

# HG Energy, LLC

Lincoln County, West Virginia

Austin Griffith #158

Austin Griffith #158

Wellbore #1

Design: Wellbore #1

## Survey Report - Geographic

17 September, 2015

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WV Department of  
Environmental Protection  
02/12/2016

# HP

## Survey Report - Geographic



<b>Company:</b>	HG Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Austin Griffith #158
<b>Project:</b>	Lincoln County, West Virginia	<b>TVD Reference:</b>	WELL @ 863.0usft (Decker #9)
<b>Site:</b>	Austin Griffith #158	<b>MD Reference:</b>	WELL @ 863.0usft (Decker #9)
<b>Well:</b>	Austin Griffith #158	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Compass

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

<b>Site</b>	Austin Griffith #158				
<b>Site Position:</b>		<b>Northing:</b>	13,882,973.44 usft	<b>Latitude:</b>	38° 13' 40.500 N
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,364,801.01 usft	<b>Longitude:</b>	81° 57' 35.300 W
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	-0.59 °

<b>Well</b>	Austin Griffith #158					
<b>Well Position</b>	+N/-S	0.0 usft	<b>Northing:</b>	13,882,973.44 usft	<b>Latitude:</b>	38° 13' 40.500 N
	+E/-W	0.0 usft	<b>Easting:</b>	1,364,801.01 usft	<b>Longitude:</b>	81° 57' 35.300 W
<b>Position Uncertainty</b>		0.0 usft	<b>Wellhead Elevation:</b>	0.0 usft	<b>Ground Level:</b>	855.0 usft

<b>Wellbore</b>	Wellbore #1				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	9/1/2015	-7.43	66.03	51,713

<b>Design</b>	Wellbore #1				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	255.07

<b>Survey Program</b>	Date: 9/17/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
527.0	2,630.0	MWD (Wellbore #1)	MWD default	MWD - Standard

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	13,882,973.44	1,364,801.01	38° 13' 40.500 N	81° 57' 35.300 W
527.0	0.88	136.11	527.0	-2.9	2.8	13,882,970.53	1,364,803.81	38° 13' 40.471 N	81° 57' 35.264 W
<b>First MWD Survey @ 527' MD / 527' TVD</b>									
557.0	1.10	129.10	557.0	-3.3	3.2	13,882,970.18	1,364,804.20	38° 13' 40.468 N	81° 57' 35.260 W
587.0	0.88	152.50	587.0	-3.7	3.5	13,882,969.79	1,364,804.53	38° 13' 40.464 N	81° 57' 35.255 W
617.0	0.71	200.31	617.0	-4.0	3.6	13,882,969.41	1,364,804.57	38° 13' 40.461 N	81° 57' 35.255 W
647.0	1.41	230.50	647.0	-4.4	3.2	13,882,969.00	1,364,804.22	38° 13' 40.456 N	81° 57' 35.259 W
677.0	2.12	250.20	676.9	-4.9	2.4	13,882,968.58	1,364,803.41	38° 13' 40.452 N	81° 57' 35.269 W
707.0	2.78	253.59	706.9	-5.3	1.2	13,882,968.19	1,364,802.19	38° 13' 40.448 N	81° 57' 35.284 W
737.0	3.27	257.60	736.9	-5.6	-0.3	13,882,967.80	1,364,800.66	38° 13' 40.444 N	81° 57' 35.304 W
767.0	4.82	253.33	766.8	-6.2	-2.4	13,882,967.25	1,364,798.62	38° 13' 40.439 N	81° 57' 35.329 W
797.0	4.99	263.73	796.7	-6.7	-4.9	13,882,966.75	1,364,796.11	38° 13' 40.433 N	81° 57' 35.361 W

**HP**  
Survey Report - Geographic



<b>Company:</b> HG Energy, LLC	<b>Local Co-ordinate Reference:</b> Well Austin Griffith #158
<b>Project:</b> Lincoln County, West Virginia	<b>TVD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Site:</b> Austin Griffith #158	<b>MD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Well:</b> Austin Griffith #158	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> Compass

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
827.0	5.61	265.09	826.6	-7.0	-7.7	13,882,966.48	1,364,793.35	38° 13' 40.430 N	81° 57' 35.395 W
857.0	6.72	266.90	856.4	-7.2	-10.9	13,882,966.26	1,364,790.14	38° 13' 40.428 N	81° 57' 35.435 W
887.0	7.51	268.40	886.2	-7.3	-14.6	13,882,966.11	1,364,786.43	38° 13' 40.426 N	81° 57' 35.482 W
917.0	8.62	268.93	915.9	-7.4	-18.8	13,882,966.01	1,364,782.22	38° 13' 40.425 N	81° 57' 35.535 W
977.0	10.69	267.43	975.0	-7.8	-28.8	13,882,965.68	1,364,772.16	38° 13' 40.420 N	81° 57' 35.661 W
1,007.0	11.58	269.50	1,004.4	-7.9	-34.6	13,882,965.53	1,364,766.37	38° 13' 40.418 N	81° 57' 35.733 W
1,037.0	13.21	268.62	1,033.7	-8.0	-41.1	13,882,965.42	1,364,759.93	38° 13' 40.416 N	81° 57' 35.814 W
1,067.0	14.41	269.10	1,062.9	-8.2	-48.2	13,882,965.28	1,364,752.77	38° 13' 40.414 N	81° 57' 35.904 W
1,097.0	15.11	271.00	1,091.9	-8.2	-55.9	13,882,965.29	1,364,745.13	38° 13' 40.414 N	81° 57' 35.999 W
1,127.0	16.62	271.00	1,120.7	-8.0	-64.1	13,882,965.43	1,364,736.93	38° 13' 40.414 N	81° 57' 36.102 W
1,157.0	17.50	269.72	1,149.4	-8.0	-72.9	13,882,965.49	1,364,728.13	38° 13' 40.414 N	81° 57' 36.212 W
1,187.0	19.00	268.93	1,177.9	-8.1	-82.3	13,882,965.37	1,364,718.74	38° 13' 40.412 N	81° 57' 36.330 W
1,217.0	19.49	266.20	1,206.2	-8.5	-92.1	13,882,964.95	1,364,708.86	38° 13' 40.407 N	81° 57' 36.454 W
1,247.0	20.59	264.83	1,234.4	-9.3	-102.4	13,882,964.14	1,364,698.61	38° 13' 40.398 N	81° 57' 36.582 W
1,277.0	21.92	263.02	1,262.4	-10.5	-113.2	13,882,962.99	1,364,687.80	38° 13' 40.385 N	81° 57' 36.718 W
1,307.0	23.29	261.39	1,290.1	-12.0	-124.6	13,882,961.42	1,364,676.38	38° 13' 40.368 N	81° 57' 36.861 W
1,337.0	24.61	260.82	1,317.5	-13.9	-136.7	13,882,959.53	1,364,664.35	38° 13' 40.348 N	81° 57' 37.011 W
1,367.0	25.32	258.31	1,344.7	-16.2	-149.1	13,882,957.24	1,364,651.90	38° 13' 40.324 N	81° 57' 37.167 W
1,397.0	25.90	255.09	1,371.7	-19.2	-161.7	13,882,954.25	1,364,639.28	38° 13' 40.294 N	81° 57' 37.325 W
1,427.0	26.38	252.93	1,398.7	-22.8	-174.4	13,882,950.61	1,364,626.58	38° 13' 40.256 N	81° 57' 37.483 W
1,457.0	26.51	250.60	1,425.5	-27.0	-187.1	13,882,946.43	1,364,613.89	38° 13' 40.214 N	81° 57' 37.642 W
1,487.0	27.22	250.51	1,452.3	-31.5	-199.9	13,882,941.92	1,364,601.11	38° 13' 40.168 N	81° 57' 37.802 W
1,517.0	27.62	249.63	1,478.9	-36.2	-212.9	13,882,937.21	1,364,588.12	38° 13' 40.120 N	81° 57' 37.964 W
1,547.0	27.80	248.61	1,505.5	-41.2	-225.9	13,882,932.23	1,364,575.09	38° 13' 40.069 N	81° 57' 38.127 W
1,607.0	28.68	247.73	1,558.3	-51.8	-252.3	13,882,921.67	1,364,548.74	38° 13' 39.962 N	81° 57' 38.455 W
1,637.0	27.71	246.89	1,584.8	-57.2	-265.3	13,882,916.21	1,364,535.66	38° 13' 39.907 N	81° 57' 38.619 W
1,817.0	24.79	246.32	1,746.2	-88.8	-338.4	13,882,884.62	1,364,462.60	38° 13' 39.587 N	81° 57' 39.530 W
1,847.0	24.48	245.62	1,773.5	-93.9	-349.8	13,882,879.53	1,364,451.17	38° 13' 39.535 N	81° 57' 39.673 W
1,877.0	24.30	246.50	1,800.8	-98.9	-361.2	13,882,874.50	1,364,439.85	38° 13' 39.485 N	81° 57' 39.814 W
1,907.0	24.39	247.20	1,828.1	-103.8	-372.5	13,882,869.64	1,364,428.48	38° 13' 39.435 N	81° 57' 39.956 W
1,937.0	23.42	247.29	1,855.6	-108.5	-383.7	13,882,864.94	1,364,417.27	38° 13' 39.388 N	81° 57' 40.096 W
1,967.0	22.89	248.92	1,883.1	-112.9	-394.7	13,882,860.54	1,364,406.33	38° 13' 39.343 N	81° 57' 40.233 W
1,997.0	22.98	250.51	1,910.8	-117.0	-405.6	13,882,856.48	1,364,395.36	38° 13' 39.302 N	81° 57' 40.370 W
2,027.0	22.40	250.99	1,938.4	-120.8	-416.6	13,882,852.67	1,364,384.44	38° 13' 39.263 N	81° 57' 40.506 W
2,057.0	21.52	252.31	1,966.3	-124.3	-427.2	13,882,849.13	1,364,373.79	38° 13' 39.227 N	81° 57' 40.639 W
2,117.0	20.11	253.99	2,022.4	-130.5	-447.6	13,882,842.95	1,364,353.39	38° 13' 39.164 N	81° 57' 40.894 W
2,177.0	17.99	253.90	2,079.1	-135.9	-466.4	13,882,837.53	1,364,334.57	38° 13' 39.108 N	81° 57' 41.129 W
2,207.0	17.10	251.61	2,107.7	-138.6	-475.1	13,882,834.85	1,364,325.93	38° 13' 39.081 N	81° 57' 41.237 W
2,237.0	16.08	250.51	2,136.4	-141.4	-483.2	13,882,832.08	1,364,317.83	38° 13' 39.053 N	81° 57' 41.338 W
2,297.0	13.08	244.29	2,194.5	-147.1	-497.1	13,882,826.36	1,364,303.88	38° 13' 38.995 N	81° 57' 41.512 W
2,327.0	11.62	241.91	2,223.8	-150.0	-502.9	13,882,823.46	1,364,298.15	38° 13' 38.965 N	81° 57' 41.584 W
2,387.0	9.50	237.90	2,282.8	-155.5	-512.4	13,882,817.98	1,364,288.63	38° 13' 38.910 N	81° 57' 41.702 W
2,417.0	8.22	233.81	2,312.4	-158.0	-516.2	13,882,815.40	1,364,284.80	38° 13' 38.884 N	81° 57' 41.750 W
2,447.0	7.73	232.53	2,342.1	-160.5	-519.5	13,882,812.91	1,364,281.47	38° 13' 38.859 N	81° 57' 41.792 W
2,477.0	6.89	233.10	2,371.9	-162.8	-522.6	13,882,810.60	1,364,278.43	38° 13' 38.836 N	81° 57' 41.829 W
2,537.0	5.70	227.81	2,431.5	-167.0	-527.7	13,882,806.44	1,364,273.34	38° 13' 38.795 N	81° 57' 41.893 W
2,630.0	5.70	227.81	2,524.1	-173.2	-534.5	13,882,800.24	1,364,266.50	38° 13' 38.732 N	81° 57' 41.978 W

TD @ 2630' MD / 2524' TVD

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Survey Report - Geographic



<b>Company:</b> HG Energy, LLC	<b>Local Co-ordinate Reference:</b> Well Austin Griffith #158
<b>Project:</b> Lincoln County, West Virginia	<b>TVD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Site:</b> Austin Griffith #158	<b>MD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Well:</b> Austin Griffith #158	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> Compass

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
527.0	527.0	-2.9	2.8	First MWD Survey @ 527' MD / 527' TVD
2,630.0	2,524.1	-173.2	-534.5	TD @ 2630' MD / 2524' TVD

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

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# HG Energy, LLC

Lincoln County, West Virginia

Austin Griffith #158

Austin Griffith #158

Wellbore #1

Design: Wellbore #1

## HG Energy EOW Report

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<b>Site:</b> Austin Griffith #158	<b>MD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Well:</b> Austin Griffith #158	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> Compass

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

<b>Site</b> Austin Griffith #158		
<b>Site Position:</b>	<b>Northing:</b> 13,882,973.44 usft	<b>Latitude:</b> 38° 13' 40.500 N
<b>From:</b> Lat/Long	<b>Easting:</b> 1,364,801.01 usft	<b>Longitude:</b> 81° 57' 35.300 W
<b>Position Uncertainty:</b> 0.0 usft	<b>Slot Radius:</b> 13-3/16 "	<b>Grid Convergence:</b> -0.59 °

<b>Well</b> Austin Griffith #158		
<b>Well Position</b> +N/-S 0.0 usft	<b>Northing:</b> 13,882,973.44 usft	<b>Latitude:</b> 38° 13' 40.500 N
+E/-W 0.0 usft	<b>Easting:</b> 1,364,801.01 usft	<b>Longitude:</b> 81° 57' 35.300 W
<b>Position Uncertainty</b> 0.0 usft	<b>Wellhead Elevation:</b> 0.0 usft	<b>Ground Level:</b> 855.0 usft

<b>Wellbore</b> Wellbore #1					
<b>Magnetics</b>	<b>Model Name</b> IGRF2015	<b>Sample Date</b> 9/1/2015	<b>Declination (°)</b> -7.43	<b>Dip Angle (°)</b> 66.03	<b>Field Strength (nT)</b> 51,713

<b>Design</b> Wellbore #1		
<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> 255.07
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<b>Survey Program</b> Date 9/17/2015				
<b>From (usft)</b> 527.0	<b>To (usft)</b> 2,630.0	<b>Survey (Wellbore)</b> MWD (Wellbore #1)	<b>Tool Name</b> MWD default	<b>Description</b> MWD - Standard

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<b>Project:</b> Lincoln County, West Virginia	<b>TVD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Site:</b> Austin Griffith #158	<b>MD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Well:</b> Austin Griffith #158	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> Compass

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	
527.0	0.88	136.11	527.0	-2.9	2.8	-2.0	0.17	4.0	136.11	
<b>First MWD Survey @ 527' MD / 527' TVD</b>										
557.0	1.10	129.10	557.0	-3.3	3.2	-2.2	0.84	4.6	135.67	
587.0	0.88	152.50	587.0	-3.7	3.5	-2.5	1.52	5.1	136.05	
617.0	0.71	200.31	617.0	-4.0	3.6	-2.4	2.21	5.4	138.53	
647.0	1.41	230.50	647.0	-4.4	3.2	-2.0	2.91	5.5	144.11	
677.0	2.12	250.20	676.9	-4.9	2.4	-1.1	3.08	5.4	153.68	
707.0	2.78	253.59	706.9	-5.3	1.2	0.2	2.25	5.4	167.30	
737.0	3.27	257.60	736.9	-5.6	-0.3	1.8	1.78	5.7	183.54	
767.0	4.82	253.33	766.8	-6.2	-2.4	3.9	5.26	6.6	201.14	
797.0	4.99	263.73	796.7	-6.7	-4.9	6.5	3.01	8.3	216.19	
827.0	5.61	265.09	826.6	-7.0	-7.7	9.2	2.11	10.3	227.72	
857.0	6.72	266.90	856.4	-7.2	-10.9	12.4	3.76	13.0	236.55	
887.0	7.51	268.40	886.2	-7.3	-14.6	16.0	2.70	16.3	243.31	
917.0	8.62	268.93	915.9	-7.4	-18.8	20.1	3.71	20.2	248.43	
977.0	10.69	267.43	975.0	-7.8	-28.8	29.9	3.48	29.9	254.94	
1,007.0	11.58	269.50	1,004.4	-7.9	-34.6	35.5	3.25	35.5	257.13	
1,037.0	13.21	268.62	1,033.7	-8.0	-41.1	41.8	5.47	41.8	258.95	
1,067.0	14.41	269.10	1,062.9	-8.2	-48.2	48.7	4.02	48.9	260.40	
1,097.0	15.11	271.00	1,091.9	-8.2	-55.9	56.1	2.84	56.5	261.70	
1,127.0	16.62	271.00	1,120.7	-8.0	-64.1	64.0	5.03	64.6	262.87	
1,157.0	17.50	269.72	1,149.4	-8.0	-72.9	72.5	3.19	73.3	263.77	
1,187.0	19.00	268.93	1,177.9	-8.1	-82.3	81.6	5.07	82.7	264.40	
1,217.0	19.49	266.20	1,206.2	-8.5	-92.1	91.2	3.41	92.5	264.73	
1,247.0	20.59	264.83	1,234.4	-9.3	-102.4	101.3	3.99	102.8	264.81	
1,277.0	21.92	263.02	1,262.4	-10.5	-113.2	112.1	4.94	113.7	264.72	

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 9/11/2015 11:31:59 AM

**HP**  
HG Energy EOW Report



<b>Company:</b> HG Energy, LLC	<b>Local Co-ordinate Reference:</b> Well Austin Griffith #158
<b>Project:</b> Lincoln County, West Virginia	<b>TVD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Site:</b> Austin Griffith #158	<b>MD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Well:</b> Austin Griffith #158	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> Compass

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)
1,307.0	23.29	261.39	1,290.1	-12.0	-124.6	123.5	5.02	125.2	264.49
1,337.0	24.61	260.82	1,317.5	-13.9	-136.7	135.6	4.47	137.4	264.19
1,367.0	25.32	258.31	1,344.7	-16.2	-149.1	148.3	4.25	150.0	263.80
1,397.0	25.90	255.09	1,371.7	-19.2	-161.7	161.2	5.03	162.9	263.23
1,427.0	26.38	252.93	1,398.7	-22.8	-174.4	174.4	3.55	175.9	262.54
1,457.0	26.51	250.60	1,425.5	-27.0	-187.1	187.8	3.49	189.1	261.78
1,487.0	27.22	250.51	1,452.3	-31.5	-199.9	201.3	2.37	202.4	261.04
1,517.0	27.62	249.63	1,478.9	-36.2	-212.9	215.0	1.90	215.9	260.34
1,547.0	27.80	248.61	1,505.5	-41.2	-225.9	228.9	1.69	229.6	259.66
1,607.0	28.68	247.73	1,558.3	-51.8	-252.3	257.1	1.62	257.5	258.40
1,637.0	27.71	246.89	1,584.8	-57.2	-265.3	271.1	3.49	271.4	257.83
1,817.0	24.79	246.32	1,746.2	-88.8	-338.4	349.9	1.63	349.9	255.29
1,847.0	24.48	245.62	1,773.5	-93.9	-349.8	362.2	1.42	362.2	254.97
1,877.0	24.30	246.50	1,800.8	-98.9	-361.2	374.5	1.35	374.5	254.68
1,907.0	24.39	247.20	1,828.1	-103.8	-372.5	386.7	1.01	386.7	254.43
1,937.0	23.42	247.29	1,855.6	-108.5	-383.7	398.7	3.24	398.8	254.21
1,967.0	22.89	248.92	1,883.1	-112.9	-394.7	410.4	2.77	410.5	254.04
1,997.0	22.98	250.51	1,910.8	-117.0	-405.6	422.1	2.09	422.2	253.92
2,027.0	22.40	250.99	1,938.4	-120.8	-416.6	433.6	2.03	433.7	253.83
2,057.0	21.52	252.31	1,966.3	-124.3	-427.2	444.8	3.36	444.9	253.78
2,117.0	20.11	253.99	2,022.4	-130.5	-447.6	466.1	2.55	466.3	253.75
2,177.0	17.99	253.90	2,079.1	-135.9	-466.4	485.7	3.53	485.8	253.75
2,207.0	17.10	251.61	2,107.7	-138.6	-475.1	494.7	3.75	494.9	253.74
2,337.0	16.08	250.51	2,136.4	-141.4	-483.2	503.3	3.56	503.4	253.69
2,297.0	13.08	244.29	2,194.5	-147.1	-497.1	518.2	5.63	518.4	253.52
2,327.0	11.62	241.91	2,223.8	-150.0	-502.9	524.5	5.15	524.7	253.39
2,287.0	9.50	237.90	2,282.8	-155.5	-512.4	535.1	3.74	535.4	253.12

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**HP**  
HG Energy EOW Report



**Company:** HG Energy, LLC  
**Project:** Lincoln County, West Virginia  
**Site:** Austin Griffith #158  
**Well:** Austin Griffith #158  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Well Austin Griffith #158  
**TVD Reference:** WELL @ 863.0usft (Decker #9)  
**MD Reference:** WELL @ 863.0usft (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 (°)
2,417.0	8.22	233.81	2,312.4	-158.0	-516.2	539.5	4.75	539.9	252.98
2,447.0	7.73	232.53	2,342.1	-160.5	-519.5	543.4	1.74	543.8	252.83
2,477.0	6.89	233.10	2,371.9	-162.8	-522.6	546.9	2.81	547.4	252.69
2,537.0	5.70	227.81	2,431.5	-167.0	-527.7	552.9	2.20	553.5	252.44
2,630.0	5.70	227.81	2,524.1	-173.2	-534.5	561.1	0.00	561.9	252.05

TD @ 2630' MD / 2524' TVD

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
527.0	527.0	-2.9	2.8	First MWD Survey @ 527' MD / 527' TVD
2,630.0	2,524.1	-173.2	-534.5	TD @ 2630' MD / 2524' TVD

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

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**HG Energy, LLC**  
Lincoln County, West Virginia  
Austin Griffith #158  
Austin Griffith #158  
Wellbore #1

Design: Wellbore #1

## HG Energy EOW Report

17 September, 2015



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**HP**  
HG Energy EOW Report



<b>Company:</b> HG Energy, LLC	<b>Local Co-ordinate Reference:</b> Well Austin Griffith #158
<b>Project:</b> Lincoln County, West Virginia	<b>TVD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Site:</b> Austin Griffith #158	<b>MD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Well:</b> Austin Griffith #158	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> Compass

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

<b>Site</b> Austin Griffith #158		
<b>Site Position:</b>	<b>Northing:</b> 13,882,973.44 usft	<b>Latitude:</b> 38° 13' 40.500 N
<b>From:</b> Lat/Long	<b>Easting:</b> 1,364,801.01 usft	<b>Longitude:</b> 81° 57' 35.300 W
<b>Position Uncertainty:</b> 0.0 usft	<b>Slot Radius:</b> 13-3/16 "	<b>Grid Convergence:</b> -0.59 °

<b>Well</b> Austin Griffith #158		
<b>Well Position</b> +N-S 0.0 usft	<b>Northing:</b> 13,882,973.44 usft	<b>Latitude:</b> 38° 13' 40.500 N
+E-W 0.0 usft	<b>Easting:</b> 1,364,801.01 usft	<b>Longitude:</b> 81° 57' 35.300 W
<b>Position Uncertainty</b> 0.0 usft	<b>Wellhead Elevation:</b> 0.0 usft	<b>Ground Level:</b> 855.0 usft

<b>Wellbore</b> Wellbore #1					
<b>Magnetics</b>	<b>Model Name</b> IGRF2015	<b>Sample Date</b> 9/1/2015	<b>Declination (°)</b> -7.43	<b>Dip Angle (°)</b> 66.03	<b>Field Strength (nT)</b> 51,713

<b>Design</b> Wellbore #1		
<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> 255.07
--------------------------	------------------------------------	------------------------	------------------------	-----------------------------

<b>Survey Program</b> Date 9/17/2015				
<b>From (usft)</b> 520.0	<b>To (usft)</b> 2,630.0	<b>Survey (Wellbore)</b> MWD (Wellbore #1)	<b>Tool Name</b> MWD default	<b>Description</b> MWD - Standard

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<b>Project:</b> Lincoln County, West Virginia	<b>TVD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Site:</b> Austin Griffith #158	<b>MD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Well:</b> Austin Griffith #158	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> 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
527.0	0.88	136.11	527.0	-2.9	2.8	-2.0	0.17	4.0	136.11
<b>First MWD Survey @ 527' MD / 527' TVD</b>									
557.0	1.10	129.10	557.0	-3.3	3.2	-2.2	0.84	4.6	135.67
587.0	0.88	152.50	587.0	-3.7	3.5	-2.5	1.52	5.1	136.05
617.0	0.71	200.31	617.0	-4.0	3.6	-2.4	2.21	5.4	138.53
647.0	1.41	230.50	647.0	-4.4	3.2	-2.0	2.91	5.5	144.11
677.0	2.12	250.20	676.9	-4.9	2.4	-1.1	3.08	5.4	153.68
707.0	2.78	253.59	706.9	-5.3	1.2	0.2	2.25	5.4	167.30
737.0	3.27	257.60	736.9	-5.6	-0.3	1.8	1.78	5.7	183.54
767.0	4.82	253.33	766.8	-6.2	-2.4	3.9	5.26	6.6	201.14
797.0	4.99	263.73	796.7	-6.7	-4.9	6.5	3.01	8.3	216.19
827.0	5.61	265.09	826.6	-7.0	-7.7	9.2	2.11	10.3	227.72
857.0	6.72	266.90	856.4	-7.2	-10.9	12.4	3.76	13.0	236.55
887.0	7.51	268.40	886.2	-7.3	-14.6	16.0	2.70	16.3	243.31
917.0	8.62	268.93	915.9	-7.4	-18.8	20.1	3.71	20.2	248.43
977.0	10.69	267.43	975.0	-7.8	-28.8	29.9	3.48	29.9	254.94
1,007.0	11.58	269.50	1,004.4	-7.9	-34.6	35.5	3.25	35.5	257.13
1,037.0	13.21	268.62	1,033.7	-8.0	-41.1	41.8	5.47	41.8	258.95
1,067.0	14.41	269.10	1,062.9	-8.2	-48.2	48.7	4.02	48.9	260.40
1,097.0	15.11	271.00	1,091.9	-8.2	-55.9	56.1	2.84	56.5	261.70
1,127.0	16.62	271.00	1,120.7	-8.0	-64.1	64.0	5.03	64.6	262.87
1,157.0	17.50	269.72	1,149.4	-8.0	-72.9	72.5	3.19	73.3	263.77
1,187.0	19.00	268.93	1,177.9	-8.1	-82.3	81.6	5.07	82.7	264.40
1,217.0	19.49	266.20	1,206.2	-8.5	-92.1	91.2	3.41	92.5	264.73
1,247.0	20.59	264.83	1,234.4	-9.3	-102.4	101.3	3.99	102.8	264.81
1,277.0	21.92	263.02	1,262.4	-10.5	-113.2	112.1	4.94	113.7	264.72

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<b>Project:</b> Lincoln County, West Virginia	<b>TVD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Site:</b> Austin Griffith #158	<b>MD Reference:</b> WELL @ 863.0usft (Decker #9)
<b>Well:</b> Austin Griffith #158	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Wellbore #1	<b>Database:</b> 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 (°)
1,307.0	23.29	261.39	1,290.1	-12.0	-124.6	123.5	5.02	125.2	264.49
1,337.0	24.61	260.82	1,317.5	-13.9	-136.7	135.6	4.47	137.4	264.19
1,367.0	25.32	258.31	1,344.7	-16.2	-149.1	148.3	4.25	150.0	263.80
1,397.0	25.90	255.09	1,371.7	-19.2	-161.7	161.2	5.03	162.9	263.23
1,427.0	26.38	252.93	1,398.7	-22.8	-174.4	174.4	3.55	175.9	262.54
1,457.0	26.51	250.60	1,425.5	-27.0	-187.1	187.8	3.49	189.1	261.78
1,487.0	27.22	250.51	1,452.3	-31.5	-199.9	201.3	2.37	202.4	261.04
1,517.0	27.62	249.63	1,478.9	-36.2	-212.9	215.0	1.90	215.9	260.34
1,547.0	27.80	248.61	1,505.5	-41.2	-225.9	228.9	1.69	229.6	259.66
1,607.0	28.68	247.73	1,558.3	-51.8	-252.3	257.1	1.62	257.5	258.40
1,637.0	27.71	246.89	1,584.8	-57.2	-265.3	271.1	3.49	271.4	257.83
1,817.0	24.79	246.32	1,746.2	-88.8	-338.4	349.9	1.63	349.9	255.29
1,847.0	24.48	245.62	1,773.5	-93.9	-349.8	362.2	1.42	362.2	254.97
1,877.0	24.30	246.50	1,800.8	-98.9	-361.2	374.5	1.35	374.5	254.68
1,907.0	24.39	247.20	1,828.1	-103.8	-372.5	386.7	1.01	386.7	254.43
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2,057.0	21.52	252.31	1,966.3	-124.3	-427.2	444.8	3.36	444.9	253.78
2,077.0	20.11	253.99	2,022.4	-130.5	-447.6	466.1	2.55	466.3	253.75
2,097.0	17.99	253.90	2,079.1	-135.9	-466.4	485.7	3.53	485.8	253.75
2,107.0	17.10	251.61	2,107.7	-138.6	-475.1	494.7	3.75	494.9	253.74
2,127.0	16.08	250.51	2,136.4	-141.4	-483.2	503.3	3.56	503.4	253.69
2,147.0	13.08	244.29	2,194.5	-147.1	-497.1	518.2	5.63	518.4	253.52
2,167.0	11.62	241.91	2,223.8	-150.0	-502.9	524.5	5.15	524.7	253.39
2,187.0	9.50	237.90	2,282.8	-155.5	-512.4	535.1	3.74	535.4	253.12

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HG Energy EOW Report



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**Site:** Austin Griffith #158  
**Well:** Austin Griffith #158  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Well Austin Griffith #158  
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**Survey**

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2,447.0	7.73	232.53	2,342.1	-160.5	-519.5	543.4	1.74	543.8	252.83
2,477.0	6.89	233.10	2,371.9	-162.8	-522.6	546.9	2.81	547.4	252.69
2,537.0	5.70	227.81	2,431.5	-167.0	-527.7	552.9	2.20	553.5	252.44
2,630.0	5.70	227.81	2,524.1	-173.2	-534.5	561.1	0.00	561.9	252.05

TD @ 2630' MD / 2524' TVD

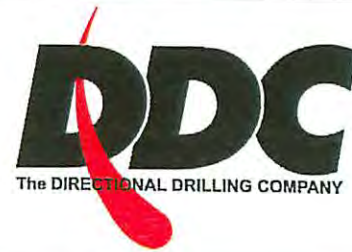
**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
527.0	527.0	-2.9	2.8	First MWD Survey @ 527' MD / 527' TVD
2,630.0	2,524.1	-173.2	-534.5	TD @ 2630' MD / 2524' TVD

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

Company Name: HG Energy, LLC  
 Austin Griffith #158  
 Lincoln County, West Virginia  
 Rig: Decker 9  
 Created By: Shane Robbins  
 Date: 9/17/2015

Austin Griffith #158  
 Lincoln County, West Virginia  
**Q150689 & AM-150590**  
 Design #1



DESIGN TARGET DETAILS							
Name	TVD	+N-S	+E/W	Northing	Eastng	Latitude	Longitude
Target Austin Griffith #158 -plan hits target center	2348.0	-155.8	-584.0	13882817.69	1364217.02	38° 13' 38.500 N	81° 67' 42.800 W

PROJECT DETAILS:		Lincoln County, West Virginia
Geodetic System:	Universal Transverse Mercator	
Datum:	NAD83 West Virginia - HARN	
Ellipsoid:	GRS 1980	
Zone:	Zone 17N (84 W to 78 W)	
System Datum:	Mean Sea Level	

WELL DETAILS: Austin Griffith #158				
+N-S	+E/W	Northing	Eastng	Ground Level:
0.0	0.0	13882973.44	1364801.01	855.0
				Latitude
				Longitude
				38° 13' 40.500 N
				81° 67' 36.300 W

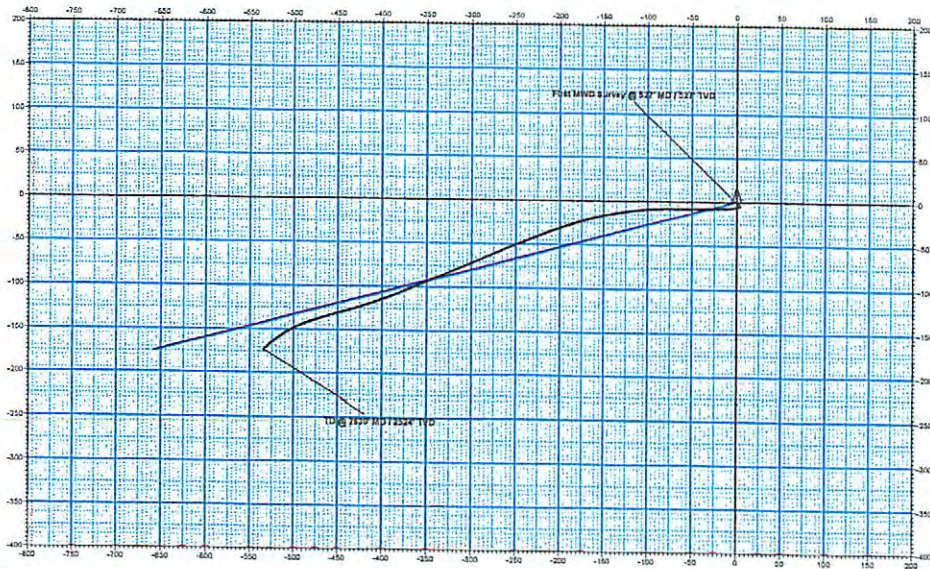
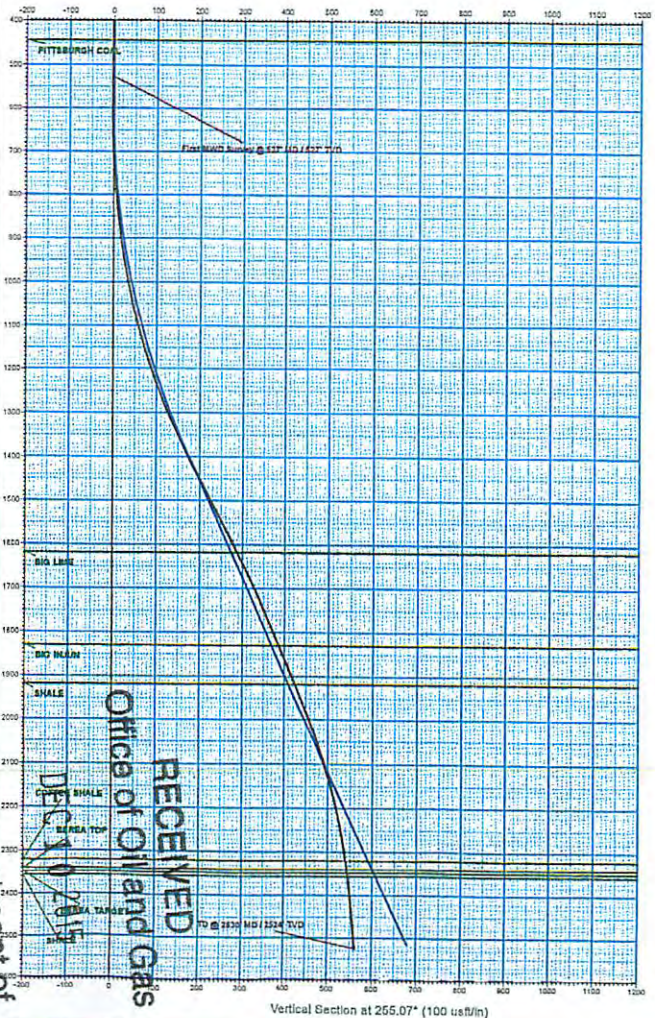
ANNOTATIONS							
MD	Inc	Ati	TVD	+N/S	+E/W	VSec:Departure	Annotations
527.0	0.88	136.11	527.0	-2.9	-2.9	-2.0	4.0
2530.0	6.70	227.81	2524.1	-173.2	-534.5	561.1	577.5
							First MWD Survey @ 527' MD / 527' TVD
							TD @ 2630' MD / 2524' TVD

**M G T**

Azimuths to Grid North  
Correction: -6.84°

Magnetic Field  
Strength: 51713.1snT  
Dip Angle: 66.03°  
Date: 9/1/2015  
Model: IGRF2015

# HG Energy



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