



PRODIRECTIONAL



**Hager Heirs 252
Lincoln County, WV
Noah Horn 294 Rig**

July 31, 2019

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Survey Certification Report



Survey Certification Letter

July 31, 2019

HG Energy

Operator Name: HG Energy
Well Name: Hager Heirs 252
County/Parish: Lincoln County
State: WV
Rig Name: Noah Horn 294
Job Number: LWW3516419

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	569'MD – 2,579'MD	2,642'MD	07/15/19 – 07/17/19	MWD-OWSG

Sincerely,

John Jordan
Well Planning Analyst
Professional Directional

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

HG Energy LLC

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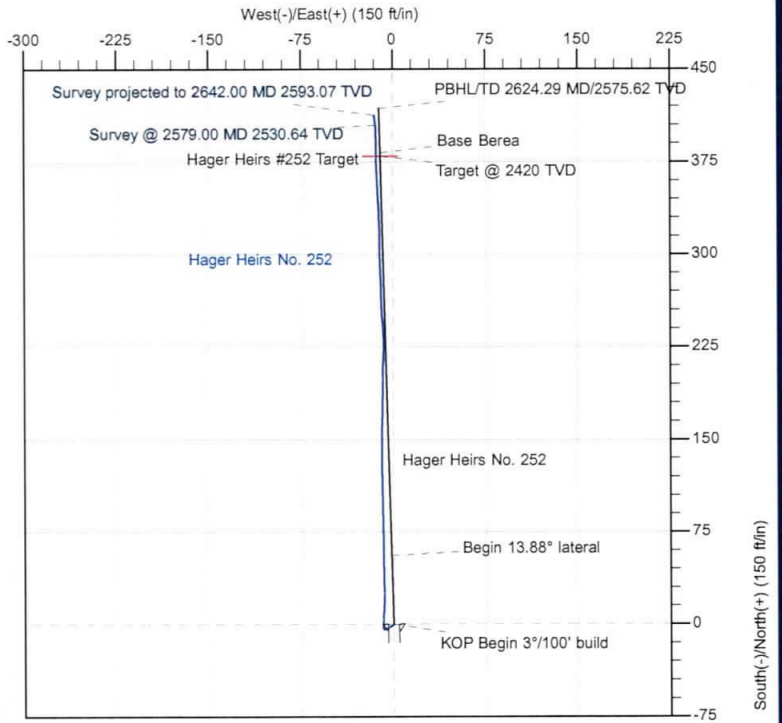
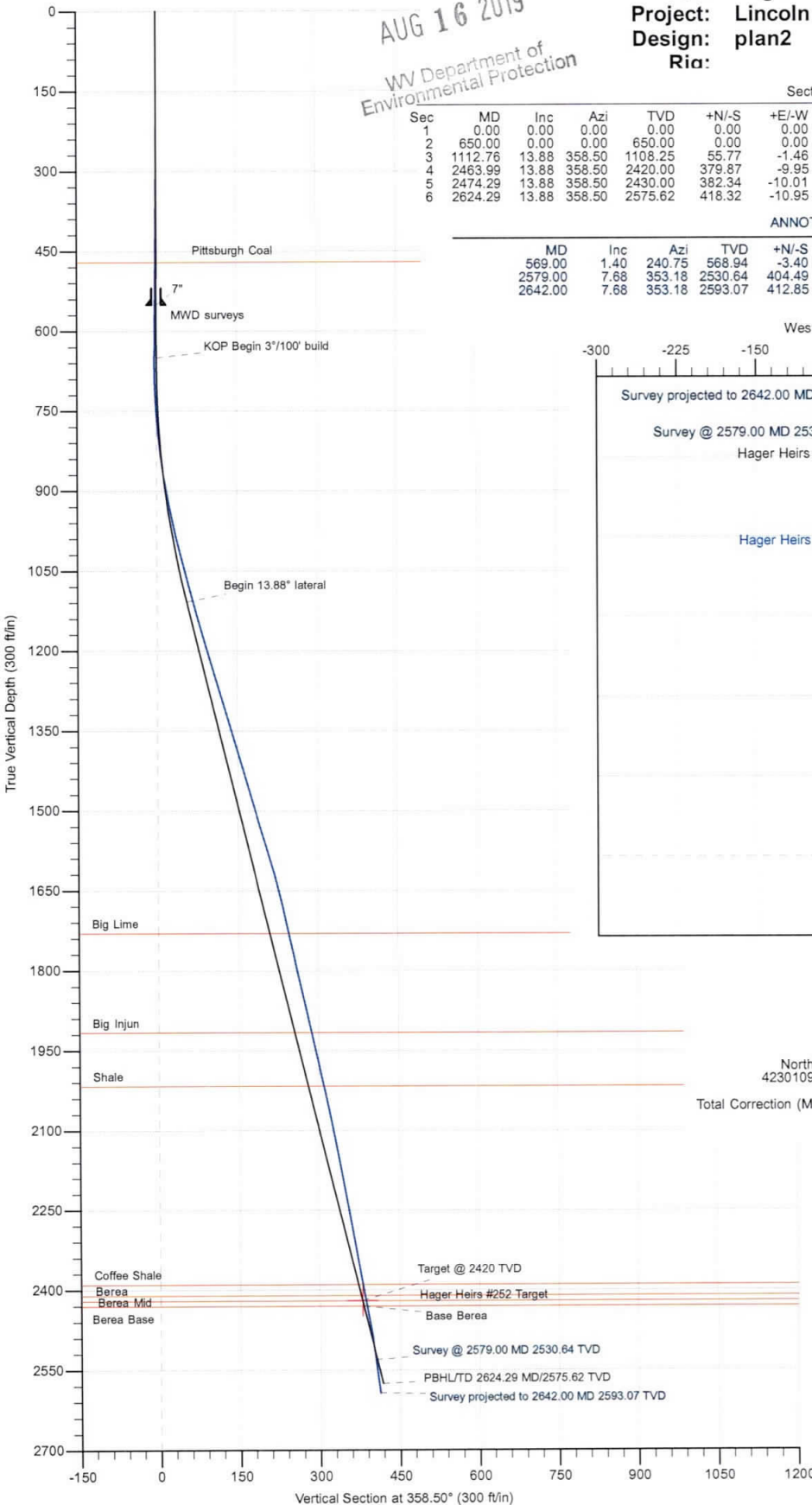
Well: Hager Heirs No. 252
Site: Hager Heirs
Project: Lincoln County, West Virginia UTM83
Design: plan2
Ria:

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	1112.76	13.88	358.50	1108.25	55.77	-1.46	3.00	358.50	55.79	Begin 13.88° lateral
4	2463.99	13.88	358.50	2420.00	379.87	-9.95	0.00	0.00	380.00	Target @ 2420 TVD
5	2474.29	13.88	358.50	2430.00	382.34	-10.01	0.00	0.00	382.47	Base Berea
6	2624.29	13.88	358.50	2575.62	418.32	-10.95	0.00	0.00	418.46	PBHL/TD 2624.29 MD/2575.62 TVD

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
569.00	1.40	240.75	568.94	-3.40	-6.06	-3.24	MWD surveys
2579.00	7.68	353.18	2530.64	404.49	-14.22	404.72	Survey @ 2579.00 MD 2530.64 TVD
2642.00	7.68	353.18	2593.07	412.85	-15.22	413.10	Survey projected to 2642.00 MD 2593.07 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=940+8 @ 948.00ft

Northing 4230109.00 Easting 415964.00 Latitude 38° 12' 54.1079 N Longitude 81° 57' 35.8493 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: 51357.5nT
Dip Angle: 65.47°
Date: 5/2/2019
Model: HDGM

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
470.00	470.00	Pittsburgh Coal
1730.00	1753.22	Big Lime
1916.00	1944.82	Big Injun
2016.00	2047.83	Shale
2390.00	2433.08	Coffee Shale
2410.00	2453.69	Berea
2420.00	2463.99	Berea Mid
2430.00	2474.29	Berea Base



PRODIRECTIONAL

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Hager Heirs No. 252
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=940+8 @ 948.00ft
Site:	Hager Heirs	MD Reference:	RKB=940+8 @ 948.00ft
Well:	Hager Heirs No. 252	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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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	Hager Heirs				
Site Position:		Northing:	4,230,109.00 m	Latitude:	38° 12' 54.1079 N
From:	Map	Easting:	415,964.00 m	Longitude:	81° 57' 35.8493 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well	Hager Heirs No. 252					
Well Position	+N/-S	0.00 ft	Northing:	4,230,109.00 m	Latitude:	38° 12' 54.1079 N
	+E/-W	0.00 ft	Easting:	415,964.00 m	Longitude:	81° 57' 35.8493 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	940.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	5/2/2019	-8.35	65.47	51,357.50000000

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	358.50	

Survey Program	Date 7/17/2019				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
569.00	2,579.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,642.00	2,642.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

Survey										
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	
569.00	1.40	240.75	568.94	-3.40	-6.06	-3.24	0.25	0.25	0.00	
MWD surveys										
599.00	1.52	240.08	598.93	-3.77	-6.73	-3.60	0.40	0.40	-2.23	
629.00	1.48	243.97	628.92	-4.14	-7.42	-3.95	0.36	-0.13	12.97	
659.00	1.09	264.48	658.92	-4.34	-8.05	-4.13	1.99	-1.30	68.37	
689.00	1.44	327.43	688.91	-4.05	-8.54	-3.82	4.51	1.17	209.83	
719.00	2.79	350.23	718.89	-3.01	-8.87	-2.78	5.22	4.50	76.00	
749.00	4.19	0.58	748.83	-1.20	-8.98	-0.96	5.10	4.67	34.50	
779.00	5.31	1.26	778.73	1.29	-8.94	1.52	3.74	3.73	2.27	

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Hager Heirs No. 252
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=940+8 @ 948.00ft
Site:	Hager Heirs	MD Reference:	RKB=940+8 @ 948.00ft
Well:	Hager Heirs No. 252	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)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
809.00	6.50	4.05	808.57	4.37	-8.79	4.60	4.08	3.97	9.30	
839.00	7.41	2.74	838.35	7.99	-8.58	8.22	3.08	3.03	-4.37	
869.00	8.66	2.84	868.05	12.18	-8.37	12.40	4.17	4.17	0.33	
899.00	10.06	3.90	897.65	17.05	-8.08	17.26	4.70	4.67	3.53	
929.00	11.02	1.53	927.15	22.53	-7.83	22.73	3.51	3.20	-7.90	
959.00	12.00	358.38	956.54	28.52	-7.84	28.71	3.88	3.27	-10.50	
989.00	13.36	358.20	985.81	35.10	-8.04	35.30	4.54	4.53	-0.60	
1,019.00	14.31	358.66	1,014.94	42.27	-8.23	42.47	3.19	3.17	1.53	
1,049.00	14.64	359.05	1,043.99	49.77	-8.38	49.97	1.15	1.10	1.30	
1,079.00	15.50	359.49	1,072.96	57.57	-8.48	57.77	2.89	2.87	1.47	
1,109.00	15.42	359.69	1,101.87	65.56	-8.54	65.76	0.32	-0.27	0.67	
1,139.00	15.48	358.99	1,130.79	73.56	-8.63	73.76	0.65	0.20	-2.33	
1,169.00	15.46	359.05	1,159.70	81.56	-8.77	81.76	0.09	-0.07	0.20	
1,199.00	16.18	359.69	1,188.56	89.73	-8.86	89.93	2.47	2.40	2.13	
1,229.00	16.69	359.11	1,217.34	98.22	-8.94	98.42	1.79	1.70	-1.93	
1,259.00	16.62	359.29	1,246.08	106.82	-9.06	107.02	0.29	-0.23	0.60	
1,289.00	16.51	358.94	1,274.83	115.37	-9.20	115.57	0.50	-0.37	-1.17	
1,319.00	16.67	359.98	1,303.59	123.94	-9.28	124.14	1.12	0.53	3.47	
1,349.00	16.71	0.38	1,332.32	132.55	-9.25	132.75	0.41	0.13	1.33	
1,379.00	16.99	0.75	1,361.03	141.25	-9.16	141.44	1.00	0.93	1.23	
1,409.00	16.53	359.93	1,389.76	149.90	-9.11	150.08	1.72	-1.53	-2.73	
1,439.00	16.32	359.53	1,418.53	158.38	-9.15	158.57	0.80	-0.70	-1.33	
1,469.00	16.28	0.21	1,447.33	166.80	-9.17	166.98	0.65	-0.13	2.27	
1,499.00	16.37	359.74	1,476.12	175.23	-9.17	175.41	0.53	0.30	-1.57	
1,529.00	16.66	0.89	1,504.88	183.76	-9.13	183.94	1.46	0.97	3.83	
1,559.00	16.74	1.05	1,533.62	192.38	-8.98	192.55	0.31	0.27	0.53	
1,589.00	16.72	1.32	1,562.35	201.01	-8.80	201.17	0.27	-0.07	0.90	
1,619.00	16.79	1.86	1,591.07	209.66	-8.56	209.81	0.57	0.23	1.80	
1,649.00	16.02	2.02	1,619.85	218.13	-8.28	218.27	2.57	-2.57	0.53	
1,679.00	14.25	0.97	1,648.81	225.96	-8.07	226.09	5.97	-5.90	-3.50	
1,709.00	12.91	358.38	1,677.97	233.00	-8.10	233.13	4.90	-4.47	-8.63	
1,739.00	12.10	356.84	1,707.26	239.49	-8.37	239.62	2.92	-2.70	-5.13	
1,769.00	12.43	355.54	1,736.57	245.85	-8.79	245.99	1.43	1.10	-4.33	
1,799.00	12.59	356.08	1,765.86	252.33	-9.27	252.48	0.66	0.53	1.80	
1,829.00	12.78	357.59	1,795.13	258.90	-9.63	259.07	1.27	0.63	5.03	
1,859.00	13.25	358.75	1,824.36	265.66	-9.84	265.82	1.79	1.57	3.87	
1,889.00	13.06	359.48	1,853.57	272.48	-9.95	272.65	0.84	-0.63	2.43	
1,919.00	12.91	358.69	1,882.80	279.22	-10.06	279.39	0.77	-0.50	-2.63	
1,949.00	12.31	357.29	1,912.08	285.77	-10.29	285.94	2.24	-2.00	-4.67	
1,979.00	12.46	356.99	1,941.38	292.19	-10.61	292.37	0.54	0.50	-1.00	
2,009.00	12.97	359.78	1,970.65	298.79	-10.79	298.97	2.66	1.70	9.30	
2,039.00	12.73	359.34	1,999.90	305.46	-10.84	305.64	0.86	-0.80	-1.47	
2,069.00	11.99	357.97	2,029.20	311.88	-10.99	312.06	2.65	-2.47	-4.57	

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Hager Heirs No. 252
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=940+8 @ 948.00ft
Site:	Hager Heirs	MD Reference:	RKB=940+8 @ 948.00ft
Well:	Hager Heirs No. 252	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)
2,099.00	11.58	358.50	2,058.57	318.01	-11.18	318.19	1.41	-1.37	1.77
2,129.00	12.07	358.63	2,087.93	324.15	-11.33	324.34	1.64	1.63	0.43
2,159.00	11.75	359.79	2,117.29	330.34	-11.42	330.53	1.33	-1.07	3.87
2,189.00	10.66	357.76	2,146.71	336.17	-11.54	336.36	3.86	-3.63	-6.77
2,219.00	10.39	355.81	2,176.21	341.64	-11.84	341.83	1.49	-0.90	-6.50
2,249.00	10.28	355.93	2,205.72	347.01	-12.23	347.21	0.37	-0.37	0.40
2,279.00	10.52	357.25	2,235.23	352.42	-12.55	352.62	1.13	0.80	4.40
2,309.00	10.79	356.67	2,264.71	357.95	-12.85	358.17	0.97	0.90	-1.93
2,339.00	10.54	356.76	2,294.19	363.50	-13.17	363.72	0.84	-0.83	0.30
2,369.00	10.18	358.41	2,323.70	368.89	-13.39	369.11	1.55	-1.20	5.50
2,399.00	9.76	359.12	2,353.25	374.08	-13.51	374.30	1.46	-1.40	2.37
2,429.00	9.79	0.94	2,382.82	379.17	-13.50	379.40	1.03	0.10	6.07
2,459.00	10.80	0.03	2,412.33	384.53	-13.46	384.75	3.41	3.37	-3.03
2,489.00	10.61	359.77	2,441.81	390.11	-13.47	390.32	0.65	-0.63	-0.87
2,519.00	9.82	358.16	2,471.33	395.42	-13.56	395.64	2.80	-2.63	-5.37
2,549.00	8.68	355.71	2,500.94	400.24	-13.81	400.46	4.02	-3.80	-8.17
2,579.00	7.68	353.18	2,530.64	404.49	-14.22	404.72	3.54	-3.33	-8.43
Survey @ 2579.00 MD 2530.64 TVD									
2,642.00	7.68	353.18	2,593.07	412.85	-15.22	413.10	0.00	0.00	0.00
Survey projected to 2642.00 MD 2593.07 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
569.00	568.94	-3.40	-6.06	MWD surveys
2,579.00	2,530.64	404.49	-14.22	Survey @ 2579.00 MD 2530.64 TVD
2,642.00	2,593.07	412.85	-15.22	Survey projected to 2642.00 MD 2593.07 TVD

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Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Hager Heirs No. 252
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=940+8 @ 948.00ft
Site:	Hager Heirs	MD Reference:	RKB=940+8 @ 948.00ft
Well:	Hager Heirs No. 252	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
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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 Hager Heirs					
Site Position:		Northing:	4,230,109.00 m	Latitude:	38° 12' 54.1079 N
From:	Map	Easting:	415,964.00 m	Longitude:	81° 57' 35.8493 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.59 °

Well Hager Heirs No. 252						
Well Position	+N/-S	0.00 ft	Northing:	4,230,109.00 m	Latitude:	38° 12' 54.1079 N
	+E/-W	0.00 ft	Easting:	415,964.00 m	Longitude:	81° 57' 35.8493 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	940.00 ft

Wellbore Original Hole					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	5/2/2019	-8.35	65.47	51,357.50000000

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	358.50	

Survey Program Date 7/17/2019					
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
569.00	2,579.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,642.00	2,642.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

Survey										
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	4,230,109.00	415,964.00	38° 12' 54.1079 N	81° 57' 35.8493 W	
569.00	1.40	240.75	568.94	-3.40	-6.06	4,230,107.97	415,962.15	38° 12' 54.0737 N	81° 57' 35.9249 W	
MWD surveys										
599.00	1.52	240.08	598.93	-3.77	-6.73	4,230,107.85	415,961.95	38° 12' 54.0699 N	81° 57' 35.9331 W	
629.00	1.48	243.97	628.92	-4.14	-7.42	4,230,107.74	415,961.74	38° 12' 54.0662 N	81° 57' 35.9418 W	
659.00	1.09	264.48	658.92	-4.34	-8.05	4,230,107.68	415,961.54	38° 12' 54.0642 N	81° 57' 35.9497 W	
689.00	1.44	327.43	688.91	-4.05	-8.54	4,230,107.77	415,961.40	38° 12' 54.0670 N	81° 57' 35.9558 W	
719.00	2.79	350.23	718.89	-3.01	-8.87	4,230,108.09	415,961.30	38° 12' 54.0772 N	81° 57' 35.9600 W	
749.00	4.19	0.58	748.83	-1.20	-8.98	4,230,108.64	415,961.26	38° 12' 54.0952 N	81° 57' 35.9617 W	
779.00	5.31	1.26	778.73	1.29	-8.94	4,230,109.40	415,961.27	38° 12' 54.1197 N	81° 57' 35.9615 W	
809.00	6.50	4.05	808.57	4.37	-8.79	4,230,110.34	415,961.32	38° 12' 54.1502 N	81° 57' 35.9600 W	

Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Hager Heirs No. 252
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=940+8 @ 948.00ft
Site:	Hager Heirs	MD Reference:	RKB=940+8 @ 948.00ft
Well:	Hager Heirs No. 252	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Office of Oil and Gas
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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
839.00	7.41	2.74	838.35	7.99	-8.58	4,230,111.44	415,961.39	38° 12' 54.1861 N	81° 57' 35.9578 W
869.00	8.66	2.84	868.05	12.18	-8.37	4,230,112.72	415,961.45	38° 12' 54.2275 N	81° 57' 35.9558 W
899.00	10.06	3.90	897.65	17.05	-8.08	4,230,114.20	415,961.54	38° 12' 54.2757 N	81° 57' 35.9528 W
929.00	11.02	1.53	927.15	22.53	-7.83	4,230,115.87	415,961.61	38° 12' 54.3299 N	81° 57' 35.9503 W
959.00	12.00	358.38	956.54	28.52	-7.84	4,230,117.70	415,961.61	38° 12' 54.3891 N	81° 57' 35.9512 W
989.00	13.36	358.20	985.81	35.10	-8.04	4,230,119.70	415,961.55	38° 12' 54.4542 N	81° 57' 35.9546 W
1,019.00	14.31	358.66	1,014.94	42.27	-8.23	4,230,121.89	415,961.49	38° 12' 54.5250 N	81° 57' 35.9580 W
1,049.00	14.64	359.05	1,043.99	49.77	-8.38	4,230,124.17	415,961.44	38° 12' 54.5992 N	81° 57' 35.9608 W
1,079.00	15.50	359.49	1,072.96	57.57	-8.48	4,230,126.55	415,961.41	38° 12' 54.6763 N	81° 57' 35.9630 W
1,109.00	15.42	359.69	1,101.87	65.56	-8.54	4,230,128.99	415,961.40	38° 12' 54.7553 N	81° 57' 35.9648 W
1,139.00	15.48	358.99	1,130.79	73.56	-8.63	4,230,131.42	415,961.37	38° 12' 54.8343 N	81° 57' 35.9670 W
1,169.00	15.46	359.05	1,159.70	81.56	-8.77	4,230,133.86	415,961.33	38° 12' 54.9134 N	81° 57' 35.9698 W
1,199.00	16.18	359.69	1,188.56	89.73	-8.86	4,230,136.36	415,961.30	38° 12' 54.9943 N	81° 57' 35.9719 W
1,229.00	16.69	359.11	1,217.34	98.22	-8.94	4,230,138.94	415,961.27	38° 12' 55.0782 N	81° 57' 35.9742 W
1,259.00	16.62	359.29	1,246.08	106.82	-9.06	4,230,141.56	415,961.24	38° 12' 55.1632 N	81° 57' 35.9768 W
1,289.00	16.51	358.94	1,274.83	115.37	-9.20	4,230,144.17	415,961.20	38° 12' 55.2477 N	81° 57' 35.9795 W
1,319.00	16.67	359.98	1,303.59	123.94	-9.28	4,230,146.78	415,961.17	38° 12' 55.3324 N	81° 57' 35.9817 W
1,349.00	16.71	0.38	1,332.32	132.55	-9.25	4,230,149.41	415,961.18	38° 12' 55.4178 N	81° 57' 35.9824 W
1,379.00	16.99	0.75	1,361.03	141.25	-9.16	4,230,152.06	415,961.21	38° 12' 55.5036 N	81° 57' 35.9825 W
1,409.00	16.53	359.93	1,389.76	149.90	-9.11	4,230,154.69	415,961.22	38° 12' 55.5892 N	81° 57' 35.9830 W
1,439.00	16.32	359.53	1,418.53	158.38	-9.15	4,230,157.28	415,961.21	38° 12' 55.6730 N	81° 57' 35.9846 W
1,469.00	16.28	0.21	1,447.33	166.80	-9.17	4,230,159.85	415,961.20	38° 12' 55.7563 N	81° 57' 35.9859 W
1,499.00	16.37	359.74	1,476.12	175.23	-9.17	4,230,162.42	415,961.20	38° 12' 55.8397 N	81° 57' 35.9870 W
1,529.00	16.66	0.89	1,504.88	183.76	-9.13	4,230,165.01	415,961.22	38° 12' 55.9240 N	81° 57' 35.9876 W
1,559.00	16.74	1.05	1,533.62	192.38	-8.98	4,230,167.64	415,961.26	38° 12' 56.0092 N	81° 57' 35.9868 W
1,589.00	16.72	1.32	1,562.35	201.01	-8.80	4,230,170.27	415,961.32	38° 12' 56.0946 N	81° 57' 35.9857 W
1,619.00	16.79	1.86	1,591.07	209.66	-8.56	4,230,172.91	415,961.39	38° 12' 56.1801 N	81° 57' 35.9838 W
1,649.00	16.02	2.02	1,619.85	218.13	-8.28	4,230,175.49	415,961.48	38° 12' 56.2639 N	81° 57' 35.9813 W
1,679.00	14.25	0.97	1,648.81	225.96	-8.07	4,230,177.88	415,961.54	38° 12' 56.3413 N	81° 57' 35.9798 W
1,709.00	12.91	358.38	1,677.97	233.00	-8.10	4,230,180.02	415,961.53	38° 12' 56.4109 N	81° 57' 35.9811 W
1,739.00	12.10	356.84	1,707.26	239.49	-8.37	4,230,182.00	415,961.45	38° 12' 56.4751 N	81° 57' 35.9853 W
1,769.00	12.43	355.54	1,736.57	245.85	-8.79	4,230,183.94	415,961.32	38° 12' 56.5379 N	81° 57' 35.9914 W
1,799.00	12.59	356.08	1,765.86	252.33	-9.27	4,230,185.91	415,961.17	38° 12' 56.6019 N	81° 57' 35.9982 W
1,829.00	12.78	357.59	1,795.13	258.90	-9.63	4,230,187.92	415,961.06	38° 12' 56.6669 N	81° 57' 36.0036 W
1,859.00	13.25	358.75	1,824.36	265.66	-9.84	4,230,189.98	415,961.00	38° 12' 56.7337 N	81° 57' 36.0072 W
1,889.00	13.06	359.48	1,853.57	272.48	-9.95	4,230,192.06	415,960.97	38° 12' 56.8012 N	81° 57' 36.0094 W
1,919.00	12.91	358.69	1,882.80	279.22	-10.06	4,230,194.11	415,960.93	38° 12' 56.8678 N	81° 57' 36.0116 W
1,949.00	12.31	357.29	1,912.08	285.77	-10.29	4,230,196.11	415,960.86	38° 12' 56.9325 N	81° 57' 36.0153 W
1,979.00	12.46	356.99	1,941.38	292.19	-10.61	4,230,198.07	415,960.77	38° 12' 56.9960 N	81° 57' 36.0202 W
2,009.00	12.97	359.78	1,970.65	298.79	-10.79	4,230,200.08	415,960.71	38° 12' 57.0612 N	81° 57' 36.0233 W
2,039.00	12.73	359.34	1,999.90	305.46	-10.84	4,230,202.11	415,960.70	38° 12' 57.1272 N	81° 57' 36.0248 W
2,069.00	11.99	357.97	2,029.20	311.88	-10.99	4,230,204.07	415,960.65	38° 12' 57.1907 N	81° 57' 36.0275 W
2,099.00	11.58	358.50	2,058.57	318.01	-11.18	4,230,205.93	415,960.59	38° 12' 57.2512 N	81° 57' 36.0307 W
2,129.00	12.07	358.63	2,087.93	324.15	-11.33	4,230,207.81	415,960.55	38° 12' 57.3120 N	81° 57' 36.0334 W
2,159.00	11.75	359.79	2,117.29	330.34	-11.42	4,230,209.69	415,960.52	38° 12' 57.3732 N	81° 57' 36.0353 W
2,189.00	10.66	357.76	2,146.71	336.17	-11.54	4,230,211.47	415,960.48	38° 12' 57.4308 N	81° 57' 36.0376 W
2,219.00	10.39	355.81	2,176.21	341.64	-11.84	4,230,213.14	415,960.39	38° 12' 57.4848 N	81° 57' 36.0421 W
2,249.00	10.28	355.93	2,205.72	347.01	-12.23	4,230,214.77	415,960.27	38° 12' 57.5379 N	81° 57' 36.0477 W
2,279.00	10.52	357.25	2,235.23	352.42	-12.55	4,230,216.42	415,960.17	38° 12' 57.5913 N	81° 57' 36.0524 W
2,309.00	10.79	356.67	2,264.71	357.95	-12.85	4,230,218.11	415,960.08	38° 12' 57.6460 N	81° 57' 36.0568 W
2,339.00	10.54	356.76	2,294.19	363.50	-13.17	4,230,219.80	415,959.99	38° 12' 57.7008 N	81° 57' 36.0615 W
2,369.00	10.18	358.41	2,323.70	368.89	-13.39	4,230,221.44	415,959.92	38° 12' 57.7541 N	81° 57' 36.0651 W
2,399.00	9.76	359.12	2,353.25	374.08	-13.51	4,230,223.02	415,959.88	38° 12' 57.8054 N	81° 57' 36.0672 W
2,429.00	9.79	0.94	2,382.82	379.17	-13.50	4,230,224.58	415,959.88	38° 12' 57.8558 N	81° 57' 36.0678 W
2,459.00	10.80	0.03	2,412.33	384.53	-13.46	4,230,226.21	415,959.90	38° 12' 57.9088 N	81° 57' 36.0679 W

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Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well Hager Heirs No. 252
Project:	Lincoln County, West Virginia UTM83	TVD Reference:	RKB=940+8 @ 948.00ft
Site:	Hager Heirs	MD Reference:	RKB=940+8 @ 948.00ft
Well:	Hager Heirs No. 252	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (m)	Map Easting (m)	Latitude	Longitude
2,489.00	10.61	359.77	2,441.81	390.11	-13.47	4,230,227.91	415,959.89	38° 12' 57.9639 N	81° 57' 36.0688 W
2,519.00	9.82	358.16	2,471.33	395.42	-13.56	4,230,229.53	415,959.87	38° 12' 58.0165 N	81° 57' 36.0707 W
2,549.00	8.68	355.71	2,500.94	400.24	-13.81	4,230,231.00	415,959.79	38° 12' 58.0640 N	81° 57' 36.0744 W
2,579.00	7.68	353.18	2,530.64	404.49	-14.22	4,230,232.29	415,959.66	38° 12' 58.1060 N	81° 57' 36.0801 W
Survey @ 2579.00 MD 2530.64 TVD									
2,642.00	7.68	353.18	2,593.07	412.85	-15.22	4,230,234.84	415,959.36	38° 12' 58.1886 N	81° 57' 36.0937 W
Survey projected to 2642.00 MD 2593.07 TVD									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
569.00	568.94	-3.40	-6.06	MWD surveys	
2,579.00	2,530.64	404.49	-14.22	Survey @ 2579.00 MD 2530.64 TVD	
2,642.00	2,593.07	412.85	-15.22	Survey projected to 2642.00 MD 2593.07 TVD	

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HG Energy LLC

Lincoln County, West Virginia UTM83

Hager Heirs

Hager Heirs No. 252

Original Hole

Design: Surveys Original Hole

Completion Report

17 July, 2019



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Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: Hager Heirs
Well: Hager Heirs No. 252
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Hager Heirs No. 252
TVD Reference: RKB=940+8 @ 948.00ft
MD Reference: RKB=940+8 @ 948.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

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

Site: Hager Heirs

Site Position: Northing: 4,230,109.00 m Latitude: 38° 12' 54.1079 N
 From: Easting: 415,964.00 m Longitude: 81° 57' 35.8493 W
Position Uncertainty: Map Slot Radius: 13-3/16 " Grid Convergence: -0.59 °

Well: Hager Heirs No. 252

Well Position: +N/-S 0.00 ft Latitude: 38° 12' 54.1079 N
 +E/-W 0.00 ft Longitude: 81° 57' 35.8493 W
Position Uncertainty: Wellhead Elevation: 0.00 ft Ground Level: 940.00 ft

Wellbore	Original Hole
Magnetics	Model Name Sample Date Declination (°) Dip Angle (°) Field Strength (nT)
	HDGM 5/2/2019 -8.35 65.47 51,357.50000000

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 0.00 358.50

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 WV Department of Environmental Protection



Completion Report

Company: HG Energy LLC
 Project: Lincoln County, West Virginia UTM83
 Site: Hager Heirs
 Well: Hager Heirs No. 252
 Wellbore: Original Hole
 Design: Surveys Original Hole

Local Co-ordinate Reference:
 TVD Reference: RKB=940+8 @ 948.00ft
 MD Reference: RKB=940+8 @ 948.00ft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: DB_Jul2216dt_v14

Well Hager Heirs No. 252
 RKB=940+8 @ 948.00ft
 RKB=940+8 @ 948.00ft
 Grid
 Minimum Curvature
 DB_Jul2216dt_v14

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Survey Program		Date	7/17/2019	
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
569.00	2,579.00	MWD (Original Hole)	MWD	OWSG MWD - Standard
2,642.00	2,642.00	Projection (Original Hole)	MWD	OWSG MWD - Standard

Survey MD (ft)	Inc (")	Azi (azimuth)	TVD (ft)	DLeg (°/100ust)	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	4,230,109.00	415,964.00
569.00	1.40	240.75	568.94	0.25	-3.40	-6.06	6.95	240.75	4,230,107.96	415,962.15
MWD surveys										
599.00	1.52	240.08	598.93	0.40	-3.77	-6.73	7.72	240.72	4,230,107.85	415,961.95
629.00	1.48	243.97	628.92	0.36	-4.14	-7.42	8.50	240.83	4,230,107.74	415,961.74
659.00	1.09	264.48	658.92	1.99	-4.34	-8.05	9.15	241.68	4,230,107.68	415,961.54
689.00	1.44	327.43	688.91	4.51	-4.05	-8.54	9.45	244.63	4,230,107.77	415,961.40
719.00	2.79	350.23	718.89	5.22	-3.01	-8.87	9.37	251.24	4,230,108.08	415,961.30
749.00	4.19	0.58	748.83	5.10	-1.20	-8.98	9.06	262.41	4,230,108.64	415,961.26
779.00	5.31	1.26	778.73	3.74	1.29	-8.94	9.03	278.19	4,230,109.39	415,961.28
809.00	6.50	4.05	808.57	4.08	4.37	-8.79	9.82	296.43	4,230,110.33	415,961.32
839.00	7.41	2.74	838.35	3.08	7.99	-8.58	11.73	312.99	4,230,111.44	415,961.39
869.00	8.66	2.84	868.05	4.17	12.18	-8.37	14.78	325.50	4,230,112.71	415,961.45
899.00	10.06	3.90	897.65	4.70	17.05	-8.08	18.87	334.64	4,230,114.20	415,961.54
929.00	11.02	1.53	927.15	3.51	22.53	-7.83	23.85	340.84	4,230,115.87	415,961.61
959.00	12.00	358.38	956.54	3.88	28.52	-7.84	29.58	344.63	4,230,117.69	415,961.61
989.00	13.36	358.20	985.81	4.54	35.10	-8.04	36.01	347.10	4,230,119.70	415,961.55
1,019.00	14.31	358.66	1,014.94	3.19	42.27	-8.23	43.06	348.98	4,230,121.88	415,961.49
1,049.00	14.64	359.05	1,043.99	1.15	49.77	-8.38	50.47	350.44	4,230,124.17	415,961.45
1,079.00	15.50	359.49	1,072.96	2.89	57.57	-8.48	58.19	351.62	4,230,126.55	415,961.42
1,109.00	15.42	359.69	1,101.87	0.32	65.56	-8.54	66.12	352.58	4,230,128.98	415,961.40



Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: Hager Heirs
Well: Hager Heirs No. 252
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference:
TVD Reference: Well Hager Heirs No. 252
MD Reference: RKB=940+8 @ 948.00ft
North Reference: RKB=940+8 @ 948.00ft
Survey Calculation Method: Grid
Database: Minimum Curvature
 DB_Jul2216dt_v14

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Survey	MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	DLeg (°/100ust)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)
	1,139.00	15.48	358.99	1,130.79	0.65	73.56	-8.63	74.06	353.31	4,230,131.42	415,961.37
	1,169.00	15.46	359.05	1,159.70	0.09	81.56	-8.77	82.03	353.87	4,230,133.86	415,961.33
	1,199.00	16.18	359.69	1,188.56	2.47	89.73	-8.86	90.17	354.36	4,230,136.35	415,961.30
	1,229.00	16.69	359.11	1,217.34	1.79	98.22	-8.94	98.63	354.80	4,230,138.94	415,961.27
	1,259.00	16.62	359.29	1,246.08	0.29	106.82	-9.06	107.20	355.15	4,230,141.56	415,961.24
	1,289.00	16.51	358.94	1,274.83	0.50	115.37	-9.20	115.74	355.44	4,230,144.16	415,961.20
	1,319.00	16.67	359.98	1,303.59	1.12	123.94	-9.28	124.28	355.72	4,230,146.78	415,961.17
	1,349.00	16.71	0.38	1,332.32	0.41	132.55	-9.25	132.87	356.01	4,230,149.40	415,961.18
	1,379.00	16.99	0.75	1,361.03	1.00	141.25	-9.16	141.54	356.29	4,230,152.05	415,961.21
	1,409.00	16.53	359.93	1,389.76	1.72	149.90	-9.11	150.17	356.52	4,230,154.69	415,961.22
	1,439.00	16.32	359.53	1,418.53	0.80	158.38	-9.15	158.64	356.69	4,230,157.27	415,961.21
	1,469.00	16.28	0.21	1,447.33	0.65	166.80	-9.17	167.05	356.85	4,230,159.84	415,961.20
	1,499.00	16.37	359.74	1,476.12	0.53	175.23	-9.17	175.47	357.00	4,230,162.41	415,961.20
	1,529.00	16.66	0.89	1,504.88	1.46	183.76	-9.13	183.99	357.16	4,230,165.01	415,961.22
	1,559.00	16.74	1.05	1,533.62	0.31	192.38	-8.98	192.59	357.33	4,230,167.64	415,961.26
	1,589.00	16.72	1.32	1,562.35	0.27	201.01	-8.80	201.21	357.49	4,230,170.27	415,961.32
	1,619.00	16.79	1.86	1,591.07	0.57	209.66	-8.56	209.83	357.66	4,230,172.90	415,961.39
	1,649.00	16.02	2.02	1,619.85	2.57	218.13	-8.28	218.28	357.83	4,230,175.48	415,961.48
	1,679.00	14.25	0.97	1,648.81	5.97	225.96	-8.07	226.10	357.96	4,230,177.87	415,961.54
	1,709.00	12.91	358.38	1,677.97	4.90	233.00	-8.10	233.14	358.01	4,230,180.02	415,961.53
	1,739.00	12.10	356.84	1,707.26	2.92	239.49	-8.37	239.63	358.00	4,230,182.00	415,961.45
	1,769.00	12.43	355.54	1,736.57	1.43	245.85	-8.79	246.00	357.95	4,230,183.93	415,961.32
	1,799.00	12.59	356.08	1,765.86	0.66	252.33	-9.27	252.50	357.90	4,230,185.91	415,961.18
	1,829.00	12.78	357.59	1,795.13	1.27	258.90	-8.63	259.08	357.87	4,230,187.91	415,961.06
	1,859.00	13.25	358.75	1,824.36	1.79	265.66	-8.84	265.84	357.88	4,230,189.97	415,961.00
	1,889.00	13.06	359.48	1,853.57	0.84	272.48	-9.95	272.66	357.91	4,230,192.05	415,960.97
	1,919.00	12.91	358.69	1,882.80	0.77	279.22	-10.06	279.40	357.94	4,230,194.11	415,960.93



Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: Hager Heirs
Well: Hager Heirs No. 252
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Hager Heirs No. 252
TVD Reference: RKB=940+8 @ 948.00ft
MD Reference: RKB=940+8 @ 948.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216ct_v14

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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)
	1,949.00	12.31	357.29	1,912.08	2.24	285.77	-10.29	285.95	357.94	4,230,196.10	415,960.87
	1,979.00	12.46	356.99	1,941.38	0.54	292.19	-10.61	292.39	357.92	4,230,198.06	415,960.77
	2,009.00	12.97	359.78	1,970.65	2.66	298.79	-10.79	298.99	357.93	4,230,200.07	415,960.71
	2,039.00	12.73	359.34	1,999.90	0.86	305.46	-10.84	305.66	357.97	4,230,202.11	415,960.70
	2,069.00	11.99	357.97	2,029.20	2.65	311.88	-10.99	312.08	357.98	4,230,204.06	415,960.65
	2,099.00	11.58	358.50	2,058.57	1.41	318.01	-11.18	318.20	357.99	4,230,205.93	415,960.59
	2,129.00	12.07	358.63	2,087.93	1.64	324.15	-11.33	324.35	358.00	4,230,207.80	415,960.55
	2,159.00	11.75	359.79	2,117.29	1.33	330.34	-11.42	330.54	358.02	4,230,209.69	415,960.52
	2,189.00	10.66	357.76	2,146.71	3.86	336.17	-11.54	336.37	358.03	4,230,211.46	415,960.48
	2,219.00	10.39	355.81	2,176.21	1.49	341.64	-11.84	341.85	358.01	4,230,213.13	415,960.39
	2,249.00	10.28	355.93	2,205.72	0.37	347.01	-12.23	347.23	357.98	4,230,214.77	415,960.27
	2,279.00	10.52	357.25	2,235.23	1.13	352.42	-12.55	352.64	357.96	4,230,216.42	415,960.17
	2,309.00	10.79	356.67	2,264.71	0.97	357.95	-12.85	358.18	357.94	4,230,218.10	415,960.08
	2,339.00	10.54	356.76	2,294.19	0.84	363.50	-13.17	363.74	357.93	4,230,219.79	415,959.99
	2,369.00	10.18	358.41	2,323.70	1.55	368.89	-13.39	369.13	357.92	4,230,221.44	415,959.92
	2,399.00	9.76	359.12	2,353.25	1.46	374.08	-13.51	374.32	357.93	4,230,223.02	415,959.88
	2,429.00	9.79	0.94	2,382.82	1.03	379.17	-13.50	379.41	357.96	4,230,224.57	415,959.88
	2,459.00	10.80	0.03	2,412.33	3.41	384.53	-13.46	384.77	358.00	4,230,226.21	415,959.90
	2,489.00	10.61	359.77	2,441.81	0.65	390.11	-13.47	390.34	358.02	4,230,227.90	415,959.89
	2,519.00	9.82	358.16	2,471.33	2.80	395.42	-13.56	395.66	358.04	4,230,229.53	415,959.87
	2,549.00	8.68	355.71	2,500.94	4.02	400.24	-13.81	400.48	358.02	4,230,230.99	415,959.79
	2,579.00	7.68	353.18	2,530.64	3.54	404.49	-14.22	404.74	357.99	4,230,232.29	415,959.67
	Survey @ 2579.00 MD 2530.64 TVD		353.18	2,593.07	0.00	412.85	-15.22	413.13	357.89	4,230,234.84	415,959.36
	2,642.00	7.68									
	Survey projected to 2642.00 MD 2593.07 TVD										



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
568.00	568.94	-3.40	-6.06	MWD surveys
2,579.00	2,530.64	404.49	-14.22	Survey @ 2579.00 MD 2530.64 TVD
2,642.00	2,593.07	412.85	-15.22	Survey projected to 2642.00 MD 2593.07 TVD

Checked By: _____ Approved By: _____ Date: _____

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