

HG Energy, LLC
Lincoln County, West Virginia
Austin Griffith #159
Austin Griffith #159

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

29 September, 2015

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Oil and Gas
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The DIRECTIONAL DRILLING COMPANY
WV Department of
Environmental Protection
02/19/2016

HP
Survey Report - Geographic



Company: HG Energy, LLC	Local Co-ordinate Reference: Well Austin Griffith #159
Project: Lincoln County, West Virginia	TVD Reference: WELL @ 696.0usft (Decker #9)
Site: Austin Griffith #159	MD Reference: WELL @ 696.0usft (Decker #9)
Well: Austin Griffith #159	North Reference: Grid
Wellbore: Wellbore #1	Survey Calculation Method: Minimum Curvature
Design: Wellbore #1	Database: Compass

Project	Lincoln County, West Virginia
Map System:	Universal Transverse Mercator
Geo Datum:	NAD83 West Virginia - HARN
Map Zone:	Zone 17N (84 W to 78 W)
System Datum:	Mean Sea Level

Site Austin Griffith #159

Site Position:		Northing: 13,882,022.91 usft	Latitude: 38° 13' 30.900 N
From: Lat/Long		Easting: 1,362,844.54 usft	Longitude: 81° 57' 59.700 W
Position Uncertainty: 0.0 usft		Slot Radius: 13-3/16 "	Grid Convergence: -0.60 °

Well Austin Griffith #159

Well Position	+N-S 0.0 usft	Northing: 13,882,022.91 usft	Latitude: 38° 13' 30.900 N
	+E-W 0.0 usft	Easting: 1,362,844.54 usft	Longitude: 81° 57' 59.700 W
Position Uncertainty 0.0 usft		Wellhead Elevation: 0.0 usft	Ground Level: 688.0 usft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	9/2/2015	-7.42	66.03	51,713

Design Wellbore #1

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	74.34

Survey Program	Date 9/29/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
379.0	2,212.0	MWD (Wellbore #1)	MWD default	MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.0	0.00	0.00	0.0	0.0	0.0	13,882,022.91	1,362,844.54	38° 13' 30.900 N	81° 57' 59.700 W
379.0	0.22	205.97	379.0	-0.7	-0.3	13,882,022.26	1,362,844.22	38° 13' 30.893 N	81° 57' 59.704 W
First Survey @ 379' MD / 379' TVD									
409.0	0.31	260.79	409.0	-0.7	-0.4	13,882,022.19	1,362,844.11	38° 13' 30.890 N	81° 57' 59.705 W
439.0	0.31	182.48	439.0	-0.8	-0.5	13,882,022.10	1,362,844.03	38° 13' 30.892 N	81° 57' 59.706 W
469.0	0.49	151.15	469.0	-1.0	-0.4	13,882,021.91	1,362,844.09	38° 13' 30.890 N	81° 57' 59.705 W
499.0	1.50	160.89	499.0	-1.5	-0.3	13,882,021.42	1,362,844.28	38° 13' 30.885 N	81° 57' 59.703 W
529.0	1.81	153.75	529.0	-2.3	0.1	13,882,020.63	1,362,844.62	38° 13' 30.877 N	81° 57' 59.699 W
559.0	2.39	152.56	559.0	-3.3	0.6	13,882,019.65	1,362,845.11	38° 13' 30.868 N	81° 57' 59.692 W
589.0	2.61	134.05	588.9	-4.3	1.4	13,882,018.62	1,362,845.89	38° 13' 30.858 N	81° 57' 59.682 W
619.0	3.18	109.86	618.9	-5.1	2.6	13,882,017.86	1,362,847.17	38° 13' 30.850 N	81° 57' 59.674 W
649.0	4.02	103.47	648.8	-5.6	4.4	13,882,017.33	1,362,848.97	38° 13' 30.844 N	81° 57' 59.644 W

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Wellbore: Wellbore #1
Design: Wellbore #1

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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
679.0	4.42	96.29	678.8	-6.0	6.6	13,882,016.96	1,362,851.14	38° 13' 30.842 N	81° 57' 59.616 W
709.0	5.70	92.76	708.6	-6.2	9.2	13,882,016.76	1,362,853.78	38° 13' 30.840 N	81° 57' 59.583 W
739.0	6.19	88.09	738.5	-6.2	12.3	13,882,016.74	1,362,856.89	38° 13' 30.840 N	81° 57' 59.544 W
769.0	7.29	83.16	768.3	-5.9	15.9	13,882,017.03	1,362,860.39	38° 13' 30.843 N	81° 57' 59.500 W
799.0	7.91	83.46	798.0	-5.4	19.8	13,882,017.49	1,362,864.33	38° 13' 30.848 N	81° 57' 59.451 W
829.0	9.19	81.66	827.7	-4.8	24.2	13,882,018.07	1,362,868.75	38° 13' 30.855 N	81° 57' 59.396 W
859.0	10.38	79.19	857.2	-4.0	29.2	13,882,018.92	1,362,873.78	38° 13' 30.864 N	81° 57' 59.333 W
889.0	11.40	76.77	886.7	-2.8	34.8	13,882,020.11	1,362,879.32	38° 13' 30.876 N	81° 57' 59.264 W
919.0	12.28	75.75	916.1	-1.3	40.8	13,882,021.57	1,362,885.30	38° 13' 30.891 N	81° 57' 59.189 W
949.0	13.39	74.08	945.3	0.4	47.2	13,882,023.31	1,362,891.73	38° 13' 30.909 N	81° 57' 59.108 W
979.0	14.58	72.98	974.4	2.5	54.1	13,882,025.37	1,362,898.68	38° 13' 30.930 N	81° 57' 59.022 W
1,009.0	15.29	71.79	1,003.4	4.8	61.5	13,882,027.71	1,362,906.05	38° 13' 30.954 N	81° 57' 58.930 W
1,039.0	16.22	69.76	1,032.3	7.5	69.2	13,882,030.40	1,362,913.74	38° 13' 30.981 N	81° 57' 58.834 W
1,069.0	17.19	69.27	1,061.0	10.5	77.3	13,882,033.42	1,362,921.82	38° 13' 31.012 N	81° 57' 58.733 W
1,099.0	18.21	71.79	1,089.6	13.5	85.9	13,882,036.45	1,362,930.42	38° 13' 31.043 N	81° 57' 58.625 W
1,129.0	20.02	72.98	1,117.9	16.5	95.2	13,882,039.42	1,362,939.78	38° 13' 31.073 N	81° 57' 58.508 W
1,159.0	21.79	74.08	1,146.0	19.5	105.5	13,882,042.45	1,362,950.05	38° 13' 31.104 N	81° 57' 58.380 W
1,189.0	23.42	74.78	1,173.7	22.6	116.6	13,882,045.54	1,362,961.16	38° 13' 31.136 N	81° 57' 58.241 W
1,219.0	25.19	74.96	1,201.0	25.8	128.5	13,882,048.76	1,362,973.07	38° 13' 31.169 N	81° 57' 58.092 W
1,249.0	26.51	75.88	1,228.0	29.1	141.2	13,882,052.05	1,362,985.73	38° 13' 31.203 N	81° 57' 57.934 W
1,279.0	28.02	75.49	1,254.7	32.5	154.5	13,882,055.45	1,362,999.05	38° 13' 31.238 N	81° 57' 57.768 W
1,309.0	29.61	75.58	1,280.9	36.2	168.5	13,882,059.06	1,363,013.05	38° 13' 31.275 N	81° 57' 57.592 W
1,339.0	31.11	75.27	1,306.8	40.0	183.2	13,882,062.88	1,363,027.72	38° 13' 31.314 N	81° 57' 57.409 W
1,369.0	32.30	74.25	1,332.3	44.1	198.4	13,882,067.03	1,363,042.94	38° 13' 31.357 N	81° 57' 57.219 W
1,399.0	33.80	73.11	1,357.5	48.7	214.1	13,882,071.63	1,363,058.64	38° 13' 31.404 N	81° 57' 57.023 W
1,429.0	34.82	74.25	1,382.3	53.5	230.3	13,882,076.38	1,363,074.86	38° 13' 31.452 N	81° 57' 56.820 W
1,489.0	35.62	69.76	1,431.3	64.2	263.2	13,882,087.07	1,363,107.75	38° 13' 31.562 N	81° 57' 56.409 W
1,609.0	33.89	67.69	1,529.9	89.0	327.0	13,882,111.87	1,363,171.50	38° 13' 31.813 N	81° 57' 55.613 W
1,669.0	34.20	67.47	1,579.6	101.8	358.0	13,882,124.68	1,363,202.55	38° 13' 31.943 N	81° 57' 55.226 W
1,699.0	34.82	66.45	1,604.3	108.4	373.6	13,882,131.33	1,363,218.19	38° 13' 32.011 N	81° 57' 55.031 W
1,729.0	35.40	66.76	1,628.9	115.3	389.5	13,882,138.18	1,363,234.02	38° 13' 32.080 N	81° 57' 54.833 W
1,759.0	36.28	66.76	1,653.2	122.2	405.6	13,882,145.11	1,363,250.16	38° 13' 32.150 N	81° 57' 54.632 W
1,819.0	36.59	67.95	1,701.5	135.9	438.5	13,882,158.83	1,363,283.05	38° 13' 32.289 N	81° 57' 54.221 W
1,849.0	36.10	68.48	1,725.6	142.5	455.0	13,882,165.43	1,363,299.56	38° 13' 32.356 N	81° 57' 54.015 W
1,879.0	35.88	68.88	1,749.9	148.9	471.4	13,882,171.84	1,363,315.98	38° 13' 32.421 N	81° 57' 53.810 W
1,909.0	34.91	70.07	1,774.4	155.0	487.7	13,882,177.93	1,363,332.25	38° 13' 32.483 N	81° 57' 53.607 W
1,939.0	33.80	71.08	1,799.1	160.7	503.7	13,882,183.56	1,363,348.22	38° 13' 32.540 N	81° 57' 53.408 W
1,969.0	32.48	72.49	1,824.2	165.8	519.3	13,882,188.69	1,363,363.79	38° 13' 32.593 N	81° 57' 53.213 W
1,999.0	31.82	73.77	1,849.6	170.4	534.5	13,882,193.33	1,363,379.07	38° 13' 32.640 N	81° 57' 53.022 W
2,029.0	31.90	73.67	1,875.1	174.9	549.7	13,882,197.77	1,363,394.27	38° 13' 32.686 N	81° 57' 52.832 W
2,059.0	31.29	74.56	1,900.7	179.2	564.8	13,882,202.07	1,363,409.39	38° 13' 32.730 N	81° 57' 52.643 W
2,089.0	31.02	76.37	1,926.3	183.1	579.9	13,882,205.97	1,363,424.41	38° 13' 32.770 N	81° 57' 52.455 W
2,119.0	30.31	77.47	1,952.1	186.5	594.8	13,882,209.43	1,363,439.31	38° 13' 32.806 N	81° 57' 52.269 W
2,149.0	29.92	77.16	1,978.1	189.8	609.5	13,882,212.73	1,363,454.00	38° 13' 32.840 N	81° 57' 52.085 W
2,212.0	29.92	77.16	2,032.7	196.8	640.1	13,882,219.72	1,363,484.63	38° 13' 32.912 N	81° 57' 51.702 W

TD @ 2212' MD / 2033' TVD

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Site: Austin Griffith #159
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Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Austin Griffith #159
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MD Reference: WELL @ 696.0usft (Decker #9)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
379.0	379.0	-0.7	-0.3	First Survey @ 379' MD / 379' TVD
2,212.0	2,032.7	196.8	640.1	TD @ 2212' MD / 2033' TVD

Checked By: _____	Approved By: _____	Date: _____
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Environmental Protection
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Lincoln County, West Virginia

Austin Griffith #159

Austin Griffith #159

Wellbore #1

Design: Wellbore #1

HG Energy EOW Report

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Project	Lincoln County, West Virginia		
Map System:	Universal Transverse Mercator	System Datum:	Mean Sea Level
Geo Datum:	NAD83 West Virginia - HARN		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	Austin Griffith #159		
Site Position:		Northing:	13,882,022.91 usft
From:	Lat/Long	Easting:	1,362,844.54 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	38° 13' 30.900 N
		Longitude:	81° 57' 59.700 W
		Grid Convergence:	-0.60 °

Well	Austin Griffith #159			
Well Position	+N/-S	0.0 usft	Northing:	13,882,022.91 usft
	+E/-W	0.0 usft	Easting:	1,362,844.54 usft
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft
			Latitude:	38° 13' 30.900 N
			Longitude:	81° 57' 59.700 W
			Ground Level:	688.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2015	9/2/2015	-7.42	66.03	51,713

Design	Wellbore #1			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	
		Tie On Depth:	0.0	
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	74.34
Survey Program	Date			
	9/29/2015			
From	Survey (Wellbore)	Tool Name	Description	
(usft)				
379.0	2,212.0 MWD (Wellbore #1)	MWD default	MWD - Standard	

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Database: Compass

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.0	0.00	
379.0	0.22	205.97	379.0	-0.7	-0.3	-0.5	0.06	0.7	205.97	
First Survey @ 379' MD / 379' TVD										
409.0	0.31	260.79	409.0	-0.7	-0.4	-0.6	0.86	0.8	210.53	
439.0	0.31	182.48	439.0	-0.8	-0.5	-0.7	1.30	1.0	211.98	
469.0	0.49	151.15	469.0	-1.0	-0.4	-0.7	0.92	1.1	204.05	
499.0	1.50	160.89	499.0	-1.5	-0.3	-0.7	3.40	1.5	189.85	
529.0	1.81	153.75	529.0	-2.3	0.1	-0.5	1.24	2.3	178.01	
559.0	2.39	152.56	559.0	-3.3	0.6	-0.3	1.94	3.3	169.98	
589.0	2.61	134.05	588.9	-4.3	1.4	0.1	2.78	4.5	162.48	
619.0	3.18	109.86	618.9	-5.1	2.6	1.2	4.45	5.7	152.51	
649.0	4.02	103.47	648.8	-5.6	4.4	2.8	3.10	7.1	141.53	
679.0	4.42	96.29	678.8	-6.0	6.6	4.8	2.21	8.9	132.02	
709.0	5.70	92.76	708.6	-6.2	9.2	7.2	4.39	11.1	123.64	
739.0	6.19	88.09	738.5	-6.2	12.3	10.2	2.29	13.8	116.55	
769.0	7.29	83.16	768.3	-5.9	15.9	13.7	4.14	16.9	110.37	
799.0	7.91	83.46	798.0	-5.4	19.8	17.6	2.07	20.5	105.33	
829.0	9.19	81.66	827.7	-4.8	24.2	22.0	4.36	24.7	101.31	
859.0	10.38	79.19	857.2	-4.0	29.2	27.1	4.21	29.5	97.77	
889.0	11.40	76.77	886.7	-2.8	34.8	32.7	3.73	34.9	94.61	
919.0	12.28	75.75	916.1	-1.3	40.8	38.9	3.02	40.8	91.88	
949.0	13.39	74.08	945.3	0.4	47.2	45.6	3.90	47.2	89.52	
979.0	14.58	72.98	974.4	2.5	54.1	52.8	4.06	54.2	87.40	
1,009.0	15.29	71.79	1,003.4	4.8	61.5	60.5	2.58	61.7	85.54	
1,039.0	16.22	69.76	1,032.3	7.5	69.2	68.7	3.60	69.6	83.83	
1,069.0	17.19	69.27	1,061.0	10.5	77.3	77.2	3.27	78.0	82.26	
1,099.0	18.21	71.79	1,089.6	13.5	85.9	86.3	4.25	86.9	81.04	

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)
1,129.0	20.02	72.98	1,117.9	16.5	95.2	96.2	6.17	96.7	80.17
1,159.0	21.79	74.08	1,146.0	19.5	105.5	106.9	6.04	107.3	79.51
1,189.0	23.42	74.78	1,173.7	22.6	116.6	118.4	5.51	118.8	79.02
1,219.0	25.19	74.96	1,201.0	25.8	128.5	130.7	5.91	131.1	78.63
1,249.0	26.51	75.88	1,228.0	29.1	141.2	143.8	4.60	144.2	78.34
1,279.0	28.02	75.49	1,254.7	32.5	154.5	157.6	5.07	157.9	78.11
1,309.0	29.61	75.58	1,280.9	36.2	168.5	172.0	5.30	172.3	77.89
1,339.0	31.11	75.27	1,306.8	40.0	183.2	187.2	5.03	187.5	77.69
1,369.0	32.30	74.25	1,332.3	44.1	198.4	202.9	4.35	203.2	77.46
1,399.0	33.80	73.11	1,357.5	48.7	214.1	219.3	5.41	219.6	77.18
1,429.0	34.82	74.25	1,382.3	53.5	230.3	236.2	4.02	236.4	76.93
1,489.0	35.62	69.76	1,431.3	64.2	263.2	270.8	4.52	270.9	76.30
1,609.0	33.89	67.69	1,529.9	89.0	327.0	338.8	1.74	338.8	74.78
1,669.0	34.20	67.47	1,579.6	101.8	358.0	372.2	0.56	372.2	74.13
1,699.0	34.82	66.45	1,604.3	108.4	373.6	389.0	2.83	389.1	73.82
1,729.0	35.40	66.76	1,628.9	115.3	389.5	406.1	2.02	406.2	73.51
1,759.0	36.28	66.76	1,653.2	122.2	405.6	423.6	2.93	423.6	73.23
1,819.0	36.59	67.95	1,701.5	135.9	438.5	458.9	1.29	459.1	72.78
1,849.0	36.10	68.48	1,725.6	142.5	455.0	476.6	1.94	476.8	72.61
1,879.0	35.88	68.88	1,749.9	148.9	471.4	494.1	1.07	494.4	72.47
1,909.0	34.91	70.07	1,774.4	155.0	487.7	511.5	3.97	511.8	72.37
1,939.0	33.80	71.08	1,799.1	160.7	503.7	528.3	4.16	528.7	72.31
1,969.0	32.48	72.49	1,824.2	165.8	519.3	544.7	5.10	545.1	72.29
1,999.0	31.82	73.77	1,849.6	170.4	534.5	560.7	3.16	561.0	72.32
2,029.0	31.90	73.67	1,875.1	174.9	549.7	576.5	0.32	576.9	72.36
2,059.0	31.29	74.56	1,900.7	179.2	564.8	592.2	2.56	592.6	72.40
2,089.0	31.02	76.37	1,926.3	183.1	579.9	607.8	3.25	608.1	72.48

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HP
HG Energy EOW Report



Company: HG Energy, LLC
Project: Lincoln County, West Virginia
Site: Austin Griffith #159
Well: Austin Griffith #159
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Austin Griffith #159
TVD Reference: WELL @ 696.0usft (Decker #9)
MD Reference: WELL @ 696.0usft (Decker #9)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)
2,119.0	30.31	77.47	1,952.1	186.5	594.8	623.0	3.02	623.3	72.59
2,149.0	29.92	77.16	1,978.1	189.8	609.5	638.1	1.40	638.3	72.70
2,212.0	29.92	77.16	2,032.7	196.8	640.1	669.5	0.00	669.7	72.91

TD @ 2212' MD / 2033' TVD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
379.0	379.0	-0.7	-0.3	First Survey @ 379' MD / 379' TVD
2,212.0	2,032.7	196.8	640.1	TD @ 2212' MD / 2033' TVD

Checked By: _____ Approved By: _____ Date: _____

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