

HG Energy, LLC
Lincoln County, West Virginia
MA Bays #157
MA Bays #157

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

15 October, 2015

RECEIVED
Office of Oil and Gas
DDC
The DIRECTIONAL DRILLING COMPANY
WV Department of
Environmental Protection

02/19/2016



Company: HG Energy, LLC
Project: Lincoln County, West Virginia
Site: MA Bays #157
Well: MA Bays #157
Wellbore: Wellbore #1
Design: Wellbore #1
Local Co-ordinate Reference: Well MA Bays #157
TVD Reference: WELL @ 953.0usft (Decker #9)
MD Reference: WELL @ 953.0usft (Decker #9)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass

Project	Lincoln 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 MA Bays #157

Site Position:
From: Lat/Long
Position Uncertainty: 0.0 usft
Northing: 13,885,075.14 usft
Easting: 1,364,982.34 usft
Slot Radius: 13-3/16"
Latitude: 38° 14' 1.300 N
Longitude: 81° 57' 33.300 W
Grid Convergence: -0.59°

Well MA Bays #157

Well Position +N/-S 0.0 usft
 +E/-W 0.0 usft
Position Uncertainty 0.0 usft
Wellhead Elevation: 0.0 usft
Ground Level: 945.0 usft
Northing: 13,885,075.14 usft
Easting: 1,364,982.34 usft
Latitude: 38° 14' 1.300 N
Longitude: 81° 57' 33.300 W

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/6/2015	-7.44	66.03	51,704

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	212.51

Survey Program		Date			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
649.0	2,753.0	MWD (Wellbore #1)	MWD default	MWD - Standard	

Survey

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	13,885,075.14	1,364,982.34	38° 14' 1.300 N	81° 57' 33.300 W
649.0	0.49	168.24	649.0	-2.7	0.6	13,885,072.42	1,364,982.90	38° 14' 1.273 N	81° 57' 33.293 W
First MWD Survey @ 649' MD / 649' TVD									
679.0	0.49	164.05	679.0	-3.0	0.6	13,885,072.18	1,364,982.96	38° 14' 1.271 N	81° 57' 33.292 W
709.0	0.88	193.98	709.0	-3.3	0.6	13,885,071.83	1,364,982.94	38° 14' 1.267 N	81° 57' 33.292 W
739.0	1.81	215.48	739.0	-3.9	0.3	13,885,071.22	1,364,982.61	38° 14' 1.261 N	81° 57' 33.296 W
769.0	2.70	225.26	769.0	-4.8	-0.5	13,885,070.34	1,364,981.84	38° 14' 1.252 N	81° 57' 33.306 W
799.0	3.80	229.27	798.9	-6.0	-1.8	13,885,069.19	1,364,980.58	38° 14' 1.241 N	81° 57' 33.321 W
829.0	4.99	230.37	828.8	-7.4	-3.5	13,885,067.71	1,364,978.82	38° 14' 1.226 N	81° 57' 33.343 W
859.0	6.32	230.55	858.7	-9.3	-5.8	13,885,065.83	1,364,976.54	38° 14' 1.207 N	81° 57' 33.371 W
889.0	7.29	229.45	888.5	-11.6	-8.5	13,885,063.54	1,364,973.82	38° 14' 1.184 N	81° 57' 33.405 W
919.0	8.22	228.48	918.2	-14.3	-11.6	13,885,060.88	1,364,970.77	38° 14' 1.158 N	81° 57' 33.443 W

HP

Survey Report - Geographic



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

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
949.0	9.41	226.76	947.8	-17.4	-15.0	13,885,057.78	1,364,967.38	38° 14' 1.127 N	81° 57' 33.485 W
979.0	10.61	225.04	977.4	-21.0	-18.7	13,885,054.15	1,364,963.64	38° 14' 1.091 N	81° 57' 33.532 W
1,009.0	12.20	223.85	1,006.8	-25.2	-22.9	13,885,049.91	1,364,959.49	38° 14' 1.048 N	81° 57' 33.583 W
1,039.0	13.70	222.44	1,036.0	-30.1	-27.4	13,885,045.00	1,364,954.89	38° 14' 0.999 N	81° 57' 33.640 W
1,069.0	15.20	221.34	1,065.1	-35.7	-32.4	13,885,039.43	1,364,949.90	38° 14' 0.944 N	81° 57' 33.702 W
1,099.0	16.48	221.87	1,093.9	-41.8	-37.9	13,885,033.31	1,364,944.46	38° 14' 0.882 N	81° 57' 33.769 W
1,129.0	17.72	223.15	1,122.6	-48.3	-43.8	13,885,026.81	1,364,938.50	38° 14' 0.818 N	81° 57' 33.843 W
1,159.0	19.31	225.04	1,151.0	-55.2	-50.5	13,885,019.97	1,364,931.86	38° 14' 0.749 N	81° 57' 33.926 W
1,189.0	20.81	225.04	1,179.2	-62.4	-57.8	13,885,012.70	1,364,924.58	38° 14' 0.677 N	81° 57' 34.016 W
1,219.0	22.32	225.75	1,207.1	-70.2	-65.6	13,885,004.96	1,364,916.73	38° 14' 0.599 N	81° 57' 34.113 W
1,249.0	23.82	223.06	1,234.7	-78.6	-73.8	13,884,996.56	1,364,908.51	38° 14' 0.515 N	81° 57' 34.215 W
1,279.0	24.79	221.87	1,262.1	-87.7	-82.2	13,884,987.45	1,364,900.18	38° 14' 0.424 N	81° 57' 34.319 W
1,309.0	25.32	217.95	1,289.2	-97.4	-90.3	13,884,977.70	1,364,892.03	38° 14' 0.327 N	81° 57' 34.419 W
1,339.0	25.72	215.48	1,316.3	-107.8	-98.0	13,884,967.34	1,364,884.31	38° 14' 0.224 N	81° 57' 34.515 W
1,369.0	25.98	212.35	1,343.3	-118.7	-105.3	13,884,956.49	1,364,877.02	38° 14' 0.116 N	81° 57' 34.605 W
1,399.0	26.29	212.75	1,370.3	-129.8	-112.4	13,884,945.35	1,364,869.91	38° 14' 0.005 N	81° 57' 34.693 W
1,429.0	26.38	213.28	1,397.1	-140.9	-119.7	13,884,934.19	1,364,862.65	38° 13' 59.894 N	81° 57' 34.782 W
1,459.0	26.69	212.88	1,424.0	-152.2	-127.0	13,884,922.96	1,364,855.34	38° 13' 59.782 N	81° 57' 34.872 W
1,489.0	27.22	211.87	1,450.7	-163.7	-134.3	13,884,911.48	1,364,848.06	38° 13' 59.668 N	81° 57' 34.962 W
1,519.0	27.71	212.35	1,477.3	-175.4	-141.6	13,884,899.76	1,364,840.70	38° 13' 59.551 N	81° 57' 35.053 W
1,549.0	28.02	211.78	1,503.9	-187.3	-149.1	13,884,887.88	1,364,833.26	38° 13' 59.433 N	81° 57' 35.144 W
1,579.0	28.50	211.65	1,530.3	-199.3	-156.5	13,884,875.79	1,364,825.79	38° 13' 59.313 N	81° 57' 35.237 W
1,609.0	28.50	211.38	1,556.6	-211.6	-164.0	13,884,863.59	1,364,818.31	38° 13' 59.191 N	81° 57' 35.329 W
1,639.0	28.68	211.87	1,583.0	-223.8	-171.6	13,884,851.36	1,364,810.78	38° 13' 59.070 N	81° 57' 35.422 W
1,669.0	28.90	211.38	1,609.3	-236.1	-179.1	13,884,839.06	1,364,803.21	38° 13' 58.947 N	81° 57' 35.515 W
1,699.0	29.30	211.78	1,635.5	-248.5	-186.8	13,884,826.63	1,364,795.57	38° 13' 58.824 N	81° 57' 35.609 W
1,729.0	29.78	212.97	1,661.6	-261.0	-194.7	13,884,814.14	1,364,787.65	38° 13' 58.699 N	81° 57' 35.707 W
1,819.0	29.70	211.56	1,739.7	-298.7	-218.5	13,884,776.39	1,364,763.81	38° 13' 58.324 N	81° 57' 36.001 W
1,849.0	28.99	210.37	1,765.9	-311.4	-226.1	13,884,763.79	1,364,756.25	38° 13' 58.198 N	81° 57' 36.094 W
1,879.0	28.90	211.25	1,792.1	-323.8	-233.5	13,884,751.32	1,364,748.81	38° 13' 58.074 N	81° 57' 36.185 W
1,909.0	28.81	210.85	1,818.4	-336.2	-241.0	13,884,738.91	1,364,741.34	38° 13' 57.951 N	81° 57' 36.277 W
1,939.0	28.59	210.15	1,844.7	-348.6	-248.3	13,884,726.50	1,364,734.03	38° 13' 57.827 N	81° 57' 36.367 W
1,969.0	28.59	210.46	1,871.1	-361.0	-255.5	13,884,714.11	1,364,726.79	38° 13' 57.704 N	81° 57' 36.457 W
1,999.0	28.68	210.37	1,897.4	-373.4	-262.8	13,884,701.71	1,364,719.51	38° 13' 57.581 N	81° 57' 36.546 W
2,029.0	28.81	208.96	1,923.7	-386.0	-270.0	13,884,689.17	1,364,712.37	38° 13' 57.459 N	81° 57' 36.634 W
2,059.0	28.19	209.05	1,950.1	-398.5	-276.9	13,884,676.65	1,364,705.43	38° 13' 57.331 N	81° 57' 36.720 W
2,089.0	27.49	208.25	1,976.6	-410.8	-283.6	13,884,664.36	1,364,698.71	38° 13' 57.209 N	81° 57' 36.802 W
2,119.0	27.31	207.77	2,003.2	-423.0	-290.1	13,884,652.17	1,364,692.23	38° 13' 57.088 N	81° 57' 36.882 W
2,149.0	26.69	209.05	2,030.0	-434.9	-296.6	13,884,640.19	1,364,685.75	38° 13' 56.969 N	81° 57' 36.961 W
2,179.0	25.01	207.86	2,057.0	-446.4	-302.8	13,884,628.69	1,364,679.51	38° 13' 56.855 N	81° 57' 37.040 W
2,209.0	23.29	207.06	2,084.3	-457.3	-308.5	13,884,617.81	1,364,673.85	38° 13' 56.746 N	81° 57' 37.118 W
2,239.0	22.09	206.58	2,112.0	-467.7	-313.7	13,884,607.48	1,364,668.63	38° 13' 56.641 N	81° 57' 37.194 W
2,269.0	21.21	206.27	2,139.9	-477.6	-318.6	13,884,597.57	1,364,663.70	38° 13' 56.545 N	81° 57' 37.267 W
2,299.0	19.62	204.64	2,168.0	-487.0	-323.1	13,884,588.12	1,364,659.20	38° 13' 56.458 N	81° 57' 37.335 W
2,329.0	17.28	203.67	2,196.5	-495.7	-327.0	13,884,579.46	1,364,655.31	38° 13' 56.365 N	81° 57' 37.399 W
2,359.0	15.29	202.17	2,225.3	-503.4	-330.3	13,884,571.72	1,364,652.03	38° 13' 56.288 N	81° 57' 37.475 W
2,389.0	13.70	201.64	2,254.3	-510.4	-333.1	13,884,564.75	1,364,649.23	38° 13' 56.219 N	81° 57' 37.549 W
2,419.0	12.20	200.85	2,283.5	-516.7	-335.5	13,884,558.49	1,364,646.79	38° 13' 56.157 N	81° 57' 37.627 W
2,449.0	10.69	199.18	2,312.9	-522.2	-337.6	13,884,552.90	1,364,644.75	38° 13' 56.101 N	81° 57' 37.706 W
2,479.0	9.50	196.84	2,342.5	-527.2	-339.2	13,884,547.90	1,364,643.12	38° 13' 56.052 N	81° 57' 37.784 W
2,539.0	7.20	190.05	2,401.8	-535.7	-341.3	13,884,539.46	1,364,641.02	38° 13' 55.968 N	81° 57' 37.859 W
2,569.0	6.58	189.35	2,431.6	-539.2	-341.9	13,884,535.91	1,364,640.42	38° 13' 55.933 N	81° 57' 37.931 W
2,629.0	5.61	185.07	2,491.3	-545.5	-342.7	13,884,529.60	1,364,639.60	38° 13' 55.871 N	81° 57' 38.000 W
2,659.0	5.08	184.15	2,521.2	-548.3	-343.0	13,884,526.81	1,364,639.37	38° 13' 55.843 N	81° 57' 38.072 W



HP
Survey Report - Geographic



Company: HG Energy, LLC	Local Co-ordinate Reference: Well MA Bays #157	
Project: Lincoln County, West Virginia	TVD Reference: WELL @ 953.0usft (Decker #9)	
Site: MA Bays #157	MD Reference: WELL @ 953.0usft (Decker #9)	
Well: MA Bays #157	North Reference: Grid	
Wellbore: Wellbore #1	Survey Calculation Method: Minimum Curvature	
Design: Wellbore #1	Database: Compass	

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
2,753.0	5.08	184.15	2,614.8	-556.6	-343.6	13,884,518.51	1,364,638.77	38° 13' 55.761 N	81° 57' 37.535 W
TD @ 2753' MD / 2615' TVD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
649.0	649.0	-2.7	0.6	First MWD Survey @ 649' MD / 649' TVD
2,753.0	2,614.8	-556.6	-343.6	TD @ 2753' MD / 2615' TVD

Checked By: _____	Approved By: _____	Date: _____
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HG Energy, LLC

Lincoln County, West Virginia

MA Bays #157

MA Bays #157

Wellbore #1

Design: Wellbore #1

HG Energy EOW Report

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Geo Datum:	NAD83 West Virginia - HARN		
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Site	MA Bays #157		
Site Position:		Northing:	13,885,075.14 usft
From:	Lat/Long	Easting:	1,364,982.34 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	38° 14' 1.300 N
		Longitude:	81° 57' 33.300 W
		Grid Convergence:	-0.59 °

Well	MA Bays #157			
Well Position	+N/-S	0.0 usft	Northing:	13,885,075.14 usft
	+E/-W	0.0 usft	Easting:	1,364,982.34 usft
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft
			Latitude:	38° 14' 1.300 N
			Longitude:	81° 57' 33.300 W
			Ground Level:	945.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2015	10/6/2015	(°)	(°)	(nT)
			-7.44	66.03	51,704

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
Vertical Section:		Tie On Depth:	0.0
	Depth From (usft)	+N/-S (usft)	+E/-W (usft)
	0.0	0.0	Direction (°)
			212.51
Survey Program	Date	From (usft)	To (usft)
	10/15/2015	649.0	2,753.0
		Survey Wellbore	Tool Name
		MWD Wellbore #1	MWD default
			Description
			MWD - Standard

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/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	
649.0	0.49	168.24	649.0	-2.7	0.6	2.0	0.08	2.8	168.24	
First MWD Survey @ 649' MD / 649' TVD										
679.0	0.49	164.05	679.0	-3.0	0.6	2.2	0.12	3.0	168.06	
709.0	0.88	193.98	709.0	-3.3	0.6	2.5	1.72	3.4	169.62	
739.0	1.81	215.48	739.0	-3.9	0.3	3.2	3.47	3.9	175.98	
769.0	2.70	225.26	769.0	-4.8	-0.5	4.3	3.22	4.8	185.95	
799.0	3.80	229.27	798.9	-6.0	-1.8	6.0	3.74	6.2	196.44	
829.0	4.99	230.37	828.8	-7.4	-3.5	8.2	3.98	8.2	205.31	
859.0	6.32	230.55	858.7	-9.3	-5.8	11.0	4.43	11.0	211.89	
889.0	7.29	229.45	888.5	-11.6	-8.5	14.4	3.26	14.4	216.28	
919.0	8.22	228.48	918.2	-14.3	-11.6	18.2	3.13	18.4	219.05	
949.0	9.41	226.76	947.8	-17.4	-15.0	22.7	4.06	22.9	220.75	
979.0	10.61	225.04	977.4	-21.0	-18.7	27.8	4.12	28.1	221.70	
1,009.0	12.20	223.85	1,006.8	-25.2	-22.9	33.6	5.36	34.0	222.17	
1,039.0	13.70	222.44	1,036.0	-30.1	-27.4	40.2	5.11	40.8	222.32	
1,069.0	15.20	221.34	1,065.1	-35.7	-32.4	47.6	5.08	48.2	222.25	
1,099.0	16.48	221.87	1,093.9	-41.8	-37.9	55.6	4.29	56.4	222.16	
1,129.0	17.72	223.15	1,122.6	-48.3	-43.8	64.3	4.32	65.3	222.21	
1,159.0	19.31	224.04	1,151.0	-55.2	-50.5	73.7	5.66	74.8	222.45	
1,189.0	20.81	225.04	1,179.2	-62.4	-57.8	83.7	5.00	85.1	222.77	
1,219.0	22.33	225.27	1,207.1	-70.2	-65.6	94.4	5.11	96.1	223.07	
1,249.0	23.88	223.97	1,234.7	-78.6	-73.8	105.9	6.11	107.8	223.21	
1,279.0	25.49	221.99	1,262.1	-87.7	-82.2	118.1	3.62	120.2	223.13	
1,309.0	27.12	217.45	1,289.2	-97.4	-90.3	130.7	5.81	132.8	222.82	
1,339.0	25.17	215.48	1,316.3	-107.8	-98.0	143.6	3.79	145.7	222.28	
1,369.0	25.35	212.35	1,343.3	-118.7	-105.3	156.7	4.63	158.7	221.59	

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Wellbore: Wellbore #1
Design: Wellbore #1

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TVD Reference: WELL @ 953.0usft (Decker #9)
MD Reference: WELL @ 953.0usft (Decker #9)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)
1,399.0	26.29	212.75	1,370.3	-129.8	-112.4	169.9	1.19	171.7	220.90
1,429.0	26.38	213.28	1,397.1	-140.9	-119.7	183.2	0.84	184.9	220.34
1,459.0	26.69	212.88	1,424.0	-152.2	-127.0	196.6	1.19	198.2	219.85
1,489.0	27.22	211.87	1,450.7	-163.7	-134.3	210.2	2.33	211.7	219.37
1,519.0	27.71	212.35	1,477.3	-175.4	-141.6	224.0	1.79	225.4	218.92
1,549.0	28.02	211.78	1,503.9	-187.3	-149.1	238.0	1.36	239.4	218.52
1,579.0	28.50	211.65	1,530.3	-199.3	-156.5	252.2	1.61	253.5	218.14
1,609.0	28.50	211.38	1,556.6	-211.6	-164.0	266.6	0.43	267.7	217.79
1,639.0	28.68	211.87	1,583.0	-223.8	-171.6	280.9	0.99	282.0	217.47
1,669.0	28.90	211.38	1,609.3	-236.1	-179.1	295.4	1.08	296.3	217.19
1,699.0	29.30	211.78	1,635.5	-248.5	-186.8	309.9	1.48	310.9	216.93
1,729.0	29.78	212.97	1,661.6	-261.0	-194.7	324.7	2.53	325.6	216.72
1,819.0	29.70	211.56	1,739.7	-298.7	-218.5	369.4	0.78	370.1	216.18
1,849.0	28.99	210.37	1,765.9	-311.4	-226.1	384.1	3.06	384.8	215.99
1,879.0	28.90	211.25	1,792.1	-323.8	-233.5	398.6	1.45	399.2	215.80
1,909.0	28.81	210.85	1,818.4	-336.2	-241.0	413.1	0.71	413.7	215.63
1,939.0	28.59	210.15	1,844.7	-348.6	-248.3	427.5	1.34	428.0	215.46
1,969.0	28.59	210.46	1,871.1	-361.0	-255.5	441.8	0.49	442.3	215.29
1,999.0	28.88	210.57	1,897.4	-373.4	-262.8	456.2	0.33	456.7	215.14
2,029.0	28.81	208.96	1,923.7	-386.0	-270.0	470.6	2.30	471.0	214.97
2,059.0	28.15	209.55	1,950.1	-398.5	-276.9	484.9	2.07	485.3	214.80
2,089.0	28.49	208.85	1,976.6	-410.8	-283.6	498.8	2.64	499.2	214.62
2,119.0	28.11	207.20	2,003.2	-423.0	-290.1	512.6	0.95	512.9	214.45
2,149.0	26.89	209.06	2,030.0	-434.9	-296.6	526.2	2.83	526.4	214.29
2,179.0	25.99	207.85	2,057.0	-446.4	-302.8	539.2	5.86	539.5	214.15
2,209.0	23.89	207.06	2,084.3	-457.3	-308.5	551.5	5.84	551.7	214.00
2,239.0	22.89	206.58	2,112.0	-467.7	-313.7	563.0	4.05	563.1	213.85

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HP
HG Energy EOW Report



Company: HG Energy, LLC
Project: Lincoln County, West Virginia
Site: MA Bays #157
Well: MA Bays #157
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well MA Bays #157
TVD Reference: WELL @ 953.0usft (Decker #9)
MD Reference: WELL @ 953.0usft (Decker #9)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)
2,269.0	21.21	206.27	2,139.9	-477.6	-318.6	574.0	2.96	574.1	213.71
2,299.0	19.62	204.64	2,168.0	-487.0	-323.1	584.4	5.63	584.5	213.56
2,329.0	17.28	203.67	2,196.5	-495.7	-327.0	593.8	7.87	593.8	213.41
2,359.0	15.29	202.17	2,225.3	-503.4	-330.3	602.1	6.78	602.1	213.27
2,389.0	13.70	201.64	2,254.3	-510.4	-333.1	609.4	5.32	609.5	213.13
2,419.0	12.20	200.85	2,283.5	-516.7	-335.5	616.0	5.03	616.1	213.00
2,449.0	10.69	199.18	2,312.9	-522.2	-337.6	621.8	5.15	621.9	212.88
2,479.0	9.50	196.84	2,342.5	-527.2	-339.2	626.9	4.19	626.9	212.76
2,539.0	7.20	190.05	2,401.8	-535.7	-341.3	635.2	4.16	635.2	212.50
2,569.0	6.58	189.35	2,431.6	-539.2	-341.9	638.5	2.09	638.5	212.38
2,629.0	5.61	185.07	2,491.3	-545.5	-342.7	644.3	1.78	644.3	212.14
2,659.0	5.08	184.15	2,521.2	-548.3	-343.0	646.7	1.79	646.8	212.02
2,753.0	5.08	184.15	2,614.8	-556.6	-343.6	654.1	0.00	654.1	211.68

TD @ 2753' MD / 2615' TVD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N-S (usft)	+E-W (usft)	Comment
649.0	649.0	-2.7	0.6	First MWD Survey @ 649' MD / 649' TVD
2,753.0	2,614.8	-56.6	-343.6	TD @ 2753' MD / 2615' TVD

Checked By: _____ Approved By: _____ Date: _____

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Company Name: HG Energy, LLC
 MA Bays #157
 Lincoln County, West Virginia
 Rig: Decker 9
 Created By: Shane Robbins
 Date: 10/15/2015

MA Bays #157
 Lincoln County, West Virginia
 Q150740 & AM-150636
 Design #1



DESIGN TARGET DETAILS							
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
Target MA Bays #157	2455.0	-372.7	-364.8	13884922.46	1364817.43	38° 13' 55.600 N	81° 57' 37.850 W
- plan hits target center							

PROJECT DETAILS:		Lincoln County, West Virginia
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	

WELL DETAILS: MA Bays #167					
		Ground Level:	845.0		
+N-S	+E-W	Northing	Easting	Latitude	Longitude
0.0	0.0	13885075.14	1364982.34	38° 14' 1.200 N	81° 57' 33.300 W

ANNOTATIONS							
MD	Inc	Azi	TVD	+N-S	+E-W	Vsect/Departure	Annotation
649.0	0.49	168.24	649.0	-2.7	0.0	2.8	First MWD Survey @ 649' MD / 649' TVD
2753.0	8.00	184.16	2814.8	-506.6	-343.6	664.1	TD @ 2753' MD / 2615' TVD

Azimuths to Grid North
 Correction: -6.84°
 Magnetic Field
 Strength: 51704.1snT
 Dip Angle: 66.03°
 Date: 10/6/2015
 Model: IGRF2015

HG Energy

