

87.04781

**HG Energy, LLC**  
Roane County, West Virginia  
J.H. Starr #112  
J.H.Starr #112

Wellbore #1

Design: Wellbore #1

## Survey Report - Geographic

16 July, 2015

**DDC**  
The DIRECTIONAL DRILLING COMPANY  
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Environmental Protection  
10/23/2015

87-04781

HP  
Survey Report - Geographic



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well J.H.Starr #112
Project:	Roane County, West Virginia	TVD Reference:	Well @ 1105.0usft (Decker #9)
Site:	J.H. Starr #112	MD Reference:	Well @ 1105.0usft (Decker #9)
Well:	J.H.Starr #112	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	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 J.H. Starr #112

Site Position:		Northing:	14,058,498.29 usft	Latitude:	38° 42' 49.100 N
From:	Lat/Long	Easting:	1,558,348.24 usft	Longitude:	81° 17' 15.800 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.18 °

Well J.H.Starr #112

Well Position	+N-S	0.0 usft	Northing:	14,058,498.29 usft	Latitude:	38° 42' 49.100 N
	+E-W	0.0 usft	Easting:	1,558,348.24 usft	Longitude:	81° 17' 15.800 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	1,097.0 usft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	6/26/2015	-7.99	66.35	51,917

Design Wellbore #1

Audit Notes:

Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
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Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)
	0.0	0.0	0.0	240.69

Survey Program Date 7/16/2015

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
500.0	2,542.0	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	14,058,498.29	1,558,348.24	38° 42' 49.100 N	81° 17' 15.800 W
500.0	0.00	0.00	500.0	0.0	0.0	14,058,498.29	1,558,348.24	38° 42' 49.100 N	81° 17' 15.800 W
First Survey @ 500' MD / 500' TVD									
528.0	0.40	28.37	528.0	0.1	0.0	14,058,498.37	1,558,348.29	38° 42' 49.101 N	81° 17' 15.799 W
558.0	0.71	78.39	558.0	0.2	0.3	14,058,498.50	1,558,348.52	38° 42' 49.102 N	81° 17' 15.798 W
588.0	0.22	76.71	588.0	0.3	0.5	14,058,498.55	1,558,348.76	38° 42' 49.103 N	81° 17' 15.793 W
618.0	1.19	270.30	618.0	0.3	0.3	14,058,498.57	1,558,348.50	38° 42' 49.103 N	81° 17' 15.797 W
648.0	1.90	270.30	648.0	0.3	-0.5	14,058,498.57	1,558,347.69	38° 42' 49.103 N	81° 17' 15.807 W
678.0	3.31	264.31	678.0	0.2	-1.9	14,058,498.49	1,558,346.33	38° 42' 49.102 N	81° 17' 15.824 W
708.0	4.20	257.21	707.9	-0.1	-3.8	14,058,498.16	1,558,344.40	38° 42' 49.099 N	81° 17' 15.848 W
738.0	5.39	254.39	737.8	-0.7	-6.3	14,058,497.54	1,558,341.97	38° 42' 49.092 N	81° 17' 15.879 W
768.0	6.72	251.48	767.6	-1.7	-9.3	14,058,496.60	1,558,338.95	38° 42' 49.083 N	81° 17' 15.917 W

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Survey Report - Geographic



Company: HG Energy, LLC  
 Project: Roane County, West Virginia  
 Site: J.H. Starr #112  
 Well: J.H.Starr #112  
 Wellbore: Wellbore #1  
 Design: Wellbore #1

Local Co-ordinate Reference: Well J.H.Starr #112  
 TVD Reference: Well @ 1105.0usft (Decker #9)  
 MD Reference: Well @ 1105.0usft (Decker #9)  
 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
798.0	8.09	250.29	797.4	-3.0	-12.9	14,058,495.33	1,558,335.30	38° 42' 49.070 N	81° 17' 15.963 W
828.0	8.88	248.40	827.0	-4.5	-17.1	14,058,493.77	1,558,331.16	38° 42' 49.055 N	81° 17' 16.015 W
858.0	10.21	247.69	856.6	-6.4	-21.7	14,058,491.90	1,558,326.54	38° 42' 49.036 N	81° 17' 16.074 W
888.0	11.09	248.00	886.1	-8.5	-26.8	14,058,489.81	1,558,321.41	38° 42' 49.015 N	81° 17' 16.138 W
918.0	12.20	247.08	915.5	-10.8	-32.4	14,058,487.50	1,558,315.81	38° 42' 48.992 N	81° 17' 16.209 W
948.0	12.51	245.00	944.8	-13.4	-38.3	14,058,484.89	1,558,309.95	38° 42' 48.966 N	81° 17' 16.283 W
978.0	13.21	243.51	974.0	-16.3	-44.3	14,058,481.99	1,558,303.94	38° 42' 48.937 N	81° 17' 16.358 W
1,008.0	14.32	242.58	1,003.2	-19.5	-50.7	14,058,478.75	1,558,297.58	38° 42' 48.905 N	81° 17' 16.439 W
1,038.0	15.11	241.79	1,032.2	-23.1	-57.4	14,058,475.19	1,558,290.84	38° 42' 48.870 N	81° 17' 16.524 W
1,068.0	15.91	242.01	1,061.1	-26.9	-64.5	14,058,471.42	1,558,283.76	38° 42' 48.832 N	81° 17' 16.613 W
1,098.0	16.31	240.99	1,089.9	-30.8	-71.8	14,058,467.44	1,558,276.44	38° 42' 48.793 N	81° 17' 16.705 W
1,128.0	16.22	238.88	1,118.7	-35.1	-79.1	14,058,463.23	1,558,269.17	38° 42' 48.751 N	81° 17' 16.796 W
1,158.0	16.79	237.38	1,147.5	-39.6	-86.3	14,058,458.73	1,558,261.94	38° 42' 48.706 N	81° 17' 16.888 W
1,188.0	17.81	235.97	1,176.1	-44.5	-93.8	14,058,453.83	1,558,254.49	38° 42' 48.657 N	81° 17' 16.982 W
1,218.0	18.69	235.40	1,204.6	-49.8	-101.5	14,058,448.53	1,558,246.73	38° 42' 48.605 N	81° 17' 17.079 W
1,248.0	19.40	233.68	1,233.0	-55.4	-109.5	14,058,442.85	1,558,238.76	38° 42' 48.548 N	81° 17' 17.180 W
1,278.0	20.11	234.21	1,261.2	-61.4	-117.7	14,058,436.88	1,558,230.56	38° 42' 48.489 N	81° 17' 17.283 W
1,308.0	20.42	234.08	1,289.4	-67.5	-126.1	14,058,430.80	1,558,222.14	38° 42' 48.429 N	81° 17' 17.389 W
1,338.0	21.30	234.08	1,317.4	-73.8	-134.8	14,058,424.53	1,558,213.48	38° 42' 48.367 N	81° 17' 17.498 W
1,368.0	21.52	233.37	1,345.3	-80.2	-143.6	14,058,418.05	1,558,204.86	38° 42' 48.302 N	81° 17' 17.609 W
1,398.0	22.01	233.68	1,373.2	-86.8	-152.5	14,058,411.44	1,558,195.71	38° 42' 48.236 N	81° 17' 17.722 W
1,428.0	22.40	234.30	1,401.0	-93.5	-161.7	14,058,404.77	1,558,186.54	38° 42' 48.170 N	81° 17' 17.837 W
1,458.0	22.49	234.78	1,428.7	-100.2	-171.0	14,058,398.13	1,558,177.21	38° 42' 48.104 N	81° 17' 17.955 W
1,488.0	23.20	236.19	1,456.3	-106.8	-180.6	14,058,391.53	1,558,167.61	38° 42' 48.039 N	81° 17' 18.073 W
1,518.0	24.08	238.17	1,483.3	-113.3	-190.7	14,058,385.02	1,558,157.50	38° 42' 47.974 N	81° 17' 18.203 W
1,548.0	24.70	239.01	1,511.1	-119.7	-201.3	14,058,378.56	1,558,146.93	38° 42' 47.910 N	81° 17' 18.336 W
1,578.0	25.32	239.80	1,538.3	-126.2	-212.2	14,058,372.11	1,558,136.01	38° 42' 47.846 N	81° 17' 18.474 W
1,608.0	26.60	240.60	1,565.3	-132.7	-223.6	14,058,365.58	1,558,124.62	38° 42' 47.781 N	81° 17' 18.617 W
1,638.0	28.28	241.61	1,591.9	-139.4	-235.7	14,058,358.91	1,558,112.51	38° 42' 47.714 N	81° 17' 18.770 W
1,668.0	30.18	242.27	1,618.1	-146.3	-248.7	14,058,352.02	1,558,099.58	38° 42' 47.646 N	81° 17' 18.932 W
1,698.0	32.08	242.40	1,643.8	-153.5	-262.4	14,058,344.82	1,558,085.85	38° 42' 47.574 N	81° 17' 19.106 W
1,728.0	33.50	241.79	1,669.0	-161.1	-276.7	14,058,337.21	1,558,071.49	38° 42' 47.499 N	81° 17' 19.286 W
1,758.0	34.91	241.08	1,693.8	-169.1	-291.6	14,058,329.15	1,558,056.68	38° 42' 47.418 N	81° 17' 19.473 W
1,788.0	36.50	241.17	1,718.2	-177.6	-306.9	14,058,320.69	1,558,041.35	38° 42' 47.334 N	81° 17' 19.666 W
1,818.0	38.62	241.08	1,741.9	-186.4	-322.9	14,058,311.86	1,558,025.34	38° 42' 47.247 N	81° 17' 19.868 W
1,848.0	40.39	240.91	1,765.1	-195.7	-339.6	14,058,302.61	1,558,008.65	38° 42' 47.154 N	81° 17' 20.078 W
1,878.0	41.10	240.77	1,787.8	-205.2	-356.7	14,058,293.07	1,557,991.55	38° 42' 47.060 N	81° 17' 20.294 W
1,908.0	40.79	239.89	1,810.5	-214.9	-373.8	14,058,283.34	1,557,974.47	38° 42' 46.963 N	81° 17' 20.509 W
1,938.0	40.30	239.67	1,833.3	-224.8	-390.6	14,058,273.52	1,557,957.61	38° 42' 46.865 N	81° 17' 20.721 W
1,968.0	40.52	239.58	1,856.1	-234.6	-407.4	14,058,263.69	1,557,940.84	38° 42' 46.768 N	81° 17' 20.933 W
1,998.0	39.90	239.01	1,879.0	-244.5	-424.1	14,058,253.80	1,557,924.18	38° 42' 46.669 N	81° 17' 21.142 W
2,028.0	39.68	238.57	1,902.1	-254.4	-440.5	14,058,243.85	1,557,907.76	38° 42' 46.570 N	81° 17' 21.349 W
2,058.0	40.30	239.50	1,925.1	-264.4	-457.0	14,058,233.93	1,557,891.23	38° 42' 46.472 N	81° 17' 21.557 W
2,088.0	40.39	241.17	1,947.9	-274.0	-473.9	14,058,224.32	1,557,874.36	38° 42' 46.376 N	81° 17' 21.770 W
2,118.0	40.39	242.49	1,970.8	-283.1	-491.0	14,058,215.14	1,557,857.22	38° 42' 46.285 N	81° 17' 21.986 W
2,148.0	39.28	241.70	1,993.8	-292.1	-508.0	14,058,206.15	1,557,840.24	38° 42' 46.195 N	81° 17' 22.200 W
2,178.0	38.71	241.17	2,017.1	-301.2	-524.6	14,058,197.12	1,557,823.66	38° 42' 46.106 N	81° 17' 22.409 W
2,208.0	38.80	241.39	2,040.5	-310.2	-541.1	14,058,188.10	1,557,807.19	38° 42' 46.016 N	81° 17' 22.616 W
2,238.0	39.11	241.30	2,063.9	-319.2	-557.6	14,058,179.06	1,557,790.64	38° 42' 45.926 N	81° 17' 22.820 W
2,268.0	39.51	241.30	2,087.1	-328.4	-574.3	14,058,169.93	1,557,773.97	38° 42' 45.835 N	81° 17' 23.035 W
2,298.0	39.81	241.17	2,110.2	-337.6	-591.1	14,058,160.71	1,557,757.18	38° 42' 45.744 N	81° 17' 23.246 W
2,328.0	39.99	241.30	2,133.2	-346.8	-607.9	14,058,151.45	1,557,740.31	38° 42' 45.651 N	81° 17' 23.459 W
2,358.0	40.52	240.51	2,156.1	-356.3	-624.9	14,058,142.03	1,557,723.37	38° 42' 45.558 N	81° 17' 23.672 W
2,388.0	40.21	239.01	2,178.9	-366.0	-641.7	14,058,132.24	1,557,706.59	38° 42' 45.460 N	81° 17' 23.884 W
2,418.0	38.89	238.31	2,202.1	-376.0	-658.0	14,058,122.31	1,557,690.27	38° 42' 45.362 N	81° 17' 24.090 W

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Survey Report - Geographic



Company:	HG Energy, LLC	Local Co-ordinate Reference:	Well J.H.Starr #112
Project:	Roane County, West Virginia	TVD Reference:	Well @ 1105.0usft (Decker #9)
Site:	J.H. Starr #112	MD Reference:	Well @ 1105.0usft (Decker #9)
Well:	J.H.Starr #112	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
2,448.0	37.69	237.69	2,225.6	-385.8	-673.7	14,058,112.46	1,557,674.51	38° 42' 45.264 N	81° 17' 24.288 W
2,478.0	35.88	236.90	2,249.6	-395.5	-688.8	14,058,102.76	1,557,659.39	38° 42' 45.167 N	81° 17' 24.478 W
2,542.0	35.88	236.90	2,301.5	-416.0	-720.3	14,058,082.27	1,557,627.97	38° 42' 44.964 N	81° 17' 24.874 W

TD @ 2542' MD / 2302' TVD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.0	500.0	0.0	0.0	First Survey @ 500' MD / 500' TVD
2,542.0	2,301.5	-416.0	-720.3	TD @ 2542' MD / 2302' TVD

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

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West Virginia Department of  
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**HG Energy, LLC**  
Roane County, West Virginia  
J.H. Starr #112  
J.H.Starr #112  
Wellbore #1

Design: Wellbore #1

## HG Energy EOW Report

16 July, 2015

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# HP HG Energy EOW Report

**Company:** HG Energy, LLC  
**Project:** Roane County, West Virginia  
**Site:** J.H. Starr #112  
**Well:** J.H. Starr #112  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Well J.H. Starr #112  
**TVD Reference:** Well @ 1105.0usft (Decker #9)  
**MD Reference:** Well @ 1105.0usft (Decker #9)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Compass

<b>Project</b>	Roane County, West Virginia		<b>System Datum:</b>	Mean Sea Level
<b>Map System:</b>	Universal Transverse Mercator			
<b>Geo Datum:</b>	NAD83 West Virginia - HARN			
<b>Map Zone:</b>	Zone 17N (84 W to 78 W)			

<b>Site</b>	J.H. Starr #112			
<b>Site Position:</b>			<b>Latitude:</b>	38° 42' 49.100 N
<b>From:</b>	Lat/Long		<b>Longitude:</b>	81° 17' 15.800 W
<b>Position Uncertainty:</b>	0.0 usft		<b>Grid Convergence:</b>	-0.18 °

<b>Well</b>	J.H. Starr #112			
<b>Well Position</b>	+N/-S	0.0 usft	<b>Latitude:</b>	38° 42' 49.100 N
	+E/-W	0.0 usft	<b>Longitude:</b>	81° 17' 15.800 W
<b>Position Uncertainty</b>		0.0 usft	<b>Ground Level:</b>	1,097.0 usft

<b>Wellbore</b>	Wellbore #1			
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	6/26/2015	-7.99	66.35
				51,917

<b>Design</b>	Wellbore #1			
<b>Audit Notes:</b>				
<b>Version:</b>	1.0	<b>Phase:</b>	<b>Tie On Depth:</b>	0.0
		<b>ACTUAL</b>	+E/-W (usft)	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	240.69	

<b>Survey Program</b>	<b>Date</b>	7/16/2015
<b>From (usft)</b>	<b>To (usft)</b>	2,542.0 MWD (Wellbore #1)
500.0		
<b>Tool Name</b>	<b>Description</b>	
MWD default	MWD - Standard	

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 WV Department of Environmental Protection  
 7/16/2015 3:37:49PM  
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Company: HG Energy, LLC  
 Project: Roane County, West Virginia  
 Site: J.H. Starr #112  
 Well: J.H. Starr #112  
 Wellbore: Wellbore #1  
 Design: Wellbore #1

Local Co-ordinate Reference: Well J.H. Starr #112  
 TVD Reference: Well @ 1105.0usft (Decker #9)  
 MD Reference: Well @ 1105.0usft (Decker #9)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature  
 Database: Compass

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	NIS (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.0	0.00
First Survey @ 500' MD / 500' TVD									
528.0	0.40	28.37	528.0	0.1	0.0	-0.1	1.43	0.1	28.37
558.0	0.71	78.39	558.0	0.2	0.3	-0.3	1.82	0.4	52.24
588.0	0.22	76.71	588.0	0.3	0.5	-0.6	1.63	0.6	62.73
618.0	1.19	270.30	618.0	0.3	0.3	-0.4	4.68	0.4	42.87
648.0	1.90	270.30	648.0	0.3	-0.5	0.3	2.37	0.6	297.51
678.0	3.31	264.31	678.0	0.2	-1.9	1.6	4.78	1.9	276.05
708.0	4.20	257.21	707.9	-0.1	-3.8	3.4	3.34	3.8	268.11
738.0	5.39	254.39	737.8	-0.7	-6.3	5.8	4.04	6.3	263.18
768.0	6.72	251.48	767.6	-1.7	-9.3	8.9	4.55	9.4	259.71
798.0	8.09	250.29	797.4	-3.0	-12.9	12.7	4.59	13.3	257.14
828.0	8.88	248.40	827.0	-4.5	-17.1	17.1	2.79	17.7	255.18
858.0	10.21	247.69	856.6	-6.4	-21.7	22.0	4.45	22.6	253.61
888.0	11.09	248.00	886.1	-8.5	-26.8	27.5	2.94	28.1	252.48
918.0	12.20	247.08	915.5	-10.8	-32.4	33.6	3.75	34.2	251.60
948.0	12.51	245.00	944.8	-13.4	-38.3	39.9	1.81	40.6	250.72
978.0	13.21	243.51	974.0	-16.3	-44.3	46.6	2.58	47.2	249.80
1,008.0	14.32	242.58	1,003.2	-19.5	-50.7	53.7	3.77	54.3	248.91
1,038.0	15.11	241.79	1,032.2	-23.1	-57.4	61.4	2.72	61.9	248.09
1,068.0	15.91	242.01	1,061.1	-26.9	-64.5	69.4	2.67	69.9	247.38
1,098.0	16.31	240.99	1,089.9	-30.8	-71.8	77.7	1.63	78.1	246.75
1,128.0	16.22	238.88	1,118.7	-35.1	-79.1	86.1	1.99	86.5	246.09
1,158.0	16.79	237.38	1,147.5	-39.6	-86.3	94.6	2.37	94.9	245.38
1,188.0	17.81	235.97	1,176.1	-44.5	-93.8	103.5	3.68	103.8	244.63
1,218.0	18.69	235.40	1,204.6	-49.8	-101.5	112.9	2.99	113.0	243.89

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HP  
HG Energy EOW Report

Company: HG Energy, LLC  
 Project: Roane County, West Virginia  
 Site: J.H. Starr #112  
 Well: J.H. Starr #112  
 Wellbore: Wellbore #1  
 Design: Wellbore #1

Local Co-ordinate Reference: Well J.H. Starr #112  
 TVD Reference: Well @ 1105.0usft (Decker #9)  
 MD Reference: Well @ 1105.0usft (Decker #9)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature  
 Database: Compass

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	D Leg (°/100usft)	Closure Distance (usft)	Closure Azimuth (°)
1,248.0	19.40	233.68	1,233.0	-55.4	-109.5	122.6	3.02	122.7	243.15
1,278.0	20.11	234.21	1,261.2	-61.4	-117.7	132.7	2.44	132.7	242.45
1,308.0	20.42	234.08	1,289.4	-67.5	-126.1	143.0	1.04	143.0	241.85
1,338.0	21.30	234.08	1,317.4	-73.8	-134.8	153.6	2.93	153.6	241.31
1,368.0	21.52	233.37	1,345.3	-80.2	-143.6	164.5	1.13	164.5	240.80
1,398.0	22.01	233.68	1,373.2	-86.8	-152.5	175.5	1.68	175.5	240.34
1,428.0	22.40	234.30	1,401.0	-93.5	-161.7	186.8	1.52	186.8	239.96
1,458.0	22.49	234.78	1,428.7	-100.2	-171.0	198.2	0.68	198.2	239.65
1,488.0	23.20	236.19	1,456.3	-106.8	-180.6	209.8	2.99	209.8	239.42
1,518.0	24.08	238.17	1,483.8	-113.3	-190.7	221.8	3.95	221.8	239.30
1,548.0	24.70	239.01	1,511.1	-119.7	-201.3	234.1	2.37	234.2	239.26
1,578.0	25.32	239.80	1,538.3	-126.2	-212.2	246.8	2.35	246.9	239.27
1,608.0	26.60	240.60	1,565.3	-132.7	-223.6	260.0	4.42	260.0	239.31
1,638.0	28.28	241.61	1,591.9	-139.4	-235.7	273.8	5.81	273.9	239.41
1,668.0	30.18	242.27	1,618.1	-146.3	-248.7	288.4	6.42	288.5	239.53
1,698.0	32.08	242.40	1,643.8	-153.5	-262.4	303.9	6.34	304.0	239.68
1,728.0	33.50	241.79	1,669.0	-161.1	-276.7	320.2	4.86	320.2	239.80
1,758.0	34.91	241.08	1,693.8	-169.1	-291.6	337.0	4.88	337.1	239.88
1,788.0	36.50	241.17	1,718.2	-177.6	-306.9	354.5	5.30	354.6	239.94
1,818.0	38.62	241.08	1,741.9	-186.4	-322.9	372.8	7.07	372.9	240.00
1,848.0	40.39	240.91	1,765.1	-195.7	-339.6	391.9	5.91	391.9	240.05
1,878.0	41.10	240.77	1,787.8	-205.2	-356.7	411.5	2.39	411.5	240.09
1,908.0	40.79	239.89	1,810.5	-214.9	-373.8	431.2	2.18	431.2	240.10
1,938.0	40.30	239.67	1,833.3	-224.8	-390.6	450.6	1.70	450.7	240.08
1,968.0	40.52	239.58	1,856.1	-234.6	-407.4	470.1	0.76	470.1	240.08
1,998.0	39.90	239.01	1,879.0	-244.5	-424.1	489.5	2.40	489.5	240.03
2,028.0	39.68	238.57	1,902.1	-254.4	-440.5	508.6	1.19	508.7	239.99

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Environmental Protection  
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# HP HG Energy EOW Report

Company: HG Energy, LLC  
 Project: Roane County, West Virginia  
 Site: J.H. Starr #112  
 Well: J.H. Starr #112  
 Wellbore: Wellbore #1  
 Design: Wellbore #1

Local Co-ordinate Reference: Well J.H. Starr #112  
 TVD Reference: Well @ 1105.0ustf (Decker #9)  
 MD Reference: Well @ 1105.0ustf (Decker #9)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature  
 Database: Compass

MD (ustf)	Inc (°)	Azi (azimuth) (°)	TVD (ustf)	N/S (ustf)	E/W (ustf)	V. Sec (ustf)	DLeg (°/100ustf)	Closure Distance (ustf)	Closure Azimuth (°)
2,058.0	40.30	239.50	1,925.1	-264.4	-457.0	527.9	2.87	528.0	239.95
2,088.0	40.39	241.17	1,947.9	-274.0	-473.9	547.3	3.62	547.4	239.97
2,118.0	40.39	242.49	1,970.8	-283.1	-491.0	566.8	2.85	566.8	240.03
2,148.0	39.28	241.70	1,993.8	-292.1	-508.0	586.0	4.07	586.0	240.10
2,178.0	38.71	241.17	2,017.1	-301.2	-524.6	604.9	2.20	604.9	240.14
2,208.0	38.80	241.39	2,040.5	-310.2	-541.1	623.6	0.55	623.7	240.17
2,238.0	39.11	241.30	2,063.9	-319.2	-557.6	642.5	1.05	642.5	240.21
2,268.0	39.51	241.30	2,087.1	-328.4	-574.3	661.5	1.33	661.5	240.24
2,298.0	39.81	241.17	2,110.2	-337.6	-591.1	680.6	1.04	680.7	240.27
2,328.0	39.99	241.30	2,133.2	-346.8	-607.9	699.9	0.66	699.9	240.29
2,358.0	40.52	240.51	2,156.1	-356.3	-624.9	719.3	2.45	719.3	240.31
2,388.0	40.21	239.01	2,178.9	-366.0	-641.7	738.7	3.40	738.7	240.30
2,418.0	38.89	238.31	2,202.1	-376.0	-658.0	757.8	4.64	757.8	240.26
2,448.0	37.69	237.69	2,225.6	-385.8	-673.7	776.4	4.20	776.4	240.20
2,478.0	35.88	236.90	2,249.6	-395.5	-688.8	794.3	6.24	794.3	240.14
2,542.0	35.88	236.90	2,301.5	-416.0	-720.3	831.7	0.00	831.8	239.99

TD @ 2542' MD / 2302' TVD

### Design Annotations

Measured Depth (ustf)	Vertical Depth (ustf)	Local Coordinates +N/-S (ustf)	Local Coordinates +E/-W (ustf)	Comment
500.0	500.0	0.0	0.0	First Survey @ 500' MD / 500' TVD
2,542.0	2,301.5	-416.0	-720.3	TD @ 2542' MD / 2302' TVD

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Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

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Company Name: HG Energy, LLC  
 J.H.Starr #112  
 Roane County, West Virginia  
 Rig: Decker 9  
 Created By: Shane Robbins  
 Date: 7/16/2015

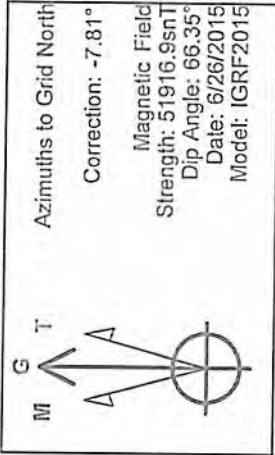
J.H.Starr #112  
 Roane County, West Virginia  
 Q150541 & AM-150466  
 Design #1

PROJECT DETAILS: Roane County, West Virginia  
 Geodetic System: Universal Transverse Mercator  
 Datum: NAD83 West Virginia - HARN  
 Ellipsoid: GRS 1980  
 System Datum: Zone 17N (63 W to 78 W)  
 Mean Sea Level

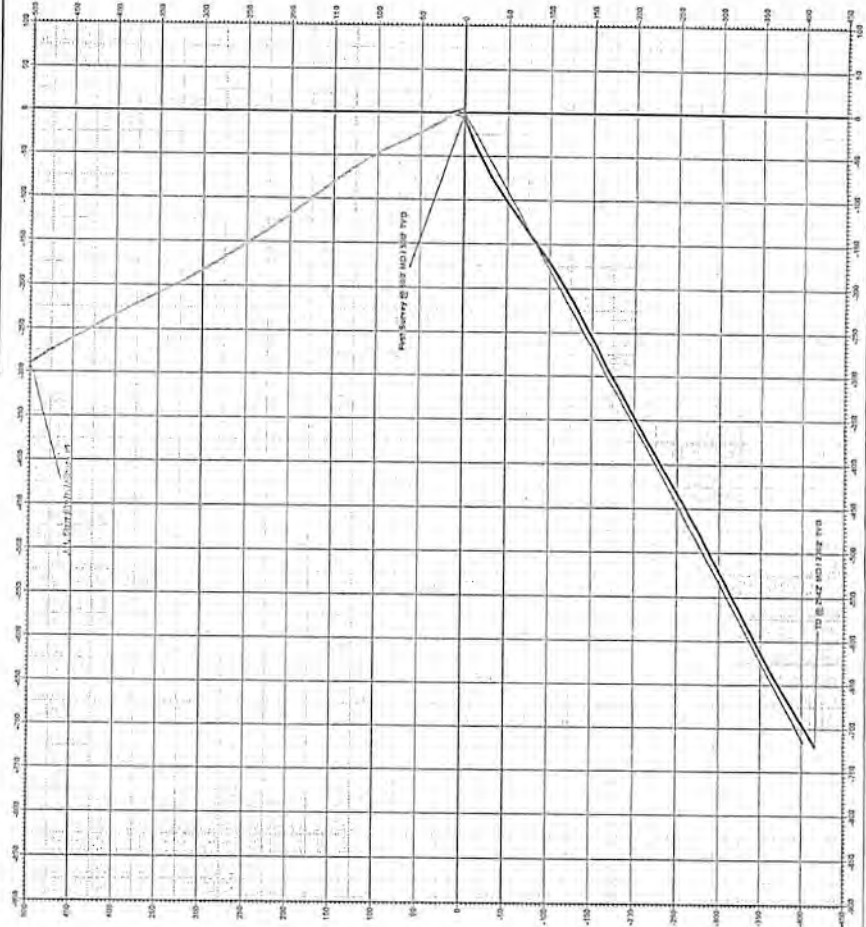
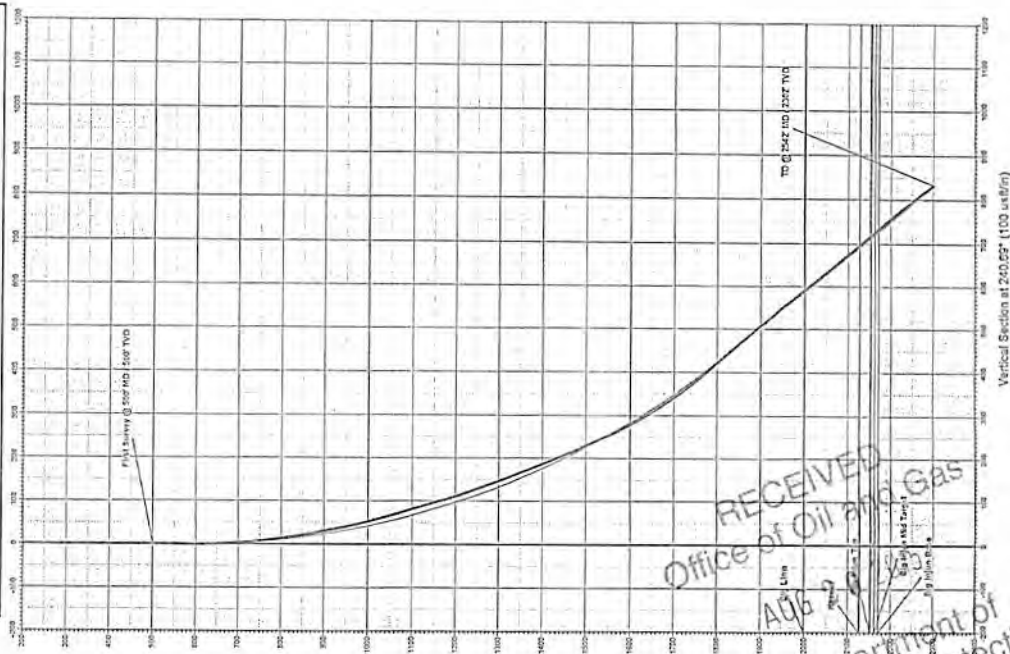
DESIGN TARGET DETAILS  
 Name: TVD 345.8 45.0W 100.0W 100.0W  
 Target: J.H. Starr #112 2162.9 -352.9 -427.1 146289146.21 158721.18 34.42 48.003 N 81° 17' 21.0 W  
 -plan hits target center

AZIMUTHS  
 MD Inc Az TVD 416.5 42.0W 100.0W 100.0W  
 6.0 0.0 201.5 0.0 0.0  
 2542.3 25.88 2162.9 224.15 -417.6 -72.3 81.7 814.8 TD @ 2542 MDJ 2322 TVD

WELL DETAILS: J.H.Starr #112  
 Ground Level: 1077.0  
 416.5 45.0W 100.0W 100.0W  
 6.0 0.0 201.5 0.0 0.0  
 2542.3 25.88 2162.9 224.15 -417.6 -72.3 81.7 814.8 TD @ 2542 MDJ 2322 TVD  
 Northing Easting Longitude  
 14284492.24 1388442.3 28.42 48.003 N 81° 17' 21.00 W



# HG Energy



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