



Duckworth Unit 1H
Ritchie County WV
Northing: 14236711.81
Easting: 1663165.95
As Drilled



Scientific Drilling

Frontier 23: GL 1025 + KB 23 @ 1046.0.usft

Gr. 1025.0

WELL DETAILS Duckworth Unit 1H
 Ground Level: 1025.0
 +N/-S 0.0 +E/-W 0.0 Northing 14236711.81 Easting 1663165.95
 Latitude 12° 19' 22.4" N Longitude 10° 55' 10.863" W

Genie Lightfoot
 11:34, July 13 2015
 Scientific Drilling
 11220 N.W. 10th Street
 Yukon, OK 73089



To convert Magnetic North to Grid, Subtract 8.42°
 To convert True North to Grid, Subtract 0.05°

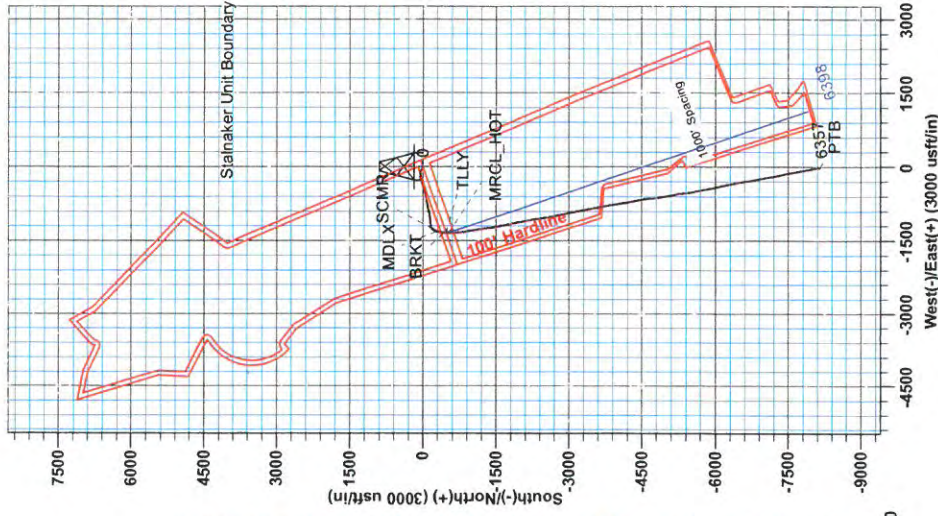
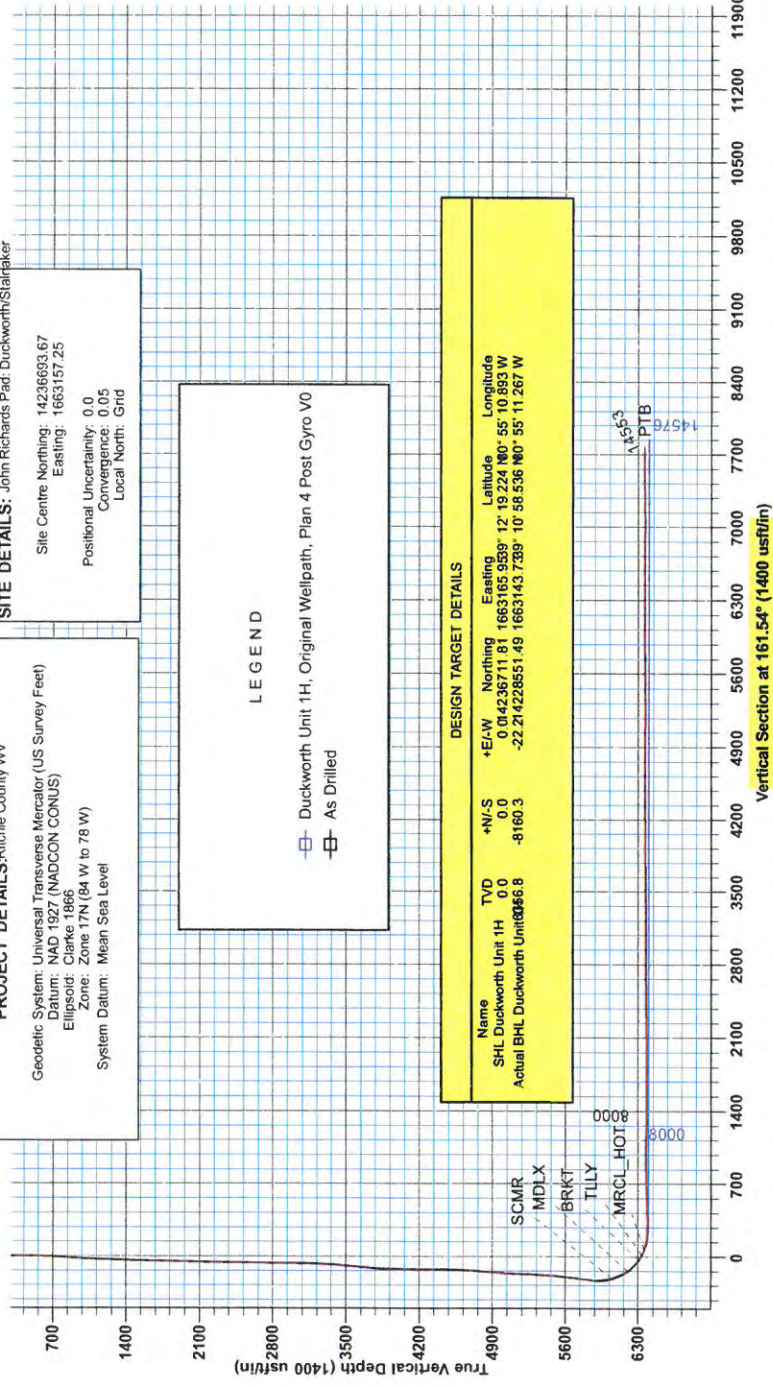
Azimuths to Grid North
 True North -0.05°
 Magnetic North -8.42°
 Magnetic Field
 Strength: 52184.687
 Dip Angle: 66.72°
 Date: 11/03/2014
 Model: BGGM2014

PROJECT DETAILS: Ritchie County WV
 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

SITE DETAILS: John Richards Pad: Duckworth/Stalaker
 Site Centre Northing: 14236693.67
 Easting: 1663157.25
 Positional Uncertainty: 0.0
 Convergence: 0.05
 Local North: Grid

LEGEND
 □ Duckworth Unit 1H, Original Wellpath, Plan 4 Post Gyro V0
 □ As Drilled

DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL Duckworth Unit 1H	0.0	0.0	0.0	14236711.81	1663165.95	12° 19' 22.4" N	10° 55' 10.863" W
Actual BHL Duckworth Unit 1H	66.8	-8160.3	-22.21	14228551.49	1663143.73	10° 58' 53.6" N	11° 26' 7" W





Antero

**Ritchie County WV
John Richards Pad: Duckworth/Stalnaker
Duckworth Unit 1H
Original Wellpath**

Design: As Drilled

EOW Completion Report

13 July, 2015





Company: Antero	Local Co-ordinate Reference: Well Duckworth Unit 1H
Project: Ritchie County WV	TVD Reference: Frontier 23: GL 1025' + KB 23' @ 1048.0usft
Site: John Richards Pad: Duckworth/Stalnaker	MD Reference: Frontier 23: GL 1025' + KB 23' @ 1048.0usft
Well: Duckworth Unit 1H	North Reference: Grid
Wellbore: Original Wellpath	Survey Calculation Method: Minimum Curvature
Design: As Drilled	Database: Antero NE

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

Site John Richards Pad: Duckworth/Stalnaker

Site Position:	Northing: 14,236,693.67 usft	Latitude: 39° 12' 19.044 N
From: Map	Easting: 1,663,157.25 usft	Longitude: 80° 55' 11.004 W
Position Uncertainty: 0.0 usft	Slot Radius: 13-3/16"	Grid Convergence: 0.05 °

Well Duckworth Unit 1H, Marcellu

Well Position	+N/-S 0.0 usft	Northing: 14,236,711.81 usft	Latitude: 39° 12' 19.224 N
	+E/-W 0.0 usft	Easting: 1,663,165.95 usft	Longitude: 80° 55' 10.893 W
Position Uncertainty	2.0 usft	Wellhead Elevation: 1,048.0 usft	Ground Level: 1,025.0 usft

Wellbore Original Wellpath

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	11/3/2014	-8.37	66.79	52,185

Design As Drilled

Audit Notes:

Version: 1.0	Phase: ACTUAL	Tie On Depth: 0.0
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Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	161.54

Survey Program Date 7/13/2015

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
49.3	5,992.9	Survey #6 Final Gyro (Original Wellpath)	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
6,066.0	14,553.0	Survey #8 Corrected (Original Wellpath)	MWD SDI	MWD - Standard ver 1.0.1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
49.3	0.40	283.07	49.3	0.0	-0.2	-0.1	0.81
73.9	0.29	258.77	73.9	0.0	-0.3	-0.1	0.74
96.6	0.35	270.42	96.6	0.0	-0.4	-0.2	0.39
122.4	0.36	235.49	122.4	0.0	-0.6	-0.2	0.83
147.4	0.30	245.76	147.4	-0.1	-0.7	-0.1	0.34
172.4	0.32	228.92	172.4	-0.2	-0.8	-0.1	0.37
196.8	0.36	228.14	196.8	-0.2	-0.9	-0.1	0.16
222.0	0.33	248.58	222.0	-0.3	-1.1	0.0	0.50
247.0	0.35	243.76	247.0	-0.4	-1.2	0.0	0.14
272.0	0.34	251.30	272.0	-0.4	-1.3	0.0	0.19



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Design: As Drilled

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MD Reference: Frontier 23: GL 1025' + KB 23' @ 1048.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	DLeg (°/100usft)
297.0	0.31	248.91	297.0	-0.5	-1.5	0.0	0.13
322.8	0.32	232.75	322.8	-0.6	-1.6	0.0	0.35
347.7	0.37	234.48	347.7	-0.7	-1.7	0.1	0.20
372.5	0.39	246.61	372.5	-0.7	-1.8	0.1	0.33
397.5	0.39	231.90	397.5	-0.8	-2.0	0.1	0.40
421.7	0.44	230.01	421.7	-0.9	-2.1	0.2	0.21
447.5	0.50	225.99	447.5	-1.1	-2.3	0.3	0.27
472.5	0.53	233.54	472.5	-1.2	-2.5	0.4	0.30
497.5	0.54	238.30	497.4	-1.3	-2.7	0.4	0.18
523.7	0.55	260.30	523.7	-1.4	-2.9	0.4	0.79
548.7	1.27	281.26	548.7	-1.4	-3.3	0.3	3.13
573.7	1.86	286.94	573.7	-1.2	-3.9	-0.1	2.44
598.7	2.23	290.68	598.7	-0.9	-4.8	-0.6	1.57
623.7	2.61	293.13	623.6	-0.5	-5.7	-1.3	1.58
647.8	2.61	291.52	647.7	-0.1	-6.8	-2.0	0.30
672.9	3.13	296.77	672.8	0.4	-7.9	-2.9	2.32
697.8	3.55	299.15	697.6	1.1	-9.2	-3.9	1.77
723.0	3.93	301.31	722.8	1.9	-10.6	-5.2	1.61
747.5	4.52	303.14	747.2	2.9	-12.1	-6.6	2.47
772.3	5.03	301.37	771.9	4.0	-13.9	-8.2	2.14
797.4	5.25	302.06	797.0	5.2	-15.8	-9.9	0.91
821.3	5.36	302.12	820.7	6.3	-17.7	-11.6	0.46
849.1	5.33	302.67	848.4	7.7	-19.9	-13.6	0.21
874.3	5.39	302.51	873.5	9.0	-21.8	-15.4	0.25
899.3	5.31	302.29	898.4	10.2	-23.8	-17.2	0.33
923.2	5.23	301.36	922.2	11.4	-25.7	-18.9	0.49
948.3	5.13	300.81	947.2	12.6	-27.6	-20.7	0.45
973.5	5.08	300.42	972.3	13.7	-29.5	-22.4	0.24
999.3	4.96	300.56	998.0	14.8	-31.5	-24.0	0.47
1,024.3	4.82	299.24	1,022.9	15.9	-33.3	-25.6	0.72
1,049.9	4.18	295.55	1,048.4	16.8	-35.1	-27.1	2.75
1,072.0	3.49	290.35	1,070.5	17.4	-36.5	-28.1	3.49
1,096.4	3.43	290.70	1,094.9	17.9	-37.9	-29.0	0.26
1,122.4	3.26	291.10	1,120.7	18.5	-39.3	-30.0	0.66
1,148.7	3.15	290.99	1,147.1	19.0	-40.6	-30.9	0.42
1,174.3	2.84	289.80	1,172.6	19.5	-41.9	-31.7	1.24
1,197.2	2.95	288.98	1,195.4	19.9	-43.0	-32.4	0.51
1,223.8	2.95	293.23	1,222.0	20.3	-44.3	-33.3	0.82
1,245.7	2.78	294.33	1,243.9	20.8	-45.3	-34.0	0.82
1,272.2	2.62	294.19	1,270.4	21.3	-46.4	-34.9	0.60
1,297.9	2.56	294.78	1,296.1	21.8	-47.5	-35.7	0.26
1,349.2	2.58	294.48	1,347.4	22.7	-49.5	-37.3	0.05
1,371.5	2.77	298.62	1,369.6	23.2	-50.5	-38.0	1.22
1,397.5	2.35	298.11	1,395.5	23.8	-51.5	-38.8	1.62



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,423.5	2.26	297.04	1,421.5	24.2	-52.4	-39.6	0.38
1,449.3	2.42	298.16	1,447.3	24.7	-53.4	-40.4	0.64
1,474.1	1.97	296.21	1,472.1	25.2	-54.2	-41.0	1.84
1,496.4	2.04	298.49	1,494.4	25.5	-54.9	-41.6	0.47
1,521.8	2.00	296.40	1,519.8	25.9	-55.7	-42.2	0.33
1,547.2	1.85	293.84	1,545.1	26.3	-56.5	-42.8	0.68
1,573.2	2.03	298.61	1,571.1	26.7	-57.2	-43.4	0.93
1,597.9	2.21	306.01	1,595.8	27.2	-58.0	-44.2	1.32
1,624.0	2.01	301.10	1,621.9	27.7	-58.8	-44.9	1.03
1,649.8	1.88	300.59	1,647.7	28.2	-59.6	-45.6	0.51
1,672.2	1.94	302.49	1,670.1	28.6	-60.2	-46.1	0.39
1,697.7	1.52	302.15	1,695.6	29.0	-60.9	-46.7	1.65
1,723.1	1.60	305.99	1,720.9	29.3	-61.4	-47.3	0.52
1,749.4	1.57	299.77	1,747.3	29.7	-62.0	-47.9	0.66
1,771.7	1.95	305.29	1,769.6	30.1	-62.6	-48.4	1.86
1,798.5	1.56	302.91	1,796.3	30.6	-63.3	-49.0	1.48
1,823.8	1.54	300.75	1,821.6	30.9	-63.9	-49.6	0.24
1,846.3	1.59	304.12	1,844.1	31.3	-64.4	-50.0	0.47
1,873.0	1.48	301.02	1,870.8	31.7	-65.0	-50.6	0.52
1,899.7	1.56	302.45	1,897.5	32.0	-65.6	-51.1	0.33
1,922.1	1.67	310.86	1,919.9	32.4	-66.1	-51.7	1.17
1,948.8	1.54	311.83	1,946.6	32.9	-66.7	-52.3	0.50
1,974.6	1.38	310.90	1,972.4	33.3	-67.2	-52.9	0.63
1,996.6	1.29	316.37	1,994.3	33.7	-67.5	-53.3	0.71
2,022.8	1.36	310.39	2,020.5	34.1	-68.0	-53.9	0.59
2,049.0	1.19	307.80	2,046.7	34.5	-68.4	-54.4	0.68
2,074.9	1.14	308.11	2,072.7	34.8	-68.8	-54.8	0.19
2,099.7	1.37	308.41	2,097.4	35.1	-69.3	-55.3	0.93
2,122.4	1.25	306.59	2,120.1	35.4	-69.7	-55.7	0.56
2,148.6	1.16	308.69	2,146.3	35.8	-70.1	-56.1	0.38
2,174.7	1.34	308.92	2,172.4	36.1	-70.6	-56.6	0.69
2,196.5	1.15	308.90	2,194.2	36.4	-70.9	-57.0	0.87
2,221.9	1.17	312.04	2,219.6	36.8	-71.3	-57.5	0.26
2,247.5	1.15	311.79	2,245.2	37.1	-71.7	-57.9	0.08
2,273.7	1.21	310.33	2,271.4	37.5	-72.1	-58.4	0.26
2,299.2	1.15	317.26	2,296.9	37.8	-72.5	-58.8	0.61
2,321.6	1.19	317.82	2,319.3	38.2	-72.8	-59.3	0.19
2,347.1	1.23	319.89	2,344.7	38.6	-73.1	-59.7	0.23
2,373.4	1.14	321.02	2,371.0	39.0	-73.5	-60.3	0.35
2,398.9	1.26	312.91	2,396.6	39.4	-73.9	-60.7	0.81
2,424.2	1.29	321.53	2,421.9	39.8	-74.2	-61.3	0.77
2,446.9	1.17	322.45	2,444.5	40.2	-74.5	-61.7	0.54
2,491.3	1.00	313.48	2,489.0	40.8	-75.1	-62.5	0.54
2,524.1	1.04	317.16	2,521.7	41.2	-75.5	-63.0	0.23
2,549.8	1.12	310.35	2,547.4	41.6	-75.9	-63.4	0.59



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Site: John Richards Pad: Duckworth/Stalnaker
Well: Duckworth Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

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TVD Reference: Frontier 23: GL 1025' + KB 23' @ 1048.0usft
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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
2,573.2	0.76	320.66	2,570.9	41.8	-76.1	-63.8	1.69
2,597.7	0.90	320.38	2,595.3	42.1	-76.4	-64.1	0.57
2,622.4	0.98	315.07	2,620.0	42.4	-76.6	-64.5	0.48
2,649.1	0.84	317.90	2,646.7	42.7	-76.9	-64.9	0.55
2,673.2	0.85	313.55	2,670.8	43.0	-77.2	-65.2	0.27
2,697.3	0.84	316.62	2,695.0	43.2	-77.4	-65.5	0.19
2,724.8	0.70	312.16	2,722.4	43.5	-77.7	-65.8	0.55
2,748.9	0.76	303.20	2,746.5	43.7	-77.9	-66.1	0.53
2,772.4	0.80	300.22	2,770.0	43.8	-78.2	-66.3	0.24
2,800.0	0.77	293.43	2,797.6	44.0	-78.5	-66.6	0.35
2,824.1	0.76	295.27	2,821.7	44.1	-78.8	-66.8	0.11
2,848.2	0.79	307.57	2,845.8	44.3	-79.1	-67.1	0.70
2,871.1	0.64	297.57	2,868.7	44.4	-79.3	-67.3	0.85
2,898.7	0.66	302.68	2,896.3	44.6	-79.6	-67.5	0.22
2,922.8	0.73	297.21	2,920.4	44.7	-79.9	-67.7	0.40
2,970.7	0.68	289.65	2,968.3	45.0	-80.4	-68.1	0.22
2,999.3	0.74	297.24	2,996.9	45.1	-80.7	-68.4	0.39
3,024.4	0.84	283.21	3,022.0	45.2	-81.1	-68.6	0.86
3,050.7	1.34	280.43	3,048.2	45.3	-81.5	-68.8	1.92
3,074.1	1.84	277.96	3,071.7	45.4	-82.2	-69.1	2.15
3,099.8	2.35	278.40	3,097.4	45.6	-83.1	-69.5	1.99
3,123.8	3.02	277.07	3,121.4	45.7	-84.2	-70.0	2.80
3,149.0	3.45	276.14	3,146.5	45.9	-85.6	-70.6	1.72
3,174.1	4.07	274.81	3,171.5	46.0	-87.3	-71.3	2.50
3,199.9	4.57	274.91	3,197.3	46.2	-89.2	-72.1	1.93
3,224.3	5.15	275.17	3,221.6	46.4	-91.3	-72.9	2.38
3,249.5	5.82	275.46	3,246.7	46.6	-93.7	-73.9	2.66
3,274.7	6.29	275.69	3,271.7	46.9	-96.3	-75.0	1.87
3,299.0	6.71	276.45	3,295.9	47.2	-99.1	-76.1	1.76
3,324.5	7.52	276.50	3,321.1	47.5	-102.2	-77.4	3.18
3,348.9	8.13	276.90	3,345.3	47.9	-105.5	-78.8	2.51
3,374.1	8.90	276.91	3,370.2	48.4	-109.2	-80.4	3.06
3,398.8	9.72	276.88	3,394.7	48.8	-113.2	-82.2	3.31
3,424.4	10.32	276.60	3,419.9	49.4	-117.6	-84.1	2.35
3,449.7	10.71	276.29	3,444.7	49.9	-122.2	-86.0	1.56
3,474.5	11.44	276.50	3,469.0	50.4	-126.9	-88.0	2.95
3,499.6	12.02	276.97	3,493.6	51.0	-132.0	-90.2	2.34
3,523.9	12.46	276.08	3,517.4	51.6	-137.1	-92.3	1.97
3,549.0	12.64	275.58	3,541.8	52.1	-142.5	-94.6	0.84
3,574.5	13.09	275.19	3,566.7	52.7	-148.2	-96.9	1.79
3,599.0	13.19	274.47	3,590.6	53.1	-153.7	-99.1	0.78
3,624.9	13.94	273.98	3,615.8	53.6	-159.8	-101.4	2.93
3,649.3	14.66	273.24	3,639.4	54.0	-165.8	-103.7	3.05
3,675.3	15.15	272.88	3,664.5	54.3	-172.5	-106.1	1.92



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3,699.6	15.84	273.02	3,687.9	54.7	-179.0	-108.5	2.84
3,724.6	16.50	273.08	3,712.0	55.0	-185.9	-111.1	2.64
3,749.7	17.24	271.97	3,736.0	55.4	-193.2	-113.7	3.21
3,774.5	17.74	268.63	3,759.6	55.4	-200.6	-116.1	4.53
3,799.8	17.98	264.80	3,783.8	54.9	-208.4	-118.1	4.72
3,824.8	18.21	261.55	3,807.5	54.0	-216.1	-119.7	4.15
3,849.1	18.48	256.73	3,830.6	52.6	-223.6	-120.7	6.33
3,874.8	19.15	252.92	3,854.9	50.4	-231.6	-121.1	5.45
3,899.5	19.87	251.12	3,878.2	47.9	-239.4	-121.2	3.79
3,924.2	20.49	251.14	3,901.4	45.1	-247.5	-121.1	2.51
3,949.2	21.19	251.66	3,924.7	42.3	-255.9	-121.1	2.90
3,974.2	22.16	252.12	3,947.9	39.4	-264.7	-121.2	3.94
3,999.3	23.35	252.40	3,971.1	36.4	-273.9	-121.3	4.77
4,024.4	24.43	252.93	3,994.1	33.4	-283.7	-121.5	4.38
4,048.7	25.60	253.67	4,016.1	30.5	-293.5	-121.8	4.98
4,074.9	26.28	254.14	4,039.6	27.3	-304.5	-122.3	2.71
4,099.1	26.60	253.67	4,061.3	24.3	-314.9	-122.7	1.58
4,124.7	27.12	253.27	4,084.1	21.0	-325.9	-123.1	2.15
4,149.0	27.45	253.21	4,105.7	17.8	-336.6	-123.5	1.36
4,174.8	28.65	253.03	4,128.5	14.3	-348.2	-123.8	4.67
4,199.5	29.72	253.15	4,150.1	10.8	-359.7	-124.1	4.33
4,224.6	30.57	253.05	4,171.7	7.1	-371.8	-124.5	3.40
4,248.9	30.75	253.00	4,192.7	3.5	-383.7	-124.8	0.75
4,274.0	30.45	252.48	4,214.3	-0.3	-395.9	-125.1	1.60
4,299.5	29.54	251.60	4,236.4	-4.2	-408.0	-125.2	3.96
4,324.1	29.67	251.97	4,257.7	-8.0	-419.5	-125.2	0.91
4,348.8	28.54	252.51	4,279.3	-11.7	-431.0	-125.4	4.70
4,373.4	28.27	252.28	4,301.0	-15.2	-442.1	-125.5	1.18
4,399.4	27.58	251.85	4,323.9	-19.0	-453.7	-125.6	2.77
4,424.1	27.05	251.10	4,345.9	-22.6	-464.4	-125.6	2.55
4,449.9	26.75	250.26	4,368.9	-26.5	-475.5	-125.5	1.87
4,474.3	26.14	249.88	4,390.7	-30.2	-485.7	-125.2	2.60
4,499.2	26.10	251.42	4,413.1	-33.8	-496.0	-125.0	2.72
4,523.9	25.42	251.59	4,435.3	-37.2	-506.2	-125.0	2.77
4,549.0	25.05	251.33	4,458.1	-40.6	-516.4	-125.0	1.54
4,574.0	25.38	252.05	4,480.7	-43.9	-526.5	-125.0	1.81
4,599.1	25.00	254.22	4,503.4	-47.0	-536.7	-125.3	3.98
4,624.8	25.26	256.87	4,526.6	-49.8	-547.2	-126.1	4.50
4,648.7	25.20	258.24	4,548.3	-52.0	-557.2	-127.1	2.45
4,673.4	25.56	259.16	4,570.6	-54.0	-567.6	-128.5	2.16
4,699.4	25.86	259.66	4,594.0	-56.1	-578.7	-130.0	1.42
4,724.0	25.83	259.65	4,616.1	-58.0	-589.2	-131.5	0.12
4,749.9	25.45	259.24	4,639.5	-60.1	-600.2	-133.1	1.62
4,774.4	25.78	259.77	4,661.6	-62.0	-610.7	-134.5	1.64



Company: Antero
Project: Ritchie County WV
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Well: Duckworth Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

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Survey Calculation Method: Minimum Curvature
Database: Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
4,799.6	25.88	260.22	4,684.2	-63.9	-621.4	-136.1	0.87
4,823.7	26.21	260.47	4,706.0	-65.7	-631.9	-137.8	1.44
4,848.9	25.97	259.97	4,728.6	-67.6	-642.8	-139.4	1.29
4,873.7	26.26	259.98	4,750.8	-69.5	-653.5	-141.0	1.17
4,899.9	26.72	259.71	4,774.2	-71.5	-665.0	-142.7	1.82
4,924.5	27.22	259.67	4,796.2	-73.5	-676.1	-144.3	2.03
4,949.4	27.43	259.39	4,818.3	-75.6	-687.3	-145.9	0.99
4,974.6	28.10	259.39	4,840.7	-77.8	-698.8	-147.5	2.65
4,999.1	28.78	259.42	4,862.2	-79.9	-710.3	-149.1	2.78
5,024.3	28.64	259.22	4,884.2	-82.2	-722.2	-150.7	0.67
5,049.2	29.30	259.20	4,906.0	-84.4	-734.0	-152.3	2.65
5,074.2	30.29	259.70	4,927.7	-86.7	-746.2	-154.1	4.08
5,099.1	30.46	260.09	4,949.3	-88.9	-758.7	-155.9	1.04
5,124.1	30.70	259.90	4,970.7	-91.1	-771.1	-157.8	1.04
5,149.3	30.48	259.74	4,992.4	-93.4	-783.8	-159.6	0.93
5,174.9	30.14	259.13	5,014.6	-95.7	-796.5	-161.4	1.79
5,206.4	29.73	258.35	5,041.8	-98.8	-811.9	-163.4	1.80
5,224.8	29.05	257.86	5,057.9	-100.7	-820.8	-164.4	3.91
5,248.7	29.11	257.34	5,078.8	-103.2	-832.1	-165.6	1.09
5,274.7	28.97	256.86	5,101.4	-106.0	-844.4	-166.8	1.05
5,299.5	28.61	256.45	5,123.3	-108.7	-856.0	-167.9	1.65
5,324.4	28.01	256.32	5,145.1	-111.5	-867.5	-168.9	2.43
5,349.4	27.84	256.05	5,167.3	-114.3	-878.9	-169.8	0.85
5,374.0	27.66	255.70	5,189.0	-117.1	-890.0	-170.7	0.99
5,399.6	27.22	255.18	5,211.7	-120.1	-901.4	-171.5	1.96
5,425.0	26.70	255.00	5,234.3	-123.0	-912.5	-172.2	2.07
5,448.4	26.01	257.02	5,255.3	-125.6	-922.6	-173.0	4.83
5,473.9	24.56	258.92	5,278.4	-127.8	-933.2	-174.2	6.52
5,499.5	24.37	259.63	5,301.7	-129.8	-943.6	-175.7	1.37
5,524.2	23.63	259.55	5,324.2	-131.6	-953.5	-177.1	3.00
5,548.9	23.52	259.72	5,346.9	-133.4	-963.3	-178.5	0.52
5,574.4	23.11	258.75	5,370.3	-135.3	-973.2	-179.8	2.21
5,599.6	22.72	257.59	5,393.5	-137.3	-982.8	-181.0	2.37
5,624.4	22.63	257.93	5,416.4	-139.3	-992.1	-182.0	0.64
5,649.8	22.79	261.19	5,439.8	-141.1	-1,001.8	-183.4	4.99
5,674.9	23.11	263.11	5,463.0	-142.4	-1,011.4	-185.2	3.24
5,699.6	23.08	263.67	5,485.7	-143.5	-1,021.1	-187.2	0.90
5,724.7	22.91	263.90	5,508.7	-144.6	-1,030.8	-189.2	0.77
5,749.0	23.30	263.72	5,531.1	-145.6	-1,040.3	-191.3	1.63
5,773.5	23.12	263.73	5,553.7	-146.7	-1,049.9	-193.3	0.73
5,799.4	22.91	262.67	5,577.5	-147.9	-1,060.0	-195.4	1.79
5,823.6	23.28	262.98	5,599.7	-149.1	-1,069.4	-197.2	1.61
5,848.9	23.44	264.26	5,622.9	-150.2	-1,079.3	-199.3	2.10
5,874.1	23.75	265.50	5,646.1	-151.1	-1,089.4	-201.6	2.32



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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,898.9	23.70	266.26	5,668.8	-151.8	-1,099.4	-204.1	1.25
5,924.9	24.01	266.46	5,692.5	-152.5	-1,109.8	-206.8	1.24
5,949.0	25.31	267.07	5,714.5	-153.0	-1,119.9	-209.4	5.48
5,974.4	25.60	266.93	5,737.3	-153.6	-1,130.7	-212.3	1.17
5,992.9	25.60	266.93	5,754.0	-154.0	-1,138.7	-214.5	0.00
6,066.0	26.29	266.47	5,819.8	-155.9	-1,170.7	-222.8	0.98
6,098.0	25.91	266.80	5,848.5	-156.7	-1,184.7	-226.5	1.27
6,130.0	24.79	261.57	5,877.5	-158.1	-1,198.4	-229.5	7.82
6,162.0	23.15	250.92	5,906.7	-161.1	-1,210.9	-230.6	14.44
6,194.0	22.95	242.27	5,936.2	-166.1	-1,222.4	-229.5	10.59
6,227.0	24.07	233.41	5,966.4	-173.1	-1,233.5	-226.4	11.22
6,259.0	26.44	227.43	5,995.4	-181.8	-1,244.0	-221.5	10.87
6,291.0	28.07	223.36	6,023.8	-192.1	-1,254.4	-215.0	7.74
6,318.0	28.75	220.10	6,047.6	-201.7	-1,263.0	-208.6	6.27
SCMR							
6,323.0	28.89	219.51	6,052.0	-203.5	-1,264.5	-207.3	6.34
6,354.0	30.44	214.42	6,078.9	-215.8	-1,273.7	-198.6	9.54
6,386.0	32.36	212.47	6,106.2	-229.7	-1,282.9	-188.3	6.79
6,418.0	33.75	211.34	6,133.0	-244.5	-1,292.1	-177.2	4.75
6,449.0	35.59	209.00	6,158.5	-259.8	-1,301.0	-165.5	7.32
6,481.0	38.07	204.71	6,184.1	-276.9	-1,309.6	-152.0	11.16
6,504.0	39.85	200.73	6,202.0	-290.2	-1,315.2	-141.2	13.35
MDLX							
6,514.0	40.67	199.09	6,209.7	-296.3	-1,317.4	-136.1	13.40
6,546.0	44.37	194.81	6,233.3	-317.0	-1,323.7	-118.5	14.67
6,578.0	48.56	191.72	6,255.3	-339.6	-1,329.0	-98.7	14.84
6,609.0	52.12	190.35	6,275.1	-363.0	-1,333.5	-78.0	11.98
6,641.0	54.76	189.40	6,294.1	-388.3	-1,337.9	-55.3	8.59
6,671.0	58.11	187.77	6,310.7	-413.0	-1,341.6	-33.1	12.05
BRKT							
6,673.0	58.33	187.67	6,311.8	-414.7	-1,341.9	-31.5	11.79
6,705.0	62.39	186.26	6,327.6	-442.3	-1,345.2	-6.4	13.25
6,731.0	66.46	184.68	6,338.8	-465.6	-1,347.5	15.0	16.59
TLLY							
6,736.0	67.24	184.39	6,340.8	-470.2	-1,347.8	19.2	16.49
6,768.0	70.43	182.47	6,352.3	-500.0	-1,349.6	46.9	11.43
6,789.0	71.82	182.01	6,359.1	-519.8	-1,350.4	65.5	6.94
MRCL_HOT							
6,799.0	72.48	181.79	6,362.2	-529.4	-1,350.7	74.4	6.92
6,831.0	75.11	180.68	6,371.1	-560.1	-1,351.4	103.4	8.87
6,863.0	79.19	178.69	6,378.2	-591.3	-1,351.2	133.0	14.12
6,894.0	83.34	177.32	6,382.9	-621.9	-1,350.1	162.4	14.08
6,907.0	85.03	176.48	6,384.3	-634.8	-1,349.4	174.9	14.50
6,947.2	87.33	173.49	6,386.9	-674.8	-1,345.9	213.9	9.37
6,964.0	88.29	172.25	6,387.6	-691.4	-1,343.8	230.3	9.33



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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
6,984.0	88.52	172.00	6,388.1	-711.2	-1,341.1	250.0	1.70
7,080.0	89.97	171.47	6,389.4	-806.2	-1,327.3	344.4	1.61
7,176.0	92.11	171.01	6,387.7	-901.1	-1,312.7	439.1	2.28
7,273.0	92.62	171.50	6,383.7	-996.9	-1,297.9	534.6	0.73
7,369.0	91.41	170.50	6,380.3	-1,091.6	-1,282.9	629.2	1.63
7,465.0	91.34	170.32	6,378.0	-1,186.2	-1,266.9	724.0	0.20
7,561.0	90.54	171.06	6,376.4	-1,281.0	-1,251.4	818.8	1.13
7,658.0	90.87	174.29	6,375.2	-1,377.2	-1,239.0	914.0	3.35
7,754.0	89.13	171.23	6,375.2	-1,472.4	-1,227.0	1,008.1	3.67
7,850.0	88.32	169.37	6,377.3	-1,567.0	-1,210.8	1,103.0	2.11
7,946.0	89.16	168.01	6,379.5	-1,661.1	-1,192.0	1,198.2	1.66
8,042.0	89.26	167.20	6,380.8	-1,754.8	-1,171.4	1,293.6	0.85
8,138.0	89.19	166.50	6,382.1	-1,848.3	-1,149.5	1,389.2	0.73
8,233.0	90.67	168.19	6,382.2	-1,941.0	-1,128.7	1,483.7	2.36
8,329.0	90.61	168.40	6,381.1	-2,035.0	-1,109.2	1,579.1	0.23
8,425.0	90.03	171.36	6,380.6	-2,129.5	-1,092.4	1,674.0	3.14
8,521.0	89.66	171.02	6,380.8	-2,224.4	-1,077.7	1,768.7	0.52
8,617.0	89.56	170.88	6,381.5	-2,319.2	-1,062.6	1,863.4	0.18
8,713.0	89.43	171.08	6,382.3	-2,414.0	-1,047.5	1,958.1	0.25
8,809.0	91.48	171.29	6,381.6	-2,508.8	-1,032.8	2,052.7	2.15
8,904.0	92.05	170.39	6,378.7	-2,602.6	-1,017.7	2,146.4	1.12
9,000.0	90.97	169.11	6,376.1	-2,697.0	-1,000.6	2,241.4	1.74
9,096.0	90.57	169.06	6,374.8	-2,791.3	-982.4	2,336.6	0.42
9,191.0	90.07	168.51	6,374.3	-2,884.4	-964.0	2,430.8	0.78
9,287.0	89.73	167.68	6,374.5	-2,978.4	-944.2	2,526.2	0.93
9,383.0	90.67	168.14	6,374.1	-3,072.2	-924.0	2,621.6	1.09
9,479.0	91.18	169.09	6,372.6	-3,166.3	-905.1	2,716.8	1.12
9,574.0	89.66	169.25	6,371.9	-3,259.6	-887.3	2,811.0	1.61
9,665.0	90.07	169.71	6,372.1	-3,349.1	-870.6	2,901.1	0.68
9,756.0	91.04	170.30	6,371.2	-3,438.7	-854.8	2,991.1	1.25
9,847.0	89.76	167.76	6,370.6	-3,528.1	-837.5	3,081.3	3.13
9,937.0	88.76	168.23	6,371.8	-3,616.1	-818.8	3,170.7	1.23
10,028.0	90.07	170.31	6,372.7	-3,705.5	-801.9	3,260.9	2.70
10,119.0	90.54	170.54	6,372.2	-3,795.2	-786.7	3,350.8	0.58
10,210.0	90.84	170.28	6,371.1	-3,884.9	-771.6	3,440.7	0.44
10,300.0	90.30	170.04	6,370.2	-3,973.6	-756.2	3,529.7	0.66
10,391.0	90.07	170.14	6,369.9	-4,063.2	-740.5	3,619.7	0.28
10,482.0	90.97	171.13	6,369.1	-4,153.0	-725.7	3,709.5	1.47
10,572.0	90.61	170.24	6,367.8	-4,241.8	-711.2	3,798.4	1.07
10,663.0	90.17	169.77	6,367.2	-4,331.4	-695.4	3,888.4	0.71
10,759.0	91.14	168.67	6,366.1	-4,425.7	-677.4	3,983.5	1.53
10,855.0	91.50	172.16	6,363.9	-4,520.4	-661.4	4,078.3	3.65
10,951.0	89.70	173.86	6,362.9	-4,615.6	-649.8	4,172.4	2.58
11,048.0	89.66	174.20	6,363.5	-4,712.1	-639.7	4,267.1	0.35



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11,144.0	89.66	173.38	6,364.0	-4,807.5	-629.3	4,360.9	0.85
11,240.0	90.24	171.85	6,364.1	-4,902.7	-616.9	4,455.1	1.70
11,336.0	90.47	168.32	6,363.5	-4,997.3	-600.4	4,550.0	3.68
11,431.0	90.10	168.25	6,363.0	-5,090.3	-581.1	4,644.4	0.40
11,528.0	90.00	168.83	6,363.0	-5,185.4	-561.9	4,740.7	0.61
11,624.0	90.44	170.80	6,362.6	-5,279.9	-544.9	4,835.6	2.10
11,720.0	90.97	173.37	6,361.4	-5,374.9	-531.7	4,930.0	2.73
11,816.0	89.23	172.44	6,361.2	-5,470.2	-519.8	5,024.1	2.06
11,911.0	89.13	168.51	6,362.6	-5,563.8	-504.1	5,117.9	4.14
12,007.0	88.76	168.32	6,364.4	-5,657.9	-484.8	5,213.2	0.43
12,102.0	90.24	168.15	6,365.2	-5,750.9	-465.4	5,307.6	1.57
12,197.0	90.34	168.03	6,364.7	-5,843.8	-445.8	5,402.0	0.16
12,292.0	89.76	167.06	6,364.6	-5,936.6	-425.4	5,496.4	1.19
12,388.0	90.07	167.98	6,364.8	-6,030.3	-404.6	5,591.9	1.01
12,484.0	90.74	168.10	6,364.1	-6,124.2	-384.7	5,687.3	0.71
12,580.0	90.84	170.04	6,362.8	-6,218.5	-366.5	5,782.5	2.02
12,677.0	90.40	169.31	6,361.7	-6,313.9	-349.1	5,878.5	0.88
12,773.0	90.91	171.22	6,360.6	-6,408.5	-332.9	5,973.4	2.06
12,869.0	90.20	172.40	6,359.7	-6,503.5	-319.2	6,067.8	1.43
12,965.0	90.40	172.45	6,359.2	-6,598.7	-306.6	6,162.1	0.21
13,060.0	89.53	169.92	6,359.3	-6,692.6	-292.0	6,255.7	2.82
13,157.0	89.40	169.83	6,360.2	-6,788.0	-275.0	6,351.7	0.16
13,252.0	89.06	170.49	6,361.4	-6,881.6	-258.7	6,445.6	0.78
13,348.0	90.30	170.07	6,362.0	-6,976.3	-242.5	6,540.5	1.36
13,444.0	90.13	169.59	6,361.6	-7,070.8	-225.6	6,635.5	0.53
13,540.0	89.90	169.25	6,361.6	-7,165.1	-207.9	6,730.6	0.43
13,636.0	89.66	168.09	6,362.0	-7,259.2	-189.1	6,825.9	1.23
13,732.0	89.60	167.43	6,362.6	-7,353.1	-168.7	6,921.3	0.69
13,828.0	89.13	166.95	6,363.6	-7,446.7	-147.4	7,016.8	0.70
13,924.0	91.07	168.13	6,363.5	-7,540.4	-126.7	7,112.3	2.37
14,020.0	91.85	168.19	6,361.0	-7,634.3	-107.0	7,207.6	0.81
14,116.0	90.77	168.89	6,358.8	-7,728.4	-88.0	7,302.9	1.34
14,212.0	90.77	171.75	6,357.5	-7,823.0	-71.8	7,397.7	2.98
14,308.0	90.74	171.43	6,356.3	-7,918.0	-57.8	7,492.2	0.33
14,405.0	89.73	171.36	6,355.9	-8,013.9	-43.3	7,587.8	1.04
14,497.0	89.60	172.02	6,356.4	-8,104.9	-30.0	7,678.4	0.73
14,553.0	89.60	172.02	6,356.8	-8,160.3	-22.2	7,733.4	0.00

PTB



Company: Antero
Project: Ritchie County WV
Site: John Richards Pad: Duckworth/Stalnaker
Well: Duckworth Unit 1H
Wellbore: Original Wellpath
Design: As Drilled

Local Co-ordinate Reference: Well Duckworth Unit 1H
TVD Reference: Frontier 23: GL 1025' + KB 23' @ 1048.0usft
MD Reference: Frontier 23: GL 1025' + KB 23' @ 1048.0usft
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)	
6,318.0	6,047.6	-201.7	-1,263.0	SCMR
6,504.0	6,202.0	-290.2	-1,315.2	MDLX
6,671.0	6,310.7	-413.0	-1,341.6	BRKT
6,731.0	6,338.8	-465.6	-1,347.5	TLLY
6,789.0	6,359.1	-519.8	-1,350.4	MRCL_HOT
14,553.0	6,356.8	-8,160.3	-22.2	PTB

Checked By: _____ Approved By: _____ Date: _____