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FEB 25 2015

WV Department of  
Environmental Protection

## **HG Energy, LLC**

Roane County, West Virginia

Carr-Nichols #102

Carr-Nichols #102

Wellbore #1

Design: Wellbore #1

## **Survey Report - Geographic**

07 January, 2015



05/01/2015

FEB 25 2015 Survey Report - Geographic



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well Carr-Nichols #102
Project:	Roane County, West Virginia	TVD Reference:	well @ 1122.0usft (Decker #9)
Site:	Carr-Nichols #102	MD Reference:	well @ 1122.0usft (Decker #9)
Well:	Carr-Nichols #102	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM Compass

Project	Roane 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	Carr-Nichols #102				
Site Position:		Northing:	14,059,902.70 usft	Latitude:	38° 43' 3.000 N
From:	Lat/Long	Easting:	1,558,756.72 usft	Longitude:	81° 17' 10.700 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.18 °

Well	Carr-Nichols #102					
Well Position	+N/-S	0.0 usft	Northing:	14,059,902.70 usft	Latitude:	38° 43' 3.000 N
	+E/-W	0.0 usft	Easting:	1,558,756.72 usft	Longitude:	81° 17' 10.700 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	1,114.0 usft	

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	12/13/2014	-7.95	66.43	51,939

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	291.33	

Survey Program	Date 1/7/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
650.0	2,634.0	MWD Survey (Wellbore #1)	MWD default	MWD - Standard

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.0	0.00	0.00	0.0	0.0	0.0	14,059,902.70	1,558,756.72	38° 43' 3.000 N	81° 17' 10.700 W	
650.0	0.00	0.00	650.0	0.0	0.0	14,059,902.70	1,558,756.72	38° 43' 3.000 N	81° 17' 10.700 W	
<b>FIRST SURVEY @ 650' MD / 650' TVD</b>										
682.0	1.30	240.80	682.0	-0.2	-0.3	14,059,902.52	1,558,756.40	38° 43' 2.998 N	81° 17' 10.704 W	
712.0	2.60	277.90	712.0	-0.2	-1.3	14,059,902.45	1,558,755.43	38° 43' 2.997 N	81° 17' 10.716 W	
742.0	4.10	283.50	741.9	0.1	-3.0	14,059,902.79	1,558,753.71	38° 43' 3.001 N	81° 17' 10.738 W	
772.0	5.60	284.60	771.8	0.7	-5.5	14,059,903.41	1,558,751.25	38° 43' 3.007 N	81° 17' 10.769 W	
802.0	7.10	287.80	801.6	1.6	-8.6	14,059,904.35	1,558,748.07	38° 43' 3.016 N	81° 17' 10.809 W	
832.0	8.40	290.20	831.4	3.0	-12.5	14,059,905.67	1,558,744.25	38° 43' 3.029 N	81° 17' 10.857 W	
862.0	9.50	292.80	861.0	4.7	-16.8	14,059,907.39	1,558,739.91	38° 43' 3.046 N	81° 17' 10.912 W	
892.0	10.10	293.50	890.6	6.7	-21.5	14,059,909.40	1,558,735.21	38° 43' 3.066 N	81° 17' 10.972 W	
922.0	10.70	294.40	920.1	8.9	-26.5	14,059,911.60	1,558,730.27	38° 43' 3.087 N	81° 17' 11.034 W	



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Survey Report - Geographic

WV Department of  
Environmental Protection  
Well Carr-Nichols #102  
Well @ 1122.0usft (Decker #9)  
well @ 1122.0usft (Decker #9)  
Grid  
Minimum Curvature  
EDM Compass

Company: HG Energy, LLC  
Project: Roane County, West Virginia  
Site: Carr-Nichols #102  
Well: Carr-Nichols #102  
Wellbore: Wellbore #1  
Design: Wellbore #1

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

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
952.0	11.40	295.20	949.5	11.3	-31.7	14,059,914.01	1,558,725.05	38° 43' 3.111 N	81° 17' 11.100 W
982.0	12.40	295.00	978.9	13.9	-37.3	14,059,916.63	1,558,719.44	38° 43' 3.137 N	81° 17' 11.171 W
1,012.0	13.30	295.90	1,008.1	16.8	-43.3	14,059,919.50	1,558,713.42	38° 43' 3.165 N	81° 17' 11.247 W
1,042.0	14.20	296.70	1,037.3	20.0	-49.7	14,059,922.66	1,558,707.03	38° 43' 3.196 N	81° 17' 11.328 W
1,072.0	15.10	297.80	1,066.3	23.4	-56.4	14,059,926.14	1,558,700.29	38° 43' 3.230 N	81° 17' 11.413 W
1,102.0	15.60	298.40	1,095.2	27.2	-63.4	14,059,929.88	1,558,693.28	38° 43' 3.267 N	81° 17' 11.502 W
1,132.0	15.50	297.80	1,124.1	31.0	-70.5	14,059,933.67	1,558,686.19	38° 43' 3.304 N	81° 17' 11.591 W
1,162.0	15.40	295.60	1,153.0	34.6	-77.7	14,059,937.26	1,558,679.05	38° 43' 3.339 N	81° 17' 11.682 W
1,192.0	16.10	292.60	1,181.9	37.9	-85.1	14,059,940.58	1,558,671.62	38° 43' 3.372 N	81° 17' 11.776 W
1,222.0	16.80	290.60	1,210.7	41.0	-93.0	14,059,943.70	1,558,663.72	38° 43' 3.403 N	81° 17' 11.875 W
1,252.0	17.50	290.40	1,239.3	44.1	-101.3	14,059,946.80	1,558,655.43	38° 43' 3.433 N	81° 17' 11.980 W
1,282.0	18.20	290.10	1,267.9	47.3	-109.9	14,059,949.98	1,558,646.80	38° 43' 3.464 N	81° 17' 12.089 W
1,312.0	19.00	291.50	1,296.3	50.7	-118.9	14,059,953.38	1,558,637.86	38° 43' 3.497 N	81° 17' 12.202 W
1,342.0	19.60	291.90	1,324.6	54.3	-128.1	14,059,957.05	1,558,628.65	38° 43' 3.533 N	81° 17' 12.319 W
1,372.0	20.20	291.20	1,352.8	58.1	-137.6	14,059,960.80	1,558,619.15	38° 43' 3.570 N	81° 17' 12.439 W
1,402.0	21.30	291.10	1,380.9	61.9	-147.5	14,059,964.63	1,558,609.24	38° 43' 3.608 N	81° 17' 12.564 W
1,432.0	22.10	290.40	1,408.8	65.9	-157.9	14,059,968.56	1,558,598.86	38° 43' 3.646 N	81° 17' 12.695 W
1,462.0	22.80	289.70	1,436.5	69.8	-168.6	14,059,972.49	1,558,588.10	38° 43' 3.685 N	81° 17' 12.831 W
1,492.0	23.70	289.50	1,464.1	73.8	-179.8	14,059,976.46	1,558,576.95	38° 43' 3.724 N	81° 17' 12.972 W
1,522.0	24.70	289.60	1,491.4	77.9	-191.4	14,059,980.57	1,558,565.36	38° 43' 3.764 N	81° 17' 13.118 W
1,552.0	25.60	290.00	1,518.6	82.2	-203.4	14,059,984.89	1,558,553.36	38° 43' 3.806 N	81° 17' 13.270 W
1,582.0	26.20	290.40	1,545.6	86.7	-215.7	14,059,989.42	1,558,541.06	38° 43' 3.851 N	81° 17' 13.425 W
1,612.0	27.00	290.00	1,572.4	91.4	-228.3	14,059,994.06	1,558,528.46	38° 43' 3.896 N	81° 17' 13.585 W
1,642.0	27.60	289.60	1,599.1	96.0	-241.2	14,059,998.72	1,558,515.51	38° 43' 3.942 N	81° 17' 13.748 W
1,672.0	28.10	289.00	1,625.6	100.7	-254.4	14,060,003.35	1,558,502.28	38° 43' 3.987 N	81° 17' 13.915 W
1,702.0	28.40	288.30	1,652.0	105.2	-267.9	14,060,007.89	1,558,488.83	38° 43' 4.032 N	81° 17' 14.085 W
1,732.0	29.50	287.90	1,678.3	109.7	-281.7	14,060,012.40	1,558,475.03	38° 43' 4.076 N	81° 17' 14.260 W
1,762.0	30.70	287.90	1,704.2	114.3	-296.0	14,060,017.02	1,558,460.71	38° 43' 4.121 N	81° 17' 14.441 W
1,792.0	33.30	288.50	1,729.6	119.3	-311.1	14,060,021.99	1,558,445.61	38° 43' 4.170 N	81° 17' 14.631 W
1,822.0	36.40	289.60	1,754.3	124.9	-327.3	14,060,027.59	1,558,429.41	38° 43' 4.225 N	81° 17' 14.836 W
1,852.0	39.80	291.10	1,777.9	131.3	-344.7	14,060,034.04	1,558,412.06	38° 43' 4.288 N	81° 17' 15.055 W
1,882.0	43.30	292.40	1,800.3	138.7	-363.1	14,060,041.42	1,558,393.59	38° 43' 4.360 N	81° 17' 15.289 W
1,912.0	45.30	293.00	1,821.8	146.8	-382.5	14,060,049.50	1,558,374.26	38° 43' 4.440 N	81° 17' 15.533 W
1,942.0	46.00	292.30	1,842.8	155.1	-402.3	14,060,057.76	1,558,354.46	38° 43' 4.521 N	81° 17' 15.783 W
1,972.0	46.80	292.30	1,863.4	163.3	-422.4	14,060,066.01	1,558,334.36	38° 43' 4.602 N	81° 17' 16.037 W
2,002.0	47.50	292.10	1,883.8	171.6	-442.7	14,060,074.32	1,558,314.00	38° 43' 4.683 N	81° 17' 16.295 W
2,032.0	48.70	291.90	1,903.9	180.0	-463.4	14,060,082.68	1,558,293.29	38° 43' 4.765 N	81° 17' 16.556 W
2,062.0	49.90	291.10	1,923.4	188.3	-484.6	14,060,091.02	1,558,272.13	38° 43' 4.847 N	81° 17' 16.824 W
2,092.0	51.00	291.10	1,942.5	196.6	-506.2	14,060,099.34	1,558,250.55	38° 43' 4.929 N	81° 17' 17.096 W
2,122.0	52.10	291.50	1,961.2	205.2	-528.1	14,060,107.88	1,558,228.66	38° 43' 5.013 N	81° 17' 17.373 W
2,152.0	53.10	291.70	1,979.4	214.0	-550.2	14,060,116.65	1,558,206.51	38° 43' 5.099 N	81° 17' 17.653 W
2,182.0	53.30	291.60	1,997.4	222.8	-572.5	14,060,125.51	1,558,184.18	38° 43' 5.186 N	81° 17' 17.935 W
2,212.0	52.90	290.90	2,015.4	231.5	-594.9	14,060,134.21	1,558,161.82	38° 43' 5.271 N	81° 17' 18.218 W
2,242.0	52.20	290.40	2,033.7	239.9	-617.2	14,060,142.61	1,558,139.53	38° 43' 5.353 N	81° 17' 18.499 W
2,272.0	52.10	290.40	2,052.1	248.2	-639.4	14,060,150.87	1,558,117.33	38° 43' 5.434 N	81° 17' 18.780 W
2,302.0	52.10	290.40	2,070.5	256.4	-661.6	14,060,159.12	1,558,095.14	38° 43' 5.515 N	81° 17' 19.060 W
2,332.0	52.10	290.40	2,088.9	264.7	-683.8	14,060,167.37	1,558,072.95	38° 43' 5.596 N	81° 17' 19.341 W
2,362.0	52.00	290.00	2,107.4	272.8	-706.0	14,060,175.54	1,558,050.75	38° 43' 5.676 N	81° 17' 19.621 W
2,392.0	52.10	290.10	2,125.8	280.9	-728.2	14,060,183.65	1,558,028.53	38° 43' 5.756 N	81° 17' 19.902 W
2,422.0	52.90	290.60	2,144.1	289.2	-750.5	14,060,191.92	1,558,006.22	38° 43' 5.837 N	81° 17' 20.184 W
2,452.0	53.60	290.90	2,162.0	297.7	-773.0	14,060,200.44	1,557,983.74	38° 43' 5.920 N	81° 17' 20.468 W
2,482.0	54.70	291.90	2,179.6	306.6	-795.6	14,060,209.31	1,557,961.10	38° 43' 6.007 N	81° 17' 20.754 W
2,512.0	55.20	292.00	2,196.8	315.8	-818.4	14,060,218.50	1,557,938.32	38° 43' 6.097 N	81° 17' 21.042 W
2,542.0	53.60	290.90	2,214.3	324.7	-841.1	14,060,227.42	1,557,915.62	38° 43' 6.185 N	81° 17' 21.329 W
2,572.0	51.40	289.60	2,232.6	333.0	-863.4	14,060,235.66	1,557,893.29	38° 43' 6.266 N	81° 17' 21.611 W



Survey Report - Geographic



<b>Company:</b>	HG Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Carr-Nichols #102
<b>Project:</b>	Roane County, West Virginia	<b>TVD Reference:</b>	well @ 1122.0usft (Decker #9)
<b>Site:</b>	Carr-Nichols #102	<b>MD Reference:</b>	well @ 1122.0usft (Decker #9)
<b>Well:</b>	Carr-Nichols #102	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	EDM Compass

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
2,634.0	51.40	289.60	2,271.2	349.2	-909.1	14,060,251.91	1,557,847.65	38° 43' 6.425 N	81° 17' 22.188 W
TD @ 2634' MD / 2271' TVD									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
650.0	650.0	0.0	0.0	FIRST SURVEY @ 650' MD / 650' TVD
2,634.0	2,271.2	349.2	-909.1	TD @ 2634' MD / 2271' TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

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Roane County, West Virginia  
Carr-Nichols #102  
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Wellbore #1

Design: Wellbore #1

**HG Energy EOW Report**

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HG Energy EOW Report

**Company:** HG Energy, LLC  
**Project:** Roane County, West Virginia  
**Site:** Carr-Nichols #102  
**Well:** Carr-Nichols #102  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:**  
 Well Carr-Nichols #102  
 well @ 1122.0usft (Decker #9)  
 well @ 1122.0usft (Decker #9)  
 Grid  
 Minimum Curvature  
 EDM Compass

**TVD Reference:**  
**MD Reference:**  
**North Reference:**  
**Survey Calculation Method:**  
**Database:**

**Project:** Roane County, West Virginia  
**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:** Carr-Nichols #102  
**Site Position:** Northing: 14,059,902.69 usft Latitude: 38° 43' 3.000 N  
 Easting: 1,558,756.71 usft Longitude: 81° 17' 10.700 W  
**From:** Lat/Long Slot Radius: 13-3/16 " Grid Convergence: -0.18 °  
**Position Uncertainty:** 0.0 usft

**Well:** Carr-Nichols #102  
**Well Position:** +N/-S 0.0 usft Northing: 14,059,902.69 usft Latitude: 38° 43' 3.000 N  
 +E/-W 0.0 usft Easting: 1,558,756.71 usft Longitude: 81° 17' 10.700 W  
**Position Uncertainty:** 0.0 usft Wellhead Elevation: 0.0 usft Ground Level: 1,114.0 usft

Wellbore	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
Wellbore #1	IGRF200510	12/13/2014	-7.95	66.43	51,939

Design	Version:	Phase:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Tie On Depth:	Direction (°)
Wellbore #1	1.0	ACTUAL	0.0	0.0	0.0	0.0	291.33

Survey Program	From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
650.0	2,634.0	MWD Survey (Wellbore #1)	MWD default	MWD - Standard	

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 Project: Roane County, West Virginia  
 Site: Carr-Nichols #102  
 Well: Carr-Nichols #102  
 Wellbore: Wellbore #1  
 Design: Wellbore #1

Local Co-ordinate Reference: Well Carr-Nichols #102  
 TVD Reference: well @ 1122.0usft (Decker #9)  
 MID Reference: well @ 1122.0usft (Decker #9)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature  
 Database: EDM Compass

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MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D/Leg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.0	0.00	
650.0	0.00	0.00	650.0	0.0	0.0	0.0	0.00	0.0	0.00	
<b>FIRST SURVEY @ 650' MD / 650' TVD</b>										
682.0	1.30	240.80	682.0	-0.2	-0.3	0.2	4.06	0.4	240.80	
712.0	2.60	277.90	712.0	-0.2	-1.3	1.1	5.83	1.3	259.03	
742.0	4.10	283.50	741.9	0.1	-3.0	2.8	5.11	3.0	271.80	
772.0	5.60	284.60	771.8	0.7	-5.5	5.3	5.01	5.5	277.44	
802.0	7.10	287.80	801.6	1.6	-8.6	8.7	5.14	8.8	280.80	
832.0	8.40	290.20	831.4	3.0	-12.5	12.7	4.46	12.8	283.41	
862.0	9.50	292.80	861.0	4.7	-16.8	17.4	3.91	17.4	285.59	
892.0	10.10	293.50	890.6	6.7	-21.5	22.5	2.04	22.5	287.30	
922.0	10.70	294.40	920.1	8.9	-26.5	27.9	2.07	27.9	288.59	
952.0	11.40	295.20	949.5	11.3	-31.7	33.6	2.39	33.6	289.65	
982.0	12.40	295.00	978.9	13.9	-37.3	39.8	3.34	39.8	290.50	
1,012.0	13.30	295.90	1,008.1	16.8	-43.3	46.4	3.07	46.4	291.21	
1,042.0	14.20	296.70	1,037.3	20.0	-49.7	53.5	3.07	53.5	291.89	
1,072.0	15.10	297.80	1,066.3	23.4	-56.4	61.1	3.14	61.1	292.56	
1,102.0	15.60	298.40	1,095.2	27.2	-63.4	69.0	1.75	69.0	293.19	
1,132.0	15.50	297.80	1,124.1	31.0	-70.5	77.0	0.63	77.0	293.70	
1,162.0	15.40	295.60	1,153.0	34.6	-77.7	84.9	1.98	85.0	293.99	
1,192.0	16.10	292.60	1,181.9	37.9	-85.1	93.0	3.58	93.1	293.99	
1,222.0	16.80	290.60	1,210.7	41.0	-93.0	101.5	3.00	101.6	293.79	
1,252.0	17.50	290.40	1,239.3	44.1	-101.3	110.4	2.34	110.5	293.53	
1,282.0	18.20	290.10	1,267.9	47.3	-109.9	119.6	2.35	119.7	293.28	
1,312.0	19.00	291.50	1,296.3	50.7	-118.9	129.2	3.05	129.2	293.09	
1,342.0	19.60	291.90	1,324.6	54.3	-128.1	139.1	2.05	139.1	292.99	
1,372.0	20.20	291.20	1,352.8	58.1	-137.6	149.3	2.15	149.3	292.90	



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Local Co-ordinate Reference:  
Well Carr-Nichols #102  
well @ 1122.0usft (Decker #9)  
well @ 1122.0usft (Decker #9)  
Grid  
Minimum Curvature  
EDM Compass

TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Company: HG Energy, LLC  
Project: Roane County, West Virginia  
Site: Carr-Nichols #102  
Well: Carr-Nichols #102  
Wellbore: Wellbore #1  
Design: Wellbore #1

FEB 25 2015

WV Department of  
Environmental Protection

MD (usft)	Inc (°)	Azl (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Soc (usft)	D Leg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)
1,402.0	21.30	291.10	1,380.9	61.9	-147.5	159.9	3.67	160.0	292.78
1,432.0	22.10	290.40	1,408.8	65.9	-157.9	171.0	2.80	171.0	292.65
1,462.0	22.80	289.70	1,436.5	69.8	-168.6	182.4	2.50	182.5	292.48
1,492.0	23.70	289.50	1,464.1	73.8	-179.8	194.3	3.01	194.3	292.31
1,522.0	24.70	289.60	1,491.4	77.9	-191.4	206.6	3.34	206.6	292.14
1,552.0	25.60	290.00	1,518.6	82.2	-203.4	219.3	3.05	219.3	292.01
1,582.0	26.20	290.40	1,545.6	86.7	-215.7	232.4	2.08	232.4	291.91
1,612.0	27.00	290.00	1,572.4	91.4	-228.3	245.9	2.73	245.9	291.81
1,642.0	27.60	289.60	1,599.1	96.0	-241.2	259.6	2.09	259.6	291.71
1,672.0	28.10	289.00	1,625.6	100.7	-254.4	273.6	1.91	273.6	291.58
1,702.0	28.40	288.30	1,652.0	105.2	-267.9	287.8	1.49	287.8	291.44
1,732.0	29.50	287.90	1,678.3	109.7	-281.7	302.3	3.72	302.3	291.28
1,762.0	30.70	287.90	1,704.2	114.3	-296.0	317.3	4.00	317.3	291.12
1,792.0	33.30	288.50	1,729.6	119.3	-311.1	333.2	6.73	333.2	290.98
1,822.0	36.40	289.60	1,754.3	124.9	-327.3	350.3	10.54	350.3	290.89
1,852.0	39.80	291.10	1,777.9	131.3	-344.7	368.8	11.75	368.8	290.86
1,882.0	43.30	292.40	1,800.3	138.7	-363.1	388.7	12.01	388.7	290.91
1,912.0	45.30	293.00	1,821.8	146.8	-382.5	409.7	6.81	409.7	291.00
1,942.0	46.00	292.30	1,842.8	155.1	-402.3	431.1	2.87	431.1	291.08
1,972.0	46.80	292.30	1,863.4	163.3	-422.4	452.8	2.67	452.8	291.14
2,002.0	47.50	292.10	1,883.8	171.6	-442.7	474.8	2.38	474.8	291.19
2,032.0	48.70	291.90	1,903.9	180.0	-463.4	497.1	4.03	497.1	291.23
2,062.0	49.90	291.10	1,923.4	188.3	-484.6	519.9	4.48	519.9	291.24
2,092.0	51.00	291.10	1,942.5	196.6	-506.2	543.0	3.67	543.0	291.23
2,122.0	52.10	291.50	1,961.2	205.2	-528.1	566.5	3.81	566.5	291.23
2,152.0	53.10	291.70	1,979.4	214.0	-550.2	590.3	3.38	590.3	291.25
2,182.0	53.30	291.60	1,997.4	222.8	-572.5	614.4	0.72	614.4	291.26

05/01/2015





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HG Energy EOW Report

FEB 25 2015

Company: HG Energy, LLC  
 Project: Roane County, West Virginia  
 Site: Carr-Nichols #102  
 Well: Carr-Nichols #102  
 Wellbore: Wellbore #1  
 Design: Wellbore #1

Local Co-ordinate Reference:  
 TVD Reference: well @ 1122.0usft (Decker #9)  
 MD Reference: well @ 1122.0usft (Decker #9)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature  
 Database: EDM Compass

**WV Department of  
Environmental Protection**

Survey	MD (usft)	Inc (°)	Azimuth (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)	
	2,212.0	52.90	290.90	2,015.4	231.5	-594.9	638.4	2.29	638.4	291.26	
	2,242.0	52.20	290.40	2,033.7	239.9	-617.2	662.2	2.68	662.2	291.24	
	2,272.0	52.10	290.40	2,052.1	248.2	-639.4	685.9	0.33	685.9	291.21	
	2,302.0	52.10	290.40	2,070.5	256.4	-661.6	709.5	0.00	709.5	291.19	
	2,332.0	52.10	290.40	2,088.9	264.7	-683.8	733.2	0.00	733.2	291.16	
	2,362.0	52.00	290.00	2,107.4	272.8	-706.0	756.8	1.10	756.9	291.13	
	2,392.0	52.10	290.10	2,125.8	280.9	-728.2	780.5	0.42	780.5	291.10	
	2,422.0	52.90	290.60	2,144.1	289.2	-750.5	804.3	2.98	804.3	291.08	
	2,452.0	53.60	290.90	2,162.0	297.7	-773.0	828.3	2.47	828.3	291.07	
	2,482.0	54.70	291.90	2,179.6	306.6	-795.6	852.6	4.55	852.7	291.08	
	2,512.0	55.20	292.00	2,196.8	315.8	-818.4	877.2	1.69	877.2	291.10	
	2,542.0	53.60	290.90	2,214.3	324.7	-841.1	901.6	6.11	901.6	291.11	
	2,572.0	51.40	289.60	2,232.6	333.0	-863.4	925.4	8.10	925.4	291.09	
	2,634.0	51.40	289.60	2,271.2	349.2	-909.1	973.8	0.00	973.8	291.01	
	TD @ 2634' MD / 2271' TVD										

Design Annotations	Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/S (usft)	Local Coordinates +E/W (usft)	Comment
	650.0	650.0	0.0	0.0	FIRST SURVEY @ 650' MD / 650' TVD
	2,634.0	2,271.2	349.2	-909.1	TD @ 2634' MD / 2271' TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

05/01/2015



Company Name: HG Energy, LLC  
 Carr-Nichols #102  
 Roane County, West Virginia  
 Rig: Decker #9  
 Created By: Jerry Arsenault  
 Date: 1/7/2015

Carr-Nichols #102  
 Roane County, West Virginia  
 Q141365 & AM-141339  
 Design #1



# HG Energy

DESIGN TARGET DETAILS							
Name	TVD	NS	EW	Northing	Easting	Latitude	Longitude
PHIL Carr-Nichols #102	2165.0	296.3	-763.8	1400220.36	1557792.59	31° 43' 6.586 N	81° 17' 20.353 W
• plan this target center							

ANNOTATIONS								
MD	Rc	Az	TVD	NS	EW	West	Departure	Association
2271.2	5534.0	51.40	239.60	249.2	-699.1	973.8	974.7	TD @ 2524 MD / 2271 TVD
								TD @ 2524 MD / 2271 TVD

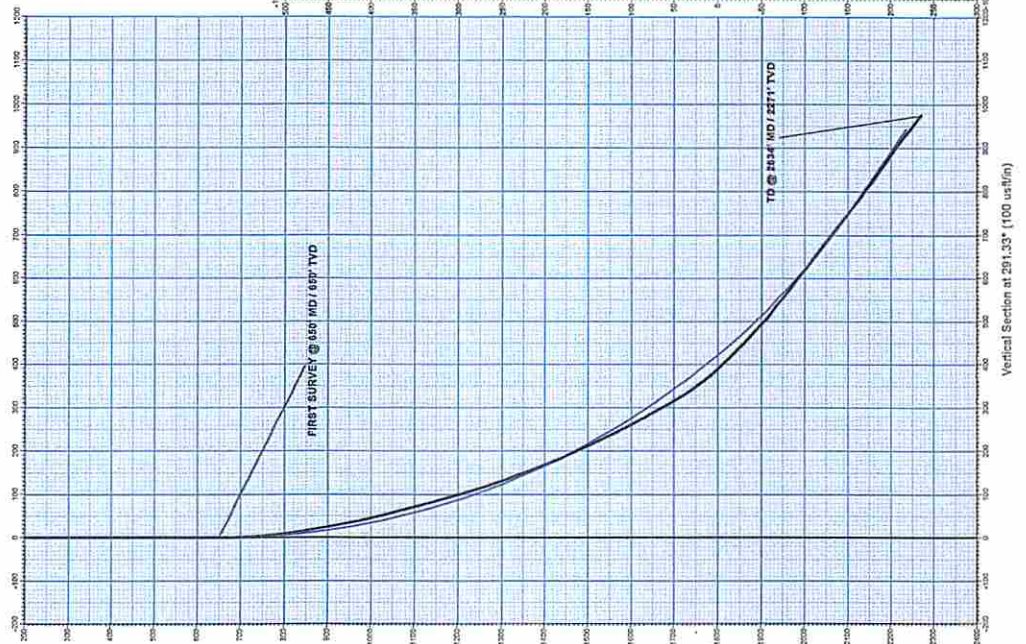
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FEB 25 2015

**MAGNETIC FIELD**  
 Azimuths to Grid North  
 Department of Environment & Natural Resources  
 Magnetic Field  
 Strength: 51939.3snT  
 Dip Angle: 66.43°  
 Date: 12/13/2014  
 Model: IGRF200510

PROJECT DETAILS:	
Geodetic System:	Roane County, West Virginia
Datum:	Universal Transverse Mercator
Ellipsoid:	GRS 1980
Zone:	17N (84 W to 78 W)
System Datum:	Mean Sea Level

WELL DETAILS:	
Well Name:	Carr-Nichols #102
Ground Level:	1114.8
Northing:	1405952.59
Easting:	168876.71
Latitude:	31° 47' 3.000 N
Longitude:	81° 17' 10.700 W



Vertical Section at 291.33° (100 us/in)