



**EG Griffith 254
Lincoln County, WV
Noah Horn 254 Rig**

July 31, 2019

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AUG 16 2019

WV Department of
Environmental Protection

Survey Certification Report



PRODIRECTIONAL

Survey Certification Letter

July 31, 2019

HG Energy

Operator Name: HG Energy
Well Name: EG Griffith 254
County/Parish: Lincoln County
State: WV
Rig Name: Noah Horn 254
Job Number: LWW3517019

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	573'MD – 2,673'MD	2,733'MD	07/22/19 – 07/24/19	MWD-OWSG

Sincerely,

John Jordan
Well Planning Analyst
Professional Directional

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WV Department of
Environmental Protection

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

prodirectional.com

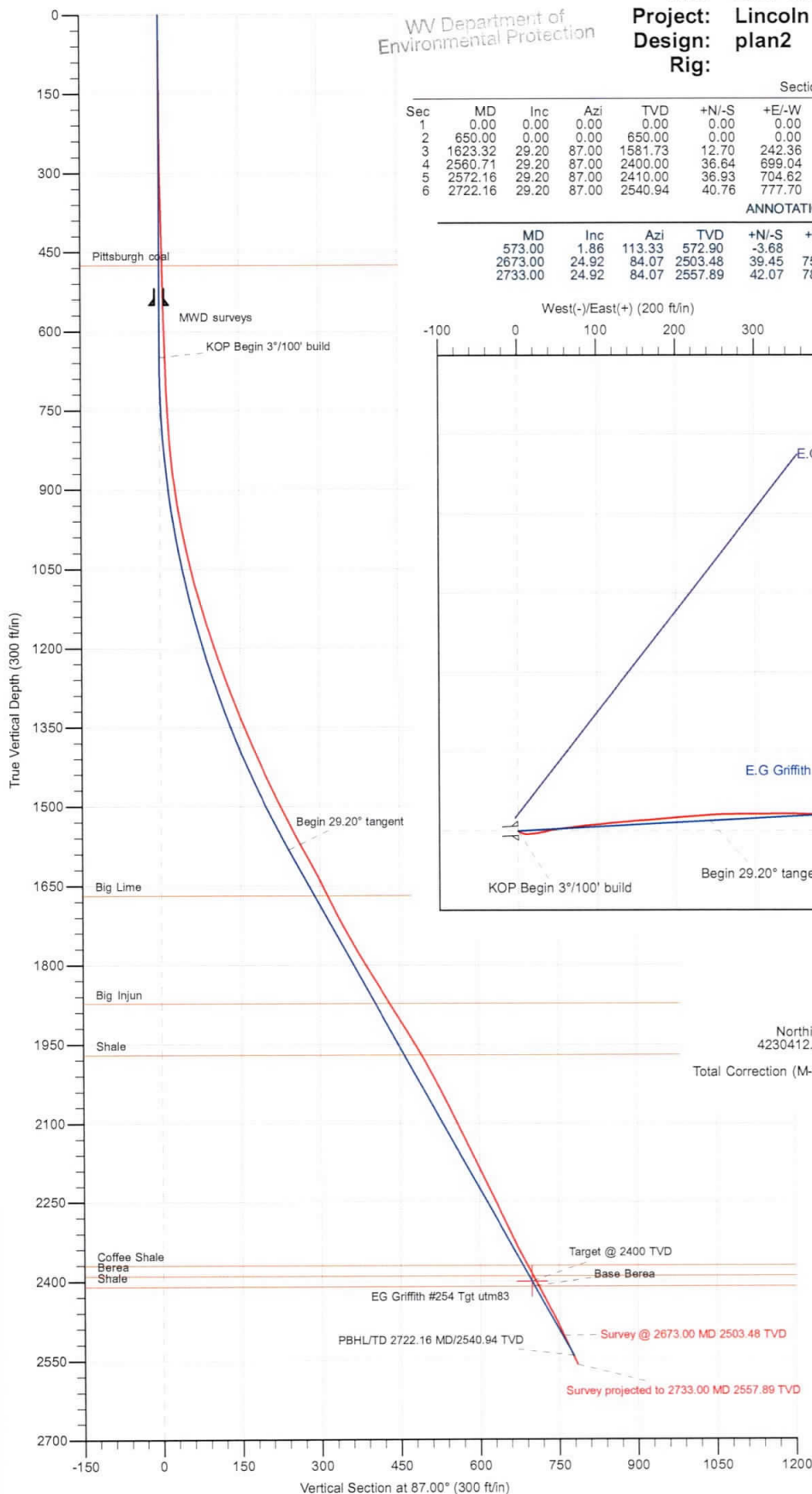
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HG Energy LLC

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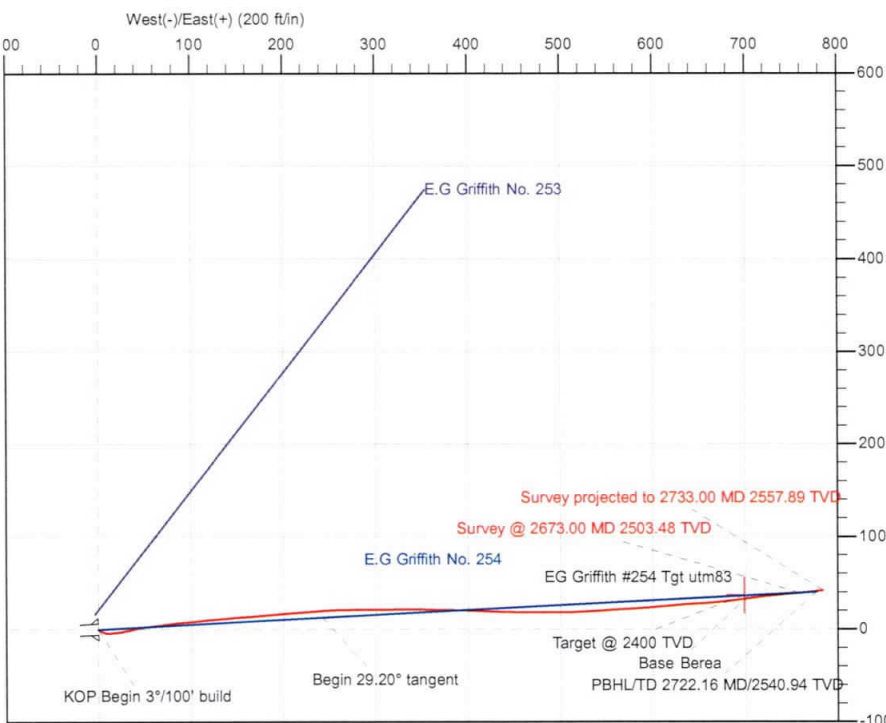
WV Department of
Environmental Protection

Well: E.G Griffith No. 254
Site: E.G. Griffith
Project: Lincoln County, West Virginia UTM83
Design: plan2
Rig:



Section Details										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	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	1623.32	29.20	87.00	1581.73	12.70	242.36	3.00	87.00	242.69	Begin 29.20° tangent
4	2560.71	29.20	87.00	2400.00	36.64	699.04	0.00	0.00	700.00	Target @ 2400 TVD
5	2572.16	29.20	87.00	2410.00	36.93	704.62	0.00	0.00	705.59	Base Berea
6	2722.16	29.20	87.00	2540.94	40.76	777.70	0.00	0.00	778.77	PBHL/TD 2722.16 MD/2540.94 TVD

ANNOTATIONS SURVEYS										
MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation			
573.00	1.86	113.33	572.90	-3.68	8.54	8.20	MWD surveys			
2673.00	24.92	84.07	2503.48	39.45	759.44	760.08	Survey @ 2673.00 MD 2503.48 TVD			
2733.00	24.92	84.07	2557.89	42.07	784.59	785.35	Survey projected to 2733.00 MD 2557.89 TVD			



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=910+8 @ 918.00ft

Northing 4230412.00 Easting 416525.00 Latitude 38° 13' 4.1255 N Longitude 81° 57' 12.9103 W

Total Correction (M->T): To convert a Magnetic Direction to a True Direction, Subtract 8.35°



Azimuths to Grid North
True North: 0.59°
Magnetic North: -7.76°

Magnetic Field
Strength: 51359.3snT
Dip Angle: 65.47°
Date: 4/24/2019
Model: HDGM

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
475.00	475.00	Pittsburgh coal
1668.00	1722.15	Big Lime
1873.00	1956.99	Big Injun
1970.00	2068.11	Shale
2370.00	2526.34	Coffee Shale
2390.00	2549.25	Berea
2410.00	2572.16	Shale



PRODIRECTIONAL

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.G Griffith No. 254
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=910+8 @ 918.00ft
Site:	E.G. Griffith	MD Reference:	RKB=910+8 @ 918.00ft
Well:	E.G Griffith No. 254	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Project	Lincoln County, West Virginia UTM83		
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	E.G. Griffith				
Site Position:		Northing:	4,230,417.00 m	Latitude:	38° 13' 4.2873 N
From:	Map	Easting:	416,524.00 m	Longitude:	81° 57' 12.9535 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	E.G Griffith No. 254					
Well Position	+N/-S	0.00 ft	Northing:	4,230,412.00 m	Latitude:	38° 13' 4.1255 N
	+E/-W	0.00 ft	Easting:	416,525.00 m	Longitude:	81° 57' 12.9103 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	910.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/24/2019	-8.35	65.47	51,359.30000000

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	85.20	

Survey Program	Date	7/31/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
573.00	2,673.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,733.00	2,733.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

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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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
573.00	1.86	113.33	572.90	-3.68	8.54	8.20	0.32	0.32	0.00	
MWD surveys										
603.00	1.50	106.64	602.89	-3.99	9.36	9.00	1.36	-1.20	-22.30	
633.00	2.14	95.56	632.87	-4.15	10.30	9.91	2.42	2.13	-36.93	
663.00	2.39	86.19	662.85	-4.17	11.48	11.09	1.49	0.83	-31.23	
693.00	2.30	82.90	692.82	-4.05	12.70	12.32	0.54	-0.30	-10.97	
723.00	2.25	83.43	722.80	-3.91	13.88	13.51	0.18	-0.17	1.77	
753.00	2.99	83.84	752.77	-3.76	15.24	14.88	2.47	2.47	1.37	
813.00	4.59	85.93	812.63	-3.42	19.20	18.84	2.68	2.67	3.48	

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.G Griffith No. 254
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=910+8 @ 918.00ft
Site:	E.G. Griffith	MD Reference:	RKB=910+8 @ 918.00ft
Well:	E.G Griffith No. 254	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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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)
843.00	5.96	80.48	842.51	-3.08	21.93	21.59	4.86	4.57	-18.17
873.00	7.35	80.24	872.30	-2.49	25.36	25.06	4.63	4.63	-0.80
903.00	8.65	79.91	902.01	-1.77	29.47	29.22	4.34	4.33	-1.10
933.00	9.51	77.11	931.64	-0.83	34.11	33.92	3.22	2.87	-9.33
963.00	10.71	77.52	961.17	0.33	39.24	39.13	4.01	4.00	1.37
993.00	11.68	79.21	990.60	1.50	44.95	44.92	3.41	3.23	5.63
1,023.00	12.60	82.01	1,019.93	2.52	51.17	51.20	3.64	3.07	9.33
1,053.00	13.68	82.58	1,049.14	3.44	57.93	58.01	3.63	3.60	1.90
1,083.00	15.04	82.67	1,078.20	4.39	65.31	65.45	4.53	4.53	0.30
1,113.00	16.29	82.71	1,107.09	5.42	73.34	73.54	4.17	4.17	0.13
1,143.00	17.25	82.80	1,135.81	6.51	81.93	82.19	3.20	3.20	0.30
1,173.00	17.97	88.23	1,164.41	7.21	90.97	91.25	5.98	2.40	18.10
1,203.00	18.75	84.13	1,192.88	7.85	100.39	100.70	5.03	2.60	-13.67
1,233.00	19.06	84.49	1,221.26	8.81	110.06	110.42	1.10	1.03	1.20
1,263.00	19.34	83.94	1,249.59	9.81	119.88	120.28	1.11	0.93	-1.83
1,293.00	20.40	84.27	1,277.81	10.85	130.02	130.47	3.55	3.53	1.10
1,323.00	21.13	85.71	1,305.86	11.78	140.62	141.11	2.97	2.43	4.80
1,353.00	22.22	84.79	1,333.74	12.70	151.66	152.19	3.81	3.63	-3.07
1,383.00	22.95	85.15	1,361.44	13.71	163.14	163.71	2.48	2.43	1.20
1,413.00	23.86	85.22	1,388.97	14.71	175.01	175.63	3.03	3.03	0.23
1,443.00	24.61	86.35	1,416.32	15.61	187.29	187.94	2.94	2.50	3.77
1,473.00	24.70	85.41	1,443.59	16.51	199.77	200.45	1.34	0.30	-3.13
1,503.00	25.22	85.67	1,470.79	17.50	212.39	213.11	1.77	1.73	0.87
1,533.00	26.35	85.03	1,497.80	18.56	225.40	226.16	3.88	3.77	-2.13
1,563.00	27.32	85.57	1,524.57	19.67	238.90	239.71	3.33	3.23	1.80
1,593.00	27.82	87.51	1,551.16	20.50	252.76	253.58	3.43	1.67	6.47
1,623.00	28.88	88.77	1,577.56	20.96	266.99	267.81	4.06	3.53	4.20
1,653.00	28.63	90.53	1,603.87	21.05	281.42	282.20	2.94	-0.83	5.87
1,683.00	27.15	89.79	1,630.38	21.01	295.46	296.18	5.07	-4.93	-2.47
1,713.00	26.66	88.79	1,657.13	21.18	309.03	309.72	2.22	-1.63	-3.33
1,743.00	26.53	89.09	1,683.96	21.42	322.46	323.12	0.62	-0.43	1.00
1,773.00	27.66	89.81	1,710.67	21.55	336.12	336.74	3.92	3.77	2.40
1,803.00	28.70	90.04	1,737.11	21.57	350.29	350.86	3.49	3.47	0.77
1,833.00	29.97	90.71	1,763.26	21.47	364.98	365.50	4.37	4.23	2.23
1,863.00	31.13	91.77	1,789.10	21.14	380.23	380.66	4.26	3.87	3.53
1,893.00	31.74	91.76	1,814.70	20.66	395.87	396.21	2.03	2.03	-0.03
1,923.00	32.24	92.47	1,840.14	20.07	411.75	411.98	2.09	1.67	2.37
1,953.00	32.19	92.01	1,865.52	19.45	427.73	427.86	0.83	-0.17	-1.53
1,983.00	31.64	91.08	1,890.99	19.02	443.58	443.62	2.46	-1.83	-3.10
2,013.00	31.77	91.15	1,916.51	18.71	459.35	459.30	0.45	0.43	0.23
2,043.00	31.67	90.66	1,942.03	18.46	475.12	474.99	0.92	-0.33	-1.63
2,073.00	30.29	90.46	1,967.75	18.31	490.56	490.37	4.61	-4.60	-0.67
2,103.00	28.66	88.90	1,993.86	18.39	505.32	505.08	6.01	-5.43	-5.20

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.G Griffith No. 254
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=910+8 @ 918.00ft
Site:	E.G. Griffith	MD Reference:	RKB=910+8 @ 918.00ft
Well:	E.G Griffith No. 254	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	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)
2,133.00	27.59	87.14	2,020.32	18.87	519.45	519.21	4.51	-3.57	-5.87
2,163.00	27.32	86.89	2,046.94	19.59	533.26	533.03	0.98	-0.90	-0.83
2,193.00	26.77	86.96	2,073.66	20.33	546.88	546.66	1.84	-1.83	0.23
2,223.00	25.85	86.41	2,100.55	21.09	560.16	559.96	3.17	-3.07	-1.83
2,253.00	25.92	86.63	2,127.54	21.89	573.23	573.05	0.40	0.23	0.73
2,283.00	25.92	87.01	2,154.53	22.62	586.32	586.16	0.55	0.00	1.27
2,313.00	25.62	85.11	2,181.54	23.51	599.33	599.20	2.93	-1.00	-6.33
2,343.00	25.34	83.93	2,208.63	24.74	612.18	612.10	1.93	-0.93	-3.93
2,373.00	25.33	83.66	2,235.74	26.13	624.94	624.94	0.39	-0.03	-0.90
2,403.00	25.63	86.16	2,262.82	27.27	637.80	637.84	3.72	1.00	8.33
2,433.00	26.05	87.77	2,289.82	27.96	650.85	650.91	2.73	1.40	5.37
2,463.00	26.80	86.12	2,316.69	28.68	664.18	664.25	3.50	2.50	-5.50
2,493.00	26.21	83.77	2,343.54	29.85	677.52	677.64	4.01	-1.97	-7.83
2,523.00	27.77	82.23	2,370.27	31.52	691.03	691.24	5.70	5.20	-5.13
2,553.00	28.65	81.58	2,396.71	33.52	705.07	705.40	3.11	2.93	-2.17
2,583.00	28.58	83.31	2,423.04	35.41	719.31	719.75	2.77	-0.23	5.77
2,613.00	27.10	84.18	2,449.57	36.93	733.23	733.75	5.12	-4.93	2.90
2,643.00	26.05	84.89	2,476.40	38.21	746.59	747.17	3.66	-3.50	2.37
2,673.00	24.92	84.07	2,503.48	39.45	759.44	760.08	3.95	-3.77	-2.73
Survey @ 2673.00 MD 2503.48 TVD									
2,733.00	24.92	84.07	2,557.89	42.07	784.59	785.35	0.00	0.00	0.00
Survey projected to 2733.00 MD 2557.89 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
573.00	572.90	-3.68	8.54	MWD surveys
2,673.00	2,503.48	39.45	759.44	Survey @ 2673.00 MD 2503.48 TVD

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Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.G Griffith No. 254
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=910+8 @ 918.00ft
Site:	E.G. Griffith	MD Reference:	RKB=910+8 @ 918.00ft
Well:	E.G Griffith No. 254	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Project	Lincoln County, West Virginia UTM83		
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	E.G. Griffith				
Site Position:		Northing:	4,230,417.00 m	Latitude:	38° 13' 4.2873 N
From:	Map	Easting:	416,524.00 m	Longitude:	81° 57' 12.9535 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	E.G Griffith No. 254					
Well Position	+N/-S	0.00 ft	Northing:	4,230,412.00 m	Latitude:	38° 13' 4.1255 N
	+E/-W	0.00 ft	Easting:	416,525.00 m	Longitude:	81° 57' 12.9103 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	910.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/24/2019	-8.35	65.47	51,359.30000000

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	85.20	

Survey Program	Date	7/31/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
573.00	2,673.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	RECEIVED Office of Oil and Gas AUG 16 2019
2,733.00	2,733.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

Survey	WV Department of Environmental Protection									
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	4,230,412.00	416,525.00	38° 13' 4.1255 N	81° 57' 12.9103 W	
573.00	1.86	113.33	572.90	-3.68	8.54	4,230,410.88	416,527.60	38° 13' 4.0899 N	81° 57' 12.8028 W	
MWD surveys										
603.00	1.50	106.64	602.89	-3.99	9.36	4,230,410.79	416,527.85	38° 13' 4.0870 N	81° 57' 12.7924 W	
633.00	2.14	95.56	632.87	-4.15	10.30	4,230,410.74	416,528.14	38° 13' 4.0854 N	81° 57' 12.7807 W	
663.00	2.39	86.19	662.85	-4.17	11.48	4,230,410.73	416,528.50	38° 13' 4.0854 N	81° 57' 12.7659 W	
693.00	2.30	82.90	692.82	-4.05	12.70	4,230,410.77	416,528.87	38° 13' 4.0867 N	81° 57' 12.7506 W	
723.00	2.25	83.43	722.80	-3.91	13.88	4,230,410.81	416,529.23	38° 13' 4.0882 N	81° 57' 12.7358 W	
753.00	2.99	83.84	752.77	-3.76	15.24	4,230,410.86	416,529.65	38° 13' 4.0899 N	81° 57' 12.7187 W	
813.00	4.59	85.93	812.63	-3.42	19.20	4,230,410.96	416,530.85	38° 13' 4.0936 N	81° 57' 12.6693 W	
843.00	5.96	80.48	842.51	-3.08	21.93	4,230,411.07	416,531.68	38° 13' 4.0973 N	81° 57' 12.6350 W	

Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.G Griffith No. 254
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=910+8 @ 918.00ft
Site:	E.G. Griffith	MD Reference:	RKB=910+8 @ 918.00ft
Well:	E.G Griffith No. 254	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
873.00	7.35	80.24	872.30	-2.49	25.36	4,230,411.24	416,532.73	38° 13' 4.1034 N	81° 57' 12.5922 W
903.00	8.65	79.91	902.01	-1.77	29.47	4,230,411.46	416,533.98	38° 13' 4.1109 N	81° 57' 12.5407 W
933.00	9.51	77.11	931.64	-0.83	34.11	4,230,411.75	416,535.39	38° 13' 4.1208 N	81° 57' 12.4827 W
963.00	10.71	77.52	961.17	0.33	39.24	4,230,412.10	416,536.96	38° 13' 4.1327 N	81° 57' 12.4185 W
993.00	11.68	79.21	990.60	1.50	44.95	4,230,412.46	416,538.70	38° 13' 4.1449 N	81° 57' 12.3471 W
1,023.00	12.60	82.01	1,019.93	2.52	51.17	4,230,412.77	416,540.60	38° 13' 4.1556 N	81° 57' 12.2693 W
1,053.00	13.68	82.58	1,049.14	3.44	57.93	4,230,413.05	416,542.66	38° 13' 4.1654 N	81° 57' 12.1847 W
1,083.00	15.04	82.67	1,078.20	4.39	65.31	4,230,413.34	416,544.91	38° 13' 4.1755 N	81° 57' 12.0923 W
1,113.00	16.29	82.71	1,107.09	5.42	73.34	4,230,413.66	416,547.35	38° 13' 4.1866 N	81° 57' 11.9918 W
1,143.00	17.25	82.80	1,135.81	6.51	81.93	4,230,413.99	416,549.97	38° 13' 4.1982 N	81° 57' 11.8843 W
1,173.00	17.97	88.23	1,164.41	7.21	90.97	4,230,414.20	416,552.73	38° 13' 4.2061 N	81° 57' 11.7711 W
1,203.00	18.75	84.13	1,192.88	7.85	100.39	4,230,414.40	416,555.60	38° 13' 4.2133 N	81° 57' 11.6531 W
1,233.00	19.06	84.49	1,221.26	8.81	110.06	4,230,414.69	416,558.55	38° 13' 4.2238 N	81° 57' 11.5320 W
1,263.00	19.34	83.94	1,249.59	9.81	119.88	4,230,414.99	416,561.54	38° 13' 4.2347 N	81° 57' 11.4091 W
1,293.00	20.40	84.27	1,277.81	10.85	130.02	4,230,415.31	416,564.63	38° 13' 4.2460 N	81° 57' 11.2821 W
1,323.00	21.13	85.71	1,305.86	11.78	140.62	4,230,415.60	416,567.86	38° 13' 4.2563 N	81° 57' 11.1494 W
1,353.00	22.22	84.79	1,333.74	12.70	151.66	4,230,415.88	416,571.22	38° 13' 4.2665 N	81° 57' 11.0111 W
1,383.00	22.95	85.15	1,361.44	13.71	163.14	4,230,416.18	416,574.72	38° 13' 4.2776 N	81° 57' 10.8674 W
1,413.00	23.86	85.22	1,388.97	14.71	175.01	4,230,416.49	416,578.34	38° 13' 4.2887 N	81° 57' 10.7187 W
1,443.00	24.61	86.35	1,416.32	15.61	187.29	4,230,416.76	416,582.09	38° 13' 4.2989 N	81° 57' 10.5649 W
1,473.00	24.70	85.41	1,443.59	16.51	199.77	4,230,417.04	416,585.89	38° 13' 4.3091 N	81° 57' 10.4086 W
1,503.00	25.22	85.67	1,470.79	17.50	212.39	4,230,417.34	416,589.74	38° 13' 4.3201 N	81° 57' 10.2505 W
1,533.00	26.35	85.03	1,497.80	18.56	225.40	4,230,417.66	416,593.70	38° 13' 4.3319 N	81° 57' 10.0877 W
1,563.00	27.32	85.57	1,524.57	19.67	238.90	4,230,418.00	416,597.82	38° 13' 4.3442 N	81° 57' 9.9187 W
1,593.00	27.82	87.51	1,551.16	20.50	252.76	4,230,418.25	416,602.04	38° 13' 4.3539 N	81° 57' 9.7451 W
1,623.00	28.88	88.77	1,577.56	20.96	266.99	4,230,418.39	416,606.38	38° 13' 4.3599 N	81° 57' 9.5667 W
1,653.00	28.63	90.53	1,603.87	21.05	281.42	4,230,418.42	416,610.78	38° 13' 4.3623 N	81° 57' 9.3858 W
1,683.00	27.15	89.79	1,630.38	21.01	295.46	4,230,418.41	416,615.05	38° 13' 4.3633 N	81° 57' 9.2100 W
1,713.00	26.66	88.79	1,657.13	21.18	309.03	4,230,418.46	416,619.19	38° 13' 4.3663 N	81° 57' 9.0399 W
1,743.00	26.53	89.09	1,683.96	21.42	322.46	4,230,418.53	416,623.28	38° 13' 4.3701 N	81° 57' 8.8716 W
1,773.00	27.66	89.81	1,710.67	21.55	336.12	4,230,418.57	416,627.45	38° 13' 4.3728 N	81° 57' 8.7004 W
1,803.00	28.70	90.04	1,737.11	21.57	350.29	4,230,418.58	416,631.77	38° 13' 4.3744 N	81° 57' 8.5228 W
1,833.00	29.97	90.71	1,763.26	21.47	364.98	4,230,418.55	416,636.25	38° 13' 4.3749 N	81° 57' 8.3386 W
1,863.00	31.13	91.77	1,789.10	21.14	380.23	4,230,418.45	416,640.89	38° 13' 4.3732 N	81° 57' 8.1475 W
1,893.00	31.74	91.76	1,814.70	20.66	395.87	4,230,418.30	416,645.66	38° 13' 4.3700 N	81° 57' 7.9514 W
1,923.00	32.24	92.47	1,840.14	20.07	411.75	4,230,418.12	416,650.50	38° 13' 4.3658 N	81° 57' 7.7523 W
1,953.00	32.19	92.01	1,865.52	19.45	427.73	4,230,417.93	416,655.37	38° 13' 4.3613 N	81° 57' 7.5519 W
1,983.00	31.64	91.08	1,890.99	19.02	443.58	4,230,417.80	416,660.20	38° 13' 4.3587 N	81° 57' 7.3532 W
2,013.00	31.77	91.15	1,916.51	18.71	459.35	4,230,417.71	416,665.01	38° 13' 4.3572 N	81° 57' 7.1556 W
2,043.00	31.67	90.66	1,942.03	18.46	475.12	4,230,417.63	416,669.82	38° 13' 4.3564 N	81° 57' 6.9579 W
2,073.00	30.29	90.46	1,967.75	18.31	490.56	4,230,417.59	416,674.52	38° 13' 4.3564 N	81° 57' 6.7643 W
2,103.00	28.66	88.90	1,993.86	18.39	505.32	4,230,417.61	416,679.02	38° 13' 4.3587 N	81° 57' 6.5794 W
2,133.00	27.59	87.14	2,020.32	18.87	519.45	4,230,417.76	416,683.33	38° 13' 4.3649 N	81° 57' 6.4023 W
2,163.00	27.32	86.89	2,046.94	19.59	533.26	4,230,417.98	416,687.54	38° 13' 4.3735 N	81° 57' 6.2293 W
2,193.00	26.77	86.96	2,073.66	20.33	546.88	4,230,418.20	416,691.69	38° 13' 4.3821 N	81° 57' 6.0586 W
2,223.00	25.85	86.41	2,100.55	21.09	560.16	4,230,418.43	416,695.74	38° 13' 4.3910 N	81° 57' 5.8924 W
2,253.00	25.92	86.63	2,127.54	21.89	573.23	4,230,418.68	416,699.72	38° 13' 4.4002 N	81° 57' 5.7286 W
2,283.00	25.92	87.01	2,154.53	22.62	586.32	4,230,418.90	416,703.71	38° 13' 4.4087 N	81° 57' 5.5646 W
2,313.00	25.62	85.11	2,181.54	23.51	599.33	4,230,419.17	416,707.68	38° 13' 4.4189 N	81° 57' 5.4017 W
2,343.00	25.34	83.93	2,208.63	24.74	612.18	4,230,419.55	416,711.59	38° 13' 4.4324 N	81° 57' 5.2408 W
2,373.00	25.33	83.66	2,235.74	26.13	624.94	4,230,419.97	416,715.48	38° 13' 4.4474 N	81° 57' 5.0811 W
2,403.00	25.63	86.16	2,262.82	27.27	637.80	4,230,420.32	416,719.40	38° 13' 4.4600 N	81° 57' 4.9201 W
2,433.00	26.05	87.77	2,289.82	27.96	650.85	4,230,420.53	416,723.38	38° 13' 4.4682 N	81° 57' 4.7566 W
2,463.00	26.80	86.12	2,316.69	28.68	664.18	4,230,420.75	416,727.44	38° 13' 4.4766 N	81° 57' 4.5896 W
2,493.00	26.21	83.77	2,343.54	29.85	677.52	4,230,421.10	416,731.51	38° 13' 4.4896 N	81° 57' 4.4226 W

Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.G Griffith No. 254
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=910+8 @ 918.00ft
Site:	E.G. Griffith	MD Reference:	RKB=910+8 @ 918.00ft
Well:	E.G Griffith No. 254	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
2,523.00	27.77	82.23	2,370.27	31.52	691.03	4,230,421.61	416,735.62	38° 13' 4.5074 N	81° 57' 4.2535 W
2,553.00	28.65	81.58	2,396.71	33.52	705.07	4,230,422.22	416,739.90	38° 13' 4.5286 N	81° 57' 4.0778 W
2,583.00	28.58	83.31	2,423.04	35.41	719.31	4,230,422.80	416,744.24	38° 13' 4.5487 N	81° 57' 3.8995 W
2,613.00	27.10	84.18	2,449.57	36.93	733.23	4,230,423.26	416,748.49	38° 13' 4.5652 N	81° 57' 3.7252 W
2,643.00	26.05	84.89	2,476.40	38.21	746.59	4,230,423.65	416,752.56	38° 13' 4.5792 N	81° 57' 3.5579 W
2,673.00	24.92	84.07	2,503.48	39.45	759.44	4,230,424.03	416,756.48	38° 13' 4.5928 N	81° 57' 3.3971 W
Survey @ 2673.00 MD 2503.48 TVD									
2,733.00	24.92	84.07	2,557.89	42.07	784.59	4,230,424.83	416,764.14	38° 13' 4.6212 N	81° 57' 3.0822 W
Survey projected to 2733.00 MD 2557.89 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
573.00	572.90	-3.68	8.54	MWD surveys
2,673.00	2,503.48	39.45	759.44	Survey @ 2673.00 MD 2503.48 TVD
2,733.00	2,557.89	42.07	784.59	Survey projected to 2733.00 MD 2557.89 TVD

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Environmental Protection

HG Energy LLC

Lincoln County, West Virginia UTM83

E.G. Griffith

E.G Griffith No. 254

Original Hole

Design: Surveys Original Hole

Completion Report

31 July, 2019



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WV Department of
Environmental Protection



Completion Report

Company: HG Energy LLC Project: Lincoln County, West Virginia UTM83 Site: E.G. Griffith Well: E.G. Griffith No. 254 Wellbore: Original Hole Design: Surveys Original Hole	Local Co-ordinate Reference: Well E.G. Griffith No. 254 TVD Reference: RKB=910+8 @ 918.00ft MD Reference: RKB=910+8 @ 918.00ft North Reference: Grid Survey Calculation Method: Minimum Curvature Database: DB_Jul2216cd_v14
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Project: Lincoln County, West Virginia UTM83 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
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Site: E.G. Griffith Site Position: Map From: 0.00 ft Position Uncertainty:	Northing: 4,230,417.00 m Eastng: 416,524.00 m Slot Radius: 13-3/16 "	Latitude: 38° 13' 4.2873 N Longitude: 81° 57' 12.9535 W Grid Convergence: -0.59 °
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Well: E.G. Griffith No. 254 Well Position: +N/-S 0.00 ft Position Uncertainty: +E/-W 0.00 ft Wellhead Elevation: 0.00 ft	Northing: 4,230,412.00 m Eastng: 416,525.00 m Wellhead Elevation: ft	Latitude: 38° 13' 4.1255 N Longitude: 81° 57' 12.9103 W Ground Level: 910.00 ft
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Wellbore: Original Hole Magnetics: HDGM	Sample Date: 4/24/2019 Declination (°): -8.35 Dip Angle (°): 65.47 Field Strength (nT): 51,359.30000000
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Design: Surveys Original Hole Audit Notes: Version: 1.0 Phase: ACTUAL Vertical Section:	Depth From (TVD) (ft): 0.00 +N/-S (ft): 0.00 +E/-W (ft): 0.00 Tie On Depth: 0.00 Direction (°): 85.20
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Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: E.G. Griffith
Well: E.G Griffith No. 254
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well E.G Griffith No. 254
TVD Reference: RKB=910+8 @ 918.00ft
MD Reference: RKB=910+8 @ 918.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_JUL2216dt_v14

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Survey Program	From (ft)	To (ft)	Date	Survey (Wellbore)	Tool Name	Description
	573.00	2,673.00	7/31/2019	MWD (Original Hole)	MWD	OWSG MWD - Standard
	2,733.00	2,733.00		Projection (Original Hole)	MWD	OWSG MWD - Standard

Survey	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	4,230,412.00	416,525.00
	573.00	1.86	113.33	572.90	0.32	-3.88	8.54	9.30	113.33	4,230,410.88	416,527.60
MWD surveys											
	603.00	1.50	106.64	602.89	1.36	-3.99	9.36	10.18	113.07	4,230,410.78	416,527.85
	633.00	2.14	95.56	632.87	2.42	-4.15	10.30	11.10	111.98	4,230,410.73	416,528.14
	663.00	2.39	86.19	662.85	1.49	-4.17	11.48	12.21	109.96	4,230,410.73	416,528.50
	693.00	2.30	82.90	692.82	0.54	-4.05	12.70	13.33	107.69	4,230,410.77	416,528.87
	723.00	2.25	83.43	722.80	0.18	-3.91	13.88	14.42	105.73	4,230,410.81	416,529.23
	753.00	2.99	83.84	752.77	2.47	-3.76	15.24	15.70	103.85	4,230,410.85	416,529.65
	813.00	4.59	85.93	812.63	2.68	-3.42	19.20	19.50	100.10	4,230,410.96	416,530.85
	843.00	5.96	80.48	842.51	4.86	-3.08	21.93	22.14	97.99	4,230,411.06	416,531.68
	873.00	7.35	80.24	872.30	4.63	-2.49	25.36	25.48	95.62	4,230,411.24	416,532.73
	903.00	8.65	79.91	902.01	4.34	-1.77	29.47	29.52	93.44	4,230,411.46	416,533.98
	933.00	9.51	77.11	931.64	3.22	-0.83	34.11	34.12	91.39	4,230,411.75	416,535.40
	963.00	10.71	77.52	961.17	4.01	0.33	39.24	39.25	89.52	4,230,412.10	416,536.96
	993.00	11.68	79.21	990.60	3.41	1.50	44.95	44.97	88.09	4,230,412.46	416,538.70
	1,023.00	12.60	82.01	1,019.93	3.64	2.52	51.17	51.23	87.18	4,230,412.77	416,540.60
	1,053.00	13.68	82.58	1,049.14	3.63	3.44	57.93	58.03	86.60	4,230,413.05	416,542.66
	1,083.00	15.04	82.67	1,078.20	4.53	4.39	65.31	65.46	86.15	4,230,413.34	416,544.91
	1,113.00	16.29	82.71	1,107.09	4.17	5.42	73.34	73.54	85.77	4,230,413.65	416,547.36
	1,143.00	17.25	82.80	1,135.81	3.20	6.51	81.93	82.19	85.45	4,230,413.99	416,549.97



Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: E.G. Griffith
Well: E.G. Griffith No. 254
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well E.G. Griffith No. 254
TVD Reference: RKB=910+8 @ 918.00ft
MD Reference: RKB=910+8 @ 918.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

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 WV Department of
 Environmental Protection

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	DLeg (°/100usft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)
1,173.00	17.97	88.23	1,164.41	5.98	7.21	90.97	91.26	85.47	4,230,414.20	416,552.73
1,203.00	18.75	84.13	1,192.88	5.03	7.85	100.39	100.70	85.53	4,230,414.39	416,555.60
1,233.00	19.06	84.49	1,221.26	1.10	8.81	110.06	110.42	85.42	4,230,414.89	416,558.55
1,263.00	19.34	83.94	1,249.59	1.11	9.81	119.88	120.28	85.32	4,230,414.99	416,561.54
1,293.00	20.40	84.27	1,277.81	3.55	10.85	130.02	130.47	85.23	4,230,415.31	416,564.63
1,323.00	21.13	85.71	1,305.86	2.97	11.78	140.62	141.11	85.21	4,230,415.59	416,567.86
1,353.00	22.22	84.79	1,333.74	3.81	12.70	151.66	152.19	85.21	4,230,415.87	416,571.23
1,383.00	22.95	85.15	1,361.44	2.48	13.71	163.14	163.71	85.20	4,230,416.18	416,574.72
1,413.00	23.86	85.22	1,388.97	3.03	14.71	175.01	175.63	85.20	4,230,416.48	416,578.34
1,443.00	24.61	86.35	1,416.32	2.94	15.61	187.29	187.94	85.23	4,230,416.76	416,582.09
1,473.00	24.70	85.41	1,443.59	1.34	16.51	199.77	200.45	85.27	4,230,417.03	416,585.89
1,503.00	25.22	85.67	1,470.79	1.77	17.50	212.39	213.11	85.29	4,230,417.33	416,589.74
1,533.00	26.35	85.03	1,497.80	3.88	18.56	225.40	226.16	85.29	4,230,417.66	416,593.70
1,563.00	27.32	85.57	1,524.57	3.33	19.67	238.90	239.71	85.29	4,230,417.99	416,597.82
1,593.00	27.82	87.51	1,551.16	3.43	20.50	252.76	253.59	85.36	4,230,418.25	416,602.04
1,623.00	28.88	88.77	1,577.56	4.06	20.96	266.99	267.81	85.51	4,230,418.39	416,606.38
1,653.00	28.63	90.53	1,603.87	2.94	21.05	281.42	282.21	85.72	4,230,418.42	416,610.78
1,683.00	27.15	89.79	1,630.38	5.07	21.01	295.46	296.20	85.93	4,230,418.40	416,615.05
1,713.00	26.66	88.79	1,657.13	2.22	21.18	309.03	309.75	86.08	4,230,418.45	416,619.19
1,743.00	26.53	89.09	1,683.96	0.62	21.42	322.46	323.17	86.20	4,230,418.53	416,623.29
1,773.00	27.66	89.81	1,710.67	3.92	21.55	336.12	336.81	86.33	4,230,418.57	416,627.45
1,803.00	28.70	90.04	1,737.11	3.49	21.57	350.29	350.95	86.48	4,230,418.58	416,631.77
1,833.00	29.97	90.71	1,763.26	4.37	21.47	364.98	365.62	86.63	4,230,418.55	416,636.25
1,863.00	31.13	91.77	1,789.10	4.26	21.14	380.23	380.82	86.82	4,230,418.44	416,640.89
1,893.00	31.74	91.76	1,814.70	2.03	20.66	395.87	396.41	87.01	4,230,418.30	416,645.66
1,923.00	32.24	92.47	1,840.14	2.09	20.07	411.75	412.24	87.21	4,230,418.12	416,650.50
1,953.00	32.19	92.01	1,865.52	0.83	19.45	427.73	428.17	87.40	4,230,417.93	416,655.37



Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: E.G. Griffith
Well: E.G. Griffith No. 254
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well E.G Griffith No. 254
TVD Reference: RKB=910+8 @ 918.00ft
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MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	DLeg (°/100usft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)
1,983.00	31.64	91.08	1,890.99	2.46	19.02	443.58	443.99	87.54	4,230,417.80	416,660.20
2,013.00	31.77	91.15	1,916.51	0.45	18.71	459.35	459.73	87.67	4,230,417.70	416,665.01
2,043.00	31.67	90.66	1,942.03	0.92	18.46	475.12	475.48	87.77	4,230,417.63	416,669.82
2,073.00	30.29	90.46	1,967.75	4.61	18.31	490.56	490.90	87.86	4,230,417.58	416,674.52
2,103.00	28.66	88.90	1,993.86	6.01	18.39	505.32	505.65	87.92	4,230,417.60	416,679.02
2,133.00	27.59	87.14	2,020.32	4.51	18.87	519.45	519.79	87.92	4,230,417.75	416,683.33
2,163.00	27.32	86.89	2,046.94	0.98	19.59	533.26	533.62	87.90	4,230,417.97	416,687.54
2,193.00	26.77	86.96	2,073.66	1.84	20.33	546.88	547.26	87.87	4,230,418.20	416,691.69
2,223.00	25.85	86.41	2,100.55	3.17	21.09	560.16	560.56	87.84	4,230,418.43	416,695.74
2,253.00	25.92	86.63	2,127.54	0.40	21.89	573.23	573.65	87.81	4,230,418.67	416,699.72
2,283.00	25.92	87.01	2,154.53	0.55	22.62	586.32	586.76	87.79	4,230,418.89	416,703.71
2,313.00	25.62	85.11	2,181.54	2.93	23.51	599.33	599.80	87.75	4,230,419.17	416,707.68
2,343.00	25.34	83.93	2,208.63	1.93	24.74	612.18	612.68	87.69	4,230,419.54	416,711.59
2,373.00	25.33	83.66	2,235.74	0.39	26.13	624.94	625.49	87.61	4,230,419.96	416,715.48
2,403.00	25.63	86.16	2,262.82	3.72	27.27	637.80	638.38	87.55	4,230,420.31	416,719.40
2,433.00	26.05	87.77	2,289.82	2.73	27.96	650.85	651.45	87.54	4,230,420.52	416,723.38
2,463.00	26.80	86.12	2,316.69	3.50	28.68	664.18	664.80	87.53	4,230,420.74	416,727.44
2,493.00	26.21	83.77	2,343.54	4.01	29.85	677.52	678.17	87.48	4,230,421.10	416,731.51
2,523.00	27.77	82.23	2,370.27	5.70	31.52	691.03	691.75	87.39	4,230,421.61	416,735.63
2,553.00	28.65	81.58	2,396.71	3.11	33.52	705.07	705.86	87.28	4,230,422.22	416,739.90
2,583.00	28.58	83.31	2,423.04	2.77	35.41	719.31	720.18	87.18	4,230,422.79	416,744.25
2,613.00	27.10	84.18	2,449.57	5.12	36.93	733.23	734.16	87.12	4,230,423.26	416,748.49
2,643.00	26.05	84.89	2,476.40	3.66	38.21	746.59	747.57	87.07	4,230,423.65	416,752.56
2,673.00	24.92	84.07	2,503.48	3.95	39.45	759.44	760.47	87.03	4,230,424.03	416,756.48
Survey @ 2673.00 MD 2603.48 TVD										
2,733.00	24.92	84.07	2,557.89	0.00	42.07	784.59	785.71	86.93	4,230,424.82	416,764.14
Survey projected to 2733.00 MD 2557.89 TVD										



Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: E.G. Griffith
Well: E.G Griffith No. 254
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well E.G Griffith No. 254
TVD Reference: RKB=910+8 @ 918.00ft
MD Reference: RKB=910+8 @ 918.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
573.00	572.90	-3.68	8.54	MWD surveys
2,673.00	2,503.48	39.45	759.44	Survey @ 2673.00 MD 2503.48 TVD
2,733.00	2,557.89	42.07	784.59	Survey projected to 2733.00 MD 2557.89 TVD

Checked By: _____

Approved By: _____

Date: _____

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Office of Oil and Gas
AUG 16 2019
WV Department of
Environmental Protection