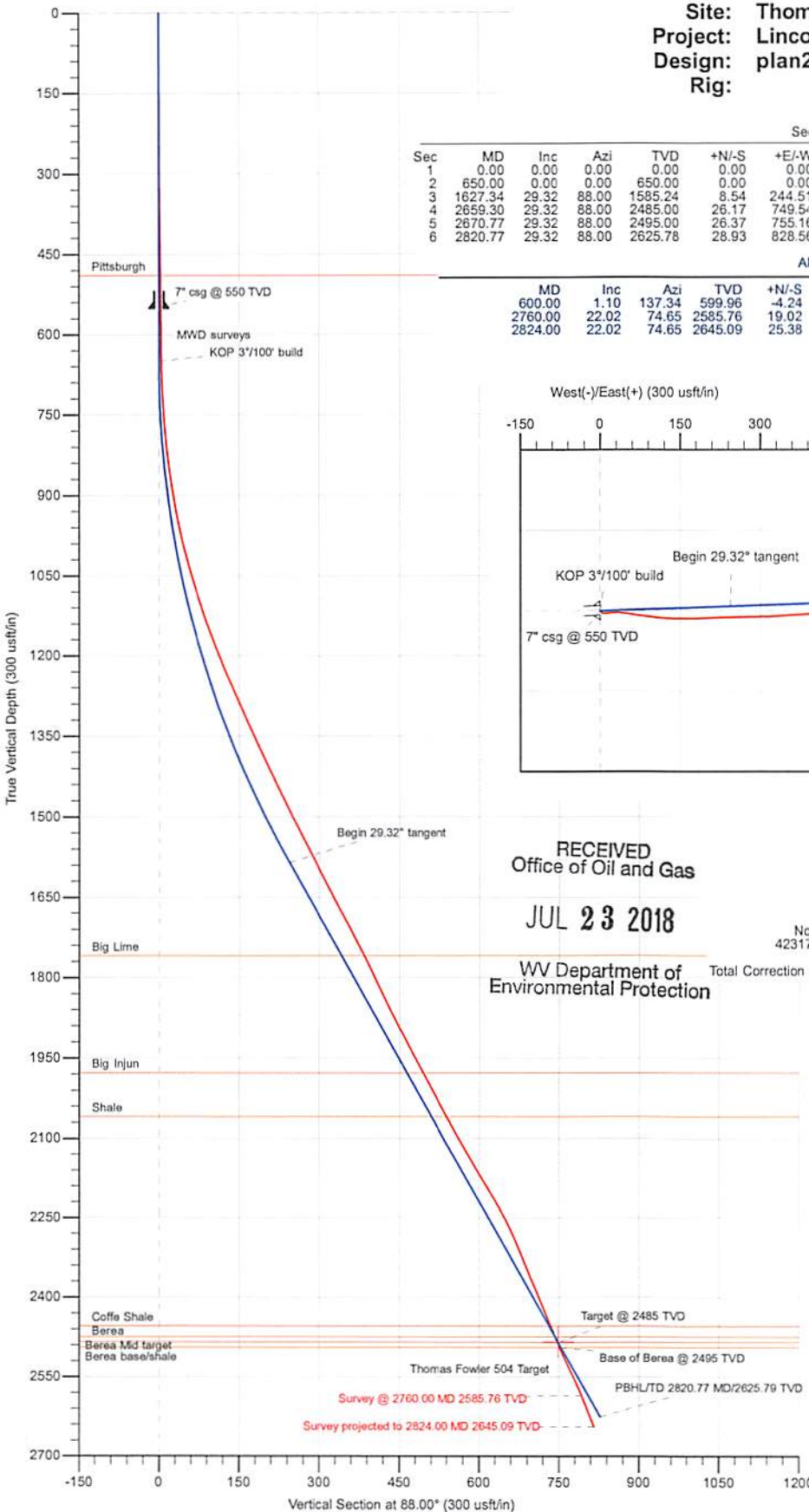


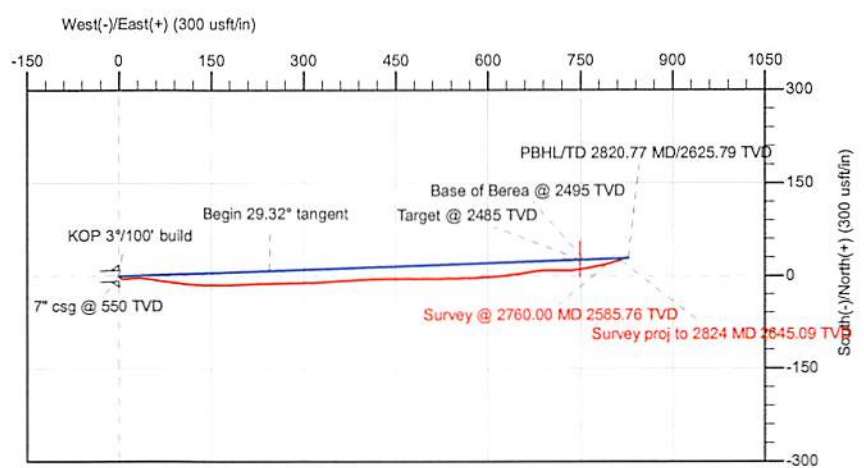
HG Energy LLC

Well: Thomas Fowler 504
 Site: Thomas Fowler
 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 3"/100' build
3	1627.34	29.32	88.00	1585.24	8.54	244.51	3.00	88.00	244.66	Begin 29.32° tangent
4	2659.30	29.32	88.00	2485.00	26.17	749.54	0.00	0.00	750.00	Target @ 2485 TVD
5	2670.77	29.32	88.00	2495.00	26.37	755.16	0.00	0.00	755.62	Base of Berea @ 2495 TVD
6	2820.77	29.32	88.00	2625.78	28.93	828.56	0.00	0.00	829.07	PBHL/TD 2820.77 MD/2625.79 TVD

ANNOTATIONS										
MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation			
600.00	1.10	137.34	599.96	-4.24	3.90	3.75	MWD surveys			
2760.00	22.02	74.65	2585.76	19.02	793.30	793.48	Survey @ 2760.00 MD 2585.76 TVD			
2824.00	22.02	74.65	2645.09	25.38	816.44	816.83	Survey projected to 2824.00 MD 2645.09 TVD			



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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=1003+6 @ 1009.00usft

Northing 4231726.00 Easting 416504.00 Latitude 38° 13' 46.7455 N Longitude 81° 57' 14.3305 W

Total Correction (M->T): To convert a Magnetic Direction to a True Direction, Subtract 8.33°



Magnetic Field
 Strength: 51470.7nT
 Dip Angle: 65.60°
 Date: 6/27/2018
 Model: HDGM

FORMATION TOP DETAILS

TVDPATH	MDPATH	FORMATION
490.00	490.00	Pittsburgh
1780.00	1827.78	Big Lime
1978.00	2077.81	Big Injun
2060.00	2171.86	Shale
2455.00	2624.89	Coffe Shale
2475.00	2647.83	Berea
2485.00	2659.30	Berea Mid target
2495.00	2670.77	Berea base/shale



Survey Report



Office of Oil and Gas

JUL 23 2018

WV Department of Environmental Protection

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Thomas Fowler 504
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=1003+6 @ 1009.00usft
Site:	Thomas Fowler	MD Reference:	RKB=1003+6 @ 1009.00usft
Well:	Thomas Fowler 504	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	Thomas Fowler				
Site Position:		Northing:	4,231,726.00 m	Latitude:	38° 13' 46.7455 N
From:	Map	Easting:	416,504.00 m	Longitude:	81° 57' 14.3305 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	Thomas Fowler 504					
Well Position	+N/-S	0.00 usft	Northing:	4,231,726.00 m	Latitude:	38° 13' 46.7455 N
	+E/-W	0.00 usft	Easting:	416,504.00 m	Longitude:	81° 57' 14.3305 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	1,003.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/27/2018	-8.35	65.60	51,470.70000000

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	88.00	

Survey Program	Date 7/2/2018				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
600.00	2,760.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,824.00	2,824.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	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	
600.00	1.10	137.34	599.96	-4.24	3.90	3.75	0.18	0.18	0.00	
MWD surveys										
630.00	0.91	130.32	629.96	-4.60	4.28	4.12	0.75	-0.63	-23.40	
660.00	1.58	104.20	659.95	-4.86	4.86	4.69	2.87	2.23	-87.07	
690.00	2.10	98.15	689.94	-5.04	5.81	5.63	1.85	1.73	-20.17	
720.00	3.34	94.95	719.90	-5.19	7.22	7.04	4.16	4.13	-10.67	
750.00	4.21	87.06	749.84	-5.21	9.19	9.01	3.37	2.90	-26.30	
780.00	4.77	82.88	779.74	-5.00	11.53	11.35	2.16	1.87	-13.93	
810.00	6.11	83.91	809.61	-4.67	14.36	14.18	4.48	4.47	3.43	

Survey Report



Company: HG Energy LLC
 Project: Lincoln County, West Virginia UTM83
 Site: Thomas Fowler
 Well: Thomas Fowler 504
 Wellbore: Original Hole
 Design: Surveys Original Hole

Local Co-ordinate Reference: Well Thomas Fowler 504
 TVD Reference: RKB=1003+6 @ 1009.00usft
 MD Reference: RKB=1003+6 @ 1009.00usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: DB_Jul2216dt_v14

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
840.00	7.19	84.49	839.41	-4.32	17.81	17.65	3.61	3.60	1.93
870.00	8.41	85.43	869.13	-3.97	21.87	21.72	4.09	4.07	3.13
900.00	9.82	86.56	898.75	-3.64	26.61	26.47	4.74	4.70	3.77
930.00	11.35	87.97	928.24	-3.38	32.11	31.97	5.17	5.10	4.70
960.00	12.22	92.73	957.61	-3.43	38.23	38.09	4.35	2.90	15.87
990.00	13.57	98.35	986.85	-4.09	44.89	44.72	6.14	4.50	18.73
1,020.00	14.79	99.59	1,015.93	-5.24	52.15	51.93	4.19	4.07	4.13
1,050.00	16.45	99.06	1,044.83	-6.55	60.12	59.85	5.55	5.53	-1.77
1,080.00	17.39	98.04	1,073.53	-7.84	68.75	68.44	3.29	3.13	-3.40
1,110.00	18.71	96.73	1,102.05	-9.03	77.97	77.61	4.60	4.40	-4.37
1,140.00	19.65	96.77	1,130.38	-10.19	87.76	87.35	3.13	3.13	0.13
1,170.00	20.23	96.22	1,158.59	-11.35	97.92	97.47	2.03	1.93	-1.83
1,200.00	21.41	95.68	1,186.63	-12.45	108.53	108.03	3.98	3.93	-1.80
1,230.00	22.42	94.71	1,214.46	-13.47	119.68	119.14	3.58	3.37	-3.23
1,260.00	23.14	92.84	1,242.12	-14.23	131.27	130.69	3.40	2.40	-6.23
1,290.00	23.93	90.80	1,269.62	-14.60	143.24	142.64	3.78	2.63	-6.80
1,320.00	23.78	90.48	1,297.06	-14.74	155.37	154.76	0.66	-0.50	-1.07
1,350.00	24.75	89.34	1,324.41	-14.72	167.70	167.08	3.59	3.23	-3.80
1,380.00	25.01	88.38	1,351.63	-14.47	180.32	179.70	1.60	0.87	-3.20
1,410.00	25.04	87.39	1,378.81	-14.00	193.00	192.39	1.40	0.10	-3.30
1,440.00	25.31	87.59	1,405.96	-13.44	205.75	205.15	0.94	0.90	0.67
1,470.00	25.60	88.64	1,433.05	-13.02	218.64	218.05	1.79	0.97	3.50
1,500.00	25.73	89.80	1,460.09	-12.84	231.63	231.04	1.73	0.43	3.87
1,530.00	26.06	89.39	1,487.08	-12.75	244.73	244.13	1.25	1.10	-1.37
1,560.00	27.10	88.78	1,513.90	-12.53	258.15	257.55	3.58	3.47	-2.03
1,590.00	27.54	88.37	1,540.56	-12.19	271.91	271.32	1.60	1.47	-1.37
1,620.00	27.40	88.44	1,567.18	-11.80	285.75	285.16	0.48	-0.47	0.23
1,650.00	27.29	88.08	1,593.82	-11.38	299.52	298.94	0.66	-0.37	-1.20
1,680.00	27.25	88.26	1,620.49	-10.95	313.26	312.69	0.31	-0.13	0.60
1,710.00	27.43	86.94	1,647.14	-10.37	327.02	326.46	2.11	0.60	-4.40
1,740.00	27.86	86.31	1,673.71	-9.55	340.92	340.38	1.73	1.43	-2.10
1,770.00	28.59	85.92	1,700.15	-8.59	355.08	354.56	2.51	2.43	-1.30
1,800.00	27.59	86.62	1,726.61	-7.67	369.17	368.68	3.51	-3.33	2.33
1,830.00	26.44	86.68	1,753.34	-6.87	382.77	382.30	3.83	-3.83	0.20
1,860.00	25.75	87.08	1,780.28	-6.15	395.95	395.49	2.37	-2.30	1.33
1,890.00	25.10	86.32	1,807.37	-5.41	408.81	408.37	2.42	-2.17	-2.53
1,920.00	25.65	88.37	1,834.48	-4.82	421.65	421.22	3.45	1.83	6.83
1,950.00	26.93	88.59	1,861.38	-4.47	434.93	434.51	4.28	4.27	0.73
1,980.00	27.45	90.44	1,888.06	-4.35	448.64	448.21	3.31	1.73	6.17
2,010.00	27.42	90.78	1,914.69	-4.50	462.46	462.02	0.53	-0.10	1.13
2,040.00	28.15	90.73	1,941.23	-4.68	476.44	475.99	2.43	2.43	-0.17
2,070.00	28.71	90.80	1,967.61	-4.87	490.72	490.25	1.87	1.87	0.23
2,100.00	28.36	90.63	1,993.97	-5.05	505.05	504.57	1.20	-1.17	-0.57

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Thomas Fowler 504
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=1003+6 @ 1009.00usft
Site:	Thomas Fowler	MD Reference:	RKB=1003+6 @ 1009.00usft
Well:	Thomas Fowler 504	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,130.00	27.97	90.36	2,020.41	-5.17	519.21	518.72	1.37	-1.30	-0.90
2,160.00	28.62	89.81	2,046.83	-5.19	533.43	532.93	2.33	2.17	-1.83
2,190.00	28.78	88.61	2,073.15	-5.00	547.84	547.33	1.99	0.53	-4.00
2,220.00	29.11	87.51	2,099.40	-4.50	562.35	561.85	2.09	1.10	-3.67
2,250.00	29.59	86.31	2,125.55	-3.71	577.03	576.55	2.53	1.60	-4.00
2,280.00	30.20	86.29	2,151.56	-2.75	591.95	591.49	2.03	2.03	-0.07
2,310.00	30.65	85.96	2,177.42	-1.72	607.11	606.68	1.60	1.50	-1.10
2,340.00	30.53	85.03	2,203.25	-0.52	622.33	621.93	1.63	-0.40	-3.10
2,370.00	29.19	82.79	2,229.27	1.06	637.18	636.83	5.81	-4.47	-7.47
2,400.00	27.04	80.67	2,255.73	3.08	651.17	650.88	7.90	-7.17	-7.07
2,430.00	24.41	80.86	2,282.75	5.17	664.02	663.79	8.77	-8.77	0.63
2,460.00	22.07	81.71	2,310.31	6.97	675.72	675.55	7.88	-7.80	2.83
2,490.00	22.10	86.02	2,338.11	8.18	686.92	686.79	5.40	0.10	14.37
2,520.00	22.50	88.48	2,365.87	8.72	698.29	698.17	3.38	1.33	8.20
2,550.00	23.15	91.47	2,393.52	8.72	709.93	709.80	4.43	2.17	9.97
2,580.00	22.34	91.36	2,421.19	8.43	721.52	721.38	2.70	-2.70	-0.37
2,610.00	21.64	87.24	2,449.01	8.57	732.75	732.60	5.65	-2.33	-13.73
2,640.00	23.24	82.25	2,476.74	9.63	744.14	744.02	8.29	5.33	-16.63
2,670.00	25.51	80.23	2,504.06	11.52	756.37	756.31	8.06	7.57	-6.73
2,700.00	26.18	80.07	2,531.06	13.76	769.26	769.27	2.25	2.23	-0.53
2,730.00	24.38	77.73	2,558.19	16.22	781.83	781.92	6.86	-6.00	-7.80
2,760.00	22.02	74.65	2,585.76	19.02	793.30	793.48	8.84	-7.87	-10.27
Survey @ 2760.00 MD 2585.76 TVD									
2,824.00	22.02	74.65	2,645.09	25.38	816.44	816.83	0.00	0.00	0.00
Survey projected to 2824.00 MD 2645.09 TVD									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
600.00	599.96	-4.24	3.90	MWD surveys
2,760.00	2,585.76	19.02	793.30	Survey @ 2760.00 MD 2585.76 TVD
2,824.00	2,645.09	25.38	816.44	Survey projected to 2824.00 MD 2645.09 TVD

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Survey Report - Geographic



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Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Thomas Fowler 504
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=1003+6 @ 1009.00usft
Site:	Thomas Fowler	MD Reference:	RKB=1003+6 @ 1009.00usft
Well:	Thomas Fowler 504	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	Thomas Fowler				
Site Position:		Northing:	4,231,726.00 m	Latitude:	38° 13' 46.7455 N
From:	Map	Easting:	416,504.00 m	Longitude:	81° 57' 14.3305 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	Thomas Fowler 504					
Well Position	+N/-S	0.00 usft	Northing:	4,231,726.00 m	Latitude:	38° 13' 46.7455 N
	+E/-W	0.00 usft	Easting:	416,504.00 m	Longitude:	81° 57' 14.3305 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	1,003.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/27/2018	-8.35	65.60	51,470.70000000

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	88.00	

Survey Program	Date	7/2/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
600.00	2,760.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,824.00	2,824.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	4,231,726.00	416,504.00	38° 13' 46.7455 N	81° 57' 14.3305 W	
600.00	1.10	137.34	599.96	-4.24	3.90	4,231,724.71	416,505.19	38° 13' 46.7040 N	81° 57' 14.2810 W	
MWD surveys										
630.00	0.91	130.32	629.96	-4.60	4.28	4,231,724.60	416,505.30	38° 13' 46.7005 N	81° 57' 14.2762 W	
660.00	1.58	104.20	659.95	-4.86	4.86	4,231,724.52	416,505.48	38° 13' 46.6980 N	81° 57' 14.2689 W	
690.00	2.10	98.15	689.94	-5.04	5.81	4,231,724.47	416,505.77	38° 13' 46.6963 N	81° 57' 14.2570 W	
720.00	3.34	94.95	719.90	-5.19	7.22	4,231,724.42	416,506.20	38° 13' 46.6949 N	81° 57' 14.2393 W	
750.00	4.21	87.06	749.84	-5.21	9.19	4,231,724.42	416,506.80	38° 13' 46.6950 N	81° 57' 14.2146 W	
780.00	4.77	82.88	779.74	-5.00	11.53	4,231,724.48	416,507.51	38° 13' 46.6973 N	81° 57' 14.1853 W	
810.00	6.11	83.91	809.61	-4.67	14.36	4,231,724.58	416,508.37	38° 13' 46.7008 N	81° 57' 14.1499 W	
840.00	7.19	84.49	839.41	-4.32	17.81	4,231,724.69	416,509.43	38° 13' 46.7046 N	81° 57' 14.1067 W	

Survey Report - Geographic



Company: HG Energy LLC
 Project: Lincoln County, West Virginia UTM83
 Site: Thomas Fowler
 Well: Thomas Fowler 504
 Wellbore: Original Hole
 Design: Surveys Original Hole

Local Co-ordinate Reference: Well Thomas Fowler 504
 TVD Reference: RKB=1003+6 @ 1009.00usft
 MD Reference: RKB=1003+6 @ 1009.00usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: DB_Jul2216dt_v14

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Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
870.00	8.41	85.43	869.13	-3.97	21.87	4,231,724.79	416,510.66	38° 13' 46.7085 N	81° 57' 14.0559 W
900.00	9.82	86.56	898.75	-3.64	26.61	4,231,724.89	416,512.11	38° 13' 46.7122 N	81° 57' 13.9965 W
930.00	11.35	87.97	928.24	-3.38	32.11	4,231,724.97	416,513.79	38° 13' 46.7154 N	81° 57' 13.9275 W
960.00	12.22	92.73	957.61	-3.43	38.23	4,231,724.96	416,515.65	38° 13' 46.7155 N	81° 57' 13.8508 W
990.00	13.57	98.35	986.85	-4.09	44.89	4,231,724.76	416,517.68	38° 13' 46.7096 N	81° 57' 13.7673 W
1,020.00	14.79	99.59	1,015.93	-5.24	52.15	4,231,724.41	416,519.89	38° 13' 46.6990 N	81° 57' 13.6761 W
1,050.00	16.45	99.06	1,044.83	-6.55	60.12	4,231,724.01	416,522.32	38° 13' 46.6869 N	81° 57' 13.5760 W
1,080.00	17.39	98.04	1,073.53	-7.84	68.75	4,231,723.61	416,524.95	38° 13' 46.6750 N	81° 57' 13.4677 W
1,110.00	18.71	96.73	1,102.05	-9.03	77.97	4,231,723.25	416,527.76	38° 13' 46.6641 N	81° 57' 13.3519 W
1,140.00	19.65	96.77	1,130.38	-10.19	87.76	4,231,722.90	416,530.75	38° 13' 46.6537 N	81° 57' 13.2291 W
1,170.00	20.23	96.22	1,158.59	-11.35	97.92	4,231,722.55	416,533.85	38° 13' 46.6433 N	81° 57' 13.1015 W
1,200.00	21.41	95.68	1,186.63	-12.45	108.53	4,231,722.21	416,537.08	38° 13' 46.6334 N	81° 57' 12.9684 W
1,230.00	22.42	94.71	1,214.46	-13.47	119.68	4,231,721.90	416,540.48	38° 13' 46.6246 N	81° 57' 12.8285 W
1,260.00	23.14	92.84	1,242.12	-14.23	131.27	4,231,721.67	416,544.01	38° 13' 46.6182 N	81° 57' 12.6832 W
1,290.00	23.93	90.80	1,269.62	-14.60	143.24	4,231,721.55	416,547.66	38° 13' 46.6157 N	81° 57' 12.5330 W
1,320.00	23.78	90.48	1,297.06	-14.74	155.37	4,231,721.51	416,551.36	38° 13' 46.6156 N	81° 57' 12.3810 W
1,350.00	24.75	89.34	1,324.41	-14.72	167.70	4,231,721.52	416,555.11	38° 13' 46.6171 N	81° 57' 12.2264 W
1,380.00	25.01	88.38	1,351.63	-14.47	180.32	4,231,721.60	416,558.96	38° 13' 46.6209 N	81° 57' 12.0683 W
1,410.00	25.04	87.39	1,378.81	-14.00	193.00	4,231,721.74	416,562.83	38° 13' 46.6268 N	81° 57' 11.9094 W
1,440.00	25.31	87.59	1,405.96	-13.44	205.75	4,231,721.91	416,566.71	38° 13' 46.6336 N	81° 57' 11.7496 W
1,470.00	25.60	88.64	1,433.05	-13.02	218.64	4,231,722.04	416,570.64	38° 13' 46.6391 N	81° 57' 11.5881 W
1,500.00	25.73	89.80	1,460.09	-12.84	231.63	4,231,722.09	416,574.60	38° 13' 46.6422 N	81° 57' 11.4253 W
1,530.00	26.06	89.39	1,487.08	-12.75	244.73	4,231,722.12	416,578.59	38° 13' 46.6444 N	81° 57' 11.2611 W
1,560.00	27.10	88.78	1,513.90	-12.53	258.15	4,231,722.19	416,582.68	38° 13' 46.6479 N	81° 57' 11.0929 W
1,590.00	27.54	88.37	1,540.56	-12.19	271.91	4,231,722.29	416,586.88	38° 13' 46.6527 N	81° 57' 10.9204 W
1,620.00	27.40	88.44	1,567.18	-11.80	285.75	4,231,722.41	416,591.10	38° 13' 46.6579 N	81° 57' 10.7470 W
1,650.00	27.29	88.08	1,593.82	-11.38	299.52	4,231,722.53	416,595.29	38° 13' 46.6635 N	81° 57' 10.5744 W
1,680.00	27.25	88.26	1,620.49	-10.95	313.26	4,231,722.67	416,599.48	38° 13' 46.6692 N	81° 57' 10.4023 W
1,710.00	27.43	86.94	1,647.14	-10.37	327.02	4,231,722.84	416,603.68	38° 13' 46.6763 N	81° 57' 10.2298 W
1,740.00	27.86	86.31	1,673.71	-9.55	340.92	4,231,723.09	416,607.91	38° 13' 46.6858 N	81° 57' 10.0557 W
1,770.00	28.59	85.92	1,700.15	-8.59	355.08	4,231,723.39	416,612.23	38° 13' 46.6968 N	81° 57' 9.8784 W
1,800.00	27.59	86.62	1,726.61	-7.67	369.17	4,231,723.67	416,616.52	38° 13' 46.7073 N	81° 57' 9.7018 W
1,830.00	26.44	86.68	1,753.34	-6.87	382.77	4,231,723.91	416,620.67	38° 13' 46.7166 N	81° 57' 9.5314 W
1,860.00	25.75	87.08	1,780.28	-6.15	395.95	4,231,724.13	416,624.69	38° 13' 46.7250 N	81° 57' 9.3663 W
1,890.00	25.10	86.32	1,807.37	-5.41	408.81	4,231,724.36	416,628.60	38° 13' 46.7337 N	81° 57' 9.2052 W
1,920.00	25.65	88.37	1,834.48	-4.82	421.65	4,231,724.54	416,632.52	38° 13' 46.7408 N	81° 57' 9.0443 W
1,950.00	26.93	88.59	1,861.38	-4.47	434.93	4,231,724.64	416,636.57	38° 13' 46.7457 N	81° 57' 8.8779 W
1,980.00	27.45	90.44	1,888.06	-4.35	448.64	4,231,724.68	416,640.74	38° 13' 46.7482 N	81° 57' 8.7061 W
2,010.00	27.42	90.78	1,914.69	-4.50	462.46	4,231,724.63	416,644.96	38° 13' 46.7481 N	81° 57' 8.5328 W
2,040.00	28.15	90.73	1,941.23	-4.68	476.44	4,231,724.58	416,649.22	38° 13' 46.7477 N	81° 57' 8.3575 W
2,070.00	28.71	90.80	1,967.61	-4.87	490.72	4,231,724.52	416,653.57	38° 13' 46.7473 N	81° 57' 8.1785 W
2,100.00	28.36	90.63	1,993.97	-5.05	505.05	4,231,724.46	416,657.94	38° 13' 46.7470 N	81° 57' 7.9988 W
2,130.00	27.97	90.36	2,020.41	-5.17	519.21	4,231,724.43	416,662.26	38° 13' 46.7472 N	81° 57' 7.8213 W
2,160.00	28.62	89.81	2,046.83	-5.19	533.43	4,231,724.42	416,666.59	38° 13' 46.7485 N	81° 57' 7.6430 W
2,190.00	28.78	88.61	2,073.15	-5.00	547.84	4,231,724.48	416,670.98	38° 13' 46.7519 N	81° 57' 7.4625 W
2,220.00	29.11	87.51	2,099.40	-4.50	562.35	4,231,724.63	416,675.40	38° 13' 46.7582 N	81° 57' 7.2807 W
2,250.00	29.59	86.31	2,125.55	-3.71	577.03	4,231,724.87	416,679.88	38° 13' 46.7676 N	81° 57' 7.0967 W
2,280.00	30.20	86.29	2,151.56	-2.75	591.95	4,231,725.17	416,684.43	38° 13' 46.7786 N	81° 57' 6.9098 W
2,310.00	30.65	85.96	2,177.42	-1.72	607.11	4,231,725.48	416,689.05	38° 13' 46.7903 N	81° 57' 6.7199 W
2,340.00	30.53	85.03	2,203.25	-0.52	622.33	4,231,725.85	416,693.69	38° 13' 46.8037 N	81° 57' 6.5293 W
2,370.00	29.19	82.79	2,229.27	1.06	637.18	4,231,726.33	416,698.21	38° 13' 46.8208 N	81° 57' 6.3434 W
2,400.00	27.04	80.67	2,255.73	3.08	651.17	4,231,726.94	416,702.48	38° 13' 46.8423 N	81° 57' 6.1683 W
2,430.00	24.41	80.86	2,282.75	5.17	664.02	4,231,727.58	416,706.39	38° 13' 46.8643 N	81° 57' 6.0074 W
2,460.00	22.07	81.71	2,310.31	6.97	675.72	4,231,728.13	416,709.96	38° 13' 46.8832 N	81° 57' 5.8610 W
2,490.00	22.10	86.02	2,338.11	8.18	686.92	4,231,728.50	416,713.37	38° 13' 46.8963 N	81° 57' 5.7207 W

Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Thomas Fowler 504
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=1003+6 @ 1009.00usft
Site:	Thomas Fowler	MD Reference:	RKB=1003+6 @ 1009.00usft
Well:	Thomas Fowler 504	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
2,520.00	22.50	88.48	2,365.87	8.72	698.29	4,231,728.66	416,716.84	38° 13' 46.9028 N	81° 57' 5.5783 W
2,550.00	23.15	91.47	2,393.52	8.72	709.93	4,231,728.66	416,720.39	38° 13' 46.9040 N	81° 57' 5.4324 W
2,580.00	22.34	91.36	2,421.19	8.43	721.52	4,231,728.58	416,723.92	38° 13' 46.9023 N	81° 57' 5.2870 W
2,610.00	21.64	87.24	2,449.01	8.57	732.75	4,231,728.62	416,727.34	38° 13' 46.9048 N	81° 57' 5.1463 W
2,640.00	23.24	82.25	2,476.74	9.63	744.14	4,231,728.94	416,730.81	38° 13' 46.9165 N	81° 57' 5.0037 W
2,670.00	25.51	80.23	2,504.06	11.52	756.37	4,231,729.52	416,734.54	38° 13' 46.9364 N	81° 57' 4.8506 W
2,700.00	26.18	80.07	2,531.06	13.76	769.26	4,231,730.20	416,738.47	38° 13' 46.9599 N	81° 57' 4.6893 W
2,730.00	24.38	77.73	2,558.19	16.22	781.83	4,231,730.95	416,742.30	38° 13' 46.9854 N	81° 57' 4.5321 W
2,760.00	22.02	74.65	2,585.76	19.02	793.30	4,231,731.80	416,745.80	38° 13' 47.0144 N	81° 57' 4.3886 W
Survey @ 2760.00 MD 2585.76 TVD									
2,824.00	22.02	74.65	2,645.09	25.38	816.44	4,231,733.74	416,752.85	38° 13' 47.0795 N	81° 57' 4.0993 W
Survey projected to 2824.00 MD 2645.09 TVD									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
600.00	599.96	-4.24	3.90	MWD surveys	
2,760.00	2,585.76	19.02	793.30	Survey @ 2760.00 MD 2585.76 TVD	
2,824.00	2,645.09	25.38	816.44	Survey projected to 2824.00 MD 2645.09 TVD	

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Report

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Thomas Fowler 504
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=1003+6 @ 1009.00usft
Site:	Thomas Fowler	MD Reference:	RKB=1003+6 @ 1009.00usft
Well:	Thomas Fowler 504	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	Thomas Fowler				
Site Position:		Northing:	4,231,726.00 m	Latitude:	38° 13' 46.7455 N
From:	Map	Easting:	416,504.00 m	Longitude:	81° 57' 14.3305 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	Thomas Fowler 504					
Well Position	+N/-S	0.00 usft	Northing:	4,231,726.00 m	Latitude:	38° 13' 46.7455 N
	+E/-W	0.00 usft	Easting:	416,504.00 m	Longitude:	81° 57' 14.3305 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	1,003.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/27/2018	-8.35	65.60	51,470.70000000

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	88.00	

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WV Department of
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JUL 23 2018

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: Thomas Fowler
Well: Thomas Fowler 504
Wellbore: Original Hole
Design: Surveys Original Hole

WV Department of
Environmental Protection

Local Co-ordinate Reference: Well Thomas Fowler 504
TVD Reference: RKB=1003+6 @ 1009.00usft
MD Reference: RKB=1003+6 @ 1009.00usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

Survey Program	Date									
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description						
600.00	2,760.00	MWD (Original Hole)	MWD	OWSG MWD - Standard						
2,824.00	2,824.00	Projection (Original Hole)	MWD	OWSG MWD - Standard						

MD (usft)	Inc (")	Azi (azimuth) (")	TVD (usft)	N/S (usft)	E/W (usft)	DLeg ("/100usft)	V. Sec (usft)	Northing (m)	Easting (m)	Closure Azimuth (")
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4,231,726.00	416,504.00	0.00
600.00	1.10	137.34	599.96	-4.24	3.90	0.18	3.75	4,231,724.71	416,505.19	137.34
MWD surveys										
630.00	0.91	130.32	629.96	-4.60	4.28	0.75	4.12	4,231,724.60	416,505.30	137.07
660.00	1.58	104.20	659.95	-4.86	4.86	2.87	4.69	4,231,724.52	416,505.48	134.97
690.00	2.10	98.15	689.94	-5.04	5.81	1.85	5.63	4,231,724.46	416,505.77	130.93
720.00	3.34	94.95	719.90	-5.19	7.22	4.16	7.04	4,231,724.42	416,506.20	125.70
750.00	4.21	87.06	749.84	-5.21	9.19	3.37	9.01	4,231,724.41	416,506.80	119.54
780.00	4.77	82.88	779.74	-5.00	11.53	2.16	11.35	4,231,724.48	416,507.51	113.43
810.00	6.11	83.91	809.61	-4.67	14.36	4.48	14.18	4,231,724.58	416,508.38	108.03
840.00	7.19	84.49	839.41	-4.32	17.81	3.61	17.65	4,231,724.68	416,509.43	103.64
870.00	8.41	85.43	869.13	-3.97	21.87	4.09	21.72	4,231,724.79	416,510.67	100.29
900.00	9.82	86.56	898.75	-3.64	26.61	4.74	26.47	4,231,724.89	416,512.11	97.79
930.00	11.35	87.97	928.24	-3.38	32.11	5.17	31.97	4,231,724.97	416,513.79	96.01
960.00	12.22	92.73	957.61	-3.43	38.23	4.35	38.09	4,231,724.95	416,515.65	95.12
990.00	13.57	98.35	986.85	-4.09	44.89	6.14	44.72	4,231,724.75	416,517.68	95.21
1,020.00	14.79	99.59	1,015.93	-5.24	52.15	4.19	51.93	4,231,724.40	416,519.89	95.74
1,050.00	16.45	99.06	1,044.83	-6.55	60.12	5.55	59.85	4,231,724.00	416,522.32	96.22
1,080.00	17.39	98.04	1,073.53	-7.84	68.75	3.29	68.44	4,231,723.61	416,524.96	96.51
1,110.00	18.71	96.73	1,102.05	-9.03	77.97	4.60	77.61	4,231,723.25	416,527.77	96.61
1,140.00	19.65	96.77	1,130.38	-10.19	87.76	3.13	87.35	4,231,722.89	416,530.75	96.63

JUL 23 2018

Report

WV Department of
Environmental Protection

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Thomas Fowler 504
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=1003+6 @ 1009.00usft
Site:	Thomas Fowler	MD Reference:	RKB=1003+6 @ 1009.00usft
Well:	Thomas Fowler 504	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (m)	Easting (m)	Closure Azimuth (°)
1,170.00	20.23	96.22	1,158.59	-11.35	97.92	2.03	97.47	4,231,722.54	416,533.85	96.61
1,200.00	21.41	95.68	1,186.63	-12.45	108.53	3.98	108.03	4,231,722.20	416,537.08	96.55
1,230.00	22.42	94.71	1,214.46	-13.47	119.68	3.58	119.14	4,231,721.90	416,540.48	96.42
1,260.00	23.14	92.84	1,242.12	-14.23	131.27	3.40	130.69	4,231,721.66	416,544.01	96.19
1,290.00	23.93	90.80	1,269.62	-14.60	143.24	3.78	142.64	4,231,721.55	416,547.66	95.82
1,320.00	23.78	90.48	1,297.06	-14.74	155.37	0.66	154.76	4,231,721.51	416,551.36	95.42
1,350.00	24.75	89.34	1,324.41	-14.72	167.70	3.59	167.08	4,231,721.51	416,555.11	95.02
1,380.00	25.01	88.38	1,351.63	-14.47	180.32	1.60	179.70	4,231,721.59	416,558.96	94.59
1,410.00	25.04	87.39	1,378.81	-14.00	193.00	1.40	192.39	4,231,721.73	416,562.83	94.15
1,440.00	25.31	87.59	1,405.96	-13.44	205.75	0.94	205.15	4,231,721.90	416,566.71	93.74
1,470.00	25.60	88.64	1,433.05	-13.02	218.64	1.79	218.05	4,231,722.03	416,570.64	93.41
1,500.00	25.73	89.80	1,460.09	-12.84	231.63	1.73	231.04	4,231,722.09	416,574.60	93.17
1,530.00	26.06	89.39	1,487.08	-12.75	244.73	1.25	244.13	4,231,722.11	416,578.59	92.98
1,560.00	27.10	88.78	1,513.90	-12.53	258.15	3.58	257.55	4,231,722.18	416,582.68	92.78
1,590.00	27.54	88.37	1,540.56	-12.19	271.91	1.60	271.32	4,231,722.29	416,586.88	92.57
1,620.00	27.40	88.44	1,567.18	-11.80	285.75	0.48	285.16	4,231,722.40	416,591.10	92.37
1,650.00	27.29	88.08	1,593.82	-11.38	299.52	0.66	298.94	4,231,722.53	416,595.29	92.18
1,680.00	27.25	88.26	1,620.49	-10.95	313.26	0.31	312.69	4,231,722.66	416,599.48	92.00
1,710.00	27.43	86.94	1,647.14	-10.37	327.02	2.11	326.46	4,231,722.84	416,603.68	91.82
1,740.00	27.86	86.31	1,673.71	-9.55	340.92	1.73	340.38	4,231,723.09	416,607.91	91.60
1,770.00	28.59	85.92	1,700.15	-8.59	355.08	2.51	354.56	4,231,723.38	416,612.23	91.39
1,800.00	27.59	86.62	1,726.61	-7.67	369.17	3.51	368.68	4,231,723.66	416,616.52	91.19
1,830.00	26.44	86.68	1,753.34	-6.87	382.77	3.83	382.30	4,231,723.91	416,620.67	91.03
1,860.00	25.75	87.08	1,780.28	-6.15	395.95	2.37	395.49	4,231,724.13	416,624.69	90.89
1,890.00	25.10	86.32	1,807.37	-5.41	408.81	2.42	408.37	4,231,724.35	416,628.60	90.76
1,920.00	25.65	88.37	1,834.48	-4.82	421.65	3.45	421.22	4,231,724.53	416,632.52	90.65
1,950.00	26.93	88.59	1,861.38	-4.47	434.93	4.28	434.51	4,231,724.64	416,636.57	90.59

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Report

WV Department of
Environmental Protection

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: Thomas Fowler
Well: Thomas Fowler 504
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Thomas Fowler 504
TVD Reference: RKB=1003+6 @ 1009.00usft
MD Reference: RKB=1003+6 @ 1009.00usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (m)	Easting (m)	Closure Azimuth (°)
1,980.00	27.45	90.44	1,888.06	-4.35	448.64	3.31	448.21	4,231,724.67	416,640.74	90.56
2,010.00	27.42	90.78	1,914.69	-4.50	462.46	0.53	462.02	4,231,724.63	416,644.96	90.56
2,040.00	28.15	90.73	1,941.23	-4.68	476.44	2.43	475.99	4,231,724.57	416,649.22	90.56
2,070.00	28.71	90.80	1,967.61	-4.87	490.72	1.87	490.25	4,231,724.51	416,653.57	90.57
2,100.00	28.36	90.63	1,993.97	-5.05	505.05	1.20	504.57	4,231,724.46	416,657.94	90.57
2,130.00	27.97	90.36	2,020.41	-5.17	519.21	1.37	518.72	4,231,724.42	416,662.26	90.57
2,160.00	28.62	89.81	2,046.83	-5.19	533.43	2.33	532.93	4,231,724.42	416,666.59	90.56
2,190.00	28.78	88.61	2,073.14	-5.00	547.84	1.99	547.33	4,231,724.48	416,670.98	90.52
2,220.00	29.11	87.51	2,099.40	-4.50	562.35	2.09	561.85	4,231,724.63	416,675.40	90.46
2,250.00	29.59	86.31	2,125.55	-3.71	577.03	2.53	576.55	4,231,724.87	416,679.88	90.37
2,280.00	30.20	86.29	2,151.56	-2.75	591.95	2.03	591.49	4,231,725.16	416,684.43	90.27
2,310.00	30.65	85.96	2,177.42	-1.72	607.11	1.60	606.68	4,231,725.48	416,689.05	90.16
2,340.00	30.53	85.03	2,203.25	-0.52	622.33	1.63	621.93	4,231,725.84	416,693.69	90.05
2,370.00	29.19	82.79	2,229.27	1.06	637.18	5.81	636.83	4,231,726.32	416,698.21	89.90
2,400.00	27.04	80.67	2,255.73	3.08	651.17	7.90	650.88	4,231,726.94	416,702.48	89.73
2,430.00	24.41	80.86	2,282.75	5.17	664.02	8.77	663.79	4,231,727.58	416,706.39	89.55
2,460.00	22.07	81.71	2,310.31	6.97	675.72	7.88	675.55	4,231,728.12	416,709.96	89.41
2,490.00	22.10	86.02	2,338.11	8.18	686.92	5.40	686.79	4,231,728.49	416,713.38	89.32
2,520.00	22.50	88.48	2,365.87	8.72	698.29	3.38	698.17	4,231,728.66	416,716.84	89.28
2,550.00	23.15	91.47	2,393.52	8.72	709.93	4.43	709.80	4,231,728.66	416,720.39	89.30
2,580.00	22.34	91.36	2,421.19	8.43	721.52	2.70	721.38	4,231,728.57	416,723.92	89.33
2,610.00	21.64	87.24	2,449.01	8.57	732.75	5.65	732.60	4,231,728.61	416,727.34	89.33
2,640.00	23.24	82.25	2,476.74	9.63	744.14	8.29	744.02	4,231,728.94	416,730.81	89.26
2,670.00	25.51	80.23	2,504.06	11.52	756.37	8.06	756.31	4,231,729.51	416,734.54	89.13
2,700.00	26.18	80.07	2,531.06	13.76	769.26	2.25	769.27	4,231,730.19	416,738.47	88.98
2,730.00	24.38	77.73	2,558.19	16.22	781.83	6.86	781.92	4,231,730.94	416,742.30	88.81

Report

Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Thomas Fowler 504
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=1003+6 @ 1009.00usft
Site:	Thomas Fowler	MD Reference:	RKB=1003+6 @ 1009.00usft
Well:	Thomas Fowler 504	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (m)	Easting (m)	Closure Azimuth (°)
2,760.00	22.02	74.65	2,585.76	19.02	793.30	8.84	793.48	4,231,731.80	416,745.80	88.83
Survey @ 2760.00 MD 2585.76 TVD										
2,824.00	22.02	74.65	2,645.09	25.38	816.44	0.00	816.83	4,231,733.73	416,752.85	88.22
Survey projected to 2824.00 MD 2645.09 TVD										

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
600.00	599.96	-4.24	3.90	MWD surveys
2,760.00	2,585.76	19.02	793.30	Survey @ 2760.00 MD 2585.76 TVD
2,824.00	2,645.09	25.38	816.44	Survey projected to 2824.00 MD 2645.09 TVD

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