



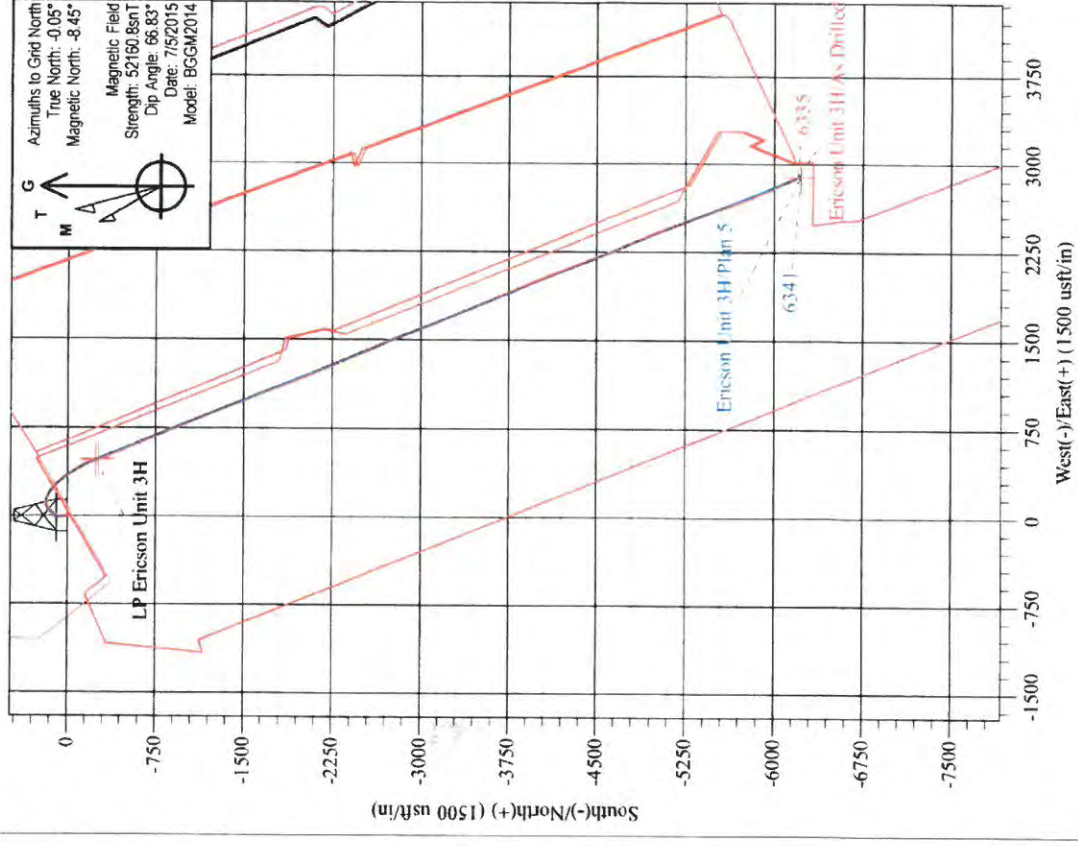
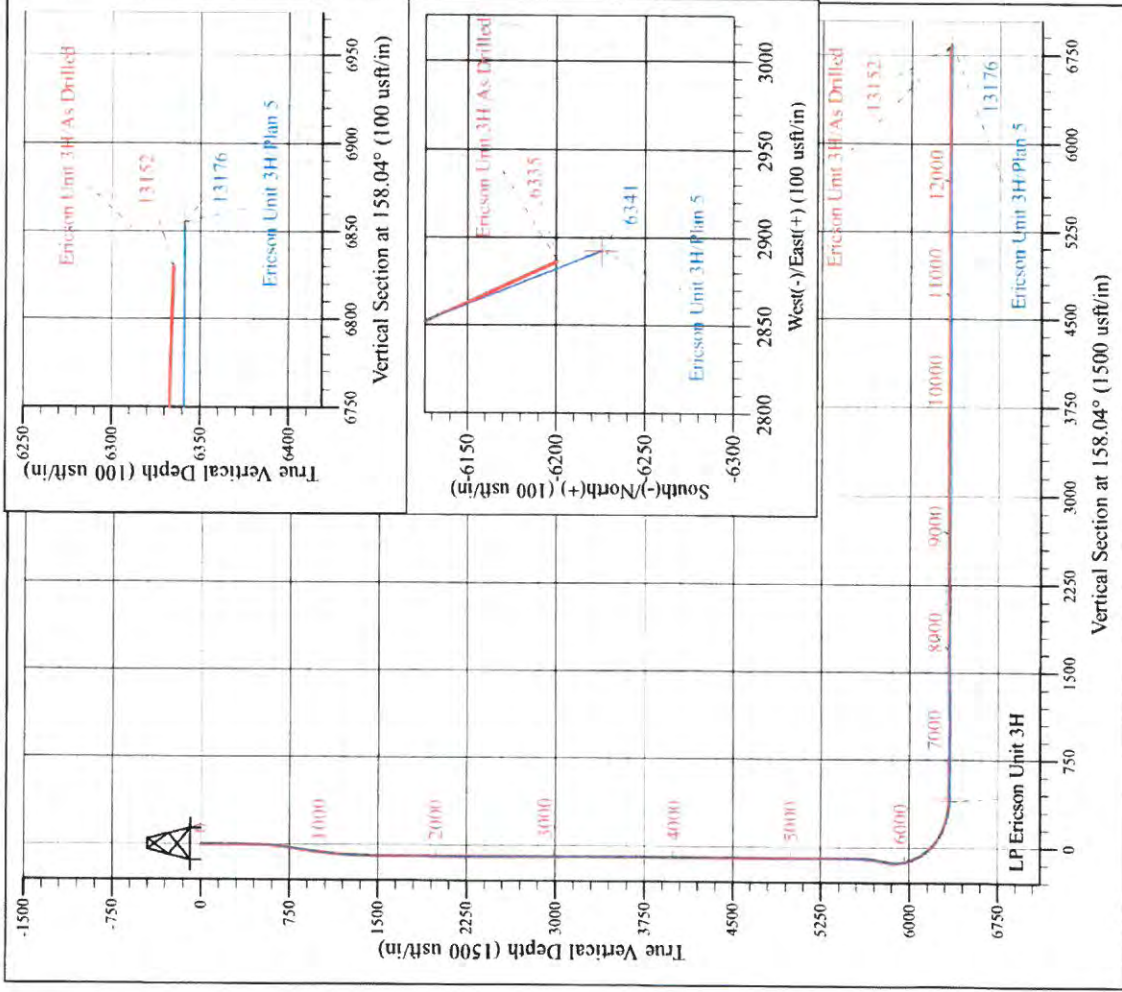
Annie Horizontal Pad: Belle/Ericson  
Ericson Unit 3H  
Plan 5  
Precision 523: GL 1004 + KB 19' @ 1023.0usft  
Ritchie County WV

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



WELL DETAILS: Ericson Unit 3H SHL

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	14281132.70	1661470.69	39° 19' 38.460 N	80° 55' 31.973 W



Ericson Unit 3H  
Approx. BHL  
39° 18' 37.123 N 80° 54' 55.298 W

Shane Rhodes  
15/27, July 28 2015  
Scientific Drilling International  
124 Vista Drive  
Charlottesville, PA 15022



## **Antero**

**Ritchie County WV  
Annie Horizontal Pad: Belle/Ericson  
Ericson Unit 3H**

**Original Wellpath**

**Design: As Drilled**

## **Standard Survey Report**

**31 July, 2015**



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





<b>Company:</b> Antero	<b>Local Co-ordinate Reference:</b> Well Ericson Unit 3H
<b>Project:</b> Ritchie County WV	<b>TVD Reference:</b> Precision 523: GL 1004' + KB 19' @ 1023.0usft
<b>Site:</b> Annie Horizontal Pad Belle/Ericson	<b>MD Reference:</b> Precision 523 GL 1004' + KB 19' @ 1023.0usft
<b>Well:</b> Ericson Unit 3H	<b>North Reference:</b> Grid
<b>Wellbore:</b> Original Wellpath	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> As Drilled	<b>Database:</b> Antero NE

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

<b>Site</b>	Annie Horizontal Pad Belle/Ericson, SHL Belle Unit 3H				
<b>Site Position:</b>	<b>Northing:</b>	14,281,134.20 usft	<b>Latitude:</b>	39° 19' 38.474 N	
<b>From:</b> Map	<b>Easting:</b>	1,661,500.66 usft	<b>Longitude:</b>	80° 55' 31.591 W	
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.05 °

<b>Well</b>	Ericson Unit 3H, Marcellus					
<b>Well Position</b>	<b>+N/-S</b>	0.0 usft	<b>Northing:</b>	14,281,132.70 usft	<b>Latitude:</b>	39° 19' 38.460 N
	<b>+E/-W</b>	0.0 usft	<b>Easting:</b>	1,661,470.69 usft	<b>Longitude:</b>	80° 55' 31.973 W
<b>Position Uncertainty</b>	2.0 usft	<b>Wellhead Elevation:</b>	1,023.0 usft	<b>Ground Level:</b>	1,004.0 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	7/5/2015	-8.40	66.83	52,161

<b>Design</b>	As Drilled				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	158.04	

<b>Survey Program</b>	Date 7/31/2015				
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
106.0	5,316.0	Survey #6 Final Gyro (Original Wellpath)	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper	
5,348.0	13,152.0	Survey #7 SDI MWD (Original Wellpath)	SDI MWD	Scientific Drilling Intl. MWD - Standard ver 1.0.1	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
106.0	0.19	158.21	106.0	-0.2	0.1	0.2	0.18	0.18	0.00	
<b>First SDI Gyro @ 106 MD</b>										
131.0	0.28	191.79	131.0	-0.3	0.1	0.3	0.64	0.36	134.32	
156.0	0.23	210.13	156.0	-0.4	0.0	0.3	0.38	-0.20	73.36	
181.0	0.17	221.51	181.0	-0.4	0.0	0.4	0.29	-0.24	45.52	
206.0	0.25	187.93	206.0	-0.5	-0.1	0.5	0.57	0.32	-134.32	
231.0	0.32	201.85	231.0	-0.6	-0.1	0.6	0.39	0.28	55.68	
256.0	0.28	193.64	256.0	-0.8	-0.1	0.7	0.23	-0.16	-32.84	
281.0	0.41	117.54	281.0	-0.9	-0.1	0.8	1.75	0.52	-304.40	



**Company:** Antero  
**Project:** Ritchie County WV  
**Site:** Annie Horizontal Pad: Belle/Ericson  
**Well:** Ericson Unit 3H  
**Wellbore:** Original Wellpath  
**Design:** As Drilled

**Local Co-ordinate Reference:** Well Ericson Unit 3H  
**TVD Reference:** Precision 523: GL 1004' + KB 19' @ 1023.0usft  
**MD Reference:** Precision 523: GL 1004' + KB 19' @ 1023.0usft  
**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)
306.0	0.49	128.16	306.0	-1.0	0.1	0.9	0.46	0.32	42.48
331.0	0.19	171.51	331.0	-1.1	0.2	1.1	1.50	-1.20	173.40
356.0	0.19	164.87	356.0	-1.2	0.2	1.2	0.09	0.00	-26.56
381.0	0.29	326.03	381.0	-1.1	0.2	1.1	1.90	0.40	644.64
406.0	0.81	330.12	406.0	-0.9	0.1	0.9	2.08	2.08	16.36
431.0	1.23	335.57	431.0	-0.5	-0.1	0.5	1.72	1.68	21.80
456.0	1.41	337.03	456.0	0.0	-0.4	-0.1	0.73	0.72	5.84
481.0	2.05	347.84	481.0	0.7	-0.6	-0.9	2.86	2.56	43.24
506.0	2.50	348.59	506.0	1.7	-0.8	-1.8	1.80	1.80	3.00
531.0	3.05	351.15	530.9	2.9	-1.0	-3.0	2.25	2.20	10.24
556.0	3.75	351.32	555.9	4.3	-1.2	-4.5	2.80	2.80	0.68
581.0	4.56	352.23	580.8	6.1	-1.5	-6.2	3.25	3.24	3.64
606.0	5.05	351.51	605.7	8.2	-1.8	-8.3	1.97	1.96	-2.88
631.0	5.85	352.03	630.6	10.6	-2.1	-10.6	3.21	3.20	2.08
656.0	6.47	353.06	655.5	13.2	-2.5	-13.2	2.52	2.48	4.12
681.0	6.99	353.00	680.3	16.1	-2.8	-16.0	2.08	2.08	-0.24
706.0	7.70	351.95	705.1	19.3	-3.2	-19.1	2.89	2.84	-4.20
731.0	8.52	351.48	729.8	22.8	-3.7	-22.5	3.29	3.28	-1.88
756.0	9.07	350.97	754.5	26.6	-4.3	-26.2	2.22	2.20	-2.04
781.0	9.35	351.74	779.2	30.5	-4.9	-30.1	1.22	1.12	3.08
806.0	9.63	352.97	803.9	34.6	-5.5	-34.1	1.38	1.12	4.92
831.0	9.62	352.98	828.5	38.7	-6.0	-38.2	0.04	-0.04	0.04
856.0	9.76	352.97	853.2	42.9	-6.5	-42.2	0.56	0.56	-0.04
881.0	9.69	353.16	877.8	47.1	-7.0	-46.3	0.31	-0.28	0.76
906.0	9.32	353.54	902.5	51.2	-7.5	-50.3	1.50	-1.48	1.52
931.0	8.51	353.52	927.2	55.1	-7.9	-54.0	3.24	-3.24	-0.08
956.0	8.00	353.82	951.9	58.6	-8.3	-57.5	2.05	-2.04	1.20
981.0	7.63	353.56	976.7	62.0	-8.7	-60.8	1.49	-1.48	-1.04
1,006.0	7.11	354.85	1,001.5	65.2	-9.0	-63.8	2.18	-2.08	5.16
1,031.0	6.71	354.46	1,026.3	68.2	-9.3	-66.7	1.61	-1.60	-1.56
1,056.0	6.20	355.48	1,051.1	71.0	-9.5	-69.4	2.09	-2.04	4.08
1,081.0	5.79	355.99	1,076.0	73.6	-9.7	-71.9	1.65	-1.64	2.04
1,106.0	5.45	355.86	1,100.9	76.0	-9.9	-74.2	1.36	-1.36	-0.52
1,131.0	4.93	355.89	1,125.8	78.3	-10.1	-76.4	2.08	-2.08	0.12
1,156.0	4.63	355.77	1,150.7	80.4	-10.2	-78.4	1.20	-1.20	-0.48
1,181.0	4.15	355.73	1,175.6	82.3	-10.4	-80.2	1.92	-1.92	-0.16
1,206.0	3.77	356.40	1,200.6	84.0	-10.5	-81.8	1.53	-1.52	2.68
1,231.0	3.38	357.88	1,225.5	85.6	-10.6	-83.3	1.60	-1.56	5.92
1,256.0	3.09	356.52	1,250.5	87.0	-10.6	-84.6	1.20	-1.16	-5.44
1,281.0	2.69	357.74	1,275.4	88.2	-10.7	-85.8	1.62	-1.60	4.88
1,306.0	2.38	355.70	1,300.4	89.3	-10.8	-86.9	1.29	-1.24	-8.16
1,331.0	2.19	357.42	1,325.4	90.3	-10.8	-87.8	0.81	-0.76	6.88
1,356.0	2.02	359.62	1,350.4	91.2	-10.9	-88.7	0.75	-0.68	8.80





**Company:** Antero  
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**Local Co-ordinate Reference:** Well Ericson Unit 3H  
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**MD Reference:** Precision 523. GL 1004' + KB 19' @ 1023.0usft  
**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)
1,381.0	1.70	0.10	1,375.4	92.1	-10.9	-89.4	1.28	-1.28	1.92
1,406.0	1.58	359.16	1,400.3	92.8	-10.9	-90.1	0.49	-0.48	-3.76
1,431.0	1.54	359.21	1,425.3	93.5	-10.9	-90.7	0.16	-0.16	0.20
1,456.0	1.36	353.99	1,450.3	94.1	-10.9	-91.3	0.89	-0.72	-20.88
1,481.0	1.11	351.38	1,475.3	94.6	-11.0	-91.9	1.02	-1.00	-10.44
1,506.0	1.19	358.35	1,500.3	95.1	-11.0	-92.3	0.64	0.32	27.88
1,531.0	0.90	354.72	1,525.3	95.6	-11.0	-92.8	1.19	-1.16	-14.52
1,556.0	0.72	350.62	1,550.3	95.9	-11.1	-93.1	0.76	-0.72	-16.40
1,581.0	0.57	343.32	1,575.3	96.2	-11.1	-93.4	0.68	-0.60	-29.20
1,606.0	0.62	350.94	1,600.3	96.4	-11.2	-93.6	0.37	0.20	30.48
1,631.0	0.63	355.31	1,625.3	96.7	-11.2	-93.9	0.19	0.04	17.48
1,656.0	0.58	357.90	1,650.3	97.0	-11.3	-94.2	0.23	-0.20	10.36
1,681.0	0.56	349.20	1,675.3	97.2	-11.3	-94.4	0.35	-0.08	-34.80
1,706.0	0.56	357.01	1,700.3	97.5	-11.3	-94.6	0.31	0.00	31.24
1,731.0	0.58	352.50	1,725.3	97.7	-11.3	-94.9	0.20	0.08	-18.04
1,756.0	0.38	328.27	1,750.3	97.9	-11.4	-95.1	1.12	-0.80	-96.92
1,781.0	0.16	285.76	1,775.3	98.0	-11.5	-95.2	1.13	-0.88	-170.04
1,806.0	0.23	272.91	1,800.3	98.0	-11.6	-95.2	0.33	0.28	-51.40
1,831.0	0.28	269.60	1,825.3	98.0	-11.7	-95.3	0.21	0.20	-13.24
1,856.0	0.30	270.76	1,850.3	98.0	-11.8	-95.3	0.08	0.08	4.64
1,881.0	0.26	284.01	1,875.3	98.0	-11.9	-95.4	0.30	-0.16	53.00
1,906.0	0.24	268.73	1,900.3	98.0	-12.0	-95.4	0.28	-0.08	-61.12
1,931.0	0.29	263.86	1,925.3	98.0	-12.1	-95.5	0.22	0.20	-19.48
1,956.0	0.25	270.88	1,950.3	98.0	-12.2	-95.5	0.21	-0.16	28.08
1,981.0	0.18	277.52	1,975.3	98.0	-12.3	-95.5	0.30	-0.28	26.56
2,006.0	0.27	262.07	2,000.3	98.0	-12.4	-95.6	0.43	0.36	-61.80
2,031.0	0.12	296.97	2,025.3	98.0	-12.5	-95.6	0.74	-0.60	139.60
2,056.0	0.13	272.84	2,050.3	98.0	-12.6	-95.6	0.21	0.04	-96.52
2,081.0	0.11	265.63	2,075.3	98.0	-12.6	-95.6	0.10	-0.08	-28.84
2,106.0	0.07	188.42	2,100.3	98.0	-12.7	-95.6	0.47	-0.16	-308.84
2,131.0	0.13	256.89	2,125.3	98.0	-12.7	-95.6	0.49	0.24	273.88
2,156.0	0.04	341.27	2,150.3	98.0	-12.7	-95.6	0.53	-0.36	337.52
2,181.0	0.05	14.58	2,175.3	98.0	-12.7	-95.7	0.11	0.04	133.24
2,206.0	0.02	9.75	2,200.3	98.0	-12.7	-95.7	0.12	-0.12	-19.32
2,231.0	0.07	300.74	2,225.3	98.1	-12.7	-95.7	0.26	0.20	-276.04
2,256.0	0.05	38.23	2,250.3	98.1	-12.7	-95.7	0.36	-0.08	389.96
2,281.0	0.12	280.70	2,275.3	98.1	-12.7	-95.7	0.60	0.28	-470.12
2,306.0	0.02	264.37	2,300.3	98.1	-12.8	-95.7	0.40	-0.40	-65.32
2,331.0	0.05	157.06	2,325.3	98.1	-12.8	-95.7	0.24	0.12	-429.24
2,356.0	0.02	341.50	2,350.3	98.1	-12.8	-95.7	0.28	-0.12	-702.24
2,381.0	0.14	279.68	2,375.3	98.1	-12.8	-95.8	0.53	0.48	-247.28
2,406.0	0.16	206.74	2,400.3	98.1	-12.9	-95.7	0.72	0.08	-291.76
2,431.0	0.06	227.11	2,425.3	98.0	-12.9	-95.7	0.42	-0.40	81.48



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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)
2,456.0	0.06	23.03	2,450.3	98.0	-12.9	-95.7	0.47	0.00	623.68
2,481.0	0.05	134.56	2,475.3	98.0	-12.9	-95.7	0.36	-0.04	446.12
2,506.0	0.09	140.57	2,500.3	98.0	-12.8	-95.7	0.16	0.16	24.04
2,531.0	0.13	81.45	2,525.3	98.0	-12.8	-95.7	0.46	0.16	-236.48
2,556.0	0.04	246.24	2,550.3	98.0	-12.8	-95.7	0.68	-0.36	659.16
2,581.0	0.02	250.58	2,575.3	98.0	-12.8	-95.7	0.08	-0.08	17.36
2,606.0	0.03	212.21	2,600.3	98.0	-12.8	-95.7	0.08	0.04	-153.48
2,631.0	0.06	182.49	2,625.3	98.0	-12.8	-95.6	0.15	0.12	-118.88
2,656.0	0.15	199.82	2,650.3	97.9	-12.8	-95.6	0.38	0.36	69.32
2,681.0	0.14	225.67	2,675.3	97.9	-12.9	-95.6	0.26	-0.04	103.40
2,706.0	0.17	155.12	2,700.3	97.8	-12.9	-95.5	0.72	0.12	-282.20
2,731.0	0.16	156.60	2,725.3	97.7	-12.8	-95.4	0.04	-0.04	5.92
2,756.0	0.15	135.38	2,750.3	97.7	-12.8	-95.4	0.23	-0.04	-84.88
2,781.0	0.16	134.59	2,775.3	97.6	-12.7	-95.3	0.04	0.04	-3.16
2,806.0	0.16	142.08	2,800.3	97.6	-12.7	-95.3	0.08	0.00	29.96
2,831.0	0.23	133.26	2,825.3	97.5	-12.6	-95.2	0.30	0.28	-35.28
2,856.0	0.18	128.49	2,850.3	97.5	-12.6	-95.1	0.21	-0.20	-19.08
2,881.0	0.24	125.33	2,875.3	97.4	-12.5	-95.0	0.24	0.24	-12.64
2,906.0	0.14	105.87	2,900.3	97.4	-12.4	-95.0	0.47	-0.40	-77.84
2,931.0	0.20	117.74	2,925.3	97.3	-12.4	-94.9	0.28	0.24	47.48
2,956.0	0.19	106.95	2,950.3	97.3	-12.3	-94.8	0.15	-0.04	-43.16
2,981.0	0.20	113.41	2,975.3	97.3	-12.2	-94.8	0.10	0.04	25.84
3,006.0	0.26	103.25	3,000.3	97.2	-12.1	-94.7	0.29	0.24	-40.64
3,031.0	0.20	103.51	3,025.3	97.2	-12.0	-94.7	0.24	-0.24	1.04
3,056.0	0.27	111.45	3,050.3	97.2	-11.9	-94.6	0.31	0.28	31.76
3,081.0	0.24	111.84	3,075.3	97.2	-11.8	-94.5	0.12	-0.12	1.56
3,106.0	0.23	104.60	3,100.3	97.1	-11.7	-94.5	0.13	-0.04	-28.96
3,131.0	0.17	105.43	3,125.3	97.1	-11.6	-94.4	0.24	-0.24	3.32
3,156.0	0.24	111.15	3,150.3	97.1	-11.5	-94.3	0.29	0.28	22.88
3,181.0	0.15	114.51	3,175.3	97.0	-11.5	-94.3	0.36	-0.36	13.44
3,206.0	0.15	104.87	3,200.3	97.0	-11.4	-94.2	0.10	0.00	-38.56
3,231.0	0.26	110.29	3,225.3	97.0	-11.3	-94.2	0.45	0.44	21.88
3,256.0	0.27	110.83	3,250.3	96.9	-11.2	-94.1	0.04	0.04	2.16
3,281.0	0.18	115.90	3,275.3	96.9	-11.1	-94.0	0.37	-0.36	20.28
3,306.0	0.18	104.92	3,300.3	96.9	-11.0	-94.0	0.14	0.00	-43.92
3,331.0	0.19	109.06	3,325.3	96.9	-11.0	-93.9	0.07	0.04	16.56
3,356.0	0.19	111.94	3,350.3	96.8	-10.9	-93.9	0.04	0.00	11.52
3,381.0	0.17	108.74	3,375.3	96.8	-10.8	-93.8	0.09	-0.08	-12.80
3,406.0	0.18	109.19	3,400.3	96.8	-10.7	-93.8	0.04	0.04	1.80
3,431.0	0.10	94.52	3,425.3	96.8	-10.7	-93.7	0.35	-0.32	-58.68
3,456.0	0.16	105.17	3,450.3	96.8	-10.6	-93.7	0.26	0.24	42.60
3,481.0	0.13	123.58	3,475.3	96.7	-10.6	-93.7	0.22	-0.12	73.64
3,506.0	0.15	102.42	3,500.3	96.7	-10.5	-93.6	0.22	0.08	-84.64
3,531.0	0.14	99.33	3,525.3	96.7	-10.5	-93.6	0.05	-0.04	-12.36





**Company:** Antero  
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**Design:** As Drilled

**Local Co-ordinate Reference:** Well Ericson Unit 3H  
**TVD Reference:** Precision 523: GL 1004' + KB 19' @ 1023.0usft  
**MD Reference:** Precision 523: GL 1004' + KB 19' @ 1023.0usft  
**North Reference:** Grd  
**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)
3,556.0	0.12	96.45	3,550.3	96.7	-10.4	-93.6	0.08	-0.08	-11.52
3,581.0	0.14	93.84	3,575.3	96.7	-10.3	-93.5	0.08	0.08	-10.44
3,606.0	0.21	89.49	3,600.3	96.7	-10.3	-93.5	0.28	0.28	-17.40
3,631.0	0.21	91.36	3,625.3	96.7	-10.2	-93.5	0.03	0.00	7.48
3,656.0	0.14	89.02	3,650.3	96.7	-10.1	-93.4	0.28	-0.28	-9.36
3,681.0	0.15	104.31	3,675.3	96.7	-10.0	-93.4	0.16	0.04	61.16
3,706.0	0.23	106.01	3,700.3	96.6	-10.0	-93.4	0.32	0.32	6.80
3,731.0	0.14	88.73	3,725.3	96.6	-9.9	-93.3	0.42	-0.36	-69.12
3,756.0	0.15	67.42	3,750.3	96.6	-9.8	-93.3	0.22	0.04	-85.24
3,781.0	0.25	89.83	3,775.3	96.7	-9.7	-93.3	0.50	0.40	89.64
3,806.0	0.15	76.05	3,800.3	96.7	-9.6	-93.3	0.44	-0.40	-55.12
3,831.0	0.18	78.66	3,825.3	96.7	-9.6	-93.2	0.12	0.12	10.44
3,856.0	0.14	84.76	3,850.3	96.7	-9.5	-93.2	0.17	-0.16	24.40
3,881.0	0.20	81.18	3,875.3	96.7	-9.4	-93.2	0.24	0.24	-14.32
3,906.0	0.19	84.45	3,900.3	96.7	-9.4	-93.2	0.06	-0.04	13.08
3,931.0	0.22	81.46	3,925.3	96.7	-9.3	-93.2	0.13	0.12	-11.96
3,956.0	0.26	85.66	3,950.3	96.7	-9.2	-93.1	0.17	0.16	16.80
3,981.0	0.33	75.36	3,975.3	96.8	-9.0	-93.1	0.35	0.28	-41.20
4,006.0	0.36	83.12	4,000.3	96.8	-8.9	-93.1	0.22	0.12	31.04
4,031.0	0.38	65.27	4,025.3	96.8	-8.7	-93.1	0.47	0.08	-71.40
4,056.0	0.36	73.43	4,050.3	96.9	-8.6	-93.1	0.23	-0.08	32.64
4,081.0	0.58	75.36	4,075.3	96.9	-8.4	-93.0	0.88	0.88	7.72
4,106.0	0.58	74.89	4,100.3	97.0	-8.1	-93.0	0.02	0.00	-1.88
4,131.0	0.56	66.14	4,125.3	97.1	-7.9	-93.0	0.36	-0.08	-35.00
4,156.0	0.58	65.94	4,150.3	97.2	-7.7	-93.0	0.08	0.08	-0.80
4,181.0	0.54	58.45	4,175.3	97.3	-7.5	-93.0	0.33	-0.16	-29.96
4,206.0	0.50	55.21	4,200.3	97.4	-7.3	-93.1	0.20	-0.16	-12.96
4,231.0	0.51	59.53	4,225.3	97.5	-7.1	-93.1	0.16	0.04	17.28
4,256.0	0.47	77.18	4,250.3	97.6	-6.9	-93.1	0.62	-0.16	70.60
4,281.0	0.54	73.67	4,275.3	97.7	-6.7	-93.1	0.31	0.28	-14.04
4,306.0	0.51	69.48	4,300.3	97.8	-6.5	-93.1	0.19	-0.12	-16.76
4,331.0	0.56	69.41	4,325.3	97.8	-6.2	-93.1	0.20	0.20	-0.28
4,356.0	0.58	69.18	4,350.3	97.9	-6.0	-93.1	0.08	0.08	-0.92
4,381.0	0.56	65.46	4,375.3	98.0	-5.8	-93.1	0.17	-0.08	-14.88
4,406.0	0.65	75.35	4,400.3	98.1	-5.5	-93.1	0.55	0.36	39.56
4,431.0	0.63	70.49	4,425.3	98.2	-5.3	-93.0	0.23	-0.08	-19.44
4,456.0	0.62	67.01	4,450.3	98.3	-5.0	-93.0	0.16	-0.04	-13.92
4,481.0	0.58	67.19	4,475.3	98.4	-4.8	-93.0	0.16	-0.16	0.72
4,506.0	0.60	65.14	4,500.3	98.5	-4.5	-93.0	0.12	0.08	-8.20
4,531.0	0.58	65.99	4,525.3	98.6	-4.3	-93.1	0.09	-0.08	3.40
4,556.0	0.69	65.99	4,550.3	98.7	-4.0	-93.1	0.44	0.44	0.00
4,581.0	0.62	65.94	4,575.3	98.8	-3.8	-93.1	0.28	-0.28	-0.20
4,606.0	0.64	64.05	4,600.3	98.9	-3.5	-93.1	0.12	0.08	-7.56



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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)
4,631.0	0.70	59.56	4,625.3	99.1	-3.3	-93.1	0.32	0.24	-17.96
4,656.0	0.69	65.84	4,650.3	99.2	-3.0	-93.1	0.31	-0.04	25.12
4,681.0	0.65	66.98	4,675.3	99.3	-2.7	-93.2	0.17	-0.16	4.56
4,706.0	0.67	67.74	4,700.3	99.4	-2.5	-93.2	0.09	0.08	3.04
4,731.0	0.77	66.03	4,725.3	99.6	-2.2	-93.2	0.41	0.40	-6.84
4,756.0	0.67	61.78	4,750.3	99.7	-1.9	-93.2	0.45	-0.40	-17.00
4,781.0	0.70	65.12	4,775.2	99.8	-1.6	-93.2	0.20	0.12	13.36
4,806.0	0.63	64.91	4,800.2	100.0	-1.4	-93.2	0.28	-0.28	-0.84
4,831.0	0.67	65.14	4,825.2	100.1	-1.1	-93.2	0.16	0.16	0.92
4,856.0	0.65	70.52	4,850.2	100.2	-0.9	-93.2	0.26	-0.08	21.52
4,881.0	0.68	65.38	4,875.2	100.3	-0.6	-93.2	0.27	0.12	-20.56
4,906.0	0.73	68.15	4,900.2	100.4	-0.3	-93.3	0.24	0.20	11.08
4,931.0	0.74	66.26	4,925.2	100.5	0.0	-93.3	0.10	0.04	-7.56
4,956.0	0.77	64.68	4,950.2	100.7	0.3	-93.3	0.15	0.12	-6.32
4,981.0	0.68	65.70	4,975.2	100.8	0.6	-93.3	0.36	-0.36	4.08
5,006.0	0.74	61.94	5,000.2	101.0	0.9	-93.3	0.30	0.24	-15.04
5,031.0	0.74	58.35	5,025.2	101.1	1.1	-93.4	0.19	0.00	-14.36
5,056.0	0.72	58.36	5,050.2	101.3	1.4	-93.4	0.08	-0.08	0.04
5,081.0	0.80	61.76	5,075.2	101.4	1.7	-93.5	0.37	0.32	13.60
5,106.0	0.77	62.09	5,100.2	101.6	2.0	-93.5	0.12	-0.12	1.32
5,131.0	0.83	62.76	5,125.2	101.8	2.3	-93.5	0.24	0.24	2.68
5,156.0	0.81	58.84	5,150.2	101.9	2.6	-93.6	0.24	-0.08	-15.68
5,181.0	0.72	57.25	5,175.2	102.1	2.9	-93.6	0.37	-0.36	-6.36
5,206.0	0.89	63.57	5,200.2	102.3	3.2	-93.7	0.77	0.68	25.28
5,231.0	0.86	64.97	5,225.2	102.5	3.6	-93.7	0.15	-0.12	5.60
5,256.0	0.94	72.74	5,250.2	102.6	3.9	-93.7	0.58	0.32	31.08
5,281.0	0.99	69.30	5,275.2	102.7	4.3	-93.7	0.31	0.20	-13.76
5,306.0	0.91	67.93	5,300.2	102.9	4.7	-93.7	0.33	-0.32	-5.48
5,316.0	0.96	65.97	5,310.2	103.0	4.9	-93.7	0.59	0.50	-19.60
<b>Last SDI Gyro @ 5316 MD</b>									
5,348.0	1.07	70.25	5,342.2	103.2	5.4	-93.7	0.42	0.34	13.38
<b>First SDI MWD @ 5348 MD</b>									
5,381.0	1.08	66.98	5,375.2	103.4	6.0	-93.7	0.19	0.03	-9.91
5,411.0	1.21	70.79	5,405.2	103.6	6.5	-93.6	0.50	0.43	12.70
5,441.0	1.20	72.76	5,435.2	103.8	7.1	-93.6	0.14	-0.03	6.57
5,470.0	1.17	77.15	5,464.2	104.0	7.7	-93.5	0.33	-0.10	15.14
5,500.0	1.08	82.79	5,494.2	104.1	8.3	-93.4	0.48	-0.30	18.80
5,530.0	0.96	89.78	5,524.2	104.1	8.8	-93.2	0.58	-0.40	23.30
5,560.0	1.48	60.15	5,554.2	104.3	9.4	-93.2	2.67	1.73	-98.77
5,590.0	3.30	41.03	5,584.1	105.1	10.3	-93.7	6.54	6.07	-63.73
5,620.0	5.43	35.63	5,614.0	106.9	11.7	-94.8	7.22	7.10	-18.00
5,649.0	7.72	33.73	5,642.8	109.7	13.6	-96.6	7.93	7.90	-6.55
5,679.0	10.33	33.93	5,672.5	113.6	16.2	-99.3	8.70	8.70	0.67
5,709.0	13.49	35.14	5,701.8	118.7	19.7	-102.7	10.57	10.53	4.03





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5,739.0	16.74	37.04	5,730.8	125.0	24.3	-106.8	10.96	10.83	6.33
5,769.0	19.84	39.42	5,759.3	132.4	30.2	-111.5	10.63	10.33	7.93
5,799.0	23.11	41.46	5,787.2	140.7	37.3	-116.6	11.18	10.90	6.80
5,829.0	25.75	44.47	5,814.5	149.8	45.8	-121.8	9.73	8.80	10.03
5,859.0	26.71	51.88	5,841.4	158.6	55.6	-126.3	11.37	3.20	24.70
5,889.0	27.29	60.74	5,868.1	166.1	66.9	-129.0	13.54	1.93	29.53
5,918.0	27.74	68.91	5,893.9	171.8	79.0	-129.8	13.10	1.55	28.17
5,948.0	27.96	75.22	5,920.4	176.1	92.4	-128.8	9.85	0.73	21.03
5,978.0	28.67	84.10	5,946.8	178.6	106.3	-125.9	14.23	2.37	29.60
6,007.0	29.29	93.81	5,972.2	178.9	120.3	-120.9	16.35	2.14	33.48
6,037.0	30.93	102.42	5,998.2	176.7	135.2	-113.4	15.39	5.47	28.70
6,067.0	32.66	107.89	6,023.7	172.6	150.4	-103.8	11.20	5.77	18.23
6,097.0	34.18	112.01	6,048.7	167.0	165.9	-92.8	9.10	5.07	13.73
6,127.0	34.25	117.13	6,073.5	159.9	181.3	-80.5	9.60	0.23	17.07
6,157.0	35.71	121.67	6,098.1	151.5	196.2	-67.1	9.94	4.87	15.13
6,187.0	38.97	125.07	6,122.0	141.5	211.4	-52.1	12.86	10.87	11.33
6,217.0	43.24	126.64	6,144.6	129.9	227.4	-35.5	14.64	14.23	5.23
6,235.0	45.49	127.80	6,157.4	122.3	237.4	-24.6	13.30	12.51	6.46
<b>Middlesex @ 6235 MD</b>									
6,247.0	47.00	128.53	6,165.7	116.9	244.2	-17.1	13.30	12.56	6.05
6,276.0	49.68	132.07	6,185.0	102.9	260.7	2.0	12.98	9.24	12.21
6,306.0	52.51	135.66	6,203.9	86.7	277.6	23.3	13.25	9.43	11.97
6,336.0	54.77	139.24	6,221.6	68.9	293.9	46.0	12.21	7.53	11.93
6,366.0	57.06	142.26	6,238.5	49.7	309.6	69.7	11.30	7.63	10.07
6,396.0	59.49	143.44	6,254.2	29.4	325.0	94.3	8.76	8.10	3.93
6,419.0	62.23	143.82	6,265.4	13.2	336.9	113.8	12.02	11.93	1.63
<b>Burket @ 6419 MD</b>									
6,425.0	62.95	143.91	6,268.2	8.9	340.0	118.9	12.02	11.93	1.58
6,455.0	66.53	144.35	6,281.0	-13.1	355.9	145.3	12.01	11.93	1.47
6,485.0	69.25	145.72	6,292.3	-35.9	371.9	172.3	10.00	9.07	4.57
6,494.0	70.00	146.23	6,295.4	-42.9	376.6	180.6	9.90	8.38	5.63
<b>Tully @ 6494 MD</b>									
6,515.0	71.77	147.39	6,302.3	-59.5	387.4	200.0	9.90	8.41	5.54
6,545.0	73.99	149.02	6,311.1	-83.8	402.5	226.3	9.04	7.40	5.43
6,570.0	75.94	150.73	6,317.6	-104.7	414.7	252.2	10.22	7.80	6.85
<b>Marcellus @ 6570 MD</b>									
6,575.0	76.33	151.07	6,318.8	-109.0	417.0	257.0	10.22	7.82	6.77
6,605.0	77.31	152.64	6,325.6	-134.7	430.8	286.0	6.05	3.27	5.23
6,634.0	78.89	154.19	6,331.6	-160.1	443.5	314.3	7.55	5.45	5.34
6,664.0	82.16	156.81	6,336.6	-187.0	455.8	343.9	13.89	10.90	8.73
6,694.0	87.08	158.77	6,339.4	-214.7	467.0	373.7	17.64	16.40	6.53
6,724.0	89.40	159.59	6,340.3	-242.7	477.7	403.7	8.20	7.73	2.73
6,813.0	90.50	158.18	6,340.4	-325.7	509.8	492.7	2.01	1.24	-1.58
6,903.0	89.60	158.10	6,340.3	-409.2	543.3	582.7	1.00	-1.00	-0.09



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**Survey**

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6,992.0	89.97	159.18	6,340.6	-492.1	575.7	671.7	1.28	0.42	1.21
7,081.0	89.09	156.68	6,341.4	-574.6	609.1	760.7	2.98	-0.99	-2.81
7,171.0	89.33	156.92	6,342.6	-657.3	644.6	850.7	0.38	0.27	0.27
7,261.0	89.66	156.79	6,343.4	-740.0	680.0	940.6	0.39	0.37	-0.14
7,350.0	90.13	157.09	6,343.6	-821.9	714.8	1,029.6	0.63	0.53	0.34
7,440.0	90.10	157.32	6,343.4	-904.9	749.7	1,119.6	0.26	-0.03	0.26
7,530.0	90.20	157.46	6,343.1	-988.0	784.3	1,209.6	0.19	0.11	0.16
7,619.0	90.71	158.34	6,342.4	-1,070.4	817.8	1,298.6	1.14	0.57	0.99
7,709.0	90.87	158.76	6,341.2	-1,154.2	850.7	1,388.6	0.50	0.18	0.47
7,798.0	91.01	158.65	6,339.7	-1,237.1	883.0	1,477.6	0.20	0.16	-0.12
7,888.0	89.87	157.95	6,339.0	-1,320.7	916.3	1,567.6	1.49	-1.27	-0.78
7,978.0	90.94	159.85	6,338.4	-1,404.7	948.7	1,657.5	2.42	1.19	2.11
8,068.0	90.97	159.60	6,336.9	-1,489.1	979.8	1,747.5	0.28	0.03	-0.28
8,157.0	90.44	158.30	6,335.8	-1,572.2	1,011.8	1,836.5	1.58	-0.60	-1.46
8,247.0	88.72	156.92	6,336.5	-1,655.4	1,046.1	1,926.5	2.45	-1.91	-1.53
8,336.0	89.77	159.10	6,337.6	-1,737.9	1,079.4	2,015.4	2.72	1.18	2.45
8,426.0	89.80	159.30	6,338.0	-1,822.0	1,111.4	2,105.4	0.22	0.03	0.22
8,515.0	90.64	157.80	6,337.6	-1,904.8	1,143.9	2,194.4	1.93	0.94	-1.69
8,605.0	90.70	158.00	6,336.6	-1,988.2	1,177.8	2,284.4	0.23	0.07	0.22
8,694.0	90.44	157.41	6,335.7	-2,070.6	1,211.5	2,373.4	0.72	-0.29	-0.66
8,784.0	89.26	157.78	6,335.9	-2,153.8	1,245.8	2,463.4	1.37	-1.31	0.41
8,873.0	90.03	157.53	6,336.5	-2,236.1	1,279.7	2,552.4	0.91	0.87	-0.28
8,963.0	90.10	156.72	6,336.4	-2,319.0	1,314.7	2,642.4	0.90	0.08	-0.90
9,052.0	90.30	157.00	6,336.1	-2,400.8	1,349.6	2,731.4	0.39	0.22	0.31
9,142.0	90.30	157.55	6,335.6	-2,483.9	1,384.4	2,821.4	0.61	0.00	0.61
9,232.0	90.13	157.23	6,335.3	-2,566.9	1,419.0	2,911.3	0.40	-0.19	-0.36
9,321.0	90.17	157.27	6,335.0	-2,649.0	1,453.4	3,000.3	0.06	0.04	0.04
9,411.0	90.07	158.16	6,334.8	-2,732.3	1,487.5	3,090.3	1.00	-0.11	0.99
9,500.0	90.27	157.78	6,334.6	-2,814.8	1,520.9	3,179.3	0.48	0.22	-0.43
9,590.0	89.63	158.72	6,334.7	-2,898.4	1,554.3	3,269.3	1.26	-0.71	1.04
9,679.0	90.23	159.42	6,334.8	-2,981.5	1,586.1	3,358.3	1.04	0.67	0.79
9,769.0	90.47	159.03	6,334.2	-3,065.7	1,618.0	3,448.3	0.51	0.27	-0.43
9,858.0	90.17	157.58	6,333.7	-3,148.4	1,650.9	3,537.3	1.66	-0.34	-1.63
9,948.0	88.93	157.51	6,334.4	-3,231.5	1,685.3	3,627.3	1.38	-1.38	-0.08
10,037.0	89.03	157.63	6,336.0	-3,313.8	1,719.2	3,716.3	0.18	0.11	0.13
10,127.0	89.33	158.39	6,337.3	-3,397.2	1,752.9	3,806.3	0.91	0.33	0.84
10,216.0	89.90	157.47	6,337.9	-3,479.7	1,786.4	3,895.3	1.22	0.64	-1.03
10,305.0	90.47	155.82	6,337.6	-3,561.4	1,821.6	3,984.2	1.96	0.64	-1.85
10,395.0	89.70	158.39	6,337.5	-3,644.3	1,856.6	4,074.2	2.98	-0.86	2.86
10,484.0	89.33	158.18	6,338.2	-3,727.0	1,889.6	4,163.2	0.48	-0.42	-0.24
10,574.0	90.60	156.79	6,338.3	-3,810.1	1,924.0	4,253.2	2.09	1.41	-1.54
10,663.0	90.64	156.81	6,337.3	-3,891.9	1,959.1	4,342.2	0.05	0.04	0.02
10,753.0	90.84	156.80	6,336.2	-3,974.6	1,994.5	4,432.1	0.22	0.22	-0.01





**Company:** Antero  
**Project:** Ritchie County WV  
**Site:** Annie Horizontal Pad: Belle/Ericson  
**Well:** Ericson Unit 3H  
**Wellbore:** Original Wellpath  
**Design:** As Drilled

**Local Co-ordinate Reference:** Well Ericson Unit 3H  
**TVD Reference:** Precision 523: GL 1004' + KB 19' @ 1023.0usft  
**MD Reference:** Precision 523: GL 1004' + KB 19' @ 1023.0usft  
**North Reference:** Gnd  
**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)
10,842.0	89.13	157.86	6,336.2	-4,056.8	2,028.8	4,521.1	2.26	-1.92	1.19
10,931.0	89.97	159.33	6,336.9	-4,139.6	2,061.3	4,610.1	1.90	0.94	1.65
11,021.0	90.17	159.43	6,336.8	-4,223.8	2,093.0	4,700.1	0.25	0.22	0.11
11,110.0	90.13	159.15	6,336.5	-4,307.1	2,124.5	4,789.1	0.32	-0.04	-0.31
11,200.0	90.13	158.30	6,336.3	-4,391.0	2,157.1	4,879.1	0.94	0.00	-0.94
11,289.0	90.30	158.54	6,336.0	-4,473.7	2,189.9	4,968.1	0.33	0.19	0.27
11,379.0	90.40	158.99	6,335.5	-4,557.6	2,222.5	5,058.0	0.51	0.11	0.50
11,469.0	90.34	159.17	6,334.9	-4,641.7	2,254.6	5,148.0	0.21	-0.07	0.20
11,558.0	89.93	156.70	6,334.7	-4,724.1	2,288.0	5,237.0	2.81	-0.46	-2.78
11,648.0	89.93	156.57	6,334.8	-4,806.8	2,323.7	5,327.0	0.14	0.00	-0.14
11,737.0	89.87	156.81	6,334.9	-4,888.5	2,359.0	5,416.0	0.26	-0.07	0.27
11,826.0	89.97	157.11	6,335.1	-4,970.4	2,393.8	5,505.0	0.36	0.11	0.34
11,916.0	89.73	159.14	6,335.3	-5,053.9	2,427.3	5,594.9	2.27	-0.27	2.26
12,005.0	89.46	158.86	6,335.9	-5,137.0	2,459.2	5,683.9	0.44	-0.30	-0.31
12,095.0	89.66	158.60	6,336.6	-5,220.9	2,491.9	5,773.9	0.36	0.22	-0.29
12,184.0	90.10	159.16	6,336.8	-5,303.9	2,523.9	5,862.9	0.80	0.49	0.63
12,273.0	90.60	160.15	6,336.3	-5,387.3	2,554.9	5,951.9	1.25	0.56	1.11
12,363.0	90.64	158.55	6,335.3	-5,471.5	2,586.6	6,041.8	1.78	0.04	-1.78
12,453.0	89.66	159.47	6,335.0	-5,555.6	2,618.8	6,131.8	1.49	-1.09	1.02
12,542.0	89.63	160.49	6,335.6	-5,639.2	2,649.3	6,220.8	1.15	-0.03	1.15
12,631.0	90.34	158.64	6,335.6	-5,722.6	2,680.4	6,309.7	2.23	0.80	-2.08
12,721.0	90.34	158.75	6,335.1	-5,806.4	2,713.1	6,399.7	0.12	0.00	0.12
12,810.0	90.34	156.22	6,334.6	-5,888.6	2,747.2	6,488.7	2.84	0.00	-2.84
12,900.0	90.44	156.18	6,333.9	-5,971.0	2,783.5	6,578.7	0.12	0.11	-0.04
12,989.0	90.77	156.34	6,333.0	-6,052.5	2,819.3	6,667.6	0.41	0.37	0.18
13,078.0	88.86	155.62	6,333.3	-6,133.7	2,855.5	6,756.6	2.29	-2.15	-0.81
13,092.0	88.46	155.04	6,333.6	-6,146.5	2,861.4	6,770.5	5.03	-2.86	-4.14
<b>Last SDI MWD @ 13092 MD</b>									
13,152.0	88.46	155.04	6,335.2	-6,200.8	2,886.7	6,830.4	0.00	0.00	0.00
<b>Projection To Bit @ 13152 MD / 6335 TVD</b>									

**Formations**

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
6,235.0	6,157.4	Middlesex @ 6235 MD		0.00	
6,419.0	6,265.4	Burket @ 6419 MD		0.00	
6,494.0	6,295.4	Tully @ 6494 MD		0.00	
6,570.0	6,317.6	Marcellus @ 6570 MD		0.00	



**Company:** Antero  
**Project:** Ritchie County WV  
**Site:** Annie Horizontal Pad: Belle/Ericson  
**Well:** Ericson Unit 3H  
**Wellbore:** Original Wellpath  
**Design:** As Drilled

**Local Co-ordinate Reference:** Well Ericson Unit 3H  
**TVD Reference:** Precision 523: GL 1004' + KB 19' @ 1023.0usft  
**MD Reference:** Precision 523: GL 1004' + KB 19' @ 1023.0usft  
**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)	
106.0	106.0	-0.2	0.1	First SDI Gyro @ 106 MD
5,316.0	5,310.2	103.0	4.9	Last SDI Gyro @ 5316 MD
5,348.0	5,342.2	103.2	5.4	First SDI MWD @ 5348 MD
13,092.0	6,333.6	-6,146.5	2,861.4	Last SDI MWD @ 13092 MD
13,152.0	6,335.2	-6,200.8	2,886.7	Projection To Bit @ 13152 MD / 6335 TVD

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