



SURVEY CALCULATION PROGRAM

TARGET DETAILS

v1.00.02

OPERATOR:	HG Energy, LLC	Supervisors:		TARGET N-S	Directional
WELL:	W.B. Carpenter #237	Jeff Gibson		TARGET E-W	
		L. PENNISI / R. BUHRMAN / S. HISER		TARGET RADIUS	
LOCATION:	Harrison County, WV			TARGET DISPLACEMENT	
JOB NUMBER:	AM-13862			TARGET CLOSURE	
COMMENTS:				TARGET TVD	Horizontal
		MAG DEC.(-/+)	-8.63	DIP AZ	
		GRID CORR.(-/+)	0.64	DIP DEG UP+/DN-	
		TOTAL CORR.(-/+)	-7.99	TARGET INCLINATION	
DATE:	1/30/2014	TIME:	11:44 AM	GRID	

MINIMUM CURVATURE CALCULATIONS(SPE-3362)	PROPOSED DIRECTION	20.00	TARGET TRACKING	
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SVY NUM	MD	INC	TRUE AZM	TVD	SECT	N-S	E-W	DLS/ 100.00	TO CENTER		CLOSURE DIR (DEG AZ)	CLOSURE DISTANCE (FEET)	BUILD RATE/ %/100'	WALK RATE/ %/100'
									ABOVE(+) BELOW(-)	RIGHT(+) LEFT(-)				
TIE	850	0.0	0.0	850.00	0.00	0.00	0.00		-850.00	0.02	63.43	0.00		
1	914	2.5	109.5	913.98	0.01	-0.47	1.32	3.91	-913.98	1.41	109.50	1.40	3.91	3.19
2	925	2.6	112.9	924.97	0.00	-0.64	1.77	1.65	-924.97	1.90	109.95	1.89	0.91	1.37
3	955	2.8	111.1	954.94	-0.05	-1.17	3.08	0.72	-954.94	3.31	110.81	3.30	0.67	-0.28
4	985	2.7	83.9	984.90	0.25	-1.36	4.47	4.32	-984.90	4.68	106.93	4.67	-0.33	-4.31
5	1015	3.4	61.5	1014.86	1.23	-0.86	5.95	4.56	-1014.86	5.90	98.23	6.02	2.33	-3.95
6	1045	4.3	51.0	1044.79	2.86	0.27	7.61	3.80	-1044.79	7.07	87.96	7.61	3.00	-0.47
7	1075	5.1	36.3	1074.69	5.10	2.05	9.27	4.80	-1074.69	8.03	77.51	9.50	2.67	-0.80
8	1105	6.2	29.4	1104.55	7.98	4.54	10.86	4.30	-1104.55	8.67	67.31	11.77	3.67	-0.45
9	1135	6.2	29.6	1134.37	11.18	7.36	12.45	0.07	-1134.37	9.20	59.42	14.47	0.00	0.01
10	1165	6.0	23.4	1164.20	14.34	10.21	13.88	2.29	-1164.20	9.56	53.66	17.23	-0.67	-0.44
11	1195	5.6	17.6	1194.05	17.37	13.04	14.94	2.36	-1194.05	9.59	48.88	19.83	-1.33	-0.39
12	1225	5.6	11.1	1223.91	20.27	15.87	15.67	2.11	-1223.91	9.31	44.62	22.30	0.00	-0.42
13	1255	6.2	11.3	1253.75	23.32	18.90	16.26	2.00	-1253.75	8.84	40.72	24.93	2.00	0.01
14	1285	7.1	14.3	1283.54	26.77	22.28	17.04	3.21	-1283.54	8.41	37.40	28.05	3.00	0.23
15	1315	8.0	16.7	1313.28	30.70	26.08	18.10	3.18	-1313.28	8.10	34.76	31.74	3.00	0.21
16	1345	8.5	18.2	1342.97	35.00	30.19	19.39	1.81	-1342.97	7.91	32.72	35.88	1.67	0.14
17	1375	8.80	20.70	1372.63	39.51	34.44	20.89	1.60	-1372.63	7.87	31.25	40.28	1.00	0.25
18	1405	9.30	20.80	1402.26	44.23	38.85	22.57	1.67	-1402.26	7.93	30.15	44.93	1.67	0.01
19	1435	9.80	20.80	1431.84	49.20	43.50	24.33	1.67	-1431.84	8.00	29.22	49.85	1.67	0.00
20	1465	10.70	19.60	1461.36	54.54	48.51	26.17	3.08	-1461.36	8.02	28.35	55.12	3.00	-0.14
21	1495	11.70	19.30	1490.79	60.37	54.01	28.11	3.34	-1490.79	7.96	27.50	60.89	3.33	-0.04
22	1525	13.30	18.70	1520.08	66.86	60.15	30.23	5.35	-1520.08	7.85	26.68	67.32	5.33	-0.09
23	1555	13.90	19.80	1549.24	73.91	66.81	32.55	2.18	-1549.24	7.76	25.98	74.32	2.00	0.17
24	1585	14.00	20.80	1578.35	81.14	73.59	35.06	0.87	-1578.35	7.79	25.48	81.52	0.33	0.16
25	1615	13.30	21.80	1607.51	88.22	80.19	37.63	2.46	-1607.51	7.95	25.14	88.58	-2.33	0.16
26	1645	13.10	23.40	1636.71	95.07	86.51	40.26	1.39	-1636.71	8.26	24.96	95.42	-0.67	0.24
27	1675	12.80	23.60	1665.95	101.78	92.68	42.94	1.01	-1665.95	8.67	24.86	102.14	-1.00	0.03
28	1705	12.70	25.20	1695.21	108.38	98.71	45.68	1.22	-1695.21	9.18	24.83	108.76	-0.33	0.24
29	1735	12.80	23.40	1724.47	114.98	104.74	48.40	1.37	-1724.47	9.68	24.80	115.38	0.33	-0.26
30	1765	13.10	21.60	1753.71	121.69	110.95	50.97	1.68	-1753.71	9.97	24.68	122.10	1.00	-0.27
31	1795	13.00	20.60	1782.93	128.47	117.27	53.41	0.82	-1782.93	10.10	24.49	128.86	-0.33	-0.15
32	1825	13.20	20.10	1812.15	135.27	123.65	55.78	0.77	-1812.15	10.14	24.28	135.64	0.67	-0.08
33	1855	13.20	20.90	1841.36	142.12	130.06	58.18	0.61	-1841.36	10.20	24.10	142.48	0.00	0.12
34	1885	13.50	19.90	1870.55	149.04	136.55	60.59	1.26	-1870.55	10.25	23.93	149.39	1.00	-0.15
35	1915	13.90	20.80	1899.70	156.15	143.22	63.06	1.51	-1899.70	10.29	23.77	156.48	1.33	0.14
36	1945	14.20	20.80	1928.80	163.43	150.02	65.65	1.00	-1928.80	10.39	23.63	163.76	1.00	0.00
37	1975	15.00	20.80	1957.83	170.99	157.09	68.33	2.67	-1957.83	10.50	23.51	171.31	2.67	0.00
38	2005	15.50	22.90	1986.77	178.88	164.42	71.27	2.48	-1986.77	10.76	23.44	179.20	1.67	0.37
39	2035	16.50	23.90	2015.61	187.13	172.00	74.56	3.46	-2015.61	11.25	23.44	187.47	3.33	0.18
40	2065	16.70	25.30	2044.36	195.67	179.79	78.13	1.49	-2044.36	11.94	23.49	196.04	0.67	0.27
41	2095	16.50	23.60	2073.11	204.22	187.60	81.67	1.75	-2073.11	12.60	23.53	204.60	-0.67	-0.32
42	2125	16.80	23.00	2101.85	212.80	195.49	85.07	1.15	-2101.85	13.10	23.52	213.20	1.00	-0.11
43	2155	17.00	23.30	2130.56	221.51	203.51	88.50	0.73	-2130.56	13.58	23.50	221.92	0.67	0.06
44	2185	17.20	21.90	2159.23	230.32	211.65	91.89	1.53	-2159.23	13.98	23.47	230.74	0.67	-0.27
45	2215	17.50	22.00	2187.87	239.26	219.95	95.24	1.00	-2187.87	14.28	23.41	239.68	1.00	0.02
46	2245	18.10	23.30	2216.43	248.42	228.41	98.77	2.40	-2216.43	14.71	23.38	248.85		
47	2275	17.40	22.90	2245.00	257.55	236.83	102.36	2.37	-2245.00	15.20	23.37	258.00	-2.33	-0.08

02/28/2014



SURVEY CALCULATION PROGRAM

v1.00.02

TARGET DETAILS

OPERATOR:	HG Energy, LLC	Supervisors:		TARGET N-S	Directional
WELL:	W.B. Carpenter #237	Jeff Gibson		TARGET E-W	
		L. PENNISI / R. BUHRMAN / S. HISER		TARGET RADIUS	
LOCATION:	Harrison County, WV			TARGET DISPLACEMENT	
JOB NUMBER:	AM-13862			TARGET CLOSURE	
COMMENTS:				TARGET TVD	Horizontal
		MAG DEC.(-/+)	-8.63	DIP AZ	
		GRID CORR.(-/+)	0.64	DIP DEG UP+/DN-	
		TOTAL CORR.(-/+)	-7.99	TARGET INCLINATION	
DATE:	1/30/2014	TIME:	11:44 AM	GRID	

MINIMUM CURVATURE CALCULATIONS(SPE-3362)	PROPOSED DIRECTION	20.00	TARGET TRACKING	
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SVY NUM	MD	INC	TRUE AZM	TVD	SECT	N-S	E-W	DLS/ 100.00	TO CENTER		CLOSURE DIR (DEG AZ)	CLOSURE DISTANCE (FEET)	BUILD RATE/ %/100'	WALK RATE/ %/100'
									ABOVE(+) BELOW(-)	RIGHT(+) LEFT(-)				
48	2305	16.40	20.30	2273.71	266.27	244.93	105.57	4.18	-2273.71	15.45	23.32	266.71	-3.33	-0.50
49	2335	15.70	18.50	2302.54	274.56	252.75	108.33	2.86	-2302.54	15.37	23.20	274.99	-2.33	-0.33
50	2365	15.20	20.40	2331.45	282.55	260.29	110.99	2.37	-2331.45	15.29	23.09	282.96	-1.67	0.34
51	2395	14.90	23.90	2360.42	290.33	267.50	113.92	3.19	-2360.42	15.58	23.07	290.75	-1.00	0.61
52	2425	14.40	26.50	2389.45	297.89	274.36	117.15	2.75	-2389.45	16.26	23.12	298.33	-1.67	0.44
53	2455	13.60	28.10	2418.56	305.08	280.81	120.47	2.96	-2418.56	17.18	23.22	305.57	-2.67	0.26
54	2485	12.90	25.50	2447.76	311.91	286.95	123.58	3.06	-2447.76	18.00	23.30	312.43	-2.33	-0.40
55	2515	12.10	22.90	2477.05	318.38	292.87	126.24	3.26	-2477.05	18.48	23.32	318.92	-2.67	-0.38
56	2545	10.80	19.10	2506.45	324.33	298.42	128.39	5.01	-2506.45	18.59	23.28	324.87	-4.33	-0.50
57	2575	9.90	16.70	2535.96	329.72	303.55	130.05	3.33	-2535.96	18.40	23.19	330.23	-3.00	-0.29
58	2605	9.30	15.00	2565.54	334.71	308.36	131.42	2.21	-2565.54	18.04	23.08	335.19	-2.00	-0.19
59	2635	8.20	14.00	2595.19	339.25	312.78	132.56	3.70	-2595.19	17.61	22.97	339.71	-3.67	-0.10
60	2665	7.60	13.40	2624.91	343.35	316.78	133.54	2.02	-2624.91	17.15	22.86	343.78	-2.00	-0.05
61	2695	7.60	10.50	2654.65	347.28	320.66	134.36	1.28	-2654.65	16.60	22.73	347.67	0.00	-0.26
62	2725	8.10	6.90	2684.36	351.29	324.71	134.97	2.34	-2684.36	15.79	22.57	351.65	1.67	-0.33
63	2755	7.80	2.10	2714.08	355.29	328.84	135.30	2.43	-2714.08	14.69	22.36	355.59	-1.00	-0.44
64	2785	8.00	356.80	2743.79	359.14	332.96	135.26	2.52	-2743.79	13.24	22.11	359.39	0.67	0.49
65	2815	8.30	355.40	2773.49	363.03	337.20	134.97	1.20	-2773.49	11.52	21.81	363.21	1.00	-0.13
66	2845	8.30	1.50	2803.18	367.05	341.53	134.85	2.93	-2803.18	9.93	21.55	367.19	0.00	-0.59
67	2875	8.30	10.70	2832.86	371.24	345.82	135.31	4.42	-2832.86	8.89	21.37	371.35	0.00	0.88
68	2905	8.50	11.60	2862.54	375.57	350.12	136.16	0.80	-2862.54	8.22	21.25	375.66	0.67	0.09
69	2935	8.70	6.70	2892.20	379.98	354.55	136.87	2.53	-2892.20	7.37	21.11	380.05	0.67	-0.49
70	2965	8.10	2.90	2921.88	384.20	358.91	137.24	2.72	-2921.88	6.23	20.93	384.25	-2.00	-0.37
71	2995	7.50	359.10	2951.60	388.05	362.98	137.32	2.64	-2951.60	4.91	20.72	388.08	-2.00	0.34
72	3025	6.90	354.20	2981.37	391.51	366.73	137.11	2.86	-2981.37	3.42	20.50	391.52	-2.00	-0.41
73	3055	6.30	348.10	3011.17	394.53	370.13	136.58	3.07	-3011.17	1.77	20.25	394.53	-2.00	-0.47
74	3085	5.70	341.50	3041.01	397.09	373.16	135.77	3.04	-3041.01	-0.03	19.99	397.09	-2.00	-0.46
75	3115	5.40	333.20	3070.87	399.22	375.83	134.66	2.85	-3070.87	-1.98	19.71	399.23	-1.00	-0.53
76	3145	4.90	335.30	3100.74	401.10	378.25	133.49	1.78	-3100.74	3.91	19.44	401.12	-1.67	0.13
77	3175	4.70	338.70	3130.64	402.93	380.56	132.51	1.16	-3130.64	5.63	19.20	402.97	-0.67	0.19
78	3205	4.30	335.70	3160.55	404.66	382.73	131.60	1.55	-3160.55	7.22	18.98	404.72	-1.33	-0.16
79	3235	3.80	332.30	3190.47	406.13	384.64	130.68	1.85	-3190.47	8.74	18.76	406.23	-1.67	-0.16
80	3291	3.80	332.30	3246.35	408.63	387.92	128.95	0.00	-3246.35	11.49	18.39	408.79	0.00	0.00
81														
82														
83														
TD														

HG Energy, LLC

Harrison County, West Virginia

W.B. Carpenter #237

W.B. Carpenter #237

Wellbore #1

Survey: MWD

DDC Survey Report

11 December, 2013



02/28/2014



I **Larry Wright**, certify that I am employed by **The Appalachian Directional Drilling Company (ADC)**. That I did on the day(s) of **11/04/13** thru **11/06/13** conduct or supervise the taking of a **MWD Survey** from a depth of **850** feet to a depth of **3291** feet, that the data is true, correct, complete and within the limitations of the tool as set forth by **The Appalachian Directional Drilling Company (ADC)**.; that I am authorized and qualified to make this report; that this survey was conducted at the request of **HG Energy, LLC** for the **W.B. Carpenter #237** API No. **47-033-05780** in **Harrison, County WV**; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by **The Appalachian Directional Drilling Company (ADC)**.

Larry Wright

Digitally signed by Larry Wright
DN: cn=Larry Wright, o=The
Directional Drilling Company,
ou=GM of Guidance Services,
email=larryw@directionaldrillers.
com, c=US
Date: 2013.12.12 16:25:40 -0600

• 1200 Heavy Haul Road • Morgan Town, WV 26501 •
• PH 304-777-2310 • FAX 304-777-2317 •

02/28/2014

DDC
Survey Report



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well W.B. Carpenter #237
Project:	Harrison County, West Virginia	TVD Reference:	WELL @ 1393.0usft (Decker #6)
Site:	W.B. Carpenter #237	MD Reference:	WELL @ 1393.0usft (Decker #6)
Well:	W.B. Carpenter #237	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Harrison County, West Virginia		
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	W.B. Carpenter #237				
Site Position:		Northing:	14,262,785.77 usft	Latitude:	39° 16' 26.600 N
From:	Lat/Long	Easting:	1,780,200.29 usft	Longitude:	80° 30' 21.800 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.31 °

Well	W.B. Carpenter #237					
Well Position	+N/-S	0.0 usft	Northing:	14,262,785.77 usft	Latitude:	39° 16' 26.600 N
	+E/-W	0.0 usft	Easting:	1,780,200.29 usft	Longitude:	80° 30' 21.800 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	1,385.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/11/2013	-8.64	66.81	52,315

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	18.39	

Survey Program	Date	12/11/2013			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
850.0	3,291.0	MWD (Wellbore #1)			

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)	
TIE IN @ 850' MD / 850' TVD										
850.0	0.00	0.00	850.0	0.0	0.0	0.0	0.00	0.00	0.00	
914.0	2.50	109.50	914.0	-0.5	1.3	0.0	3.91	3.91	0.00	
925.0	2.60	112.90	925.0	-0.6	1.8	-0.1	1.65	0.91	30.91	
955.0	2.80	111.10	954.9	-1.2	3.1	-0.1	0.72	0.67	-6.00	
985.0	2.70	83.90	984.9	-1.4	4.5	0.1	4.32	-0.33	-90.67	
1,015.0	3.40	61.50	1,014.9	-0.9	6.0	1.1	4.56	2.33	-74.67	
1,045.0	4.30	51.00	1,044.8	0.3	7.6	2.7	3.80	3.00	-35.00	
1,075.0	5.10	36.30	1,074.7	2.1	9.3	4.9	4.80	2.67	-49.00	
1,105.0	6.20	29.40	1,104.5	4.5	10.9	7.7	4.30	3.67	-23.00	

DDC
Survey Report



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well W.B. Carpenter #237
Project:	Harrison County, West Virginia	TVD Reference:	WELL @ 1393.0usft (Decker #6)
Site:	W.B. Carpenter #237	MD Reference:	WELL @ 1393.0usft (Decker #6)
Well:	W.B. Carpenter #237	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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)
1,135.0	6.20	29.60	1,134.4	7.4	12.5	10.9	0.07	0.00	0.67
1,165.0	6.00	23.40	1,164.2	10.2	13.9	14.1	2.29	-0.67	-20.67
1,195.0	5.60	17.60	1,194.0	13.0	14.9	17.1	2.36	-1.33	-19.33
1,225.0	5.60	11.10	1,223.9	15.9	15.7	20.0	2.11	0.00	-21.67
1,255.0	6.20	11.30	1,253.7	18.9	16.3	23.1	2.00	2.00	0.67
1,285.0	7.10	14.30	1,283.5	22.3	17.0	26.5	3.21	3.00	10.00
1,315.0	8.00	16.70	1,313.3	26.1	18.1	30.5	3.18	3.00	8.00
1,345.0	8.50	18.20	1,343.0	30.2	19.4	34.8	1.81	1.67	5.00
1,375.0	8.80	20.70	1,372.6	34.4	20.9	39.3	1.60	1.00	8.33
1,405.0	9.30	20.80	1,402.3	38.9	22.6	44.0	1.67	1.67	0.33
1,435.0	9.80	20.80	1,431.8	43.5	24.3	49.0	1.67	1.67	0.00
1,465.0	10.70	19.60	1,461.4	48.5	26.2	54.3	3.08	3.00	-4.00
1,495.0	11.70	19.30	1,490.8	54.0	28.1	60.1	3.34	3.33	-1.00
1,525.0	13.30	18.70	1,520.1	60.1	30.2	66.6	5.35	5.33	-2.00
1,555.0	13.90	19.80	1,549.2	66.8	32.6	73.7	2.18	2.00	3.67
1,585.0	14.00	20.80	1,578.4	73.6	35.1	80.9	0.87	0.33	3.33
1,615.0	13.30	21.80	1,607.5	80.2	37.6	88.0	2.46	-2.33	3.33
1,645.0	13.10	23.40	1,636.7	86.5	40.3	94.8	1.39	-0.67	5.33
1,675.0	12.80	23.60	1,666.0	92.7	42.9	101.5	1.01	-1.00	0.67
1,705.0	12.70	25.20	1,695.2	98.7	45.7	108.1	1.22	-0.33	5.33
1,735.0	12.80	23.40	1,724.5	104.7	48.4	114.7	1.37	0.33	-6.00
1,765.0	13.10	21.60	1,753.7	111.0	51.0	121.4	1.68	1.00	-6.00
1,795.0	13.00	20.60	1,782.9	117.3	53.4	128.1	0.82	-0.33	-3.33
1,825.0	13.20	20.10	1,812.2	123.6	55.8	134.9	0.77	0.67	-1.67
1,855.0	13.20	20.90	1,841.4	130.1	58.2	141.8	0.61	0.00	2.67
1,885.0	13.50	19.90	1,870.6	136.6	60.6	148.7	1.26	1.00	-3.33
1,915.0	13.90	20.80	1,899.7	143.2	63.1	155.8	1.51	1.33	3.00
1,945.0	14.20	20.80	1,928.8	150.0	65.6	163.1	1.00	1.00	0.00
1,975.0	15.00	20.80	1,957.8	157.1	68.3	170.6	2.67	2.67	0.00
2,005.0	15.50	22.90	1,986.8	164.4	71.3	178.5	2.48	1.67	7.00
2,035.0	16.50	23.90	2,015.6	172.0	74.6	186.7	3.46	3.33	3.33
2,065.0	16.70	25.30	2,044.4	179.8	78.1	195.3	1.49	0.67	4.67
2,095.0	16.50	23.60	2,073.1	187.6	81.7	203.8	1.75	-0.67	-5.67
2,125.0	16.80	23.00	2,101.9	195.5	85.1	212.3	1.15	1.00	-2.00
2,155.0	17.00	23.30	2,130.6	203.5	88.5	221.0	0.73	0.67	1.00
2,185.0	17.20	21.90	2,159.2	211.7	91.9	229.8	1.53	0.67	-4.67
2,215.0	17.50	22.00	2,187.9	220.0	95.2	238.8	1.00	1.00	0.33
2,245.0	18.10	23.30	2,216.4	228.4	98.8	247.9	2.40	2.00	4.33
2,275.0	17.40	22.90	2,245.0	236.8	102.4	257.0	2.37	-2.33	-1.33
2,305.0	16.40	20.30	2,273.7	244.9	105.6	265.7	4.18	-3.33	-8.67
2,335.0	15.70	18.50	2,302.5	252.8	108.3	274.0	2.86	-2.33	-6.00
2,365.0	15.20	20.40	2,331.5	260.3	111.0	282.0	2.37	-1.67	6.33
2,395.0	14.90	23.90	2,360.4	267.5	113.9	289.8	3.19	-1.00	11.67
2,425.0	14.40	26.50	2,389.4	274.4	117.1	297.3	2.75	-1.67	8.67

DDC
Survey Report



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well W.B. Carpenter #237
Project:	Harrison County, West Virginia	TVD Reference:	WELL @ 1393.0usft (Decker #6)
Site:	W.B. Carpenter #237	MD Reference:	WELL @ 1393.0usft (Decker #6)
Well:	W.B. Carpenter #237	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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)
2,455.0	13.60	28.10	2,418.6	280.8	120.5	304.5	2.96	-2.67	5.33
2,485.0	12.90	25.50	2,447.8	286.9	123.6	311.3	3.06	-2.33	-8.67
2,515.0	12.10	22.90	2,477.0	292.9	126.2	317.7	3.26	-2.67	-8.67
2,545.0	10.80	19.10	2,506.5	298.4	128.4	323.7	5.01	-4.33	-12.67
2,575.0	9.90	16.70	2,536.0	303.5	130.0	329.1	3.33	-3.00	-8.00
2,605.0	9.30	15.00	2,565.5	308.4	131.4	334.1	2.21	-2.00	-5.67
2,635.0	8.20	14.00	2,595.2	312.8	132.6	338.6	3.70	-3.67	-3.33
2,665.0	7.60	13.40	2,624.9	316.8	133.5	342.7	2.02	-2.00	-2.00
2,695.0	7.60	10.50	2,654.6	320.7	134.4	346.7	1.28	0.00	-9.67
2,725.0	8.10	6.90	2,684.4	324.7	135.0	350.7	2.34	1.67	-12.00
2,755.0	7.80	2.10	2,714.1	328.8	135.3	354.7	2.43	-1.00	-16.00
2,785.0	8.00	356.80	2,743.8	333.0	135.3	358.6	2.52	0.67	-17.67
2,815.0	8.30	355.40	2,773.5	337.2	135.0	362.6	1.20	1.00	-4.67
2,845.0	8.30	1.50	2,803.2	341.5	134.9	366.6	2.93	0.00	20.33
2,875.0	8.30	10.70	2,832.9	345.8	135.3	370.8	4.42	0.00	30.67
2,905.0	8.50	11.60	2,862.5	350.1	136.2	375.2	0.80	0.67	3.00
2,935.0	8.70	6.70	2,892.2	354.5	136.9	379.6	2.53	0.67	-16.33
2,965.0	8.10	2.90	2,921.9	358.9	137.2	383.9	2.72	-2.00	-12.67
2,995.0	7.50	359.10	2,951.6	363.0	137.3	387.8	2.64	-2.00	-12.67
3,025.0	6.90	354.20	2,981.4	366.7	137.1	391.3	2.86	-2.00	-16.33
3,055.0	6.30	348.10	3,011.2	370.1	136.6	394.3	3.07	-2.00	-20.33
3,085.0	5.70	341.50	3,041.0	373.2	135.8	396.9	3.04	-2.00	-22.00
3,115.0	5.40	333.20	3,070.9	375.8	134.7	399.1	2.85	-1.00	-27.67
3,145.0	4.90	335.30	3,100.7	378.3	133.5	401.0	1.78	-1.67	7.00
3,175.0	4.70	338.70	3,130.6	380.6	132.5	402.9	1.16	-0.67	11.33
3,205.0	4.30	335.70	3,160.5	382.7	131.6	404.7	1.55	-1.33	-10.00
3,235.0	3.80	332.30	3,190.5	384.6	130.7	406.2	1.85	-1.67	-11.33
TD @ 3291' MD / 3246' TVD									
3,291.0	3.80	332.30	3,246.3	387.9	129.0	408.8	0.00	0.00	0.00

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
850.0	850.0	0.0	0.0	TIE IN @ 850' MD / 850' TVD
3,291.0	3,246.3	387.9	129.0	TD @ 3291' MD / 3246' TVD

Checked By: _____ Approved By: _____ Date: _____

HG Energy, LLC

Harrison County, West Virginia

W.B. Carpenter #237

W.B. Carpenter #237

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

07 January, 2014



02/28/2014

DDC
Survey Report - Geographic



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well W.B. Carpenter #237
Project:	Harrison County, West Virginia	TVD Reference:	WELL @ 1393.0usft (Decker #6)
Site:	W.B. Carpenter #237	MD Reference:	WELL @ 1393.0usft (Decker #6)
Well:	W.B. Carpenter #237	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Harrison County, West Virginia		
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	W.B. Carpenter #237				
Site Position:		Northing:	14,262,785.77 usft	Latitude:	39° 16' 26.600 N
From:	Lat/Long	Easting:	1,780,200.29 usft	Longitude:	80° 30' 21.800 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.31 °

Well	W.B. Carpenter #237					
Well Position	+N/-S	0.0 usft	Northing:	14,262,785.77 usft	Latitude:	39° 16' 26.600 N
	+E/-W	0.0 usft	Easting:	1,780,200.29 usft	Longitude:	80° 30' 21.800 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	1,385.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/11/2013	-8.64	66.81	52,315

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	18.39	

Survey Program	Date	12/11/2013			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
850.0	3,291.0	MWD (Wellbore #1)			

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
850.0	0.00	0.00	850.0	0.0	0.0	14,262,785.77	1,780,200.29	39° 16' 26.600 N	80° 30' 21.800 W	
TIE IN @ 850' MD / 850' TVD										
914.0	2.50	109.50	914.0	-0.5	1.3	14,262,785.31	1,780,201.61	39° 16' 26.595 N	80° 30' 21.783 W	
925.0	2.60	112.90	925.0	-0.6	1.8	14,262,785.13	1,780,202.06	39° 16' 26.594 N	80° 30' 21.778 W	
955.0	2.80	111.10	954.9	-1.2	3.1	14,262,784.60	1,780,203.37	39° 16' 26.588 N	80° 30' 21.761 W	
985.0	2.70	83.90	984.9	-1.4	4.5	14,262,784.41	1,780,204.76	39° 16' 26.586 N	80° 30' 21.743 W	
1,015.0	3.40	61.50	1,014.9	-0.9	6.0	14,262,784.91	1,780,206.24	39° 16' 26.591 N	80° 30' 21.724 W	
1,045.0	4.30	51.00	1,044.8	0.3	7.6	14,262,786.05	1,780,207.90	39° 16' 26.602 N	80° 30' 21.703 W	
1,075.0	5.10	36.30	1,074.7	2.1	9.3	14,262,787.83	1,780,209.56	39° 16' 26.620 N	80° 30' 21.682 W	
1,105.0	6.20	29.40	1,104.5	4.5	10.9	14,262,790.31	1,780,211.15	39° 16' 26.644 N	80° 30' 21.662 W	
1,135.0	6.20	29.60	1,134.4	7.4	12.5	14,262,793.13	1,780,212.74	39° 16' 26.672 N	80° 30' 21.641 W	
1,165.0	6.00	23.40	1,164.2	10.2	13.9	14,262,795.98	1,780,214.17	39° 16' 26.700 N	80° 30' 21.623 W	

DDC
Survey Report - Geographic



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well W.B. Carpenter #237
Project:	Harrison County, West Virginia	TVD Reference:	WELL @ 1393.0usft (Decker #6)
Site:	W.B. Carpenter #237	MD Reference:	WELL @ 1393.0usft (Decker #6)
Well:	W.B. Carpenter #237	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
1,195.0	5.60	17.60	1,194.0	13.0	14.9	14,262,798.82	1,780,215.23	39° 16' 26.728 N	80° 30' 21.609 W	
1,225.0	5.60	11.10	1,223.9	15.9	15.7	14,262,801.65	1,780,215.96	39° 16' 26.756 N	80° 30' 21.600 W	
1,255.0	6.20	11.30	1,253.7	18.9	16.3	14,262,804.67	1,780,216.56	39° 16' 26.786 N	80° 30' 21.592 W	
1,285.0	7.10	14.30	1,283.5	22.3	17.0	14,262,808.06	1,780,217.33	39° 16' 26.819 N	80° 30' 21.582 W	
1,315.0	8.00	16.70	1,313.3	26.1	18.1	14,262,811.85	1,780,218.39	39° 16' 26.857 N	80° 30' 21.568 W	
1,345.0	8.50	18.20	1,343.0	30.2	19.4	14,262,815.96	1,780,219.68	39° 16' 26.897 N	80° 30' 21.551 W	
1,375.0	8.80	20.70	1,372.6	34.4	20.9	14,262,820.21	1,780,221.19	39° 16' 26.939 N	80° 30' 21.532 W	
1,405.0	9.30	20.80	1,402.3	38.9	22.6	14,262,824.63	1,780,222.86	39° 16' 26.983 N	80° 30' 21.510 W	
1,435.0	9.80	20.80	1,431.8	43.5	24.3	14,262,829.28	1,780,224.62	39° 16' 27.029 N	80° 30' 21.487 W	
1,465.0	10.70	19.60	1,461.4	48.5	26.2	14,262,834.29	1,780,226.47	39° 16' 27.078 N	80° 30' 21.464 W	
1,495.0	11.70	19.30	1,490.8	54.0	28.1	14,262,839.78	1,780,228.41	39° 16' 27.132 N	80° 30' 21.439 W	
1,525.0	13.30	18.70	1,520.1	60.1	30.2	14,262,845.92	1,780,230.52	39° 16' 27.193 N	80° 30' 21.411 W	
1,555.0	13.90	19.80	1,549.2	66.8	32.6	14,262,852.58	1,780,232.84	39° 16' 27.259 N	80° 30' 21.381 W	
1,585.0	14.00	20.80	1,578.4	73.6	35.1	14,262,859.36	1,780,235.35	39° 16' 27.326 N	80° 30' 21.349 W	
1,615.0	13.30	21.80	1,607.5	80.2	37.6	14,262,865.96	1,780,237.92	39° 16' 27.391 N	80° 30' 21.316 W	
1,645.0	13.10	23.40	1,636.7	86.5	40.3	14,262,872.29	1,780,240.56	39° 16' 27.453 N	80° 30' 21.282 W	
1,675.0	12.80	23.60	1,666.0	92.7	42.9	14,262,878.45	1,780,243.24	39° 16' 27.514 N	80° 30' 21.247 W	
1,705.0	12.70	25.20	1,695.2	98.7	45.7	14,262,884.48	1,780,245.97	39° 16' 27.573 N	80° 30' 21.212 W	
1,735.0	12.80	23.40	1,724.5	104.7	48.4	14,262,890.51	1,780,248.69	39° 16' 27.633 N	80° 30' 21.177 W	
1,765.0	13.10	21.60	1,753.7	111.0	51.0	14,262,896.72	1,780,251.27	39° 16' 27.694 N	80° 30' 21.144 W	
1,795.0	13.00	20.60	1,782.9	117.3	53.4	14,262,903.04	1,780,253.70	39° 16' 27.757 N	80° 30' 21.112 W	
1,825.0	13.20	20.10	1,812.2	123.6	55.8	14,262,909.42	1,780,256.07	39° 16' 27.819 N	80° 30' 21.082 W	
1,855.0	13.20	20.90	1,841.4	130.1	58.2	14,262,915.84	1,780,258.47	39° 16' 27.883 N	80° 30' 21.051 W	
1,885.0	13.50	19.90	1,870.6	136.6	60.6	14,262,922.33	1,780,260.88	39° 16' 27.947 N	80° 30' 21.020 W	
1,915.0	13.90	20.80	1,899.7	143.2	63.1	14,262,928.99	1,780,263.35	39° 16' 28.013 N	80° 30' 20.988 W	
1,945.0	14.20	20.80	1,928.8	150.0	65.6	14,262,935.80	1,780,265.94	39° 16' 28.080 N	80° 30' 20.954 W	
1,975.0	15.00	20.80	1,957.8	157.1	68.3	14,262,942.87	1,780,268.62	39° 16' 28.150 N	80° 30' 20.920 W	
2,005.0	15.50	22.90	1,986.8	164.4	71.3	14,262,950.19	1,780,271.56	39° 16' 28.222 N	80° 30' 20.882 W	
2,035.0	16.50	23.90	2,015.6	172.0	74.6	14,262,957.78	1,780,274.85	39° 16' 28.297 N	80° 30' 20.840 W	
2,065.0	16.70	25.30	2,044.4	179.8	78.1	14,262,965.57	1,780,278.42	39° 16' 28.373 N	80° 30' 20.794 W	
2,095.0	16.50	23.60	2,073.1	187.6	81.7	14,262,973.37	1,780,281.97	39° 16' 28.450 N	80° 30' 20.748 W	
2,125.0	16.80	23.00	2,101.9	195.5	85.1	14,262,981.26	1,780,285.36	39° 16' 28.528 N	80° 30' 20.704 W	
2,155.0	17.00	23.30	2,130.6	203.5	88.5	14,262,989.28	1,780,288.79	39° 16' 28.607 N	80° 30' 20.660 W	
2,185.0	17.20	21.90	2,159.2	211.7	91.9	14,262,997.43	1,780,292.18	39° 16' 28.688 N	80° 30' 20.616 W	
2,215.0	17.50	22.00	2,187.9	220.0	95.2	14,263,005.72	1,780,295.53	39° 16' 28.770 N	80° 30' 20.573 W	
2,245.0	18.10	23.30	2,216.4	228.4	98.8	14,263,014.19	1,780,299.06	39° 16' 28.853 N	80° 30' 20.528 W	
2,275.0	17.40	22.90	2,245.0	236.8	102.4	14,263,022.60	1,780,302.65	39° 16' 28.936 N	80° 30' 20.481 W	
2,305.0	16.40	20.30	2,273.7	244.9	105.6	14,263,030.70	1,780,305.86	39° 16' 29.016 N	80° 30' 20.440 W	
2,335.0	15.70	18.50	2,302.5	252.8	108.3	14,263,038.53	1,780,308.62	39° 16' 29.093 N	80° 30' 20.404 W	
2,365.0	15.20	20.40	2,331.5	260.3	111.0	14,263,046.06	1,780,311.28	39° 16' 29.168 N	80° 30' 20.370 W	
2,395.0	14.90	23.90	2,360.4	267.5	113.9	14,263,053.27	1,780,314.21	39° 16' 29.239 N	80° 30' 20.332 W	
2,425.0	14.40	26.50	2,389.4	274.4	117.1	14,263,060.14	1,780,317.44	39° 16' 29.306 N	80° 30' 20.291 W	
2,455.0	13.60	28.10	2,418.6	280.8	120.5	14,263,066.59	1,780,320.77	39° 16' 29.370 N	80° 30' 20.248 W	
2,485.0	12.90	25.50	2,447.8	286.9	123.6	14,263,072.72	1,780,323.87	39° 16' 29.430 N	80° 30' 20.208 W	
2,515.0	12.10	22.90	2,477.0	292.9	126.2	14,263,078.64	1,780,326.53	39° 16' 29.489 N	80° 30' 20.174 W	
2,545.0	10.80	19.10	2,506.5	298.4	128.4	14,263,084.19	1,780,328.68	39° 16' 29.544 N	80° 30' 20.146 W	
2,575.0	9.90	16.70	2,536.0	303.5	130.0	14,263,089.32	1,780,330.34	39° 16' 29.594 N	80° 30' 20.125 W	
2,605.0	9.30	15.00	2,565.5	308.4	131.4	14,263,094.13	1,780,331.71	39° 16' 29.642 N	80° 30' 20.107 W	
2,635.0	8.20	14.00	2,595.2	312.8	132.6	14,263,098.55	1,780,332.85	39° 16' 29.685 N	80° 30' 20.092 W	
2,665.0	7.60	13.40	2,624.9	316.8	133.5	14,263,102.56	1,780,333.83	39° 16' 29.725 N	80° 30' 20.079 W	
2,695.0	7.60	10.50	2,654.6	320.7	134.4	14,263,106.44	1,780,334.65	39° 16' 29.763 N	80° 30' 20.069 W	
2,725.0	8.10	6.90	2,684.4	324.7	135.0	14,263,110.48	1,780,335.27	39° 16' 29.803 N	80° 30' 20.060 W	
2,755.0	7.80	2.10	2,714.1	328.8	135.3	14,263,114.62	1,780,335.59	39° 16' 29.844 N	80° 30' 20.056 W	
2,785.0	8.00	356.80	2,743.8	333.0	135.3	14,263,118.74	1,780,335.55	39° 16' 29.885 N	80° 30' 20.056 W	
2,815.0	8.30	355.40	2,773.5	337.2	135.0	14,263,122.98	1,780,335.26	39° 16' 29.927 N	80° 30' 20.060 W	

DDC
Survey Report - Geographic



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well W.B. Carpenter #237
Project:	Harrison County, West Virginia	TVD Reference:	WELL @ 1393.0usft (Decker #6)
Site:	W.B. Carpenter #237	MD Reference:	WELL @ 1393.0usft (Decker #6)
Well:	W.B. Carpenter #237	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
2,845.0	8.30	1.50	2,803.2	341.5	134.9	14,263,127.30	1,780,335.15	39° 16' 29.969 N	80° 30' 20.061 W
2,875.0	8.30	10.70	2,832.9	345.8	135.3	14,263,131.59	1,780,335.60	39° 16' 30.012 N	80° 30' 20.055 W
2,905.0	8.50	11.60	2,862.5	350.1	136.2	14,263,135.89	1,780,336.45	39° 16' 30.054 N	80° 30' 20.044 W
2,935.0	8.70	6.70	2,892.2	354.5	136.9	14,263,140.32	1,780,337.16	39° 16' 30.098 N	80° 30' 20.034 W
2,965.0	8.10	2.90	2,921.9	358.9	137.2	14,263,144.68	1,780,337.53	39° 16' 30.141 N	80° 30' 20.029 W
2,995.0	7.50	359.10	2,951.6	363.0	137.3	14,263,148.75	1,780,337.61	39° 16' 30.181 N	80° 30' 20.028 W
3,025.0	6.90	354.20	2,981.4	366.7	137.1	14,263,152.50	1,780,337.40	39° 16' 30.219 N	80° 30' 20.030 W
3,055.0	6.30	348.10	3,011.2	370.1	136.6	14,263,155.91	1,780,336.88	39° 16' 30.252 N	80° 30' 20.037 W
3,085.0	5.70	341.50	3,041.0	373.2	135.8	14,263,158.93	1,780,336.06	39° 16' 30.282 N	80° 30' 20.047 W
3,115.0	5.40	333.20	3,070.9	375.8	134.7	<u>14,263,161.60</u>	<u>1,780,334.95</u>	39° 16' 30.309 N	80° 30' 20.061 W
3,145.0	4.90	335.30	3,100.7	378.3	133.5	14,263,164.03	1,780,333.78	39° 16' 30.333 N	80° 30' 20.076 W
3,175.0	4.70	338.70	3,130.6	380.6	132.5	14,263,166.34	1,780,332.80	39° 16' 30.356 N	80° 30' 20.088 W
3,205.0	4.30	335.70	3,160.5	382.7	131.6	14,263,168.51	1,780,331.89	39° 16' 30.377 N	80° 30' 20.099 W
3,235.0	3.80	332.30	3,190.5	384.6	130.7	14,263,170.41	1,780,330.97	39° 16' 30.396 N	80° 30' 20.111 W
3,291.0	3.80	332.30	3,246.3	387.9	129.0	14,263,173.70	1,780,329.24	39° 16' 30.428 N	80° 30' 20.133 W

TD @ 3291' MD / 3246' TVD

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
3,291.0	3,246.3	387.9	129.0	TD @ 3291' MD / 3246' TVD

Checked By: _____ Approved By: _____ Date: _____

W.B. Carpenter #237
 Harrison County, West Virginia
 Q130959 & AM-13862
 Design #1

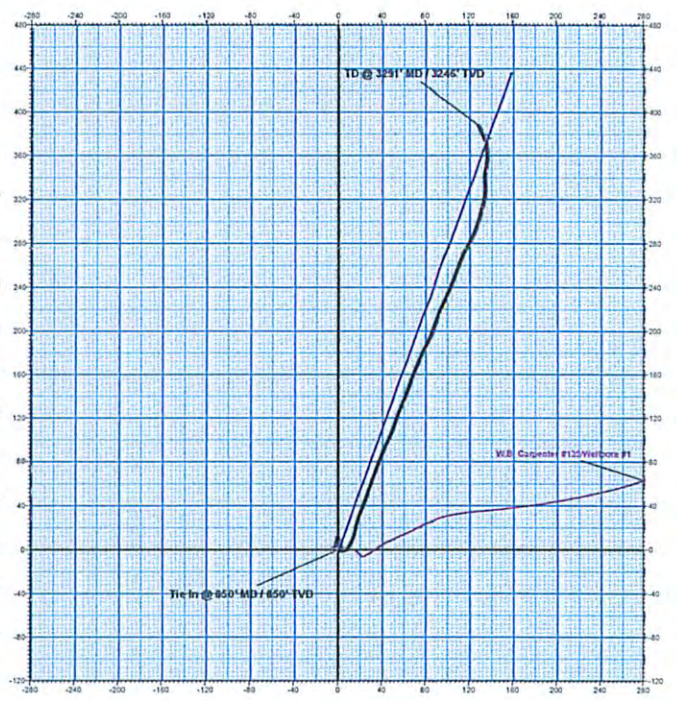
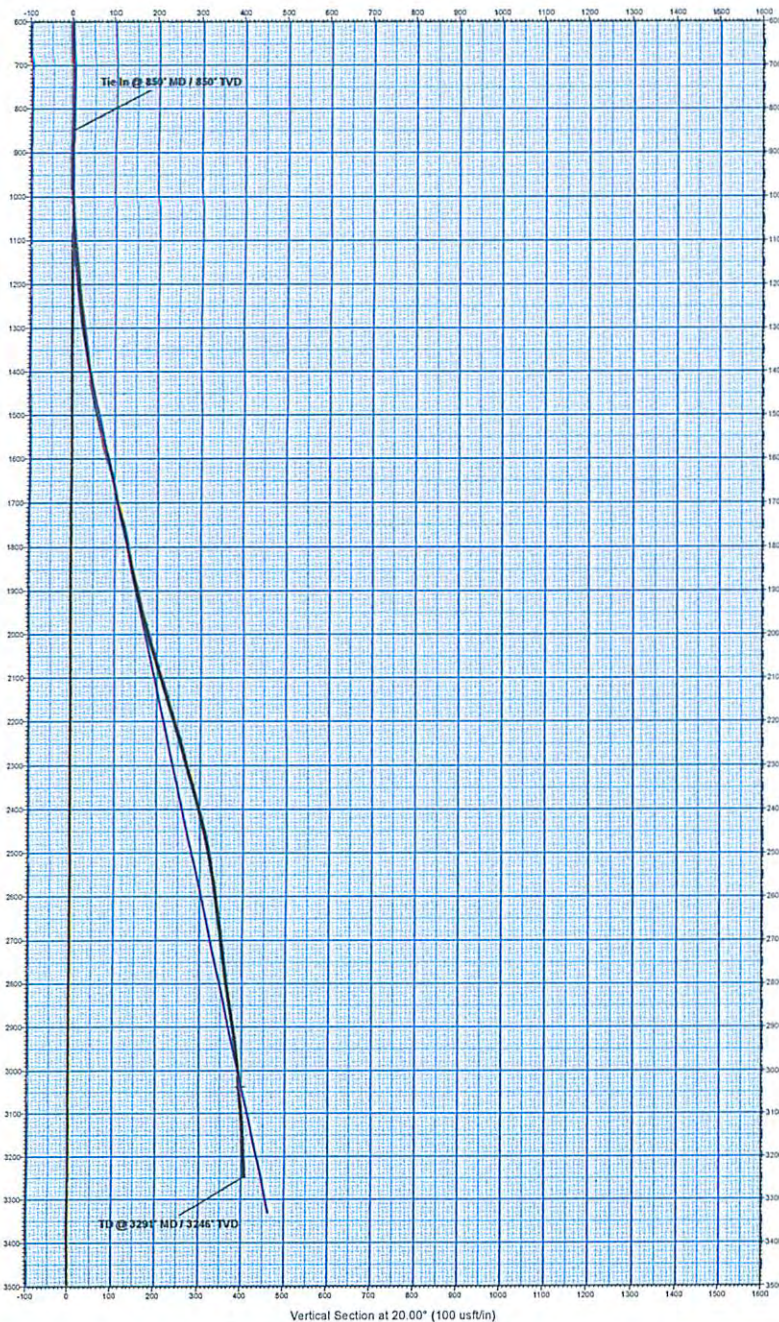
Company Name: HG Energy, LLC
 W.B. Carpenter #237
 Harrison County, West Virginia
 Rig: Decker #6
 Created By: James Dawson
 Date: 11/06/2013



WELL DETAILS: W.B. Carpenter #237				
Ground Level: 1385.0				
+N/-S	+E/-W	Northing	Easting	Latitude
0.0	0.0	293521.43	1715189.60	39° 16' 26.600 N
		Longitude		
		80° 30' 21.800 W		

PROJECT DETAILS: Harrison County, West Virginia	
Geodetic System:	US State Plane 1927 (Exact solution)
Datum:	NAD 1927 (NADCON CONUS)
Ellipsoid:	Clarke 1866
Zone:	West Virginia North 4701
System Datum:	Mean Sea Level

HG Energy



DESIGN TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude
Target W.B. Carpenter #237	3037.0	375.9	136.8	281897.31	1715325.41	39° 16' 30.330 N
- plan hits target center						

ANNOTATIONS							
MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Departure
850.0	0.00	340.00	850.0	0.0	0.0	0.0	0.0
3291.0	3.80	332.30	3246.3	387.9	129.0	409.6	423.0
							Tie In @ 850' MD / 850' TVD
							TD @ 3291' MD / 3246' TVD

M G T Azimuths to Grid North

Correction: -8.00°

Magnetic Field
 Strength: 52328.5snT
 Dip Angle: 66.82°
 Date: 10/31/2013
 Model: IGRF2010