-7.0	6.3	-8.8	0.51
3,686.0	0.15	141.35	3,686.0	-7.0	6.3	-8.9	0.26
3,711.0	0.13	146.99	3,711.0	-7.1	6.4	-8.9	0.10
3,736.0	0.21	136.32	3,736.0	-7.1	6.4	-9.0	0.34
3,761.0	0.15	130.08	3,761.0	-7.2	6.5	-9.1	0.25
3,786.0	0.20	140.71	3,786.0	-7.2	6.5	-9.1	0.24
3,811.0	0.13	136.03	3,811.0	-7.3	6.6	-9.2	0.28
3,836.0	0.16	132.91	3,836.0	-7.3	6.6	-9.3	0.12
3,861.0	0.09	171.78	3,861.0	-7.4	6.7	-9.3	0.42
3,886.0	0.19	135.81	3,886.0	-7.4	6.7	-9.4	0.51
3,911.0	0.12	157.86	3,911.0	-7.5	6.7	-9.4	0.36
3,936.0	0.16	169.91	3,936.0	-7.5	6.7	-9.5	0.20
3,961.0	0.09	222.37	3,961.0	-7.6	6.7	-9.5	0.51
3,986.0	0.22	247.79	3,986.0	-7.6	6.7	-9.6	0.58
4,011.0	0.20	159.47	4,011.0	-7.7	6.6	-9.6	1.17
4,036.0	0.15	139.62	4,036.0	-7.7	6.7	-9.7	0.31
4,061.0	0.10	113.24	4,061.0	-7.8	6.7	-9.7	0.30
4,086.0	0.18	147.04	4,086.0	-7.8	6.8	-9.8	0.45
4,111.0	0.12	184.66	4,111.0	-7.9	6.8	-9.8	0.45
4,136.0	0.21	190.68	4,136.0	-7.9	6.8	-9.9	0.37
4,161.0	0.26	193.64	4,161.0	-8.0	6.8	-10.0	0.21
4,186.0	0.20	212.73	4,186.0	-8.1	6.7	-10.1	0.39
4,211.0	0.30	213.21	4,211.0	-8.2	6.7	-10.1	0.40
4,236.0	0.31	206.61	4,236.0	-8.3	6.6	-10.2	0.15
4,261.0	0.34	206.93	4,261.0	-8.5	6.5	-10.3	0.12
4,286.0	0.46	214.10	4,286.0	-8.6	6.4	-10.4	0.52
4,311.0	0.31	215.44	4,311.0	-8.7	6.3	-10.5	0.60
4,336.0	0.37	209.72	4,336.0	-8.9	6.3	-10.6	0.28
4,361.0	0.35	212.23	4,361.0	-9.0	6.2	-10.7	0.10
4,386.0	0.38	219.31	4,386.0	-9.1	6.1	-10.8	0.22
4,411.0	0.33	219.96	4,411.0	-9.3	6.0	-10.8	0.20
4,436.0	0.39	217.40	4,436.0	-9.4	5.9	-10.9	0.25
4,461.0	0.31	228.06	4,461.0	-9.5	5.8	-11.0	0.41
4,486.0	0.39	212.42	4,486.0	-9.6	5.7	-11.0	0.50
4,511.0	0.37	216.17	4,511.0	-9.7	5.6	-11.1	0.13
4,536.0	0.37	212.06	4,536.0	-9.9	5.5	-11.2	0.11
4,561.0	0.34	222.33	4,561.0	-10.0	5.4	-11.3	0.28
4,586.0	0.32	221.33	4,586.0	-10.1	5.3	-11.4	0.08
4,611.0	0.34	221.58	4,611.0	-10.2	5.2	-11.4	0.08
4,636.0	0.39	221.08	4,636.0	-10.3	5.1	-11.5	0.20
4,661.0	0.30	232.63	4,661.0	-10.4	5.0	-11.6	0.45
4,686.0	0.43	225.45	4,686.0	-10.5	4.9	-11.6	0.55

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EOW Completion Report



**Company:** Antero  
**Project:** Ritchie County WV  
**Site:** Charlene Pad: Hendershot/Paige/Eppard/Brook/E  
**Well:** Bow Unit 1H  
**Wellbore:** Original Wellpath  
**Design:** As Drilled

**Local Co-ordinate Reference:** Well Bow Unit 1H  
**TVD Reference:** Patterson 325: GL 1118' + KB 24' @ 1142.0usft  
**MD Reference:** Patterson 325: GL 1118' + KB 24' @ 1142.0usft  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	DLeg (°/100usft)
4,711.0	0.33	229.25	4,711.0	-10.7	4.8	-11.7	0.41
4,736.0	0.34	229.10	4,736.0	-10.8	4.7	-11.7	0.04
4,761.0	0.37	223.18	4,761.0	-10.9	4.5	-11.8	0.19
4,786.0	0.36	234.84	4,786.0	-11.0	4.4	-11.8	0.30
4,811.0	0.33	238.59	4,811.0	-11.0	4.3	-11.9	0.15
4,836.0	0.30	236.93	4,836.0	-11.1	4.2	-11.9	0.13
4,861.0	0.27	222.42	4,861.0	-11.2	4.1	-11.9	0.31
4,886.0	0.27	242.52	4,886.0	-11.3	4.0	-11.9	0.38
4,911.0	0.34	235.23	4,911.0	-11.3	3.9	-12.0	0.32
4,936.0	0.27	242.18	4,936.0	-11.4	3.8	-12.0	0.32
4,961.0	0.28	250.42	4,961.0	-11.5	3.7	-12.0	0.16
4,986.0	0.30	237.24	4,986.0	-11.5	3.6	-12.0	0.28
5,011.0	0.24	258.41	5,011.0	-11.6	3.4	-12.0	0.46
5,036.0	0.23	266.65	5,036.0	-11.6	3.3	-12.0	0.14
5,061.0	0.23	258.65	5,061.0	-11.6	3.2	-12.0	0.13
5,086.0	0.18	264.70	5,086.0	-11.6	3.2	-11.9	0.22
5,111.0	0.28	270.04	5,111.0	-11.6	3.1	-11.9	0.41
5,136.0	0.23	264.46	5,136.0	-11.6	2.9	-11.9	0.22
5,161.0	0.20	292.90	5,161.0	-11.6	2.9	-11.8	0.44
5,186.0	0.30	260.20	5,186.0	-11.6	2.8	-11.8	0.68
5,211.0	0.23	260.56	5,211.0	-11.6	2.6	-11.7	0.28
5,236.0	0.28	264.75	5,236.0	-11.6	2.5	-11.7	0.21
5,261.0	0.28	273.62	5,261.0	-11.6	2.4	-11.7	0.17
5,286.0	0.29	270.98	5,286.0	-11.6	2.3	-11.6	0.07
5,311.0	0.28	279.79	5,311.0	-11.6	2.2	-11.6	0.18
5,336.0	0.27	288.15	5,336.0	-11.6	2.0	-11.5	0.17
5,361.0	0.29	269.39	5,361.0	-11.6	1.9	-11.4	0.37
5,386.0	0.33	267.56	5,386.0	-11.6	1.8	-11.4	0.16
5,411.0	0.26	271.29	5,411.0	-11.6	1.7	-11.3	0.29
5,436.0	0.27	285.66	5,436.0	-11.5	1.5	-11.3	0.27
5,461.0	0.35	280.88	5,461.0	-11.5	1.4	-11.2	0.34
5,486.0	0.29	284.97	5,486.0	-11.5	1.3	-11.1	0.26
5,511.0	0.40	283.05	5,511.0	-11.5	1.1	-11.0	0.44
5,536.0	0.39	287.21	5,536.0	-11.4	1.0	-10.9	0.12
5,561.0	0.32	281.12	5,561.0	-11.4	0.8	-10.8	0.32
5,586.0	0.41	281.78	5,586.0	-11.3	0.7	-10.8	0.36
5,611.0	0.44	277.55	5,611.0	-11.3	0.5	-10.7	0.17
5,636.0	0.38	289.24	5,636.0	-11.3	0.3	-10.6	0.41
5,661.0	0.44	272.54	5,661.0	-11.2	0.1	-10.5	0.53
5,686.0	0.43	279.61	5,686.0	-11.2	-0.1	-10.4	0.22
5,711.0	0.50	260.40	5,711.0	-11.2	-0.3	-10.3	0.68
5,736.0	0.56	284.24	5,736.0	-11.2	-0.5	-10.2	0.91
5,750.0	0.57	273.21	5,750.0	-11.2	-0.6	-10.1	0.78
5,782.0	0.87	351.10	5,782.0	-10.9	-0.8	-9.8	2.92



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WV GEOLOGICAL SURVEY  
MORGANTOWN, WV

EOW Completion Report



<b>Company:</b>	Antero	<b>Local Co-ordinate Reference:</b>	Well Bow Unit 1H
<b>Project:</b>	Ritchie County WV	<b>TVD Reference:</b>	Patterson 325: GL 1118' + KB 24' @ 1142.0usft
<b>Site:</b>	Charlene Pad: Hendershot/Paige/Eppard/Brook/E	<b>MD Reference:</b>	Patterson 325: GL 1118' + KB 24' @ 1142.0usft
<b>Well:</b>	Bow Unit 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Wellpath	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	As Drilled	<b>Database:</b>	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,800.0	2.73	24.63	5,799.9	-10.4	-0.7	-9.4	11.48
<b>RNST</b>							
5,813.0	4.20	29.38	5,812.9	-9.7	-0.3	-8.9	11.48
5,845.0	7.48	31.94	5,844.7	-6.9	1.4	-6.9	10.28
5,876.0	11.32	30.77	5,875.3	-2.6	4.0	-3.9	12.40
5,907.0	13.96	32.78	5,905.6	3.2	7.6	0.1	8.63
5,939.0	16.37	35.62	5,936.5	10.1	12.3	4.7	7.88
5,970.0	18.15	32.22	5,966.1	17.7	17.4	9.9	6.60
6,002.0	19.46	27.97	5,996.4	26.6	22.6	16.2	5.92
6,033.0	21.70	24.73	6,025.4	36.4	27.4	23.5	8.10
6,065.0	24.27	20.55	6,054.8	47.9	32.2	32.3	9.51
6,096.0	26.68	14.06	6,082.8	60.7	36.1	42.7	11.89
6,128.0	29.37	9.04	6,111.1	75.4	39.1	55.2	11.17
6,159.0	32.52	5.21	6,137.7	91.2	41.0	69.1	11.98
6,161.0	32.73	5.04	6,139.3	92.3	41.1	70.1	11.70
<b>SCMR</b>							
6,190.0	35.87	2.74	6,163.3	108.6	42.2	84.8	11.70
6,221.0	39.04	359.06	6,187.9	127.4	42.5	102.1	12.51
6,253.0	42.79	356.50	6,212.1	148.3	41.7	121.8	12.83
6,282.0	46.30	353.51	6,232.8	168.6	39.9	141.3	14.08
<b>MDLX</b>							
6,284.0	46.54	353.32	6,234.1	170.0	39.7	142.7	14.08
6,316.0	50.35	351.55	6,255.4	193.8	36.6	165.9	12.60
6,347.0	54.71	348.74	6,274.2	218.0	32.3	189.9	15.80
6,379.0	56.38	346.99	6,292.3	243.8	26.8	215.9	6.90
6,410.0	57.49	346.08	6,309.2	269.1	20.7	241.6	4.34
6,442.0	61.61	343.13	6,325.4	295.6	13.4	269.0	15.13
6,469.0	65.22	341.31	6,337.5	318.6	6.0	293.1	14.68
<b>BRKT</b>							
6,473.0	65.76	341.05	6,339.2	322.1	4.9	296.7	14.68
6,505.0	68.90	339.70	6,351.5	349.9	-5.1	326.2	10.56
6,534.0	72.34	337.79	6,361.1	375.4	-15.0	353.5	13.40
<b>TLLY</b>							
6,536.0	72.58	337.66	6,361.7	377.1	-15.7	355.4	13.40
6,567.0	75.88	337.46	6,370.2	404.7	-27.1	385.3	10.66
6,598.0	79.27	336.68	6,376.8	432.6	-38.9	415.5	11.21
<b>MRCL_HOT</b>							
6,599.0	79.38	336.65	6,377.0	433.5	-39.3	416.5	11.21
6,630.0	80.98	336.79	6,382.3	461.5	-51.4	447.1	5.18
6,662.0	83.87	337.31	6,386.5	490.7	-63.7	478.8	9.17
6,693.0	86.08	337.99	6,389.2	519.3	-75.5	509.6	7.46
6,728.0	89.34	338.08	6,390.6	551.7	-88.5	544.6	9.32
6,759.0	89.60	337.82	6,390.9	580.5	-100.2	575.6	1.19
6,853.0	91.28	337.91	6,390.2	667.5	-135.6	669.6	1.79
6,948.0	88.29	339.75	6,390.6	756.1	-169.9	764.6	3.70

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WV GEOLOGICAL SURVEY  
MORGANTOWN, WV

EOW Completion Report



**Company:** Antero  
**Project:** Ritchie County WV  
**Site:** Charlene Pad: Hendershot/Paige/Eppard/Brook/E  
**Well:** Bow Unit 1H  
**Wellbore:** Original Wellpath  
**Design:** As Drilled

**Local Co-ordinate Reference:** Well Bow Unit 1H  
**TVD Reference:** Patterson 325: GL 1118' + KB 24' @ 1142.0usft  
**MD Reference:** Patterson 325: GL 1118' + KB 24' @ 1142.0usft  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
7,042.0	88.46	339.40	6,393.2	844.2	-202.7	858.5	0.41
7,137.0	87.05	338.96	6,396.9	932.9	-236.4	953.4	1.55
7,230.0	86.79	338.17	6,401.9	1,019.3	-270.4	1,046.3	0.89
7,325.0	90.13	338.17	6,404.5	1,107.5	-305.7	1,141.2	3.52
7,419.0	91.36	337.91	6,403.3	1,194.6	-340.8	1,235.2	1.34
7,513.0	89.16	337.56	6,402.8	1,281.6	-376.4	1,329.2	2.37
7,608.0	89.08	337.12	6,404.3	1,369.3	-413.0	1,424.2	0.47
7,702.0	89.43	336.59	6,405.5	1,455.7	-450.0	1,518.2	0.68
7,796.0	88.02	336.41	6,407.6	1,541.9	-487.4	1,612.1	1.51
7,890.0	87.41	336.41	6,411.4	1,628.0	-525.0	1,706.0	0.65
7,984.0	88.90	335.97	6,414.4	1,713.9	-563.0	1,799.9	1.65
8,078.0	89.52	339.84	6,415.7	1,801.0	-598.3	1,893.9	4.17
8,173.0	89.52	337.91	6,416.5	1,889.6	-632.5	1,988.9	2.03
8,267.0	89.69	336.68	6,417.1	1,976.3	-668.8	2,082.8	1.32
8,361.0	89.16	336.77	6,418.1	2,062.7	-706.0	2,176.8	0.57
8,455.0	89.78	339.14	6,418.9	2,149.8	-741.2	2,270.8	2.61
8,549.0	88.81	338.79	6,420.1	2,237.5	-775.0	2,364.8	1.10
8,643.0	88.37	341.95	6,422.4	2,326.0	-806.5	2,458.7	3.39
8,738.0	88.37	342.21	6,425.1	2,416.4	-835.8	2,553.4	0.27
8,832.0	89.43	341.78	6,426.9	2,505.7	-864.8	2,647.1	1.22
8,926.0	90.31	342.04	6,427.1	2,595.1	-894.0	2,740.9	0.98
9,020.0	89.43	337.64	6,427.4	2,683.3	-926.4	2,834.8	4.77
9,114.0	89.78	338.17	6,428.0	2,770.4	-961.7	2,928.8	0.68
9,208.0	89.43	335.97	6,428.6	2,857.0	-998.4	3,022.8	2.37
9,303.0	90.40	335.36	6,428.8	2,943.5	-1,037.5	3,117.7	1.21
9,396.0	90.75	335.62	6,427.9	3,028.1	-1,076.1	3,210.6	0.47
9,491.0	91.10	337.20	6,426.3	3,115.2	-1,114.1	3,305.6	1.70
9,585.0	90.75	338.26	6,424.8	3,202.2	-1,149.7	3,399.6	1.19
9,679.0	88.99	336.41	6,425.0	3,288.9	-1,185.9	3,493.5	2.72
9,773.0	90.22	335.97	6,425.7	3,374.9	-1,223.9	3,587.5	1.39
9,867.0	90.75	337.64	6,424.9	3,461.3	-1,260.9	3,681.5	1.86
9,962.0	90.92	336.85	6,423.5	3,548.9	-1,297.6	3,776.5	0.85
10,052.0	90.66	336.41	6,422.2	3,631.5	-1,333.3	3,866.4	0.57
10,143.0	90.40	335.53	6,421.4	3,714.6	-1,370.4	3,957.4	1.01
10,233.0	91.45	337.56	6,420.0	3,797.1	-1,406.2	4,047.3	2.54
10,324.0	90.22	338.26	6,418.6	3,881.4	-1,440.4	4,138.3	1.56
10,415.0	90.22	338.26	6,418.3	3,966.0	-1,474.1	4,229.3	0.00
10,505.0	90.57	338.44	6,417.7	4,049.6	-1,507.3	4,319.3	0.44
10,596.0	89.52	337.73	6,417.6	4,134.0	-1,541.3	4,410.3	1.39
10,686.0	88.72	338.08	6,419.0	4,217.4	-1,575.2	4,500.3	0.97
10,776.0	89.87	337.73	6,420.1	4,300.8	-1,609.0	4,590.3	1.34
10,867.0	90.13	337.73	6,420.1	4,385.0	-1,643.5	4,681.3	0.29
10,958.0	90.22	337.03	6,419.8	4,469.0	-1,678.5	4,772.3	0.78
11,048.0	90.31	336.94	6,419.4	4,551.9	-1,713.7	4,862.3	0.14



AUG 10 2015



## WV GEOLOGICAL SURVEY EOW Completion Report Resources MORGANTOWN, WV



<b>Company:</b> Antero	<b>Local Co-ordinate Reference:</b> Well Bow Unit 1H	
<b>Project:</b> Ritchie County WV	<b>TVD Reference:</b> Patterson 325: GL 1118' + KB 24' @ 1142.0usft	
<b>Site:</b> Charlene Pad: Hendershot/Paige/Eppard/Brook/E	<b>MD Reference:</b> Patterson 325: GL 1118' + KB 24' @ 1142.0usft	
<b>Well:</b> Bow Unit 1H	<b>North Reference:</b> Grid	
<b>Wellbore:</b> Original Wellpath	<b>Survey Calculation Method:</b> Minimum Curvature	
<b>Design:</b> As Drilled	<b>Database:</b> Oklahoma District	

### Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	DLeg (°/100usft)
11,142.0	90.57	338.35	6,418.7	4,638.8	-1,749.4	4,956.3	1.53
11,236.0	89.60	337.73	6,418.5	4,726.0	-1,784.6	5,050.3	1.22
11,330.0	90.31	339.67	6,418.6	4,813.5	-1,818.7	5,144.2	2.20
11,423.0	90.40	338.52	6,418.0	4,900.4	-1,851.9	5,237.2	1.24
11,517.0	89.78	337.03	6,417.9	4,987.4	-1,887.5	5,331.2	1.72
11,611.0	90.48	338.17	6,417.7	5,074.3	-1,923.3	5,425.2	1.42
11,704.0	90.22	337.20	6,417.1	5,160.4	-1,958.6	5,518.2	1.08
11,798.0	90.57	338.96	6,416.4	5,247.6	-1,993.7	5,612.2	1.91
11,892.0	90.22	337.82	6,415.8	5,335.0	-2,028.3	5,706.2	1.27
11,986.0	90.22	339.67	6,415.4	5,422.6	-2,062.4	5,800.2	1.97
12,080.0	89.96	339.40	6,415.3	5,510.6	-2,095.2	5,894.1	0.40
12,175.0	90.31	339.23	6,415.1	5,599.5	-2,128.8	5,989.1	0.41
12,270.0	90.84	339.75	6,414.1	5,688.5	-2,162.1	6,084.1	0.78
12,364.0	91.45	339.40	6,412.2	5,776.5	-2,194.9	6,178.0	0.75
12,458.0	89.52	339.31	6,411.4	5,864.5	-2,228.0	6,272.0	2.06
12,552.0	89.87	338.61	6,411.9	5,952.2	-2,261.8	6,366.0	0.83
12,646.0	90.56	339.23	6,411.6	6,039.9	-2,295.6	6,459.9	0.99
12,740.0	91.36	339.23	6,410.0	6,127.8	-2,328.9	6,553.9	0.85
12,834.0	89.69	336.06	6,409.1	6,214.7	-2,364.6	6,647.9	3.81
12,928.0	89.60	333.34	6,409.7	6,299.7	-2,404.8	6,741.7	2.90
13,022.0	89.78	336.94	6,410.2	6,385.0	-2,444.3	6,835.6	3.83
13,115.0	90.75	338.79	6,409.8	6,471.1	-2,479.4	6,928.6	2.25
13,209.0	91.19	338.70	6,408.2	6,558.7	-2,513.4	7,022.6	0.48
13,303.0	90.66	338.44	6,406.7	6,646.2	-2,547.8	7,116.6	0.63
13,398.0	90.75	337.38	6,405.5	6,734.2	-2,583.5	7,211.5	1.12
13,492.0	90.84	336.59	6,404.2	6,820.7	-2,620.2	7,305.5	0.85
13,586.0	89.52	336.59	6,403.9	6,907.0	-2,657.6	7,399.5	1.40
13,680.0	89.52	338.61	6,404.7	6,993.9	-2,693.4	7,493.5	2.15
13,774.0	90.13	339.93	6,405.0	7,081.8	-2,726.7	7,587.5	1.55
13,783.0	90.22	340.02	6,405.0	7,090.3	-2,729.8	7,596.4	1.41
13,839.0	90.22	340.02	6,404.8	7,142.9	-2,748.9	7,652.4	0.00

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,800.0	5,799.9	-10.4	-0.7	RNST
6,161.0	6,139.3	92.3	41.1	SCMR
6,282.0	6,232.8	168.6	39.9	MDLX
6,469.0	6,337.5	318.6	6.0	BRKT
6,534.0	6,361.1	375.4	-15.0	TLTY
6,598.0	6,376.8	432.6	-38.9	MRCL_HOT

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