



EJ May 148
Lincoln County, WV
Noah Horn 777 Rig

June 7, 2019

Survey Certification Report



Survey Certification Letter

June 7, 2019

HG Energy

Operator Name: HG Energy
Well Name: EJ May 148
County/Parish: Lincoln County
State: WV
Rig Name: Noah Horn 777
Job Number: LWW3116619

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	500'MD – 2,570'MD	2,636'MD	05/28/19 – 05/30/19	MWD-OWSG

Sincerely,

John Jordan
Well Planning Analyst
Professional Directional

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

prodirectional.com

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WV Department of
Environmental Protection

HG Energy LLC

Well: E.J. May No. 148
 Site: E.J. May
 Project: Lincoln County, West Virginia UTM NAD27
 Design: plan1
 Rig: Noah Horn 777

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
390.00	390.00	Pittsburgh coal
1616.00	1864.60	Big Lime
1815.00	1881.14	Big Injun
1910.00	1984.51	Shale
2310.00	2419.76	Coffee Shale
2330.00	2441.53	Berea
2341.00	2453.50	Berea Mid tgt
2352.00	2465.47	Berea Base
2352.00	2465.47	Shale

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	0.000	0.00	
2	550.00	0.00	0.00	550.00	0.00	0.00	0.00	0.000	0.00	KOP Begin 3°/100' build
3	1323.96	23.22	68.75	1302.95	56.06	144.17	3.00	68.750	154.69	Begin 23.22° tangent
4	2453.50	23.22	68.75	2341.00	217.46	559.20	0.00	0.000	600.00	Berea Tgt @ 2341 TVD
5	2465.47	23.22	68.75	2352.00	219.17	563.60	0.00	0.000	604.72	Base Beria
6	2615.47	23.22	68.75	2489.85	240.61	618.72	0.00	0.000	663.86	PBHLTD 2615.47 MD/2489.85 TVD

ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Annotation
500.00	2.63	112.36	499.82	-4.36	10.61	8.31	MWD surveys
2570.00	17.59	65.92	2448.63	243.49	615.48	661.88	Survey @ 2570.00 MD 2448.63 TVD
2636.00	17.59	65.92	2511.55	251.63	633.69	681.80	Survey projected to 2636.00 MD 2511.55 TVD

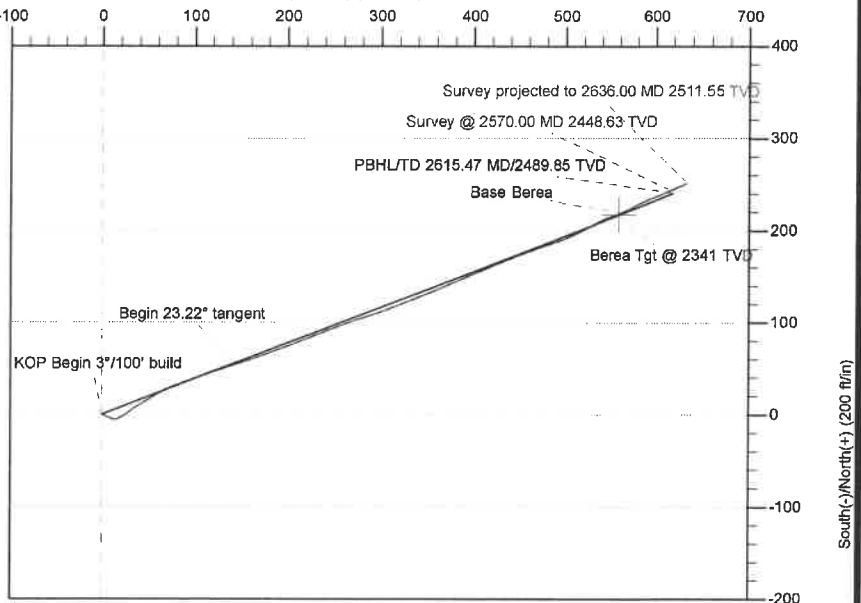
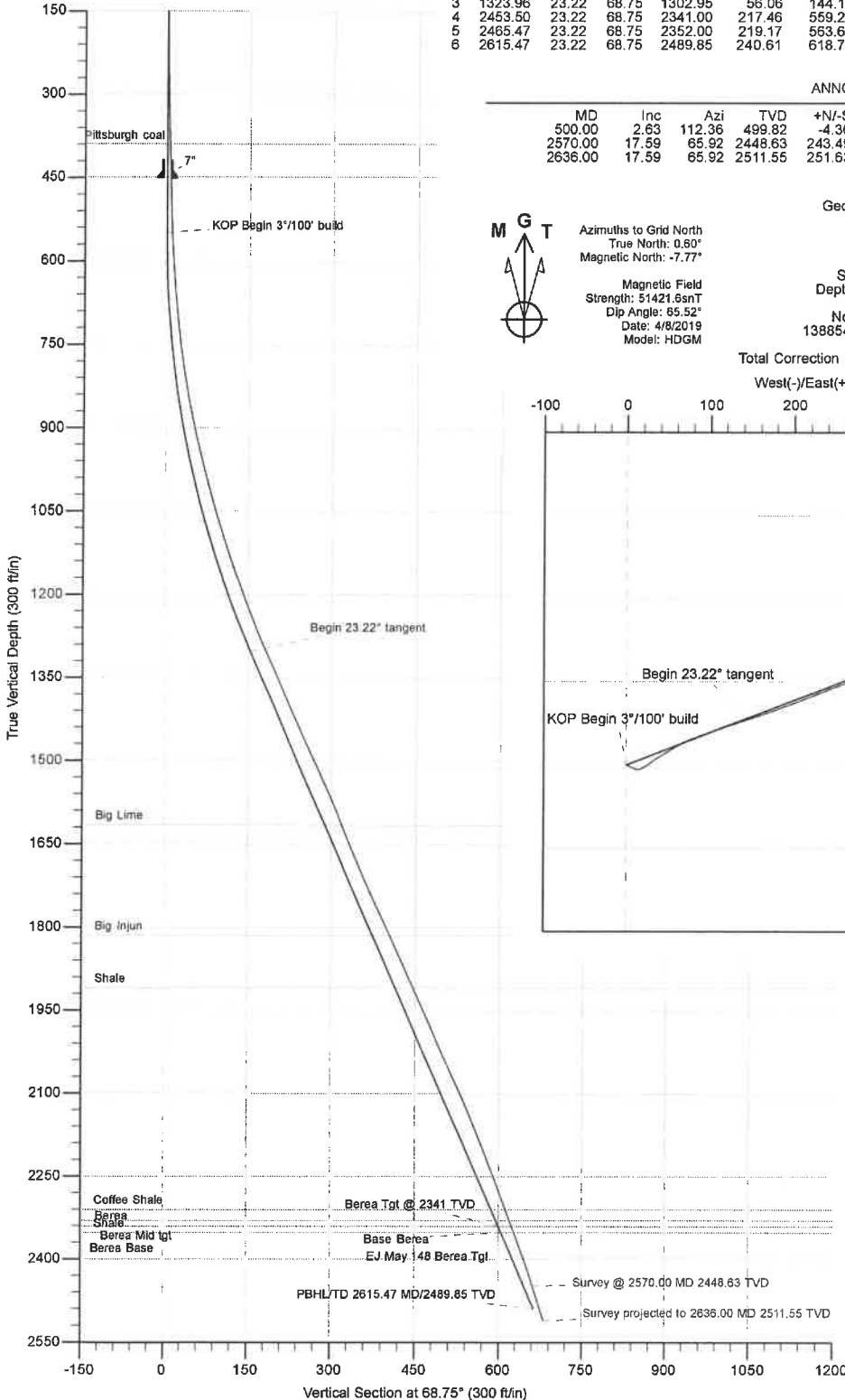
Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level
 Depth Reference: RKB=840+8 @ 848.00ft (Noah Horn 777)

Northing 13885472.29 Easting 1363202.39 Latitude 38.23659300 Longitude -81.96546291

Total Correction (M->T): To convert a Magnetic Direction to a True Direction, Subtract 8.3°

West(-)/East(+) (200 ft/in)



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 Environmental Protection

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.J. May No. 148
Project:	Lincoln County, West Virginia UTM NAD27	TVD Reference:	RKB=840+8 @ 848.00ft
Site:	E.J. May	MD Reference:	RKB=840+8 @ 848.00ft
Well:	E.J. May No. 148	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Project	Lincoln County, West Virginia UTM NAD27		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	E.J. May				
Site Position:		Northing:	13,886,049.68 usft	Latitude:	38.23823221
From:	Map	Easting:	1,365,069.18 usft	Longitude:	-81.95898304
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.594 °

Well	E.J. May No. 148					
Well Position	+N/-S	0.00 ft	Northing:	13,885,472.29 usft	Latitude:	38.23659300
	+E/-W	0.00 ft	Easting:	1,363,202.39 usft	Longitude:	-81.96546290
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	840.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	HDGM	4/8/2019	(°) -8.367	(°) 65.517	(nT) 51,421.60000000

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.00	0.00	0.00	68.75	

Survey Program	Date	5/30/2019			
From	To	Survey (Wellbore)	Tool Name	Description	
500.00	2,570.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,636.00	2,636.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

Survey										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate	
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(°/100ft)	(°/100ft)	(°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	2.63	112.36	499.82	-4.36	10.61	8.31	0.53	0.53	0.00	
MWD surveys										
530.00	2.70	113.16	529.79	-4.90	11.90	9.31	0.26	0.23	2.67	
560.00	2.87	102.15	559.76	-5.34	13.28	10.44	1.87	0.57	-36.70	
590.00	3.84	77.60	589.71	-5.28	15.00	12.06	5.71	3.23	-81.83	
620.00	4.42	67.25	619.63	-4.62	17.04	14.21	3.14	1.93	-34.50	
650.00	4.68	65.76	649.53	-3.67	19.23	16.59	0.95	0.87	-4.97	
680.00	5.78	60.50	679.41	-2.42	21.66	19.31	4.00	3.67	-17.53	
710.00	6.64	58.26	709.23	-0.77	24.45	22.51	2.98	2.87	-7.47	

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Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.J. May No. 148
Project:	Lincoln County, West Virginia UTM NAD27	TVD Reference:	RKB=840+8 @ 848.00ft
Site:	E.J. May	MD Reference:	RKB=840+8 @ 848.00ft
Well:	E.J. May No. 148	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	WVD Environmental Protection (°/100ft)
740.00	7.10	55.08	739.02	1.21	27.44	26.01	1.99	1.53	-10.60
770.00	7.69	53.75	768.77	3.45	30.58	29.75	2.05	1.97	-4.43
800.00	8.84	54.37	798.46	5.98	34.07	33.93	3.84	3.83	2.07
830.00	9.57	55.38	828.07	8.74	38.00	38.58	2.49	2.43	3.37
860.00	10.97	56.67	857.59	11.73	42.44	43.80	4.73	4.67	4.30
890.00	12.24	59.19	886.97	14.93	47.55	49.73	4.56	4.23	8.40
920.00	13.27	61.64	916.23	18.19	53.31	56.28	3.88	3.43	8.17
950.00	13.96	59.75	945.39	21.65	59.47	63.27	2.74	2.30	-6.30
980.00	14.50	59.95	974.47	25.35	65.85	70.56	1.81	1.80	0.67
1,010.00	15.45	63.78	1,003.45	29.00	72.68	78.25	4.57	3.17	12.77
1,040.00	16.48	68.31	1,032.30	32.34	80.22	86.49	5.39	3.43	15.10
1,070.00	17.17	71.20	1,061.01	35.34	88.37	95.17	3.61	2.30	9.63
1,100.00	17.32	70.72	1,089.66	38.24	96.78	104.05	0.69	0.50	-1.60
1,130.00	17.68	72.02	1,118.27	41.12	105.32	113.07	1.77	1.20	4.33
1,160.00	18.88	71.47	1,146.76	44.07	114.26	122.46	4.04	4.00	-1.83
1,190.00	19.68	71.76	1,175.08	47.19	123.65	132.35	2.62	2.60	0.97
1,220.00	20.69	70.83	1,203.24	50.51	133.45	142.69	3.60	3.43	-3.10
1,250.00	21.43	70.43	1,231.23	54.09	143.62	153.46	2.51	2.47	-1.33
1,280.00	22.34	71.05	1,259.07	57.77	154.18	164.64	3.13	3.03	2.07
1,310.00	22.53	71.24	1,286.80	61.47	165.01	176.08	0.68	0.63	0.63
1,340.00	23.11	70.12	1,314.45	65.32	175.99	187.70	2.42	1.93	-3.73
1,370.00	23.64	70.30	1,341.99	69.35	187.19	199.60	1.78	1.77	0.60
1,400.00	23.84	69.56	1,369.45	73.50	198.54	211.68	1.20	0.67	-2.47
1,430.00	24.06	68.71	1,396.87	77.84	209.92	223.85	1.36	0.73	-2.83
1,460.00	24.28	68.03	1,424.24	82.36	221.33	236.14	1.18	0.73	-2.27
1,490.00	24.43	67.13	1,451.57	87.08	232.77	248.51	1.33	0.50	-3.00
1,520.00	24.31	67.23	1,478.90	91.88	244.18	260.88	0.42	-0.40	0.33
1,550.00	24.19	68.94	1,506.25	96.48	255.61	273.20	2.37	-0.40	5.70
1,580.00	23.55	70.63	1,533.68	100.68	267.00	285.34	3.12	-2.13	5.63
1,610.00	22.50	71.76	1,561.29	104.46	278.11	297.06	3.80	-3.50	3.77
1,640.00	22.09	72.42	1,589.05	107.96	288.94	308.42	1.60	-1.37	2.20
1,670.00	22.52	70.37	1,616.81	111.60	299.72	319.79	2.96	1.43	-6.83
1,700.00	22.12	68.58	1,644.56	115.59	310.39	331.18	2.63	-1.33	-5.97
1,730.00	21.74	68.04	1,672.39	119.73	320.81	342.39	1.43	-1.27	-1.80
1,760.00	22.13	68.17	1,700.22	123.91	331.20	353.59	1.31	1.30	0.43
1,790.00	23.47	66.65	1,727.87	128.36	341.93	365.22	4.88	4.47	-5.07
1,820.00	24.23	67.67	1,755.31	133.09	353.11	377.34	2.88	2.53	3.40
1,850.00	24.76	66.86	1,782.61	137.89	364.58	389.77	2.09	1.77	-2.70
1,880.00	24.76	67.72	1,809.85	142.75	376.18	402.33	1.20	0.00	2.87
1,910.00	23.92	67.83	1,837.19	147.42	387.62	414.70	2.80	-2.80	0.37
1,940.00	23.39	66.94	1,864.67	152.05	398.73	426.73	2.13	-1.77	-2.97
1,970.00	24.11	66.05	1,892.12	156.87	409.81	438.80	2.68	2.40	-2.97
2,000.00	24.50	67.79	1,919.47	161.71	421.17	451.14	2.72	1.30	5.80

Survey Report



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.J. May No. 148
Project:	Lincoln County, West Virginia UTM NAD27	TVD Reference:	RKB=840+8 @ 848.00ft
Site:	E.J. May	MD Reference:	RKB=840+8 @ 848.00ft
Well:	E.J. May No. 148	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)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
2,030.00	23.68	66.70	1,946.85	166.44	432.46	463.38	3.11	-2.73	-3.63	
2,060.00	22.67	68.12	1,974.43	170.98	443.36	475.19	3.85	-3.37	4.73	
2,090.00	22.77	68.95	2,002.10	175.22	454.14	486.77	1.12	0.33	2.77	
2,120.00	23.61	70.57	2,029.68	179.30	465.23	498.58	3.52	2.80	5.40	
2,150.00	24.45	70.79	2,057.08	183.35	476.76	510.79	2.82	2.80	0.73	
2,180.00	24.38	70.79	2,084.40	187.43	488.47	523.18	0.23	-0.23	0.00	
2,210.00	23.49	68.43	2,111.82	191.66	499.87	535.35	4.36	-2.97	-7.87	
2,240.00	22.16	64.91	2,139.47	196.26	510.56	546.98	6.35	-4.43	-11.73	
2,270.00	21.32	61.04	2,167.34	201.30	520.45	558.03	5.54	-2.80	-12.90	
2,300.00	21.39	60.24	2,195.28	206.65	529.98	568.84	1.00	0.23	-2.67	
2,330.00	21.16	66.60	2,223.24	211.52	539.70	579.66	7.73	-0.77	21.20	
2,360.00	21.09	71.29	2,251.22	215.40	549.78	590.47	5.64	-0.23	15.63	
2,390.00	20.66	70.30	2,279.25	218.92	559.87	601.15	1.85	-1.43	-3.30	
2,420.00	19.69	63.72	2,307.42	222.94	569.39	611.48	8.22	-3.23	-21.93	
2,450.00	20.53	62.10	2,335.59	227.64	578.57	621.74	3.36	2.80	-5.40	
2,480.00	20.88	65.68	2,363.65	232.30	588.09	632.30	4.38	1.17	11.93	
2,510.00	19.89	68.94	2,391.77	236.34	597.73	642.74	5.02	-3.30	10.87	
2,540.00	18.47	68.59	2,420.11	239.91	606.91	652.60	4.75	-4.73	-1.17	
2,570.00	17.59	65.92	2,448.63	243.49	615.48	661.88	4.02	-2.93	-8.90	
Survey @ 2570.00 MD 2448.63 TVD										
2,636.00	17.59	65.92	2,511.55	251.63	633.69	681.80	0.00	0.00	0.00	
Survey projected to 2636.00 MD 2511.55 TVD										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
500.00	499.82	-4.36	10.61	MWD surveys	
2,570.00	2,448.63	243.49	615.48	Survey @ 2570.00 MD 2448.63 TVD	
2,636.00	2,511.55	251.63	633.69	Survey projected to 2636.00 MD 2511.55 TVD	

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Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.J. May No. 148
Project:	Lincoln County, West Virginia UTM NAD27	TVD Reference:	RKB=840+8 @ 848.00ft
Site:	E.J. May	MD Reference:	RKB=840+8 @ 848.00ft
Well:	E.J. May No. 148	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Project	Lincoln County, West Virginia UTM NAD27		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	E.J. May				
Site Position:		Northing:	13,886,049.68 usft	Latitude:	38.23823221
From:	Map	Easting:	1,365,069.18 usft	Longitude:	-81.95898304
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.594 °

Well	E.J. May No. 148					
Well Position	+N/-S	0.00 ft	Northing:	13,885,472.29 usft	Latitude:	38.23659300
	+E/-W	0.00 ft	Easting:	1,363,202.39 usft	Longitude:	-81.96546290
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	840.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	HDGM	4/8/2019	(°) -8.367	(°) 65.517	(nT) 51,421.60000000

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.00	0.00	0.00	68.75	

Survey Program	Date	5/30/2019			
From	To	Survey (Wellbore)	Tool Name	Description	
(ft)	(ft)				
500.00	2,570.00	MWD (Original Hole)	MWD	OWSG MWD - Standard	
2,636.00	2,636.00	Projection (Original Hole)	MWD	OWSG MWD - Standard	

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude	
Depth	(°)	(°)	Depth	(ft)	(ft)	Northing	Easting			
(ft)			(ft)			(usft)	(usft)			
0.00	0.00	0.00	0.00	0.00	0.00	13,885,472.29	1,363,202.39	38.23659300	-81.96546290	
500.00	2.63	112.36	499.82	-4.36	10.61	13,885,467.93	1,363,213.00	38.23658132	-81.96542580	
MWD surveys										
530.00	2.70	113.16	529.79	-4.90	11.90	13,885,467.39	1,363,214.29	38.23657987	-81.96542130	
560.00	2.87	102.15	559.76	-5.34	13.28	13,885,466.95	1,363,215.67	38.23657872	-81.96541646	
590.00	3.84	77.60	589.71	-5.28	15.00	13,885,467.01	1,363,217.38	38.23657892	-81.96541049	
620.00	4.42	67.25	619.63	-4.62	17.04	13,885,467.67	1,363,219.43	38.23658080	-81.96540339	
650.00	4.68	65.76	649.53	-3.67	19.23	13,885,468.62	1,363,221.61	38.23658347	-81.96539582	
680.00	5.78	60.50	679.41	-2.42	21.66	13,885,469.87	1,363,224.04	38.23658697	-81.96538740	
710.00	6.64	58.26	709.23	-0.77	24.45	13,885,471.53	1,363,226.83	38.23659160	-81.96537775	
740.00	7.10	55.08	739.02	1.21	27.44	13,885,473.50	1,363,229.83	38.23659710	-81.96536739	

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Project:	Lincoln County, West Virginia UTM NAD27	TVD Reference:	RKB=840+8 @ 848.00ft
Site:	E.J. May	MD Reference:	RKB=840+8 @ 848.00ft
Well:	E.J. May No. 148	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
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Survey

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Environmental Protection

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
770.00	7.69	53.75	768.77	3.45	30.58	13,885,475.75	1,363,232.97	38.23660337	-81.96535654
800.00	8.84	54.37	798.46	5.98	34.07	13,885,478.28	1,363,236.46	38.23661042	-81.96534447
830.00	9.57	55.38	828.07	8.74	38.00	13,885,481.04	1,363,240.39	38.23661811	-81.96533090
860.00	10.97	56.67	857.59	11.73	42.44	13,885,484.02	1,363,244.82	38.23662644	-81.96531556
890.00	12.24	59.19	886.97	14.93	47.55	13,885,487.22	1,363,249.94	38.23663536	-81.96529786
920.00	13.27	61.64	916.23	18.19	53.31	13,885,490.48	1,363,255.70	38.23664450	-81.96527791
950.00	13.96	59.75	945.39	21.65	59.47	13,885,493.94	1,363,261.86	38.23665417	-81.96525660
980.00	14.50	59.95	974.47	25.35	65.85	13,885,497.65	1,363,268.24	38.23666453	-81.96523453
1,010.00	15.45	63.78	1,003.45	29.00	72.68	13,885,501.29	1,363,275.07	38.23667474	-81.96521086
1,040.00	16.48	68.31	1,032.30	32.34	80.22	13,885,504.63	1,363,282.61	38.23668412	-81.96518472
1,070.00	17.17	71.20	1,061.01	35.34	88.37	13,885,507.63	1,363,290.76	38.23669260	-81.96515647
1,100.00	17.32	70.72	1,089.66	38.24	96.78	13,885,510.53	1,363,299.16	38.23670081	-81.96512730
1,130.00	17.68	72.02	1,118.27	41.12	105.32	13,885,513.41	1,363,307.71	38.23670896	-81.96509763
1,160.00	18.88	71.47	1,146.76	44.07	114.26	13,885,516.36	1,363,316.65	38.23671732	-81.96506662
1,190.00	19.66	71.76	1,175.08	47.19	123.65	13,885,519.48	1,363,326.04	38.23672616	-81.96503402
1,220.00	20.69	70.83	1,203.24	50.51	133.45	13,885,522.80	1,363,335.84	38.23673556	-81.96500002
1,250.00	21.43	70.43	1,231.23	54.09	143.62	13,885,526.38	1,363,346.01	38.23674568	-81.96496473
1,280.00	22.34	71.05	1,259.07	57.77	154.18	13,885,530.07	1,363,356.57	38.23675611	-81.96492811
1,310.00	22.53	71.24	1,286.80	61.47	165.01	13,885,533.77	1,363,367.40	38.23676658	-81.96489051
1,340.00	23.11	70.12	1,314.45	65.32	175.99	13,885,537.62	1,363,378.38	38.23677747	-81.96485242
1,370.00	23.64	70.30	1,341.99	69.35	187.19	13,885,541.65	1,363,389.58	38.23678886	-81.96481357
1,400.00	23.84	69.56	1,369.45	73.50	198.54	13,885,545.79	1,363,400.92	38.23680057	-81.96477421
1,430.00	24.06	68.71	1,396.87	77.84	209.92	13,885,550.13	1,363,412.30	38.23681281	-81.96473475
1,460.00	24.28	68.03	1,424.24	82.36	221.33	13,885,554.66	1,363,423.72	38.23682557	-81.96469515
1,490.00	24.43	67.13	1,451.57	87.08	232.77	13,885,559.38	1,363,435.16	38.23683886	-81.96465550
1,520.00	24.31	67.23	1,478.90	91.88	244.18	13,885,564.18	1,363,446.57	38.23685237	-81.96461594
1,550.00	24.19	68.94	1,506.25	96.48	255.61	13,885,568.78	1,363,458.00	38.23686533	-81.96457630
1,580.00	23.55	70.63	1,533.68	100.68	267.00	13,885,572.97	1,363,469.39	38.23687719	-81.96453679
1,610.00	22.50	71.76	1,561.29	104.46	278.11	13,885,576.76	1,363,480.49	38.23688790	-81.96449825
1,640.00	22.09	72.42	1,589.05	107.96	288.94	13,885,580.26	1,363,491.32	38.23689782	-81.96446067
1,670.00	22.52	70.37	1,616.81	111.60	299.72	13,885,583.89	1,363,502.11	38.23690811	-81.96442323
1,700.00	22.12	68.58	1,644.56	115.59	310.39	13,885,587.88	1,363,512.78	38.23691939	-81.96438622
1,730.00	21.74	68.04	1,672.39	119.73	320.81	13,885,592.03	1,363,523.19	38.23693106	-81.96435012
1,760.00	22.13	68.17	1,700.22	123.91	331.20	13,885,596.20	1,363,533.59	38.23694283	-81.96431406
1,790.00	23.47	66.65	1,727.87	128.38	341.93	13,885,600.67	1,363,544.32	38.23695541	-81.96427686
1,820.00	24.23	67.67	1,755.31	133.09	353.11	13,885,605.38	1,363,555.50	38.23696866	-81.96423810
1,850.00	24.76	66.86	1,782.61	137.89	364.58	13,885,610.19	1,363,566.97	38.23698220	-81.96419832
1,880.00	24.76	67.72	1,809.85	142.75	376.18	13,885,615.04	1,363,578.56	38.23699585	-81.96415814
1,910.00	23.92	67.83	1,837.19	147.42	387.62	13,885,619.72	1,363,590.01	38.23700902	-81.96411845
1,940.00	23.39	66.94	1,864.67	152.05	398.73	13,885,624.34	1,363,601.12	38.23702205	-81.96407893
1,970.00	24.11	66.05	1,892.12	156.87	409.81	13,885,629.16	1,363,612.20	38.23703561	-81.96404152
2,000.00	24.50	67.79	1,919.47	161.71	421.17	13,885,634.00	1,363,623.56	38.23704922	-81.96400214
2,030.00	23.68	66.70	1,946.85	166.44	432.46	13,885,638.74	1,363,634.85	38.23706255	-81.96396259
2,060.00	22.67	68.12	1,974.43	170.98	443.36	13,885,643.27	1,363,645.75	38.23707533	-81.96392250
2,090.00	22.77	68.95	2,002.10	175.22	454.14	13,885,647.51	1,363,656.53	38.23708728	-81.96388781
2,120.00	23.61	70.57	2,029.68	179.30	465.23	13,885,651.60	1,363,667.61	38.23709881	-81.96384936
2,150.00	24.45	70.79	2,057.08	183.35	476.76	13,885,655.64	1,363,679.14	38.23711024	-81.96380936
2,180.00	24.38	70.79	2,084.40	187.43	488.47	13,885,659.72	1,363,690.85	38.23712179	-81.96376873
2,210.00	23.49	68.43	2,111.82	191.66	499.87	13,885,663.95	1,363,702.26	38.23713374	-81.96372916
2,240.00	22.16	64.91	2,139.47	196.26	510.56	13,885,668.55	1,363,712.95	38.23714668	-81.96369212
2,270.00	21.32	61.04	2,167.34	201.30	520.45	13,885,673.59	1,363,722.84	38.23716081	-81.96365784
2,300.00	21.39	60.24	2,195.28	206.65	529.98	13,885,678.95	1,363,732.36	38.23717579	-81.96362488
2,330.00	21.16	66.60	2,223.24	211.52	539.70	13,885,683.81	1,363,742.08	38.23718943	-81.96359121
2,360.00	21.09	71.29	2,251.22	215.40	549.78	13,885,687.70	1,363,752.17	38.23720039	-81.96355624
2,390.00	20.66	70.30	2,279.25	218.92	559.87	13,885,691.21	1,363,762.26	38.23721033	-81.96352121

Survey Report - Geographic



Company:	HG Energy LLC	Local Co-ordinate Reference:	Well E.J. May No. 148
Project:	Lincoln County, West Virginia UTM NAD27	TVD Reference:	RKB=840+8 @ 848.00ft
Site:	E.J. May	MD Reference:	RKB=840+8 @ 848.00ft
Well:	E.J. May No. 148	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
2,420.00	19.69	63.72	2,307.42	222.94	569.39	13,885,695.23	1,363,771.78	38.23722165	-81.96348822
2,450.00	20.53	62.10	2,335.59	227.64	578.57	13,885,699.93	1,363,780.96	38.23723482	-81.96345642
2,480.00	20.88	65.68	2,363.65	232.30	588.09	13,885,704.60	1,363,790.48	38.23724790	-81.96342343
2,510.00	19.89	68.94	2,391.77	236.34	597.73	13,885,708.63	1,363,800.11	38.23725926	-81.96339003
2,540.00	18.47	68.59	2,420.11	239.91	606.91	13,885,712.20	1,363,809.30	38.23726933	-81.96335817
2,570.00	17.59	65.92	2,448.63	243.49	615.48	13,885,715.79	1,363,817.86	38.23727942	-81.96332848
Survey @ 2570.00 MD 2448.63 TVD									
2,636.00	17.59	65.92	2,511.55	251.63	633.69	13,885,723.92	1,363,836.07	38.23730229	-81.96326536
Survey projected to 2636.00 MD 2511.55 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
500.00	499.82	-4.36	10.61	MWD surveys
2,570.00	2,448.63	243.49	615.48	Survey @ 2570.00 MD 2448.63 TVD
2,636.00	2,511.55	251.63	633.69	Survey projected to 2636.00 MD 2511.55 TVD

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HG Energy LLC

Lincoln County, West Virginia UTM83

E.J. May

E.J. May No. 148

Original Hole

Design: Surveys Original Hole

Completion Report

11 June, 2019



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Environmental Protection



Completion Report

Company: HG Energy LLC	Well E.J. May No. 148
Project: Lincoln County, West Virginia UTM83	RKB=840+8 @ 848.00ft
Site: E.J. May	RKB=840+8 @ 848.00ft
Well: E.J. May No. 148	Grid
Wellbore: Original Hole	Minimum Curvature
Design: Surveys Original Hole	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 E.J. May

Site Position: Northing: 4,232,693.00 m Latitude: 38° 14' 17.9765 N

From: Easting: 416,089.00 m Longitude: 81° 57' 31.8099 W

Position Uncertainty: Slot Radius: 13-3/16 " Grid Convergence: -0.59 °

Well E.J. May No. 148

Well Position +N-S 0.00 ft Northing: 4,232,517.00 m Latitude: 38° 14' 12.0751 N

+E-W 0.00 ft Easting: 415,520.00 m Longitude: 81° 57' 55.1380 W

Position Uncertainty Wellhead Elevation: 0.00 ft

Wellbore Original Hole

Magnetics	Model Name HDGM	Sample Date 4/8/2019	Declination (°) -8.37	Dip Angle (°) 65.52	Field Strength (nT) 51,421.60000000
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Design Surveys Original Hole

Audit Notes:

Version: 1.0	Phase: ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (ft) 0.00	+N-S (ft) 0.00
		+E-W (ft) 0.00
		Direction (°) 68.75

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WV Department of
Environmental Protection



Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM63
Site: E.J. May
Well: E.J. May No. 148
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference:
TVD Reference: Well E.J. May No. 148
MD Reference: RKB=840+8 @ 848.00ft
North Reference: RKB=840+8 @ 848.00ft
Survey Calculation Method: Grid
Database: Minimum Curvature
 DB_Jul2216dt_v14

Survey Program	From (ft)	To (ft)	Date	Survey (Wellbore)	Tool Name	Description
	500.00	2,570.00	6/3/2019	MWD (Original Hole)	MWD	OWSG MWD - Standard
	2,636.00	2,636.00		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	4,232,517.00	415,520.00
	500.00	2.63	112.36	499.82	0.53	-4.36	10.61	11.47	112.36	4,232,515.67	415,523.23
	530.00	2.70	113.16	529.79	0.26	-4.90	11.90	12.87	112.40	4,232,515.51	415,523.63
	560.00	2.87	102.15	559.76	1.87	-5.34	13.28	14.31	111.91	4,232,515.37	415,524.05
	590.00	3.84	77.60	589.71	5.71	-5.28	15.00	15.90	109.41	4,232,515.39	415,524.57
	620.00	4.42	67.25	619.63	3.14	-4.62	17.04	17.66	105.17	4,232,515.59	415,525.19
	650.00	4.68	65.76	649.53	0.95	-3.67	19.23	19.57	100.81	4,232,515.88	415,525.86
	680.00	5.78	60.50	679.41	4.00	-2.42	21.66	21.79	96.39	4,232,516.26	415,526.60
	710.00	6.84	58.26	709.23	2.98	-0.77	24.45	24.46	91.80	4,232,516.77	415,527.45
	740.00	7.10	55.08	739.02	1.99	1.21	27.44	27.47	87.48	4,232,517.37	415,528.36
	770.00	7.69	53.75	768.77	2.05	3.45	30.58	30.78	83.56	4,232,518.05	415,529.32
	800.00	8.84	54.37	798.46	3.84	5.98	34.07	34.59	80.04	4,232,518.82	415,530.39
	830.00	9.57	55.38	828.07	2.49	8.74	38.00	38.99	77.04	4,232,519.67	415,531.58
	860.00	10.97	56.67	857.59	4.73	11.73	42.44	44.03	74.55	4,232,520.57	415,532.93
	890.00	12.24	59.19	886.97	4.56	14.93	47.55	49.84	72.57	4,232,521.55	415,534.49
	920.00	13.27	61.64	916.23	3.88	18.19	53.31	56.33	71.16	4,232,522.54	415,536.25
	950.00	13.96	59.75	945.39	2.74	21.55	59.47	63.29	70.00	4,232,523.60	415,538.13
	980.00	14.50	59.95	974.47	1.81	25.35	65.85	70.56	68.94	4,232,524.73	415,540.07
	1,010.00	15.45	63.78	1,003.45	4.57	29.00	72.68	78.25	68.25	4,232,525.84	415,542.15
	1,040.00	16.48	68.31	1,032.30	5.39	32.34	80.22	86.49	68.05	4,232,526.86	415,544.45

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Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: E.J. May
Well: E.J. May No. 148
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well E.J. May No. 148
TVD Reference: RKB=840+8 @ 848.00ft
MD Reference: RKB=840+8 @ 848.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	D/Leg (°/100usft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)
1,070.00	17.17	71.20	1,061.01	3.61	35.34	88.37	95.17	68.20	4,232,527.77	415,546.93
1,100.00	17.32	70.72	1,089.66	0.69	38.24	96.78	104.06	68.44	4,232,528.66	415,549.50
1,130.00	17.68	72.02	1,118.27	1.77	41.12	105.32	113.07	68.67	4,232,529.53	415,552.10
1,160.00	18.88	71.47	1,146.76	4.04	44.07	114.26	122.46	68.91	4,232,530.43	415,554.83
1,190.00	19.66	71.76	1,175.08	2.62	47.19	123.65	132.35	69.11	4,232,531.38	415,557.69
1,220.00	20.69	70.83	1,203.24	3.60	50.51	133.45	142.69	69.27	4,232,532.40	415,560.68
1,250.00	21.43	70.43	1,231.23	2.51	54.09	143.62	153.47	69.36	4,232,533.49	415,563.78
1,280.00	22.34	71.05	1,259.07	3.13	57.77	154.18	164.65	69.46	4,232,534.61	415,566.99
1,310.00	22.53	71.24	1,286.80	0.68	61.47	165.01	176.09	69.57	4,232,535.74	415,570.30
1,340.00	23.11	70.12	1,314.45	2.42	65.32	175.99	187.73	69.64	4,232,536.91	415,573.64
1,370.00	23.64	70.30	1,341.99	1.78	69.35	187.19	199.63	69.67	4,232,538.14	415,577.06
1,400.00	23.84	69.56	1,369.45	1.20	73.50	198.54	211.71	69.69	4,232,539.40	415,580.51
1,430.00	24.06	68.71	1,396.87	1.36	77.84	209.92	223.88	69.66	4,232,540.72	415,583.98
1,460.00	24.28	68.03	1,424.24	1.18	82.36	221.33	236.16	69.59	4,232,542.10	415,587.46
1,490.00	24.43	67.13	1,451.57	1.33	87.08	232.77	248.53	69.49	4,232,543.54	415,590.95
1,520.00	24.31	67.23	1,478.90	0.42	91.88	244.18	260.90	69.38	4,232,545.01	415,594.43
1,550.00	24.19	68.94	1,506.25	2.37	96.48	255.61	273.21	69.32	4,232,546.41	415,597.91
1,580.00	23.55	70.63	1,533.68	3.12	100.68	267.00	285.35	69.34	4,232,547.69	415,601.38
1,610.00	22.50	71.76	1,561.29	3.80	104.46	278.11	297.08	69.41	4,232,548.84	415,604.77
1,640.00	22.09	72.42	1,589.05	1.60	107.96	288.94	308.45	69.51	4,232,549.91	415,608.07
1,670.00	22.52	70.37	1,616.81	2.96	111.60	299.72	319.83	69.58	4,232,551.02	415,611.36
1,700.00	22.12	68.58	1,644.56	2.63	115.59	310.39	331.22	69.57	4,232,552.23	415,614.61
1,730.00	21.74	68.04	1,672.39	1.43	119.73	320.81	342.42	69.53	4,232,553.49	415,617.78
1,760.00	22.13	68.17	1,700.22	1.31	123.91	331.20	353.62	69.49	4,232,554.77	415,620.95
1,790.00	23.47	66.65	1,727.87	4.88	128.38	341.93	365.24	69.42	4,232,556.13	415,624.22
1,820.00	24.23	67.67	1,755.31	2.88	133.09	353.11	377.36	69.35	4,232,557.56	415,627.63
1,850.00	24.76	66.86	1,782.61	2.09	137.89	364.58	389.79	69.28	4,232,559.03	415,631.13

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Completion Report

Company: HG Energy LLC
Project: Lincoln County, West Virginia UTM83
Site: E.J. May
Well: E.J. May No. 148
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well E.J. May No. 148
TVD Reference: RKB=840+8 @ 848.00ft
MD Reference: RKB=840+8 @ 848.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Jul2216dt_v14

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	DLeg (°/100ustft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	Northing (m)	Easting (m)
1,880.00	24.76	67.72	1,809.85	1.20	142.75	376.17	402.35	69.22	4,232,560.51	415,634.66
1,910.00	23.92	67.83	1,837.19	2.80	147.42	387.62	414.71	69.18	4,232,561.93	415,638.15
1,940.00	23.39	66.94	1,864.66	2.13	152.05	398.73	426.74	69.13	4,232,563.34	415,641.53
1,970.00	24.11	66.05	1,892.12	2.68	156.87	409.81	438.81	69.05	4,232,564.81	415,644.91
2,000.00	24.50	67.79	1,919.47	2.72	161.71	421.17	451.15	69.00	4,232,566.29	415,648.37
2,030.00	23.68	66.70	1,946.85	3.11	166.44	432.46	463.39	68.95	4,232,567.73	415,651.81
2,060.00	22.67	68.12	1,974.43	3.85	170.98	443.36	475.19	68.91	4,232,569.11	415,655.14
2,090.00	22.77	68.95	2,002.10	1.12	175.22	454.14	486.77	68.90	4,232,570.41	415,658.42
2,120.00	23.61	70.57	2,029.68	3.52	179.30	465.23	498.58	68.92	4,232,571.65	415,661.80
2,150.00	24.45	70.79	2,057.08	2.82	183.35	476.76	510.80	68.96	4,232,572.88	415,665.32
2,180.00	24.38	70.79	2,084.40	0.23	187.43	488.47	523.19	69.01	4,232,574.13	415,668.88
2,210.00	23.49	68.43	2,111.82	4.36	191.66	499.87	535.36	69.02	4,232,575.42	415,672.36
2,240.00	22.16	64.91	2,139.47	6.35	196.26	510.56	546.98	68.97	4,232,576.82	415,675.62
2,270.00	21.32	61.04	2,167.34	5.54	201.30	520.45	558.03	68.85	4,232,578.36	415,678.63
2,300.00	21.39	60.24	2,195.28	1.00	206.65	529.98	568.84	68.70	4,232,579.99	415,681.54
2,330.00	21.16	66.60	2,223.24	7.73	211.52	539.70	579.67	68.60	4,232,581.47	415,684.50
2,360.00	21.09	71.29	2,251.22	5.64	215.40	549.78	590.47	68.60	4,232,582.65	415,687.57
2,390.00	20.66	70.30	2,279.25	1.85	218.92	559.87	601.15	68.64	4,232,583.73	415,690.65
2,420.00	19.69	63.72	2,307.42	8.22	222.94	569.39	611.48	68.62	4,232,584.95	415,693.55
2,450.00	20.53	62.10	2,335.59	3.36	227.64	578.57	621.74	68.52	4,232,586.38	415,696.35
2,480.00	20.88	65.68	2,363.65	4.38	232.30	588.09	632.31	68.45	4,232,587.81	415,699.25
2,510.00	19.89	68.94	2,391.77	5.02	236.34	597.73	642.75	68.43	4,232,589.04	415,702.19
2,540.00	18.47	68.59	2,420.11	4.75	239.91	606.91	652.61	68.43	4,232,590.12	415,704.99
2,570.00	17.59	65.92	2,448.63	4.02	243.49	615.48	661.89	68.42	4,232,591.22	415,707.60
Survey @ 2570.00 MD 2448.63 TVD										
2,636.00	16.80		2,511.68	1.20	251.44	633.29	681.38	68.35	4,232,593.64	415,713.03

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Survey projected to 2636.00 MD 2511.63



Completion Report

Company: HG Energy LLC	Well E.J. May No. 148
Project: Lincoln County, West Virginia UTM63	RKB=840+8 @ 848.00ft
Site: E.J. May	RKB=840+8 @ 848.00ft
Well: E.J. May No. 148	Grid
Wellbore: Original Hole	Minimum Curvature
Design: Surveys Original Hole	DB_Jul2216dt_v14

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

Design Annotations		Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
		500.00	499.82	-4.36	10.61	MWD surveys
		2,570.00	2,448.63	243.49	615.48	Survey @ 2570.00 MD 2448.63 TVD
		2,636.00	2,511.68	251.44	633.29	Survey projected to 2636.00 MD 2511.68 TVD

Checked By: _____ Approved By: _____ Date: _____

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