

12/28/2018



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WV Department of  
Environmental Protection

**Ephraim Griffith 133**  
**Lincoln County, WV**  
**Noah Horn 294 Rig**

**October 11, 20186**

**Survey Certification Report**

12/28/2018



**PRO**DIRECTIONAL

## Survey Certification Letter

October 11, 2018

# HG Energy

Operator Name: HG Energy  
Well Name: Ephraim Griffith 133  
County/Parish: Lincoln County  
State: WV  
Rig Name: Noah Horn 294  
Job Number: LWV3112318

This is to certify the surveys performed on the referenced well by Professional Directional Ent., Inc. are true and correct MWD Surveys, data provided as follows:

<u>Surveyor</u>	<u>Surveyed Depths</u>	<u>Projection to Bit</u>	<u>Dates Performed</u>	<u>Type of Survey</u>
ProDirectional	568'MD – 2,758'MD	2,822'MD	10/08/18 – 10/10/18	MWD-OWSG

Sincerely,

John Jordan  
Well Planning Analyst  
Professional Directional

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850 Conroe Park West Drive | Conroe, TX 77303 | Phone: 936.441.7266

[prodirectional.com](http://prodirectional.com)



# HG Energy LLC

Well: Ephraim Griffith No. 133  
 Site: Ephraim Griffith  
 Project: Lincoln County, West Virginia UTM83  
 Design: plan2  
 Rig: Noah Horn 294

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  
 Depth Reference: RKB=888+6 @ 894.00ft (Noah Horn 294)

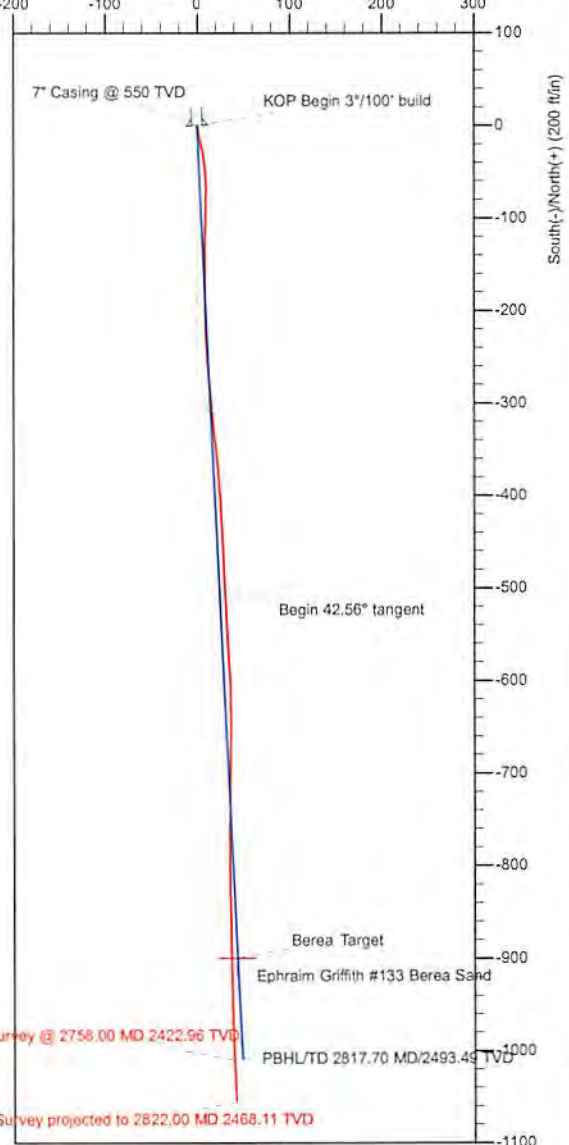
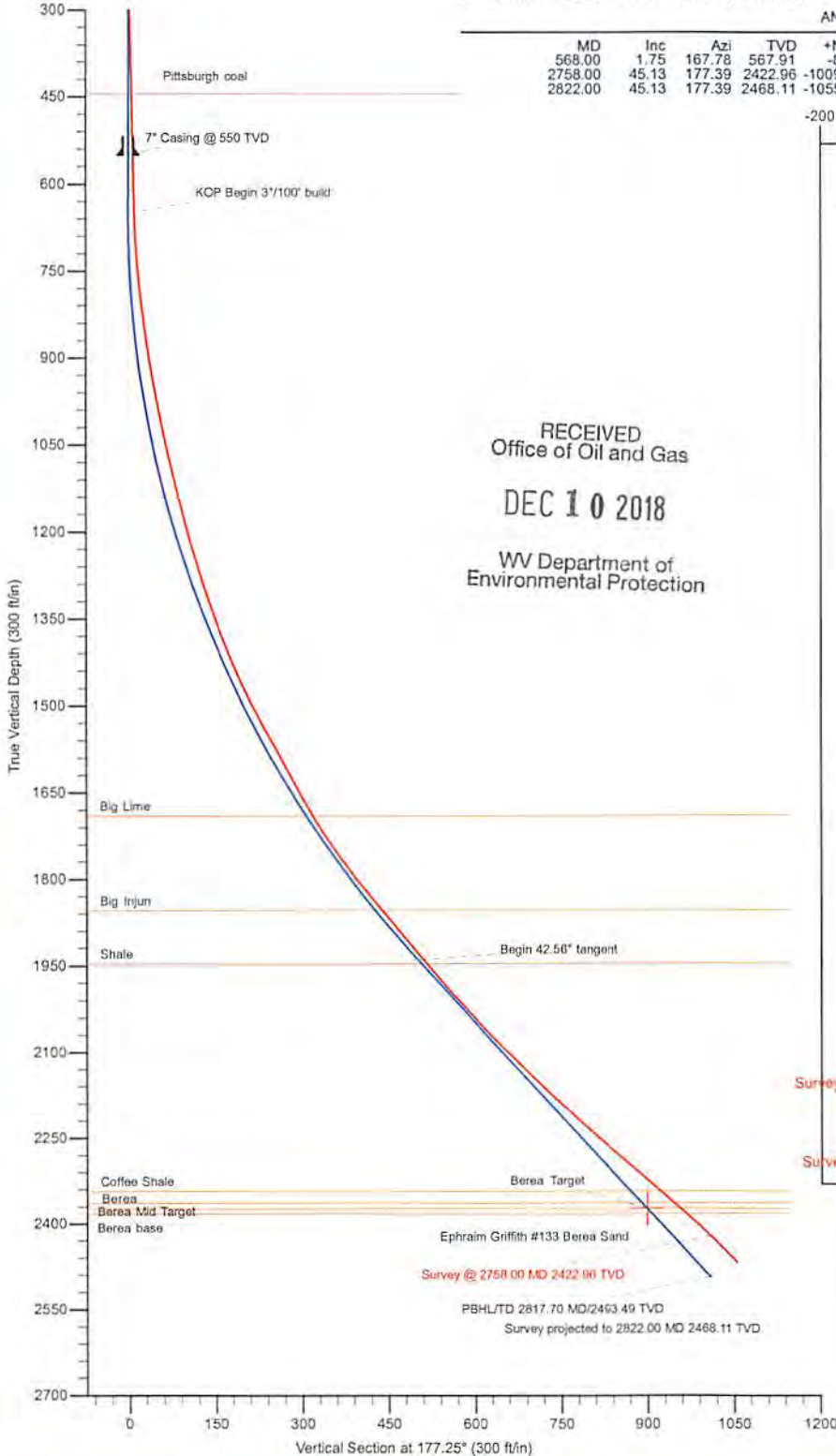
Northing 4230802.00 Easting 416835.00 Latitude 38° 13' 16.8807 N Longitude 81° 57' 0.3277 W

Total Correction (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 7.75°

Section Details										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	D/deg	TFace	V/Sect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	650.00	0.00	0.00	650.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 3'/100' build
3	2068.61	42.56	177.25	1941.71	-502.49	24.14	3.00	177.25	503.07	Begin 42.56° tangent
4	2655.49	42.56	177.25	2374.00	-988.97	43.18	0.00	0.00	900.00	Berea Target
5	2667.71	42.56	177.25	2383.00	-907.22	43.58	0.00	0.00	908.27	
6	2817.71	42.56	177.25	2493.49	-1008.55	48.44	0.00	0.00	1009.72	PBHL/TD 2817.70 MD/2493.49 TVD

ANNOTATIONS SURVEYS

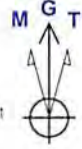
MD	Inc	Azi	TVD	+N/-S	+E/-W	V/Sect	Annotation
568.00	1.75	167.78	567.91	-8.48	1.84	8.56	MWD surveys
2758.00	45.13	177.39	2422.96	-1009.62	39.98	1010.58	Survey @ 2758.00 MD 2422.96 TVD
2822.00	45.13	177.39	2468.11	-1055.13	42.04	1055.94	Survey projected to 2822.00 MD 2468.11 TVD



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FORMATION TOP DETAILS

TVDPATH	MDPATH	FORMATION	MAGNETIC FIELD
445.00	445.00	Pittsburgh coal	Strength: 51413.1sn
1691.00	1750.98	Big Lime	Dip Angle: 65.55
1855.00	1953.98	Big Injun	Date: 10/5/2018
1947.00	2075.79	Shale	Model: HDGM
2343.00	2613.40	Coffee Shale	
2364.00	2641.91	Berea	
2374.00	2655.49	Berea Mid Target	
2383.00	2667.71	Berea base	



Survey Report



<b>Company:</b>	HG Energy LLC	<b>Local Co-ordinate Reference:</b>	Well Ephraim Griffith No. 133
<b>Project:</b>	Lincoln County, West Virginia UTM83	<b>TVD Reference:</b>	RKB=888+6 @ 894.00ft (Noah Horn 294)
<b>Site:</b>	Ephraim Griffith	<b>MD Reference:</b>	RKB=888+6 @ 894.00ft (Noah Horn 294)
<b>Well:</b>	Ephraim Griffith No. 133	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Jul2216dt_v14

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<b>Project</b>	Lincoln County, West Virginia UTM83		
<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>	Ephraim Griffith				
<b>Site Position:</b>		<b>Northing:</b>	4,230,802.00 m	<b>Latitude:</b>	38° 13' 16.8807 N
<b>From:</b>	Map	<b>Easting:</b>	416,835.00 m	<b>Longitude:</b>	81° 57' 0.3277 W
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	-0.59 °

<b>Well</b>	Ephraim Griffith No. 133					
<b>Well Position</b>	+N-S	0.00 ft	<b>Northing:</b>	4,230,802.00 m	<b>Latitude:</b>	38° 13' 16.8807 N
	+E-W	0.00 ft	<b>Easting:</b>	416,835.00 m	<b>Longitude:</b>	81° 57' 0.3277 W
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	888.00 ft

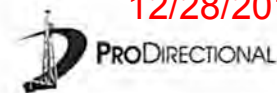
<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	10/5/2018	-8.33	65.55	51,413.10000000

<b>Design</b>	Surveys Original Hole				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N-S (ft)</b>	<b>+E-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	177.25	

<b>Survey Program</b>	<b>Date</b>	10/11/2018			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
568.00	2,758.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,822.00	2,822.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N-S (ft)</b>	<b>+E-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
568.00	1.75	167.78	567.91	-8.48	1.84	8.56	0.31	0.31	0.00	
<b>MWD surveys</b>										
598.00	1.68	166.57	597.90	-9.35	2.04	9.44	0.26	-0.23	-4.03	
628.00	1.64	163.81	627.89	-10.19	2.26	10.29	0.30	-0.13	-9.20	
658.00	2.18	163.94	657.87	-11.15	2.53	11.26	1.80	1.80	0.43	
688.00	3.13	163.21	687.84	-12.49	2.93	12.61	3.17	3.17	-2.43	
718.00	4.29	163.62	717.77	-14.35	3.48	14.50	3.87	3.87	1.37	
748.00	5.34	165.64	747.67	-16.78	4.14	16.95	3.54	3.50	6.73	
778.00	6.20	168.49	777.51	-19.72	4.81	19.92	3.02	2.87	9.50	

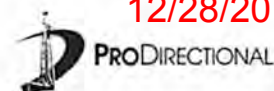




Survey Report

<b>Company:</b> HG Energy LLC	<b>Local Co-ordinate Reference:</b> Well Ephraim Griffith No. 133	RECEIVED Office of Oil and Gas  DEC 10 2018
<b>Project:</b> Lincoln County, West Virginia UTM83	<b>TVD Reference:</b> RKB=888+6 @ 894.00ft (Noah Horn 294)	
<b>Site:</b> Ephraim Griffith	<b>MD Reference:</b> RKB=888+6 @ 894.00ft (Noah Horn 294)	
<b>Well:</b> Ephraim Griffith No. 133	<b>North Reference:</b> Grid	
<b>Wellbore:</b> Original Hole	<b>Survey Calculation Method:</b> Minimum Curvature	
<b>Design:</b> Surveys Original Hole	<b>Database:</b> DB_Jul2216dt_v14	

Survey										W.V. Department of Environmental Protection
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Bulid Rate (°/100usft)	Turn Rate (°/100usft)	
808.00	6.90	168.84	807.32	-23.07	5.49	23.31	2.34	2.33	1.17	
838.00	7.64	169.86	837.08	-26.80	6.19	27.07	2.50	2.47	3.40	
868.00	8.57	170.58	866.78	-30.97	6.90	31.27	3.12	3.10	2.40	
898.00	9.39	171.17	896.41	-35.59	7.64	35.92	2.75	2.73	1.97	
928.00	10.23	171.59	925.97	-40.65	8.41	41.00	2.81	2.80	1.40	
958.00	10.84	173.37	955.46	-46.08	9.13	46.47	2.30	2.03	5.93	
988.00	11.48	175.55	984.90	-51.86	9.68	52.27	2.55	2.13	7.27	
1,018.00	12.03	178.53	1,014.27	-57.97	9.99	58.38	2.73	1.83	9.93	
1,048.00	12.47	180.62	1,043.59	-64.33	10.04	64.74	2.08	1.47	6.97	
1,078.00	12.65	181.14	1,072.87	-70.85	9.94	71.25	0.71	0.60	1.73	
1,108.00	13.16	181.88	1,102.11	-77.55	9.76	77.93	1.79	1.70	2.47	
1,138.00	14.00	181.23	1,131.27	-84.59	9.57	84.95	2.85	2.80	-2.17	
1,168.00	14.58	181.23	1,160.34	-91.99	9.41	92.34	1.93	1.93	0.00	
1,198.00	15.02	180.63	1,189.35	-99.66	9.29	99.99	1.55	1.47	-2.00	
1,228.00	15.68	181.00	1,218.28	-107.60	9.18	107.91	2.22	2.20	1.23	
1,258.00	16.63	180.92	1,247.09	-115.94	9.04	116.24	3.17	3.17	-0.27	
1,288.00	17.48	181.15	1,275.77	-124.74	8.88	125.02	2.84	2.83	0.77	
1,318.00	18.53	180.95	1,304.30	-134.01	8.71	134.27	3.51	3.50	-0.67	
1,348.00	19.84	180.60	1,332.64	-143.87	8.57	144.11	4.38	4.37	-1.17	
1,378.00	20.86	180.57	1,360.76	-154.30	8.47	154.53	3.40	3.40	-0.10	
1,408.00	21.95	179.46	1,388.69	-165.25	8.47	165.46	3.88	3.83	-3.70	
1,438.00	22.39	178.91	1,416.48	-176.57	8.63	176.78	1.62	1.47	-1.83	
1,468.00	23.47	178.59	1,444.10	-188.25	8.89	188.46	3.62	3.60	-1.07	
1,498.00	24.95	177.40	1,471.47	-200.55	9.32	200.76	5.19	4.93	-3.97	
1,528.00	26.91	177.96	1,498.44	-213.65	9.85	213.88	6.58	6.53	1.87	
1,558.00	28.68	177.78	1,524.98	-227.63	10.37	227.87	5.91	5.90	-0.60	
1,588.00	29.78	177.68	1,551.16	-242.27	10.95	242.52	3.67	3.67	-0.33	
1,618.00	29.25	176.44	1,577.27	-257.03	11.71	257.30	2.70	-1.77	-4.13	
1,648.00	27.95	174.63	1,603.61	-271.35	12.82	271.65	5.21	-4.33	-6.03	
1,678.00	28.09	174.47	1,630.09	-285.38	14.16	285.73	0.53	0.47	-0.53	
1,708.00	28.78	174.32	1,656.47	-299.59	15.55	299.99	2.31	2.30	-0.50	
1,738.00	30.28	174.15	1,682.57	-314.30	17.04	314.76	5.01	5.00	-0.57	
1,768.00	32.21	174.20	1,708.22	-329.78	18.62	330.30	6.43	6.43	0.17	
1,798.00	34.00	173.92	1,733.35	-346.08	20.31	346.66	5.99	5.97	-0.93	
1,828.00	35.86	174.18	1,757.94	-363.16	22.09	363.81	6.22	6.20	0.87	
1,858.00	37.40	175.51	1,782.02	-380.99	23.70	381.69	5.77	5.13	4.43	
1,888.00	38.91	176.42	1,805.61	-399.48	25.00	400.22	5.37	5.03	3.03	
1,918.00	39.37	177.06	1,828.88	-418.38	26.08	419.15	2.04	1.53	2.13	
1,948.00	38.86	176.66	1,852.15	-437.28	27.11	438.08	1.90	-1.70	-1.33	
1,978.00	39.56	177.17	1,875.40	-456.22	28.13	457.04	2.57	2.33	1.70	
2,008.00	40.65	177.42	1,898.34	-475.52	29.04	476.37	3.67	3.63	0.83	
2,038.00	40.58	177.65	1,921.12	-495.03	29.88	495.90	0.55	-0.23	0.77	
2,068.00	40.25	176.92	1,943.96	-514.46	30.80	515.35	1.92	-1.10	-2.43	



Survey Report

<b>Company:</b>	HG Energy LLC	<b>Local Co-ordinate Reference:</b>	Well Ephraim Griffith No. 133
<b>Project:</b>	Lincoln County, West Virginia UTM83	<b>TVD Reference:</b>	RKB=888+6 @ 894.00ft (Noah Horn 294)
<b>Site:</b>	Ephraim Griffith	<b>MD Reference:</b>	RKB=888+6 @ 894.00ft (Noah Horn 294)
<b>Well:</b>	Ephraim Griffith No. 133	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Jul2216dt_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,098.00	40.07	176.63	1,966.89	-533.78	31.89	534.69	0.87	-0.60	-0.97
2,128.00	41.34	176.90	1,989.63	-553.31	33.00	554.26	4.27	4.23	0.90
2,158.00	42.69	176.37	2,011.92	-573.35	34.18	574.33	4.65	4.50	-1.77
2,188.00	43.29	176.93	2,033.86	-593.78	35.37	594.79	2.37	2.00	1.87
2,218.00	43.57	178.55	2,055.65	-614.38	36.18	615.41	3.83	0.93	5.40
2,248.00	43.67	179.49	2,077.37	-635.07	36.54	636.10	2.19	0.33	3.13
2,278.00	44.34	180.88	2,098.94	-655.91	36.47	656.91	3.92	2.23	4.63
2,308.00	45.09	181.31	2,120.26	-677.02	36.06	677.97	2.70	2.50	1.43
2,338.00	45.90	180.59	2,141.29	-698.41	35.71	699.32	3.20	2.70	-2.40
2,368.00	46.69	180.41	2,162.02	-720.10	35.52	720.97	2.67	2.63	-0.60
2,398.00	47.14	180.67	2,182.51	-742.01	35.32	742.85	1.63	1.50	0.87
2,428.00	47.68	180.41	2,202.82	-764.09	35.11	764.90	1.91	1.80	-0.87
2,458.00	48.02	179.61	2,222.95	-786.33	35.10	787.11	2.28	1.13	-2.67
2,488.00	48.51	179.64	2,242.92	-808.72	35.25	809.48	1.64	1.63	0.10
2,518.00	48.86	178.69	2,262.72	-831.25	35.58	832.00	2.65	1.17	-3.17
2,548.00	48.96	178.76	2,282.44	-853.85	36.08	854.60	0.38	0.33	0.23
2,578.00	48.46	178.22	2,302.24	-876.39	36.68	877.14	2.15	-1.67	-1.80
2,608.00	48.26	178.96	2,322.17	-898.80	37.23	899.55	1.96	-0.67	2.47
2,638.00	48.95	179.52	2,342.01	-921.30	37.53	922.04	2.69	2.30	1.87
2,668.00	48.28	178.97	2,361.84	-943.81	37.82	944.54	2.62	-2.23	-1.83
2,698.00	47.68	178.20	2,381.92	-966.09	38.37	966.82	2.76	-2.00	-2.57
2,728.00	47.28	177.99	2,402.20	-988.19	39.11	988.93	1.43	-1.33	-0.70
2,758.00	45.13	177.39	2,422.96	-1,009.82	39.98	1,010.58	7.31	-7.17	-2.00
<b>Survey @ 2758.00 MD 2422.96 TVD</b>									
2,822.00	45.13	177.39	2,468.11	-1,055.13	42.04	1,055.94	0.00	0.00	0.00
<b>Survey projected to 2822.00 MD 2468.11 TVD</b>									

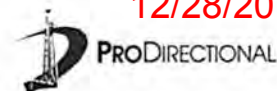
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
568.00	567.91	-8.48	1.84	MWD surveys
2,758.00	2,422.96	-1,009.82	39.98	Survey @ 2758.00 MD 2422.96 TVD
2,822.00	2,468.11	-1,055.13	42.04	Survey projected to 2822.00 MD 2468.11 TVD

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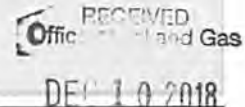
WV Department of  
Environmental Protection



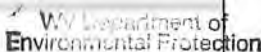


Survey Report - Geographic

<b>Company:</b> HG Energy LLC	<b>Local Co-ordinate Reference:</b> Well Ephraim Griffith No. 133
<b>Project:</b> Lincoln County, West Virginia UTM83	<b>TVD Reference:</b> RKB=888+6 @ 894.00ft
<b>Site:</b> Ephraim Griffith	<b>MD Reference:</b> RKB=888+6 @ 894.00ft
<b>Well:</b> Ephraim Griffith No. 133	<b>North Reference:</b> Grid
<b>Wellbore:</b> Original Hole	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Surveys Original Hole	<b>Database:</b> DB_Jul2216dt_v14



<b>Project</b> Lincoln County, West Virginia UTM83	<b>System Datum:</b> Mean Sea Level
<b>Map System:</b> Universal Transverse Mercator	<b>Map Zone:</b> Zone 17N (84 W to 78 W)
<b>Geo Datum:</b> NAD83 West Virginia - HARN	



<b>Site</b> Ephraim Griffith			
<b>Site Position:</b>	<b>From:</b> Map	<b>Northing:</b> 4,230,802.00 m	<b>Latitude:</b> 38° 13' 16.8807 N
<b>Position Uncertainty:</b> 0.00 ft	<b>Easting:</b> 416,835.00 m	<b>Longitude:</b> 81° 57' 0.3277 W	<b>Grid Convergence:</b> -0.59 °
<b>Slot Radius:</b> 13-3/16 "			

<b>Well</b> Ephraim Griffith No. 133			
<b>Well Position</b>	<b>+N/-S</b> 0.00 ft	<b>Northing:</b> 4,230,802.00 m	<b>Latitude:</b> 38° 13' 16.8807 N
	<b>+E/-W</b> 0.00 ft	<b>Easting:</b> 416,835.00 m	<b>Longitude:</b> 81° 57' 0.3277 W
<b>Position Uncertainty</b> 0.00 ft	<b>Wellhead Elevation:</b> ft	<b>Ground Level:</b> 888.00 ft	

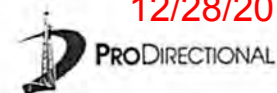
<b>Wellbore</b> Original Hole					
<b>Magnetics</b>	<b>Model Name</b> HDGM	<b>Sample Date</b> 10/5/2018	<b>Declination (°)</b> -8.33	<b>Dip Angle (°)</b> 65.55	<b>Field Strength (nT)</b> 51,413.10000000

<b>Design</b> Surveys Original Hole				
<b>Audit Notes:</b>				
<b>Version:</b> 1.0	<b>Phase:</b> ACTUAL	<b>Tie On Depth:</b> 0.00		
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b> 0.00	<b>+N/-S (ft)</b> 0.00	<b>+E/-W (ft)</b> 0.00	<b>Direction (°)</b> 177.25

<b>Survey Program</b>	<b>Date</b> 10/11/2018			
<b>From (ft)</b> 568.00	<b>To (ft)</b> 2,758.00	<b>Survey (Wellbore)</b> MWD (Original Hole)	<b>Tool Name</b> MWD	<b>Description</b> OWSG MWD - Standard
<b>2,822.00</b>	<b>2,822.00</b>	<b>Projection (Original Hole)</b>	<b>MWD</b>	<b>OWSG MWD - Standard</b>

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	4,230,802.00	416,835.00	38° 13' 16.8807 N	81° 57' 0.3277 W
568.00	1.75	167.78	567.91	-8.48	1.84	4,230,799.42	416,835.56	38° 13' 16.7971 N	81° 57' 0.3036 W
<b>MWD surveys</b>									
598.00	1.68	166.57	597.90	-9.35	2.04	4,230,799.15	416,835.62	38° 13' 16.7885 N	81° 57' 0.3010 W
628.00	1.84	163.81	627.89	-10.19	2.26	4,230,798.90	416,835.69	38° 13' 16.7802 N	81° 57' 0.2981 W
658.00	2.18	163.94	657.87	-11.15	2.53	4,230,798.61	416,835.77	38° 13' 16.7707 N	81° 57' 0.2945 W
688.00	3.13	163.21	687.84	-12.49	2.93	4,230,798.20	416,835.89	38° 13' 16.7576 N	81° 57' 0.2894 W
718.00	4.29	163.62	717.77	-14.35	3.48	4,230,797.63	416,836.06	38° 13' 16.7392 N	81° 57' 0.2822 W
748.00	5.34	165.64	747.67	-16.78	4.14	4,230,796.89	416,836.26	38° 13' 16.7153 N	81° 57' 0.2736 W
778.00	6.20	168.49	777.51	-19.72	4.81	4,230,796.00	416,836.47	38° 13' 16.6863 N	81° 57' 0.2648 W
808.00	6.90	168.84	807.32	-23.07	5.49	4,230,794.97	416,836.67	38° 13' 16.6532 N	81° 57' 0.2560 W

Survey Report - Geographic



<b>Company:</b> HG Energy LLC	<b>Local Co-ordinate Reference:</b> Well Ephraim Griffith No. 133	
<b>Project:</b> Lincoln County, West Virginia UTM83	<b>TVD Reference:</b> RKB=888+6 @ 894.00ft	
<b>Site:</b> Ephraim Griffith	<b>MD Reference:</b> RKB=888+6 @ 894.00ft	
<b>Well:</b> Ephraim Griffith No. 133	<b>North Reference:</b> Grid	
<b>Wellbore:</b> Original Hole	<b>Survey Calculation Method:</b> Minimum Curvature	
<b>Design:</b> Surveys Original Hole	<b>Database:</b> DB_Jul2216dt_v14	

<b>Project</b> Lincoln County, West Virginia UTM83	<b>System Datum:</b> Mean Sea Level	
<b>Map System:</b> Universal Transverse Mercator		
<b>Geo Datum:</b> NAD83 West Virginia - HARN		
<b>Map Zone:</b> Zone 17N (84 W to 78 W)		

<b>Site</b> Ephraim Griffith					
<b>Site Position:</b>		<b>Northing:</b> 4,230,802.00 m	<b>Latitude:</b> 38° 13' 16.8807 N		
<b>From:</b> Map		<b>Easting:</b> 416,835.00 m	<b>Longitude:</b> 81° 57' 0.3277 W		
<b>Position Uncertainty:</b> 0.00 ft		<b>Slot Radius:</b> 13-3/16 "	<b>Grid Convergence:</b> -0.59 "		

<b>Well</b> Ephraim Griffith No. 133					
<b>Well Position</b>	<b>+N/-S</b> 0.00 ft	<b>Northing:</b> 4,230,802.00 m	<b>Latitude:</b> 38° 13' 16.8807 N		
	<b>+E/-W</b> 0.00 ft	<b>Easting:</b> 416,835.00 m	<b>Longitude:</b> 81° 57' 0.3277 W		
<b>Position Uncertainty</b> 0.00 ft		<b>Wellhead Elevation:</b> ft	<b>Ground Level:</b> 888.00 ft		

<b>Wellbore</b> Original Hole					
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	10/5/2018	-8.33	65.55	51,413.10000000

<b>Design</b> Surveys Original Hole					
<b>Audit Notes:</b>					
<b>Version:</b> 1.0	<b>Phase:</b> ACTUAL	<b>Tie On Depth:</b> 0.00			
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	177.25	

<b>Survey Program</b> Date 10/11/2018					
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
568.00	2,758.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,822.00	2,822.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

<b>Survey</b>										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	4,230,802.00	416,835.00	38° 13' 16.8807 N	81° 57' 0.3277 W	
568.00	1.75	167.78	567.91	-8.48	1.84	4,230,799.42	416,835.56	38° 13' 16.7971 N	81° 57' 0.3036 W	
<b>MWD surveys</b>										
598.00	1.68	166.57	597.90	-9.35	2.04	4,230,799.15	416,835.62	38° 13' 16.7885 N	81° 57' 0.3010 W	
628.00	1.64	163.81	627.89	-10.19	2.26	4,230,798.90	416,835.69	38° 13' 16.7802 N	81° 57' 0.2981 W	
658.00	2.18	163.94	657.87	-11.15	2.53	4,230,798.61	416,835.77	38° 13' 16.7707 N	81° 57' 0.2945 W	
688.00	3.13	163.21	687.84	-12.49	2.93	4,230,798.20	416,835.89	38° 13' 16.7576 N	81° 57' 0.2894 W	
718.00	4.29	163.62	717.77	-14.35	3.48	4,230,797.63	416,836.06	38° 13' 16.7392 N	81° 57' 0.2822 W	
748.00	5.34	165.64	747.67	-16.78	4.14	4,230,796.89	416,836.26	38° 13' 16.7153 N	81° 57' 0.2736 W	
778.00	6.20	168.49	777.51	-19.72	4.81	4,230,796.00	416,836.47	38° 13' 16.6863 N	81° 57' 0.2648 W	
808.00	6.90	168.84	807.32	-23.07	5.49	4,230,794.97	416,836.67	38° 13' 16.6532 N	81° 57' 0.2560 W	





Survey Report - Geographic

Company: HG Energy LLC  
 Project: Lincoln County, West Virginia UTM83  
 Site: Ephraim Griffith  
 Well: Ephraim Griffith No. 133  
 Wellbore: Original Hole  
 Design: Surveys Original Hole

Local Co-ordinate Reference:  
 TVD Reference:  
 MD Reference:  
 North Reference:  
 Survey Calculation Method:  
 Database:

Well Ephraim Griffith No. 133  
 RKB=888+6 @ 894.00ft  
 RKB=888+6 @ 894.00ft  
 Grid  
 Minimum Curvature  
 DB\_Jul2218dt\_v14

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 DEC 10 2018  
 WV Department of  
 Environmental Protection

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
838.00	7.64	169.86	837.08	-26.80	6.19	4,230,793.84	416,836.88	38° 13' 16.6163 N	81° 57' 0.2467 W
868.00	8.57	170.58	866.78	-30.97	6.60	4,230,792.56	416,837.10	38° 13' 16.5752 N	81° 57' 0.2372 W
898.00	9.39	171.17	896.41	-35.59	7.64	4,230,791.16	416,837.33	38° 13' 16.5296 N	81° 57' 0.2273 W
926.00	10.23	171.59	925.97	-40.65	8.41	4,230,789.62	416,837.56	38° 13' 16.4797 N	81° 57' 0.2171 W
958.00	10.84	173.37	955.46	-46.08	9.13	4,230,787.98	416,837.78	38° 13' 16.4260 N	81° 57' 0.2074 W
988.00	11.48	175.55	984.90	-51.66	9.88	4,230,786.20	416,837.95	38° 13' 16.3689 N	81° 57' 0.1997 W
1,018.00	12.03	178.53	1,014.27	-57.97	9.99	4,230,784.34	416,838.05	38° 13' 16.3088 N	81° 57' 0.1950 W
1,048.00	12.47	180.62	1,043.59	-64.33	10.04	4,230,782.40	416,838.06	38° 13' 16.2457 N	81° 57' 0.1936 W
1,078.00	12.65	181.14	1,072.87	-70.85	9.94	4,230,780.41	416,838.03	38° 13' 16.1812 N	81° 57' 0.1940 W
1,108.00	13.16	181.89	1,102.11	-77.55	9.76	4,230,778.37	416,837.97	38° 13' 16.1149 N	81° 57' 0.1954 W
1,138.00	14.00	181.23	1,131.27	-84.59	9.57	4,230,776.22	416,837.92	38° 13' 16.0453 N	81° 57' 0.1968 W
1,168.00	14.58	181.23	1,160.34	-91.99	9.41	4,230,773.96	416,837.87	38° 13' 15.9720 N	81° 57' 0.1979 W
1,198.00	15.02	180.63	1,189.35	-99.68	9.29	4,230,771.63	416,837.83	38° 13' 15.8983 N	81° 57' 0.1985 W
1,228.00	15.68	181.00	1,218.28	-107.60	9.18	4,230,769.21	416,837.80	38° 13' 15.8177 N	81° 57' 0.1989 W
1,258.00	16.63	180.82	1,247.09	-115.94	9.04	4,230,768.67	416,837.75	38° 13' 15.7352 N	81° 57' 0.1995 W
1,288.00	17.48	181.15	1,275.77	-124.74	8.88	4,230,763.98	416,837.70	38° 13' 15.6482 N	81° 57' 0.2004 W
1,318.00	18.53	180.95	1,304.30	-134.01	8.71	4,230,761.16	416,837.65	38° 13' 15.5565 N	81° 57' 0.2013 W
1,348.00	19.84	180.60	1,332.64	-143.87	8.57	4,230,758.15	416,837.61	38° 13' 15.4590 N	81° 57' 0.2017 W
1,378.00	20.88	180.57	1,360.76	-154.30	8.47	4,230,754.97	416,837.58	38° 13' 15.3559 N	81° 57' 0.2017 W
1,408.00	21.95	179.46	1,388.69	-165.25	8.47	4,230,751.64	416,837.58	38° 13' 15.2476 N	81° 57' 0.2003 W
1,438.00	22.39	178.91	1,416.46	-176.57	8.63	4,230,748.19	416,837.63	38° 13' 15.1357 N	81° 57' 0.1988 W
1,468.00	23.47	176.59	1,444.10	-188.25	8.89	4,230,744.62	416,837.71	38° 13' 15.0202 N	81° 57' 0.1921 W
1,498.00	24.85	177.40	1,471.47	-200.55	9.32	4,230,740.88	416,837.84	38° 13' 14.8987 N	81° 57' 0.1851 W
1,528.00	26.91	177.98	1,498.44	-213.65	9.85	4,230,736.88	416,838.00	38° 13' 14.7691 N	81° 57' 0.1768 W
1,558.00	28.88	177.78	1,524.98	-227.63	10.37	4,230,732.62	416,838.16	38° 13' 14.6310 N	81° 57' 0.1685 W
1,588.00	29.78	177.68	1,551.16	-242.27	10.95	4,230,728.16	416,838.34	38° 13' 14.4863 N	81° 57' 0.1593 W
1,618.00	29.25	176.44	1,577.27	-257.03	11.71	4,230,723.66	416,838.57	38° 13' 14.3404 N	81° 57' 0.1479 W
1,648.00	27.95	174.83	1,603.61	-271.35	12.62	4,230,719.30	416,838.91	38° 13' 14.1990 N	81° 57' 0.1321 W
1,678.00	28.09	174.47	1,630.09	-285.38	14.16	4,230,715.02	416,839.31	38° 13' 14.0604 N	81° 57' 0.1136 W
1,708.00	28.78	174.32	1,656.47	-299.59	15.55	4,230,710.69	416,839.74	38° 13' 13.9200 N	81° 57' 0.0942 W
1,738.00	30.28	174.15	1,682.57	-314.30	17.04	4,230,706.20	416,840.19	38° 13' 13.7748 N	81° 57' 0.0737 W
1,768.00	32.01	174.20	1,708.22	-329.78	18.62	4,230,701.49	416,840.67	38° 13' 13.6217 N	81° 57' 0.0519 W
1,798.00	34.00	173.92	1,733.35	-348.08	20.31	4,230,696.52	416,841.19	38° 13' 13.4608 N	81° 57' 0.0288 W
1,828.00	35.86	174.18	1,757.94	-363.16	22.09	4,230,691.31	416,841.73	38° 13' 13.2920 N	81° 57' 0.0041 W
1,858.00	37.40	175.51	1,782.02	-380.99	23.70	4,230,685.88	416,842.22	38° 13' 13.1159 N	81° 56' 59.9817 W
1,888.00	38.91	176.42	1,805.61	-399.48	25.00	4,230,680.24	416,842.62	38° 13' 12.9333 N	81° 56' 59.9630 W
1,918.00	39.37	177.08	1,828.88	-418.38	26.08	4,230,674.48	416,842.95	38° 13' 12.7464 N	81° 56' 59.9471 W
1,948.00	38.86	176.66	1,852.15	-437.28	27.11	4,230,668.72	416,843.26	38° 13' 12.5597 N	81° 56' 59.9316 W
1,978.00	39.56	177.17	1,875.40	-456.22	28.13	4,230,662.95	416,843.57	38° 13' 12.3725 N	81° 56' 59.9164 W
2,008.00	40.65	177.42	1,898.34	-475.52	29.04	4,230,657.07	416,843.85	38° 13' 12.1818 N	81° 56' 59.9025 W
2,038.00	40.58	177.65	1,921.12	-495.03	29.88	4,230,651.12	416,844.11	38° 13' 11.9889 N	81° 56' 59.8895 W
2,068.00	40.25	176.92	1,943.66	-514.46	30.80	4,230,645.20	416,844.39	38° 13' 11.7969 N	81° 56' 59.8754 W
2,098.00	40.07	176.63	1,966.89	-533.78	31.89	4,230,639.31	416,844.72	38° 13' 11.6060 N	81° 56' 59.8593 W
2,128.00	41.34	176.90	1,989.63	-553.31	33.00	4,230,633.36	416,845.06	38° 13' 11.4130 N	81° 56' 59.8430 W
2,158.00	42.69	176.37	2,011.92	-573.35	34.18	4,230,627.25	416,845.42	38° 13' 11.2149 N	81° 56' 59.8256 W
2,188.00	43.29	176.93	2,033.86	-593.78	35.37	4,230,621.02	416,845.78	38° 13' 11.0131 N	81° 56' 59.8080 W
2,218.00	43.57	178.55	2,055.65	-614.38	36.18	4,230,614.74	416,846.03	38° 13' 10.8094 N	81° 56' 59.7952 W
2,248.00	43.67	179.49	2,077.37	-635.07	36.54	4,230,608.43	416,846.14	38° 13' 10.6049 N	81° 56' 59.7881 W
2,278.00	44.34	180.88	2,098.94	-655.91	36.47	4,230,602.08	416,846.11	38° 13' 10.3988 N	81° 56' 59.7883 W
2,308.00	45.09	181.31	2,120.28	-677.02	36.06	4,230,595.65	416,845.99	38° 13' 10.1901 N	81° 56' 59.7888 W
2,338.00	45.90	180.59	2,141.29	-698.41	35.71	4,230,589.13	416,845.88	38° 13' 9.9785 N	81° 56' 59.7803 W
2,368.00	48.89	180.41	2,162.02	-720.10	35.52	4,230,582.52	416,845.83	38° 13' 9.7841 N	81° 56' 59.7899 W
2,398.00	47.14	180.67	2,182.51	-742.01	35.32	4,230,575.84	416,845.76	38° 13' 9.5474 N	81° 56' 59.7897 W
2,428.00	47.68	180.41	2,202.82	-764.09	35.11	4,230,569.11	416,845.70	38° 13' 9.3290 N	81° 56' 59.7894 W
2,458.00	48.02	179.61	2,222.85	-786.33	35.10	4,230,562.33	416,845.70	38° 13' 9.1091 N	81° 56' 59.7888 W

Survey Report - Geographic

<b>Company:</b>	HG Energy LLC	<b>Local Co-ordinate Reference:</b>	Well Ephraim Griffith No. 133
<b>Project:</b>	Lincoln County, West Virginia UTM83	<b>TVD Reference:</b>	RKB=888+6 @ 894.00ft
<b>Site:</b>	Ephraim Griffith	<b>MD Reference:</b>	RKB=888+6 @ 894.00ft
<b>Well:</b>	Ephraim Griffith No. 133	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Jul2216dt_v14

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
2,488.00	48.51	179.64	2,242.92	-808.72	35.25	4,230,555.51	416,845.74	38° 13' 8.8877 N	81° 56' 59.7819 W
2,518.00	48.86	178.69	2,262.72	-831.25	35.58	4,230,548.64	416,845.84	38° 13' 8.6650 N	81° 56' 59.7749 W
2,548.00	48.96	178.76	2,282.44	-853.85	36.08	4,230,541.75	416,846.00	38° 13' 8.4415 N	81° 56' 59.7657 W
2,578.00	48.46	178.22	2,302.24	-876.39	36.68	4,230,534.88	416,846.18	38° 13' 8.2188 N	81° 56' 59.7553 W
2,608.00	48.26	178.96	2,322.17	-898.80	37.23	4,230,528.05	416,846.35	38° 13' 7.9972 N	81° 56' 59.7455 W
2,638.00	48.95	179.52	2,342.01	-921.30	37.53	4,230,521.19	416,846.44	38° 13' 7.7747 N	81° 56' 59.7389 W
2,668.00	48.28	178.97	2,361.84	-943.81	37.82	4,230,514.33	416,846.53	38° 13' 7.5522 N	81° 56' 59.7323 W
2,698.00	47.68	178.20	2,381.92	-966.09	38.37	4,230,507.54	416,846.69	38° 13' 7.3320 N	81° 56' 59.7225 W
2,728.00	47.28	177.99	2,402.20	-988.19	39.11	4,230,500.80	416,846.92	38° 13' 7.1136 N	81° 56' 59.7105 W
2,758.00	45.13	177.39	2,422.96	-1,009.82	39.98	4,230,494.21	416,847.18	38° 13' 6.8997 N	81° 56' 59.6968 W
<b>Survey @ 2758.00 MD 2422.96 TVD</b>									
2,822.00	45.13	177.39	2,468.11	-1,055.13	42.04	4,230,480.40	416,847.81	38° 13' 6.4519 N	81° 56' 59.6651 W
<b>Survey projected to 2822.00 MD 2468.11 TVD</b>									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
568.00	567.91	-8.48	1.84	MWD surveys	
2,758.00	2,422.96	-1,009.82	39.98	Survey @ 2758.00 MD 2422.96 TVD	
2,822.00	2,468.11	-1,055.13	42.04	Survey projected to 2822.00 MD 2468.11 TVD	

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 The Department of  
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# **HG Energy LLC**

**Lincoln County, West Virginia UTM83**

**Ephraim Griffith**

**Ephraim Griffith No. 133**

**Original Hole**

**Design: Surveys Original Hole**

## **Completion Report**

**11 October, 2018**



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**DEC 10 2018**  
**West Virginia Department of**  
**Environmental Protection**



Completion Report

**Company:** HG Energy LLC  
**Project:** Lincoln County, West Virginia UTM83  
**Site:** Ephraim Griffith  
**Well:** Ephraim Griffith No. 133  
**Wellbore:** Original Hole  
**Design:** Surveys Original Hole

**Local Co-ordinate Reference:**  
**TVD Reference:** Well Ephraim Griffith No. 133  
**MD Reference:** RKB=888+6 @ 894,00ft (Noah Horn 294)  
**North Reference:** RKB=888+6 @ 894,00ft (Noah Horn 294)  
**Survey Calculation Method:** Grid  
**Database:** Minimum Curvature  
 DB\_Jul2216ct\_v14

**Project:** Lincoln County, West Virginia UTM83  
**Map System:** Universal Transverse Mercator  
**Geo Datum:** NAD83 West Virginia - HARN  
**Map Zone:** Zone 17N (64 W to 78 W)

**System Datum:** Mean Sea Level

**Site:** Ephraim Griffith  
**Site Position:** Northing: 4,230,802.00 m  
 Easting: 416,835.00 m  
 Slot Radius: 13-3/16 "

**Position Uncertainty:** 0.00 ft  
 Latitude: 38° 13' 16.8807 N  
 Longitude: 81° 57' 0.3277 W  
 Grid Convergence: -0.59 °

**Well:** Ephraim Griffith No. 133  
**Well Position:** +N/-S 0.00 ft  
 +E/-W 0.00 ft  
 Wellhead Elevation: 0.00 ft  
 Latitude: 38° 13' 16.8807 N  
 Longitude: 81° 57' 0.3277 W  
 Ground Level: 888.00 ft

**Wellbore:** Original Hole  
**Magnetics:** Model Name: HDGM Sample Date: 10/5/2018  
 Declination (°): -8.33 Dip Angle (°): 65.55 Field Strength (nT): 51,413.10000000

**Design:** Surveys Original Hole  
**Audit Notes:** Version: 1.0 Phase: ACTUAL Tie On Depth: 0.00  
**Vertical Section:** Depth From (TVD) (ft): 0.00 +N/-S (ft): 0.00 +E/-W (ft): 0.00 Direction (°): 177.25

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**Database:** DB\_Jul2216dt\_v14

Survey Program	Date 10/11/2018			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
568.00	2,758.00	MWD (Original Hole)	MWD	OWSG MWD - Standard
2,822.00	2,822.00	Projection (Original Hole)	MWD	OWSG MWD - Standard

MD (ft)	Inc (")	Azi (azimuth) (°)	TVD (ft)	DLeg (°/100usft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4,230,802.00	416,835.00
568.00	1.75	167.78	567.91	0.31	-8.48	1.84	8.67	167.78	4,230,799.42	416,835.56
<b>MWD surveys</b>										
598.00	1.68	166.57	597.90	0.26	-9.35	2.04	9.57	167.72	4,230,799.15	416,835.62
628.00	1.64	163.81	627.89	0.30	-10.19	2.26	10.44	167.51	4,230,798.89	416,835.69
658.00	2.18	163.94	657.87	1.80	-11.15	2.53	11.44	167.20	4,230,798.60	416,835.77
688.00	3.13	163.21	687.84	3.17	-12.49	2.93	12.82	166.80	4,230,798.19	416,835.89
718.00	4.29	163.62	717.77	3.87	-14.35	3.48	14.76	166.36	4,230,797.63	416,836.06
748.00	5.34	165.64	747.67	3.54	-16.78	4.14	17.28	166.12	4,230,796.89	416,836.26
778.00	6.20	168.49	777.51	3.02	-19.72	4.81	20.29	166.28	4,230,795.99	416,836.47
808.00	6.90	168.84	807.32	2.34	-23.07	5.49	23.71	166.62	4,230,794.97	416,836.67
838.00	7.64	169.86	837.08	2.50	-26.80	6.19	27.51	167.00	4,230,793.83	416,836.89
868.00	8.57	170.58	866.78	3.12	-30.97	6.90	31.73	167.43	4,230,792.56	416,837.10
898.00	9.39	171.17	896.41	2.75	-35.59	7.64	36.41	167.88	4,230,791.15	416,837.33
928.00	10.23	171.59	925.97	2.81	-40.65	8.41	41.51	168.31	4,230,789.61	416,837.56
958.00	10.84	173.37	955.46	2.30	-46.08	9.13	46.98	168.80	4,230,787.95	416,837.78
988.00	11.48	175.55	984.90	2.55	-51.86	9.68	52.76	169.43	4,230,786.19	416,837.95
1,018.00	12.03	178.53	1,014.27	2.73	-57.97	9.99	58.82	170.22	4,230,784.33	416,838.05
1,048.00	12.47	180.62	1,043.59	2.08	-64.33	10.04	65.11	171.13	4,230,782.39	416,838.06
1,078.00	12.65	181.14	1,072.87	0.71	-70.85	9.94	71.55	172.01	4,230,780.40	416,838.03
1,108.00	13.16	181.88	1,102.11	1.79	-77.55	9.76	78.16	172.83	4,230,778.36	416,837.98

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North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: DB\_Jul2216dt\_v14

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	DLeg (°/100usft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)
1,948.00	38.86	176.66	1,852.15	1.90	-437.28	27.11	438.12	176.45	4,230,668.72	416,843.26
1,978.00	39.56	177.17	1,875.40	2.57	-456.22	28.13	457.08	176.47	4,230,662.95	416,843.57
2,008.00	40.65	177.42	1,898.34	3.67	-475.52	29.04	476.41	176.50	4,230,657.06	416,843.85
2,038.00	40.58	177.65	1,921.12	0.55	-495.03	29.88	495.93	176.55	4,230,651.11	416,844.11
2,068.00	40.25	176.92	1,943.96	1.92	-514.46	30.80	515.38	176.57	4,230,645.19	416,844.39
2,098.00	40.07	176.63	1,966.89	0.87	-533.78	31.89	534.73	176.58	4,230,639.30	416,844.72
2,128.00	41.34	176.90	1,989.63	4.27	-553.31	33.00	554.29	176.59	4,230,633.35	416,845.06
2,158.00	42.69	176.37	2,011.92	4.65	-573.35	34.18	574.37	176.59	4,230,627.24	416,845.42
2,188.00	43.29	176.93	2,033.86	2.37	-593.78	35.37	594.83	176.59	4,230,621.02	416,845.78
2,218.00	43.57	178.55	2,055.65	3.83	-614.38	36.18	615.45	176.63	4,230,614.74	416,846.03
2,248.00	43.67	179.49	2,077.37	2.19	-635.07	36.54	636.12	176.71	4,230,608.43	416,846.14
2,278.00	44.34	180.88	2,098.94	3.92	-655.91	36.47	656.93	176.82	4,230,602.08	416,846.12
2,308.00	45.09	181.31	2,120.26	2.70	-677.02	36.06	677.98	178.95	4,230,595.64	416,845.99
2,338.00	45.90	180.59	2,141.29	3.20	-698.41	35.71	699.32	177.07	4,230,589.12	416,845.88
2,368.00	46.69	180.41	2,162.02	2.67	-720.10	35.52	720.97	177.18	4,230,582.51	416,845.83
2,398.00	47.14	180.67	2,182.51	1.63	-742.01	35.32	742.85	177.28	4,230,575.84	416,845.76
2,428.00	47.68	180.41	2,202.82	1.91	-764.09	35.11	764.90	177.37	4,230,569.10	416,845.70
2,458.00	48.02	179.61	2,222.95	2.28	-786.33	35.10	787.12	177.44	4,230,562.33	416,845.70
2,488.00	48.51	179.64	2,242.92	1.64	-808.72	35.25	809.49	177.50	4,230,555.50	416,845.74
2,518.00	48.86	178.89	2,262.72	2.65	-831.25	35.58	832.01	177.55	4,230,548.64	416,845.84
2,548.00	48.96	178.76	2,282.44	0.38	-853.85	36.08	854.62	177.58	4,230,541.75	416,846.00
2,578.00	48.46	178.22	2,302.24	2.15	-876.39	36.68	877.15	177.60	4,230,534.88	416,846.18
2,608.00	48.26	178.96	2,322.17	1.96	-898.80	37.23	899.57	177.63	4,230,528.05	416,846.35
2,638.00	48.95	179.52	2,342.01	2.69	-921.30	37.53	922.07	177.67	4,230,521.19	416,846.44
2,668.00	48.28	178.97	2,361.84	2.62	-943.81	37.82	944.57	177.71	4,230,514.33	416,846.53
2,698.00	47.68	178.20	2,381.92	2.76	-966.09	38.37	966.85	177.73	4,230,507.54	416,846.70
2,728.00	47.28	177.99	2,402.20	1.43	-988.19	39.11	988.96	177.73	4,230,500.80	416,846.92



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<b>Project:</b>	Lincoln County, West Virginia UTM83	<b>TVD Reference:</b>	RKB=888+6 @ 894.00ft (Noah Horn 294)
<b>Site:</b>	Ephraim Griffith	<b>MD Reference:</b>	RKB=888+6 @ 894.00ft (Noah Horn 294)
<b>Well:</b>	Ephraim Griffith No. 133	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Jul2216dt_v14

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	DLeg (°/100usft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)
2,758.00	45.13	177.39	2,422.96	7.31	-1,009.82	39.98	1,010.61	177.73	4,230,494.21	416,847.18
<b>Survey @ 2758.00 MD 2422.96 TVD</b>										
2,822.00	45.13	177.39	2,468.11	0.00	-1,055.13	42.04	1,055.97	177.72	4,230,480.40	416,847.81
<b>Survey projected to 2822.00 MD 2468.11 TVD</b>										

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
588.00	567.91	-8.48	1.84	MWD surveys
2,758.00	2,422.96	-1,009.82	39.98	Survey @ 2758.00 MD 2422.96 TVD
2,822.00	2,468.11	-1,055.13	42.04	Survey projected to 2822.00 MD 2468.11 TVD

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

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