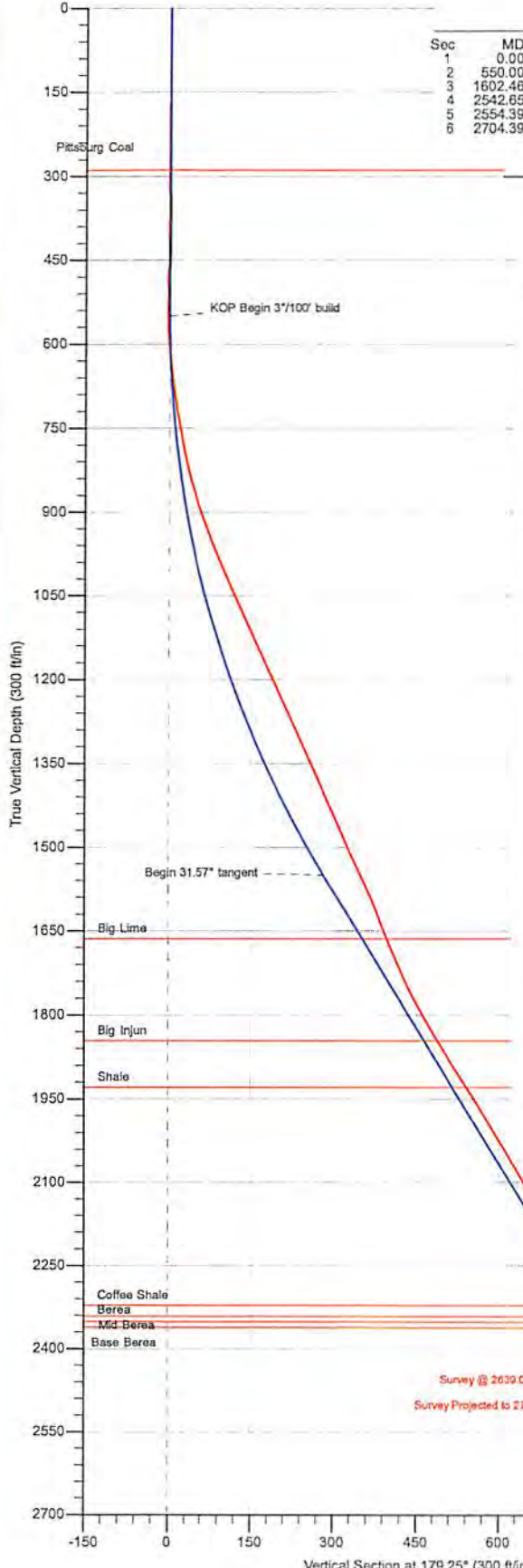


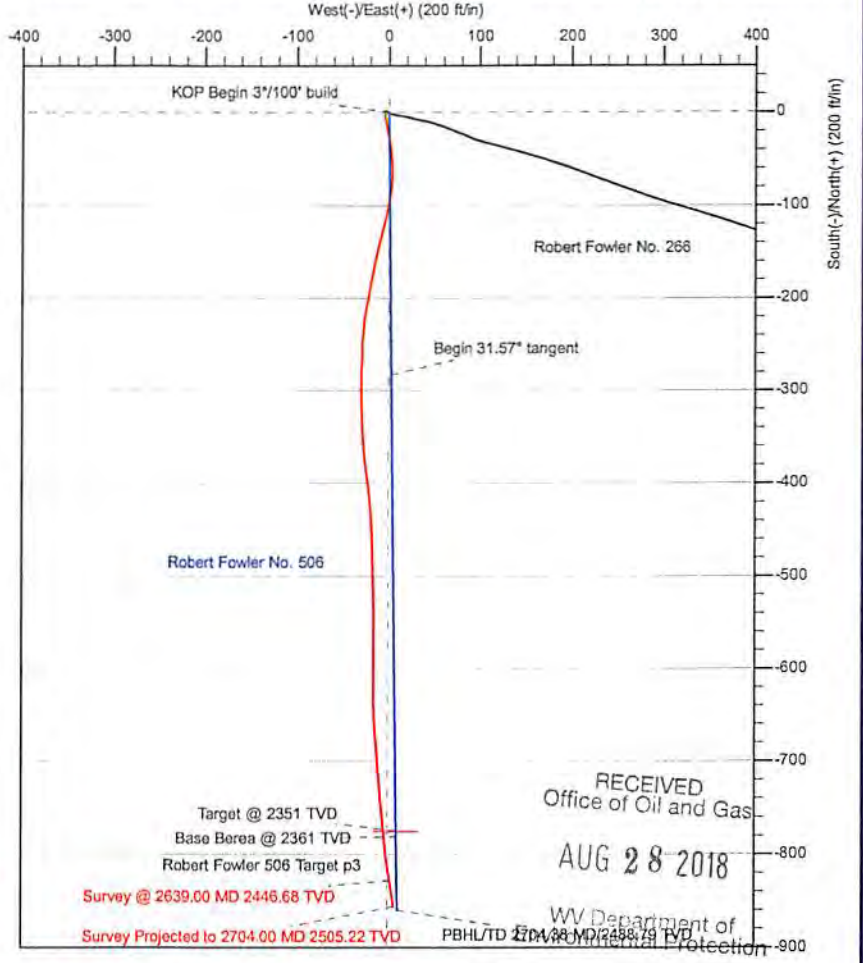
HG Energy LLC

Well: Robert Fowler No. 506
 Site: Robert Fowler
 Project: Lincoln County, West Virginia UTM83
 Design: plan3
 Rig: Noah Horn 294



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	550.00	0.00	0.00	550.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 3 1/100' build
3	1602.46	31.57	179.25	1550.00	-282.70	3.70	3.00	179.25	282.72	Begin 31.57° tangent
4	2542.65	31.57	179.25	2351.00	-774.94	10.14	0.00	0.00	775.00	Target @ 2351 TVD
5	2554.39	31.57	179.25	2361.00	-781.08	10.22	0.00	0.00	781.15	Base Berea @ 2361 TVD
6	2704.39	31.57	179.25	2488.80	-859.61	11.25	0.00	0.00	859.69	PBHL/TD 2704.38 MD/2488.79 TVD

ANNOTATIONS SURVEYS										
MD	Inc	Azi	TVD	+N-S	+E-W	Vsect	Annotation			
450.00	0.83	303.71	449.98	1.81	-2.71	-1.84	MWD surveys			
2639.00	25.76	171.14	2446.68	-828.19	2.66	828.15	Survey @ 2639.00 MD 2446.68 TVD			
2704.00	25.76	171.14	2505.22	-856.10	7.01	856.12	Survey Projected to 2704.00 MD 2505.22 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=870+6 @ 876.00ft (Noah Horn 294)

Northing: 4231525.00 Easting: 416611.00 Latitude: 38.227850 Longitude: -81.952735

Total Correction (M->T): To convert a Magnetic Direction to a True Direction, Subtract 8.36°

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
288.00	288.00	Pittsburg Coal
1663.00	1735.10	Big Lime
1845.00	1948.73	Big Injun
1928.00	2046.15	Shale
2321.00	2507.44	Coffee Shale
2341.00	2530.91	Berea
2351.00	2542.65	Mid Berea
2361.00	2554.39	Base Berea



Azimuths to Grid North
 True North: 0.59
 Magnetic North: -7.76
 Magnetic Field
 Strength: 51457.2sn
 Dip Angle: 65.58
 Date: 7/24/2011
 Model: HDGM





Survey Report

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Robert Fowler No. 506
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Site:	Robert Fowler	MD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Well:	Robert Fowler No. 506	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_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	Robert Fowler				
Site Position:	Northing:	4,231,525.00 m	Latitude:	38.227850	
From: Map	Easting:	416,611.00 m	Longitude:	-81.952735	
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	Robert Fowler No. 506					
Well Position	+N/-S	0.00 ft	Northing:	4,231,525.00 m	Latitude:	38.227850
	+E/-W	0.00 ft	Easting:	416,611.00 m	Longitude:	-81.952735
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft	Ground Level:	870.00 ft	

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	7/24/2018	-8.35	65.58	51,457.20000000

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	179.25	

Survey Program	Date 8/13/2018			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
450.00	2,639.00	MWD (Original Hole)	MWD	OWSG MWD - Standard
2,704.00	2,704.00	Projection (Original Hole)	MWD	OWSG MWD - Standard

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Survey	WV Department of Environmental Protection									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
450.00	0.83	303.71	449.98	1.81	-2.71	-1.84	0.18	0.18	0.00	
MWD surveys										
480.00	0.89	304.70	479.98	2.06	-3.08	-2.10	0.21	0.20	3.30	
510.00	0.93	308.29	509.98	2.35	-3.47	-2.39	0.23	0.13	11.97	
540.00	0.57	242.60	539.97	2.43	-3.79	-2.48	2.89	-1.20	-218.97	
570.00	2.12	189.06	569.97	1.81	-4.01	-1.86	6.13	5.17	-178.47	
600.00	4.22	179.58	599.92	0.16	-4.09	-0.21	7.19	7.00	-31.60	
630.00	5.79	173.91	629.80	-2.45	-3.92	2.40	5.48	5.23	-18.90	
660.00	7.19	171.71	659.61	-5.81	-3.49	5.77	4.74	4.67	-7.33	

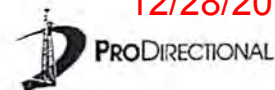


Survey Report

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Robert Fowler No. 506
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Site:	Robert Fowler	MD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Well:	Robert Fowler No. 506	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
690.00	8.35	170.82	689.34	-9.82	-2.87	9.78	3.89	3.87	-2.97
720.00	9.52	169.21	718.97	-14.41	-2.06	14.38	3.99	3.90	-5.37
750.00	10.64	168.95	748.51	-19.54	-0.97	19.53	3.96	3.73	-7.53
780.00	12.05	168.52	777.92	-25.31	0.28	25.31	4.81	4.70	5.23
810.00	13.70	169.73	807.17	-31.88	1.54	31.89	5.57	5.50	4.03
840.00	15.11	171.23	836.22	-39.24	2.77	39.27	4.86	4.70	5.00
870.00	16.99	174.49	865.05	-47.46	3.78	47.51	6.95	6.27	10.87
900.00	18.87	178.30	893.59	-56.68	4.35	56.73	7.38	6.27	12.70
930.00	20.60	182.85	921.83	-66.80	4.23	66.85	7.71	5.77	15.17
960.00	22.05	186.81	949.78	-77.66	3.30	77.70	6.81	4.83	13.20
990.00	23.11	189.20	977.48	-89.07	1.69	89.08	4.67	3.53	7.97
1,020.00	23.55	190.80	1,005.03	-100.77	-0.37	100.75	2.57	1.47	5.33
1,050.00	23.84	192.37	1,032.50	-112.57	-2.80	112.53	2.31	0.97	5.23
1,080.00	24.79	193.66	1,059.84	-124.61	-5.58	124.52	3.63	3.17	4.30
1,110.00	25.44	193.41	1,087.00	-136.99	-8.56	136.86	2.20	2.17	-0.83
1,140.00	25.65	193.55	1,114.07	-149.57	-11.58	149.40	0.73	0.70	0.47
1,170.00	25.50	192.05	1,141.13	-162.20	-14.45	161.99	2.22	-0.50	-5.00
1,200.00	25.53	189.95	1,168.20	-174.88	-16.91	174.64	3.02	0.10	-7.00
1,230.00	25.40	189.91	1,195.29	-187.58	-19.13	187.32	0.44	-0.43	-0.13
1,260.00	25.54	189.50	1,222.37	-200.30	-21.31	200.00	0.75	0.47	-1.37
1,290.00	25.70	191.31	1,249.42	-213.06	-23.65	212.73	2.66	0.53	6.03
1,320.00	24.81	186.66	1,276.56	-225.69	-25.66	225.33	7.25	-2.97	-15.50
1,350.00	24.35	183.45	1,303.84	-238.12	-26.76	237.75	4.71	-1.53	-10.70
1,380.00	24.48	181.88	1,331.16	-250.50	-27.34	250.12	2.21	0.43	-5.23
1,410.00	24.65	182.21	1,358.44	-262.97	-27.78	262.58	0.73	0.57	1.10
1,440.00	24.69	182.44	1,385.71	-275.48	-28.29	275.08	0.35	0.13	0.77
1,470.00	23.88	180.36	1,413.05	-287.81	-28.59	287.41	3.93	-2.70	-6.93
1,500.00	23.10	178.92	1,440.57	-299.77	-28.52	299.37	3.23	-2.60	-4.80
1,530.00	22.97	178.44	1,468.17	-311.50	-28.25	311.11	0.76	-0.43	-0.69
1,560.00	23.63	178.49	1,495.73	-323.36	-27.93	322.97	2.20	2.20	0.17
1,590.00	24.95	177.30	1,523.07	-335.69	-27.48	335.31	4.69	4.69	3.97
1,620.00	25.55	176.35	1,550.20	-348.47	-26.77	348.09	2.41	2.00	-3.17
1,650.00	25.04	176.07	1,577.33	-361.26	-25.92	360.89	1.75	1.70	-0.93
1,680.00	22.61	174.01	1,604.77	-373.33	-24.88	372.98	8.56	-8.10	-6.87
1,710.00	20.95	171.57	1,632.63	-384.38	-23.50	384.03	6.30	-5.53	-8.13
1,740.00	21.62	171.92	1,660.58	-395.15	-21.93	394.83	2.27	2.23	1.17
1,770.00	22.81	172.96	1,688.35	-406.40	-20.44	406.09	4.18	3.97	3.47
1,800.00	25.08	174.37	1,715.77	-418.50	-19.11	418.21	7.80	7.57	4.70
1,830.00	26.75	175.28	1,742.75	-431.55	-17.93	431.28	5.72	5.57	3.03
1,860.00	27.22	176.15	1,769.49	-445.13	-16.91	444.87	2.05	1.57	2.90
1,890.00	28.64	178.02	1,795.99	-459.16	-16.20	458.91	5.56	4.73	6.23
1,920.00	30.75	179.03	1,822.05	-474.02	-15.82	473.77	7.23	7.03	3.37
1,950.00	32.06	178.62	1,847.66	-489.64	-15.50	489.40	4.42	4.37	-1.37

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Survey Report

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Robert Fowler No. 506
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Site:	Robert Fowler	MD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Well:	Robert Fowler No. 506	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
1,980.00	32.20	178.66	1,873.06	-505.59	-15.12	505.35	0.47	0.47	0.13	
2,010.00	32.55	179.21	1,898.40	-521.66	-14.82	521.42	1.52	1.17	1.83	
2,040.00	33.22	180.16	1,923.59	-537.94	-14.74	537.70	2.82	2.23	3.17	
2,070.00	32.65	179.63	1,948.77	-554.25	-14.71	554.01	2.13	-1.90	-1.77	
2,100.00	31.61	179.45	1,974.17	-570.21	-14.58	569.97	3.48	-3.47	-0.60	
2,130.00	31.16	179.43	1,999.78	-585.83	-14.43	585.59	1.50	-1.50	-0.07	
2,160.00	31.46	180.32	2,025.42	-601.42	-14.39	601.18	1.84	1.00	2.97	
2,190.00	30.91	180.32	2,051.08	-616.95	-14.48	616.71	1.83	-1.83	0.00	
2,220.00	30.17	180.16	2,076.92	-632.20	-14.54	631.95	2.48	-2.47	-0.53	
2,250.00	28.63	178.16	2,103.06	-646.92	-14.33	646.68	6.09	-5.13	-6.67	
2,280.00	27.26	176.34	2,129.56	-660.96	-13.66	660.73	5.38	-4.57	-6.07	
2,310.00	25.65	174.82	2,156.41	-674.29	-12.64	674.06	5.82	-5.37	-5.07	
2,340.00	26.38	174.99	2,183.38	-687.39	-11.47	687.18	2.45	2.43	0.57	
2,370.00	27.80	176.50	2,210.08	-701.02	-10.46	700.82	5.26	4.73	5.03	
2,400.00	28.39	174.81	2,236.55	-715.10	-9.39	714.92	3.30	1.97	-5.63	
2,430.00	29.53	175.57	2,262.80	-729.58	-8.17	729.41	3.99	3.80	2.53	
2,460.00	29.01	173.65	2,288.97	-744.18	-6.80	744.02	3.58	-1.73	-6.40	
2,490.00	29.67	175.60	2,315.12	-758.81	-5.42	758.68	3.87	2.20	6.50	
2,520.00	29.46	175.71	2,341.21	-773.57	-4.30	773.45	0.72	-0.70	0.37	
2,550.00	28.70	173.98	2,367.43	-788.09	-2.99	787.98	3.78	-2.53	-5.77	
2,580.00	27.16	171.63	2,393.94	-802.03	-1.24	801.95	6.31	-5.13	-7.83	
2,610.00	28.79	171.64	2,420.67	-815.49	0.74	815.43	1.23	-1.23	0.03	
2,639.00	25.76	171.14	2,446.68	-828.19	2.66	828.15	3.63	-3.55	-1.72	
Survey @ 2639.00 MD 2446.68 TVD										
2,704.00	25.76	171.14	2,505.22	-856.10	7.01	856.12	0.00	0.00	0.00	
Survey Projected to 2704.00 MD 2505.22 TVD										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
450.00	449.98	1.81	-2.71	MWD surveys	
2,639.00	2,446.68	-828.19	2.66	Survey @ 2639.00 MD 2446.68 TVD	

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Survey Report - Geographic

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Robert Fowler No. 506
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Site:	Robert Fowler	MD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Well:	Robert Fowler No. 506	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_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	Robert Fowler				
Site Position:		Northing:	4,231,525.00 m	Latitude:	38.227850
From:	Map	Easting:	416,611.00 m	Longitude:	-81.952735
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	Robert Fowler No. 506					
Well Position	+N/-S	0.00 ft	Northing:	4,231,525.00 m	Latitude:	38.227850
	+E/-W	0.00 ft	Easting:	416,611.00 m	Longitude:	-81.952735
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft	Ground Level:	870.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	7/24/2018	-8.35	65.58	51,457.20000000

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	179.25	

Survey Program	Date 8/13/2018				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
450.00	2,639.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,704.00	2,704.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

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Survey	AUG 28 2018									
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	4,231,525.00	416,611.00	38.227850	-81.952735
	450.00	0.83	303.71	449.98	1.81	-2.71	4,231,525.56	416,610.17	38.227855	-81.952744
MWD surveys	480.00	0.89	304.70	479.98	2.06	-3.08	4,231,525.63	416,610.06	38.227856	-81.952746
	510.00	0.93	308.29	509.98	2.35	-3.47	4,231,525.72	416,609.94	38.227857	-81.952747
	540.00	0.57	242.60	539.97	2.43	-3.79	4,231,525.74	416,609.84	38.227857	-81.952748
	570.00	2.12	189.06	569.97	1.81	-4.01	4,231,525.56	416,609.78	38.227855	-81.952749
	600.00	4.22	179.58	599.92	0.16	-4.09	4,231,525.05	416,609.75	38.227851	-81.952749
	630.00	5.79	173.91	629.80	-2.45	-3.92	4,231,524.26	416,609.80	38.227843	-81.952748
	660.00	7.19	171.71	659.61	-5.81	-3.49	4,231,523.23	416,609.94	38.227834	-81.952747
	690.00	8.35	170.82	689.34	-9.82	-2.87	4,231,522.01	416,610.12	38.227823	-81.952745

WV Department of
Environmental Protection



Survey Report - Geographic

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Robert Fowler No. 506
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Site:	Robert Fowler	MD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Well:	Robert Fowler No. 506	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_v14

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
720.00	9.52	169.21	718.97	-14.41	-2.06	4,231,520.61	416,610.37	38.227811	-81.952742
750.00	10.64	166.95	748.51	-19.54	-0.97	4,231,519.05	416,610.70	38.227797	-81.952738
780.00	12.05	168.52	777.92	-25.31	0.28	4,231,517.29	416,611.08	38.227781	-81.952733
810.00	13.70	169.73	807.17	-31.88	1.54	4,231,515.29	416,611.47	38.227763	-81.952728
840.00	15.11	171.23	836.22	-39.24	2.77	4,231,513.05	416,611.84	38.227743	-81.952724
870.00	16.99	174.49	865.05	-47.46	3.78	4,231,510.54	416,612.15	38.227720	-81.952720
900.00	18.87	178.30	893.59	-56.68	4.35	4,231,507.73	416,612.32	38.227695	-81.952718
930.00	20.60	182.85	921.83	-66.80	4.23	4,231,504.64	416,612.29	38.227667	-81.952718
960.00	22.05	186.81	949.78	-77.66	3.30	4,231,501.33	416,612.00	38.227637	-81.952721
990.00	23.11	189.20	977.48	-89.07	1.69	4,231,497.86	416,611.51	38.227606	-81.952726
1,020.00	23.55	190.80	1,005.03	-100.77	-0.37	4,231,494.29	416,610.89	38.227574	-81.952733
1,050.00	23.84	192.37	1,032.50	-112.57	-2.80	4,231,490.69	416,610.15	38.227541	-81.952741
1,080.00	24.79	193.66	1,059.84	-124.61	-5.58	4,231,487.02	416,609.30	38.227508	-81.952750
1,110.00	25.44	193.41	1,087.00	-136.99	-8.56	4,231,483.25	416,608.39	38.227474	-81.952760
1,140.00	25.65	193.55	1,114.07	-149.57	-11.58	4,231,479.42	416,607.47	38.227439	-81.952770
1,170.00	25.50	192.05	1,141.13	-162.20	-14.45	4,231,475.57	416,606.60	38.227404	-81.952779
1,200.00	25.53	189.95	1,168.20	-174.88	-16.91	4,231,471.70	416,605.85	38.227369	-81.952788
1,230.00	25.40	189.91	1,195.29	-187.58	-19.13	4,231,467.83	416,605.17	38.227335	-81.952795
1,260.00	25.54	189.50	1,222.37	-200.30	-21.31	4,231,463.95	416,604.50	38.227300	-81.952802
1,290.00	25.70	191.31	1,249.42	-213.06	-23.65	4,231,460.06	416,603.79	38.227264	-81.952810
1,320.00	24.81	186.66	1,276.56	-225.69	-25.66	4,231,456.21	416,603.18	38.227230	-81.952816
1,350.00	24.35	183.45	1,303.84	-238.12	-26.76	4,231,452.43	416,602.84	38.227196	-81.952820
1,380.00	24.48	181.88	1,331.16	-250.50	-27.34	4,231,448.65	416,602.67	38.227161	-81.952821
1,410.00	24.65	182.21	1,358.44	-262.97	-27.78	4,231,444.85	416,602.53	38.227127	-81.952822
1,440.00	24.69	182.44	1,385.71	-275.48	-28.29	4,231,441.04	416,602.38	38.227093	-81.952824
1,470.00	23.88	180.36	1,413.05	-287.81	-28.59	4,231,437.28	416,602.28	38.227059	-81.952824
1,500.00	23.10	178.92	1,440.57	-299.77	-28.52	4,231,433.64	416,602.31	38.227026	-81.952823
1,530.00	22.97	178.44	1,468.17	-311.50	-28.25	4,231,430.06	416,602.39	38.226994	-81.952822
1,560.00	23.63	178.49	1,495.73	-323.36	-27.93	4,231,426.44	416,602.49	38.226961	-81.952821
1,590.00	24.95	177.30	1,523.07	-335.69	-27.48	4,231,422.68	416,602.62	38.226927	-81.952819
1,620.00	25.55	176.35	1,550.20	-348.47	-26.77	4,231,418.79	416,602.84	38.226892	-81.952816
1,650.00	25.04	176.07	1,577.33	-361.26	-25.92	4,231,414.89	416,603.10	38.226857	-81.952812
1,680.00	22.61	174.01	1,604.77	-373.33	-24.88	4,231,411.21	416,603.41	38.226824	-81.952808
1,710.00	20.95	171.57	1,632.63	-384.38	-23.50	4,231,407.85	416,603.64	38.226794	-81.952803
1,740.00	21.62	171.92	1,660.58	-395.15	-21.93	4,231,404.56	416,604.31	38.226764	-81.952797
1,770.00	22.81	172.96	1,688.35	-406.40	-20.44	4,231,401.14	416,604.77	38.226733	-81.952792
1,800.00	25.08	174.37	1,715.77	-418.50	-19.11	4,231,397.45	416,605.18	38.226700	-81.952786
1,830.00	26.75	175.28	1,742.75	-431.55	-17.93	4,231,393.47	416,605.54	38.226664	-81.952782
1,860.00	27.22	176.15	1,769.49	-445.13	-16.91	4,231,389.33	416,605.85	38.226627	-81.952778
1,890.00	28.64	178.02	1,795.99	-459.16	-16.20	4,231,385.05	416,606.06	38.226589	-81.952775
1,920.00	30.75	179.03	1,822.05	-474.02	-15.82	4,231,380.52	416,606.18	38.226548	-81.952773
1,950.00	32.06	178.62	1,847.66	-489.64	-15.50	4,231,375.76	416,606.27	38.226505	-81.952771
1,980.00	32.20	178.66	1,873.06	-505.59	-15.12	4,231,370.90	416,606.39	38.226461	-81.952769
2,010.00	32.55	179.21	1,898.40	-521.66	-14.82	4,231,366.00	416,606.48	38.226417	-81.952768
2,040.00	33.22	180.16	1,923.59	-537.94	-14.74	4,231,361.04	416,606.51	38.226372	-81.952767
2,070.00	32.65	179.63	1,948.77	-554.25	-14.71	4,231,356.07	416,606.52	38.226328	-81.952766
2,100.00	31.61	179.45	1,974.17	-570.21	-14.58	4,231,351.21	416,606.56	38.226284	-81.952765
2,130.00	31.16	179.43	1,999.78	-585.83	-14.43	4,231,346.44	416,606.60	38.226241	-81.952764
2,160.00	31.46	180.32	2,025.42	-601.42	-14.39	4,231,341.69	416,606.61	38.226198	-81.952763
2,190.00	30.91	180.32	2,051.08	-616.95	-14.48	4,231,336.96	416,606.59	38.226155	-81.952763
2,220.00	30.17	180.16	2,076.92	-632.20	-14.54	4,231,332.31	416,606.57	38.226113	-81.952763
2,250.00	28.63	178.16	2,103.06	-646.92	-14.33	4,231,327.82	416,606.63	38.226073	-81.952762
2,280.00	27.26	176.34	2,129.56	-660.96	-13.66	4,231,323.54	416,606.83	38.226034	-81.952759
2,310.00	25.65	174.82	2,156.41	-674.29	-12.64	4,231,319.48	416,607.15	38.225998	-81.952755
2,340.00	26.38	174.98	2,183.38	-687.39	-11.47	4,231,315.49	416,607.50	38.225962	-81.952750

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Survey Report - Geographic

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Robert Fowler No. 506
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Site:	Robert Fowler	MD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Well:	Robert Fowler No. 506	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_v14

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
2,370.00	27.80	176.50	2,210.08	-701.02	-10.46	4,231,311.33	416,607.81	38.225925	-81.952746
2,400.00	28.39	174.81	2,236.55	-715.10	-9.39	4,231,307.04	416,608.14	38.225886	-81.952742
2,430.00	29.53	175.57	2,262.80	-729.58	-8.17	4,231,302.63	416,608.51	38.225846	-81.952737
2,460.00	29.01	173.65	2,288.97	-744.18	-6.80	4,231,298.18	416,608.93	38.225806	-81.952732
2,490.00	29.67	175.60	2,315.12	-758.81	-5.42	4,231,293.72	416,609.35	38.225766	-81.952727
<u>2,520.00</u>	<u>29.46</u>	<u>175.71</u>	<u>2,341.21</u>	<u>-773.57</u>	<u>-4.30</u>	<u>4,231,289.22</u>	<u>416,609.69</u>	<u>38.225725</u>	<u>-81.952722</u>
2,550.00	28.70	173.98	2,367.43	-788.09	-2.99	4,231,284.79	416,610.09	38.225686	-81.952717
2,580.00	27.16	171.63	2,393.94	-802.03	-1.24	4,231,280.55	416,610.62	38.225647	-81.952710
2,610.00	26.79	171.64	2,420.67	-815.49	0.74	4,231,276.44	416,611.22	38.225610	-81.952703
2,639.00	25.76	171.14	2,446.68	-828.19	2.66	4,231,272.57	416,611.81	38.225576	-81.952696
Survey @ 2639.00 MD 2446.68 TVD									
2,704.00	25.76	171.14	2,505.22	-856.10	7.01	4,231,264.07	416,613.14	38.225499	-81.952680
Survey Projected to 2704.00 MD 2505.22 TVD									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
450.00	449.98	1.81	-2.71	MWD surveys	
2,639.00	2,446.68	-828.19	2.66	Survey @ 2639.00 MD 2446.68 TVD	
2,704.00	2,505.22	-856.10	7.01	Survey Projected to 2704.00 MD 2505.22 TVD	

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HG Energy LLC

Lincoln County, West Virginia UTM83

Robert Fowler

Robert Fowler No. 506

Original Hole

Design: Surveys Original Hole

Completion Report

13 August, 2018



Completion Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Robert Fowler No. 506
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Site:	Robert Fowler	MD Reference:	RKB=870+6 @ 876.00ft (Noah Horn 294)
Well:	Robert Fowler No. 506	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_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	Robert Fowler				
Site Position:		Northing:	4,231,525.00 m	Latitude:	38.227850
From:	Map	Easting:	416,611.00 m	Longitude:	-81.952735
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	Robert Fowler No. 506					
Well Position	+N/-S	0.00 ft	Northing:	4,231,525.00 m	Latitude:	38.227850
	+E/-W	0.00 ft	Easting:	416,611.00 m	Longitude:	-81.952735
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	870.00 ft

Wellbore	Original Hole					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)	
	HDGM	7/24/2018	-8.35	65.58	51,457.20000000	

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	179.25	

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Completion Report



Company: HG Energy LLC
 Project: Lincoln County, West Virginia UTM83
 Site: Robert Fowler
 Well: Robert Fowler No. 506
 Wellbore: Original Hole
 Design: Surveys Original Hole

Local Co-ordinate Reference: Well Robert Fowler No. 506
 TVD Reference: RKB=870+6 @ 876.00ft (Noah Horn 294)
 MD Reference: RKB=870+6 @ 876.00ft (Noah Horn 294)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: DB_Aug0116_LT_v14

Survey Program	Date									
	8/13/2018									
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description						
450.00	2,639.00	MWD (Original Hole)	MWD	OWSG MWD - Standard						
2,704.00	2,704.00	Projection (Original Hole)	MWD	OWSG MWD - Standard						

MD (ft)	Inc (")	Azi (azimuth) (")	TVD (ft)	V. Sec (ft)	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	4,231,525.00	416,611.00
450.00	0.83	303.71	449.98	-1.84	1.81	-2.71	3.26	303.71	4,231,525.55	416,610.17
MWD surveys										
480.00	0.89	304.70	479.98	-2.10	2.06	-3.08	3.71	303.77	4,231,525.63	416,610.06
510.00	0.93	308.29	509.98	-2.39	2.35	-3.47	4.19	304.09	4,231,525.71	416,609.94
540.00	0.57	242.60	539.97	-2.48	2.43	-3.79	4.50	302.64	4,231,525.74	416,609.84
570.00	2.12	189.06	569.97	-1.86	1.81	-4.01	4.40	294.31	4,231,525.55	416,609.78
600.00	4.22	179.58	599.92	-0.21	0.16	-4.09	4.09	272.23	4,231,525.05	416,609.75
630.00	5.79	173.91	629.80	2.40	-2.45	-3.92	4.62	238.00	4,231,524.25	416,609.81
660.00	7.19	171.71	659.61	5.77	-5.81	-3.49	6.78	210.98	4,231,523.23	416,609.94
690.00	8.35	170.82	689.34	9.78	-9.82	-2.87	10.23	196.30	4,231,522.01	416,610.12
720.00	9.52	169.21	718.97	14.38	-14.41	-2.06	14.55	188.13	4,231,520.61	416,610.37
750.00	10.64	166.95	748.51	19.53	-19.54	-0.97	19.57	182.84	4,231,519.04	416,610.70
780.00	12.05	168.52	777.92	25.31	-25.31	0.28	25.31	179.37	4,231,517.29	416,611.09
810.00	13.70	169.73	807.17	31.89	-31.88	1.54	31.91	177.24	4,231,515.28	416,611.47
840.00	15.11	171.23	836.22	39.27	-39.24	2.77	39.33	175.97	4,231,513.04	416,611.84
870.00	16.99	174.49	865.05	47.51	-47.46	3.78	47.61	175.44	4,231,510.53	416,612.15
900.00	18.87	178.30	893.59	56.73	-56.68	4.35	56.84	175.61	4,231,507.72	416,612.33
930.00	20.66	182.85	921.83	66.85	-66.80	4.23	66.93	176.38	4,231,504.64	416,612.29
960.00	22.05	188.81	949.78	77.70	-77.66	3.30	77.73	177.57	4,231,501.33	416,612.01
990.00	23.31	189.20	977.48	89.08	-89.07	1.69	89.08	178.91	4,231,497.85	416,611.52

Office of Oil and Gas
 Department of Environmental Protection
 AUG 28 2018

Completion Report



Company: HG Energy LLC
 Project: Lincoln County, West Virginia UTM83
 Site: Robert Fowler
 Well: Robert Fowler No. 506
 Wellbore: Original Hole
 Design: Surveys Original Hole

Local Co-ordinate Reference: Well Robert Fowler No. 506
 TVD Reference: RKB=870+6 @ 876.00ft (Noah Horn 294)
 MD Reference: RKB=870+6 @ 876.00ft (Noah Horn 294)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: DB_Aug0116_LT_v14

MD (ft)	Inc (")	Azi (azimuth) (")	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (")	Northing (m)	Easting (m)
1,020.00	23.55	190.80	1,005.03	100.75	-100.77	-0.37	100.77	180.21	4,231,494.29	416,610.89
1,050.00	23.84	192.37	1,032.50	112.53	-112.57	-2.80	112.61	181.42	4,231,490.69	416,610.15
1,080.00	24.79	193.66	1,059.84	124.52	-124.61	-5.58	124.73	182.56	4,231,487.02	416,609.30
1,110.00	25.44	193.41	1,087.00	136.86	-136.99	-8.56	137.26	183.58	4,231,483.25	416,608.39
1,140.00	25.65	193.55	1,114.07	149.40	-149.57	-11.58	150.02	184.43	4,231,479.41	416,607.47
1,170.00	25.50	192.05	1,141.13	161.99	-162.20	-14.45	162.84	185.09	4,231,475.56	416,606.60
1,200.00	25.53	189.95	1,168.20	174.64	-174.88	-16.91	175.69	185.52	4,231,471.70	416,605.85
1,230.00	25.40	189.91	1,195.29	187.32	-187.58	-19.13	188.56	185.82	4,231,467.82	416,605.17
1,260.00	25.54	189.50	1,222.37	200.00	-200.30	-21.31	201.43	186.07	4,231,463.95	416,604.50
1,290.00	25.70	191.31	1,249.42	212.73	-213.06	-23.65	214.37	186.33	4,231,460.06	416,603.79
1,320.00	24.81	186.66	1,276.56	225.33	-225.69	-25.66	227.14	186.49	4,231,456.21	416,603.18
1,350.00	24.35	183.45	1,303.84	237.75	-238.12	-26.76	239.61	186.41	4,231,452.42	416,602.84
1,380.00	24.48	181.88	1,331.16	250.12	-250.50	-27.34	251.99	186.23	4,231,448.65	416,602.67
1,410.00	24.65	182.21	1,358.44	262.58	-262.97	-27.78	264.43	186.03	4,231,444.85	416,602.53
1,440.00	24.69	182.44	1,385.71	275.08	-275.48	-28.29	276.93	185.86	4,231,441.03	416,602.38
1,470.00	23.88	180.36	1,413.05	287.41	-287.81	-28.59	289.23	185.67	4,231,437.28	416,602.28
1,500.00	23.10	178.92	1,440.57	299.37	-299.77	-28.52	301.12	185.44	4,231,433.63	416,602.31
1,530.00	22.97	178.44	1,468.17	311.10	-311.50	-28.25	312.78	185.18	4,231,430.05	416,602.39
1,560.00	23.63	178.49	1,495.73	322.97	-323.36	-27.93	324.57	184.94	4,231,426.44	416,602.49
1,590.00	24.95	177.30	1,523.07	335.31	-335.69	-27.48	336.82	184.68	4,231,422.68	416,602.62
1,620.00	25.55	176.35	1,550.20	348.09	-348.47	-26.77	349.50	184.39	4,231,418.79	416,602.84
1,650.00	25.04	176.07	1,577.33	360.89	-361.26	-25.92	362.19	184.10	4,231,414.89	416,603.10
1,680.00	22.61	174.01	1,604.77	372.98	-373.33	-24.88	374.16	183.81	4,231,411.21	416,603.42
1,710.00	20.95	171.57	1,632.63	384.03	-384.37	-23.50	385.09	183.50	4,231,407.84	416,603.84
1,740.00	21.62	171.92	1,660.58	394.83	-395.15	-21.93	395.76	183.18	4,231,404.56	416,604.32
1,770.00	22.81	171.96	1,688.35	406.09	-406.40	-20.44	406.91	182.88	4,231,401.13	416,604.77
1,800.00	25.08	171.77	1,715.77	418.21	-418.50	-19.11	418.93	182.61	4,231,397.44	416,605.18

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 WV Department of Environmental Protection

Completion Report



Company: HG Energy LLC
 Project: Lincoln County, West Virginia UTM83
 Site: Robert Fowler
 Well: Robert Fowler No. 506
 Wellbore: Original Hole
 Design: Surveys Original Hole

Local Co-ordinate Reference: Well Robert Fowler No. 506
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Survey												
MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)		
1,830.00	26.75	175.28	1,742.75	431.28	-431.55	-17.93	431.93	182.38	4,231,393.46	416,605.54		
1,860.00	27.22	176.15	1,769.49	444.87	-445.13	-16.91	445.45	182.18	4,231,389.32	416,605.85		
1,890.00	28.64	178.02	1,795.99	458.91	-459.16	-16.20	459.45	182.02	4,231,385.05	416,606.06		
1,920.00	30.75	179.03	1,822.05	473.77	-474.02	-15.82	474.28	181.91	4,231,380.52	416,606.18		
1,950.00	32.06	178.62	1,847.66	489.40	-489.64	-15.50	489.89	181.81	4,231,375.76	416,606.28		
1,980.00	32.20	178.66	1,873.06	505.35	-505.59	-15.12	505.82	181.71	4,231,370.89	416,606.39		
2,010.00	32.55	179.21	1,898.40	521.42	-521.66	-14.82	521.87	181.63	4,231,366.00	416,606.48		
2,040.00	33.22	180.16	1,923.59	537.70	-537.94	-14.74	538.15	181.57	4,231,361.03	416,606.51		
2,070.00	32.65	179.63	1,948.77	554.01	-554.25	-14.71	554.45	181.52	4,231,356.06	416,606.52		
2,100.00	31.61	179.45	1,974.17	569.97	-570.21	-14.58	570.39	181.46	4,231,351.20	416,606.56		
2,130.00	31.16	179.43	1,999.78	585.59	-585.83	-14.43	586.01	181.41	4,231,346.44	416,606.60		
2,160.00	31.46	180.32	2,025.42	601.18	-601.42	-14.39	601.59	181.37	4,231,341.69	416,606.61		
2,190.00	30.91	180.32	2,051.08	616.71	-616.95	-14.48	617.12	181.34	4,231,336.95	416,606.59		
2,220.00	30.17	180.16	2,076.92	631.95	-632.20	-14.54	632.37	181.32	4,231,332.31	416,606.57		
2,250.00	28.63	178.16	2,103.06	646.68	-646.92	-14.33	647.08	181.27	4,231,327.82	416,606.63		
2,280.00	27.26	176.34	2,129.56	660.73	-660.96	-13.66	661.10	181.18	4,231,323.54	416,606.84		
2,310.00	25.65	174.82	2,156.41	674.06	-674.29	-12.64	674.41	181.07	4,231,319.48	416,607.15		
2,340.00	26.38	174.99	2,183.38	687.18	-687.39	-11.47	687.49	180.96	4,231,315.48	416,607.50		
2,370.00	27.80	176.50	2,210.08	700.82	-701.02	-10.46	701.09	180.86	4,231,311.33	416,607.81		
2,400.00	28.39	174.81	2,236.55	714.92	-715.10	-9.39	715.16	180.75	4,231,307.04	416,608.14		
2,430.00	29.53	175.57	2,262.80	729.41	-729.58	-8.17	729.62	180.64	4,231,302.63	416,608.51		
2,460.00	29.01	173.65	2,288.97	744.02	-744.18	-6.80	744.21	180.52	4,231,298.17	416,608.93		
2,490.00	29.67	175.60	2,315.12	758.68	-758.81	-5.42	758.83	180.41	4,231,293.71	416,609.35		
2,520.00	29.46	175.71	2,341.21	773.45	-773.57	-4.30	773.58	180.32	4,231,289.22	416,609.69		
2,550.00	28.70	173.98	2,367.43	787.98	-788.09	-2.99	788.10	180.22	4,231,284.79	416,610.09		
2,580.00	27.16	171.63	2,393.94	801.95	-802.03	-1.24	802.03	180.09	4,231,280.54	416,610.62		
2,610.00	26.79	171.64	2,420.67	815.43	-815.49	0.74	815.49	179.95	4,231,276.44	416,611.22		

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Completion Report



Company: HG Energy LLC	Local Co-ordinate Reference: Well Robert Fowler No. 506
Project: Lincoln County, West Virginia UTM83	TVD Reference: RKB=870+6 @ 876.00ft (Noah Horn 294)
Site: Robert Fowler	MD Reference: RKB=870+6 @ 876.00ft (Noah Horn 294)
Well: Robert Fowler No. 506	North Reference: Grid
Wellbore: Original Hole	Survey Calculation Method: Minimum Curvature
Design: Surveys Original Hole	Database: DB_Aug0116_LT_v14

MD (ft)	Inc (")	Azi (azimuth) (")	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (")	Northing (m)	Easting (m)
2,639.00	25.76	171.14	2,446.68	828.15	-828.19	2.66	828.19	179.82	4,231,272.57	416,611.81
Survey @ 2639.00 MD 2446.68 TVD										
2,704.00	25.76	171.14	2,505.22	856.12	-856.10	7.01	856.13	179.53	4,231,264.06	416,613.14
Survey Projected to 2704.00 MD 2505.22 TVD										

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
450.00	449.98	1.81	-2.71	MWD surveys
2,639.00	2,446.68	-828.19	2.66	Survey @ 2639.00 MD 2446.68 TVD
2,704.00	2,505.22	-856.10	7.01	Survey Projected to 2704.00 MD 2505.22 TVD

Checked By: _____ Approved By: _____ Date: _____

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