



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Monday, August 27, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / Fracture

HG ENERGY II APPALACHIA, LLC
5260 DUPONT ROAD

PARKERSBURG, WV 26101

Re: Permit Modification Approval for MND 1 FHS
47-051-01838-00-00

**WELL BORE PATH DIRECTION FROM TOP HOLE TO TANGENT POINT-THEN
CORRECT CURVE TO MAINTAIN PERMITTED PATH**

HG ENERGY II APPALACHIA, LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926-0450.

A handwritten signature in blue ink, appearing to read "James A. Martin", is written over a circular blue stamp.

James A. Martin
Chief

Operator's Well Number: MND 1 FHS
Farm Name: CONSOLIDATION COAL COMPANY/ MURRAY E
U.S. WELL NUMBER: 47-051-01838-00-00
Horizontal 6A Fracture
Date Modification Issued: August 27, 2018

Promoting a healthy environment.

08/31/2018

SURFACE HOLE LOCATION (SHL)

UTM 17 - NAD83
 N: 4411118.961
 E: 519310.984
 NAD27, WV NORTH
 N: 494167.550
 E: 1642185.587
 LAT/LON DATUM-NAD83
 LAT: 39.849871
 LON: -80.774263

APPROX. LANDING POINT

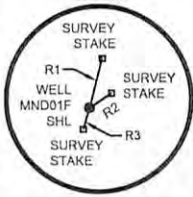
UTM 17 - NAD83
 N: 4410758.345
 E: 519128.387
 NAD27, WV NORTH
 N: 492994.214
 E: 1641566.653
 LAT/LON DATUM-NAD83
 LAT: 39.846626
 LON: -80.776408

BOTTOM HOLE LOCATION

UTM 17 - NAD83
 N: 4408262.857
 E: 520938.631
 NAD27, WV NORTH
 N: 484705.898
 E: 1647370.123
 LAT/LON DATUM-NAD83
 LAT: 39.824099
 LON: -80.755328

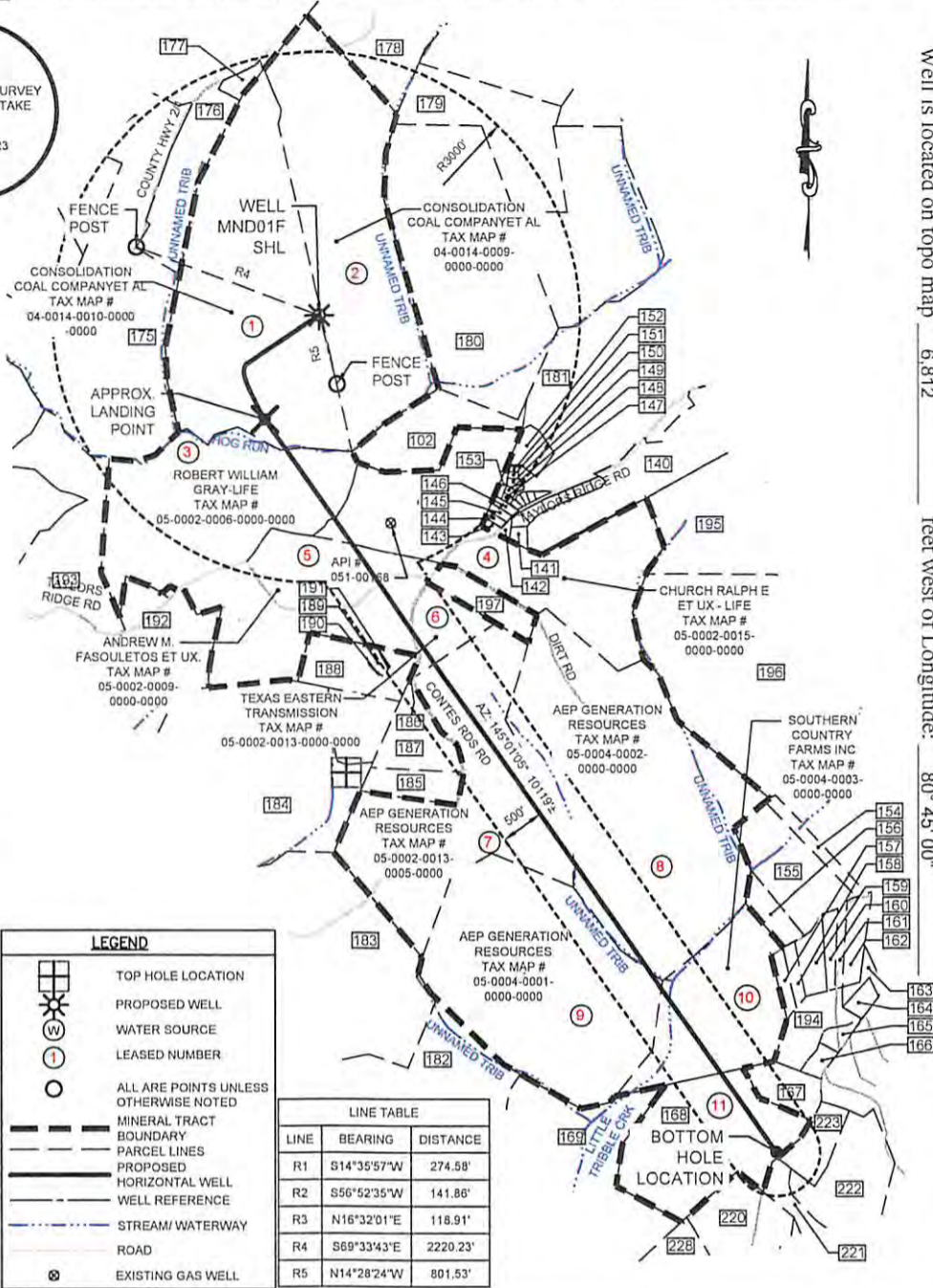
**WATER WELLS:
 NONE FOUND**

**REFERENCE
 DETAIL**



Well is located on topo map 9,154 feet south of Latitude: 39° 52' 30"

Well is located on topo map 6,812 feet west of Longitude: 80° 45' 00"



NOTES:

- There are no water wells or developed springs within 250' of proposed well.
- There are no existing buildings within 625' of proposed well.
- Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
- There are no native trout streams within 300' of proposed well.
- Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
- It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, and based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.

Waterford Corporate Park III, Suite 101
 5200 Gaugstown Drive
 Sewickley, PA 15143
 P: 724-444-1100
 F: 724-444-1104
 www.pve-ec.com



Civil Engineering | Land Development | Structure Design
 Land Planning | Landscape Architecture | Environmental

FILE #: MND 01 FHS

DRAWING #: MND 01 FHS

SCALE: 1"=2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT H 138: 638.58'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

SIGNED:

R.P.E.: 18786 L.L.S.: P.S. NO. _____



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP OFFICE OF OIL & GAS 601 57TH STREET CHARLESTON, WV 25304



DATE: AUGUST 20, 2018

OPERATOR'S WELL #: MND 01 FHS

API WELL # 47 051
 STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep

Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1150.00'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWHATAN POINT, W. VA./OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 126.99

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY, LLC, ET AL. ACREAGE: 126.99

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY) _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,455' ± TMD: 16,940' ±

WELL OPERATOR: HG ENERGY II APPALACHIA, LLC DESIGNATED AGENT: DIANE C. WHITE

Address: 5260 DUPONT ROAD Address: 5260 DUPONT ROAD

City PARKERSBURG State WV Zip Code 26101 City PARKERSBURG State WV Zip Code 26101

08/31/2018

HG ENERGY

Location: Marshall County, WV
 Field: Marshall (NAD27 SP Northern Zone 4701)
 Facility: MND1 Pad

Slot: Slot F
 Well: MND1 FHS
 Wellbore: MND1 FHS PWB



Plot reference wellpath is MND1 FHS PWB Rev-C Q

True vertical depths are referenced to Patterson 347 (RKB)	Grid System: NAD27 Lambert West Virginia SP, Northern Zone (4701), US feet
Measured depths are referenced to Patterson 347 (RKB)	North Reference: Grid north
Patterson 347 (RKB) to Mean Sea Level: 1175 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot F): -1150 feet	Depths are in feet
Coordinates are in feet referenced to East	Created by: released on 2018-08-24
	Database: WA_MPL_Eastern05_Defn

Location Information

Facility Name	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude		
MND1 Pad	1642158.830	494161.810	39°50'59.203"N	80°46'28.371"W		
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot F	-22.11	16.27	1642175.100	494139.700	39°50'58.986"N	80°46'28.158"W

Comment: Surveys Recorded as DHS Top Hole

Patterson 347 (RKB) to Mud line (At Slot: Slot F): 25ft

Mean Sea Level to Mud line (At Slot: Slot F): -1150ft

Patterson 347 (RKB) to Mean Sea Level: 1175ft

Survey Program

Start MD (ft)	End MD (ft)	Tool	Model	Log Name/Comment	Wellbore
25.00	1081.00	OWSG MWD rev2	OWSG MWD rev2 + HRGM	01_WFDM -17.12" (130-1080)	MND1 FHS AWB
1081.00	2501.00	OWSG MWD rev2	OWSG MWD rev2 + HRGM	02_WFDM -12.114" (1080-2500)	MND1 FHS AWB
2501.00	5021.00	OWSG MWD rev2	OWSG MWD rev2 + HRGM	03_WFDM -8.1/2" (2500-5000)	MND1 FHS AWB
5021.00	17486.67	BH AutoTrack Curve	BH AutoTrack Curve (Short)	BH AT Curve -8.1/2"	MND1 FHS PWB

Targets

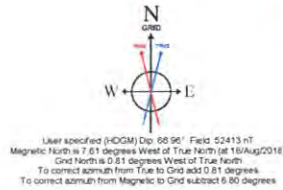
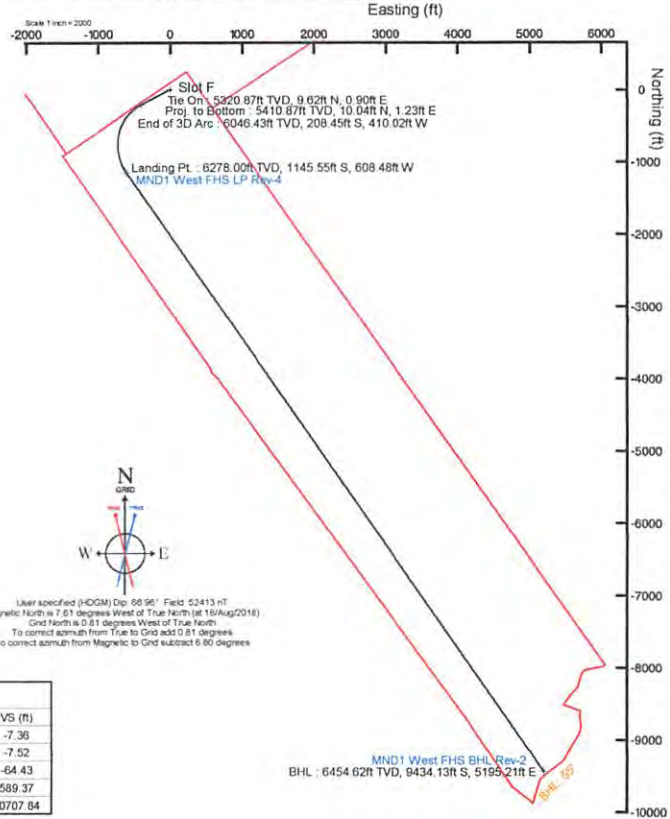
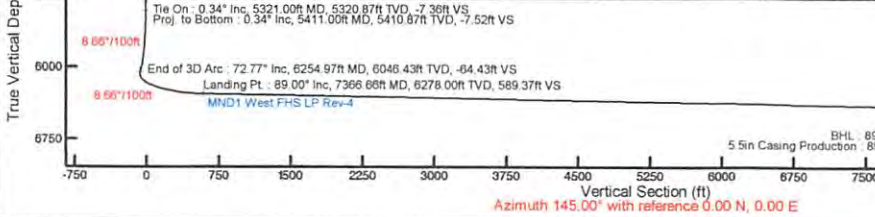
Name	MD (ft)	TVD (ft)	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
MND1 West FHS LP Rev-4	7366.66	6278.00	-1145.55	-608.48	1641866.65	492984.21	39°50'47.581"N	80°46'35.750"W
MND1 West FHS BHL Rev-2	17486.67	6454.62	-9434.13	5195.21	1642370.03	494706.08	39°49'26.462"N	80°45'19.580"W

Hole and Casing Sections

Name	Start MD (ft)	End MD (ft)	Interval (ft)	Start TVD (ft)	End TVD (ft)	Start Local N (ft)	Start Local E (ft)	End Local N (ft)	End Local E (ft)	Wellbore
20in Conductor	25.00	65.00	40.00	25.00	65.00	0.00	0.00	0.00	0.00	MND1 FHS AWB
17.5in Open Hole	65.00	1170.00	1105.00	65.00	1166.87	0.00	0.00	4.56	-2.91	MND1 FHS AWB
13.375in Casing Surface	25.00	1120.00	1105.00	25.00	1124.67	0.00	0.00	5.01	-2.82	MND1 FHS AWB
12.25in Open Hole	1170.00	2609.00	1439.00	1166.87	2608.94	4.56	-2.91	-2.16	-4.35	MND1 FHS AWB
9.825in Casing Intermediate	25.00	2505.00	2500.00	25.00	2504.94	0.00	0.00	-2.26	-4.53	MND1 FHS AWB
8.5in Open Hole	2609.00	17486.67	14877.67	2609.94	6454.62	-2.16	-4.35	-9434.13	5195.21	MND1 FHS PWB
5.5in Casing Production	25.00	17486.60	17461.60	25.00	6454.62	0.00	0.00	-9434.07	5195.17	MND1 FHS PWB

Well Profile Data

Design Comment	MD (ft)	Inc (")	Az (°)	TVD (ft)	Local N (ft)	Local E (ft)	DLS (1/100ft)	VS (ft)
Tie On	5321.00	0.340	37.400	5320.67	9.62	0.90	0.26	-7.36
Proj. to Bottom	5411.00	0.340	37.400	5410.67	10.04	1.23	0.00	-7.52
End of 3D Arc	6254.97	72.770	241.871	6046.43	-208.45	-410.02	8.66	-64.43
Landing Pt.	7366.66	89.000	145.000	6278.00	-1145.55	-608.48	8.66	589.37
BHL	17486.67	89.000	145.000	6454.62	-9434.13	5195.21	0.00	10707.64



Planned Wellpath Report

MND1 FHS PWP Rev-C.0

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HG ENERGY	Slot	Slot F
Area	Marshall County, WV	Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)	Wellbore	MND1 FHS PWB
Facility	MND1 Pad		

REPORT SETUP INFORMATION			
Projection System	NAD27 / Lambert West Virginia SP, Northern Zone (4701), US feet	Software System	WellArchitect® 5.1
North Reference	Grid	User	Delaset
Scale	0.999948	Report Generated	24/Aug/2018 at 16:00
Convergence at slot	0.81° West	Database/Source file	WA_MPL_EasternUS_Defn\MND1_FHS_PWP_Rev-C.0.xml

WELLPATH LOCATION						
	Local coordinates		Grid coordinates		Geographic coordinates	
	North[ft]	East[ft]	Easting[US ft]	Northing[US ft]	Latitude	Longitude
Slot Location	-22.11	16.27	1642175.10	494139.70	39°50'58.986"N	80°46'28.158"W
Facility Reference Pt			1642158.83	494161.81	39°50'59.203"N	80°46'28.371"W
Field Reference Pt			1695580.20	532946.00	39°57'29.416"N	80°35'09.466"W

WELLPATH DATUM			
Calculation method	Minimum curvature	Patterson 347 (RKB) to Facility Vertical Datum	25.00ft
Horizontal Reference Pt	Slot	Patterson 347 (RKB) to Mean Sea Level	1175.00ft
Vertical Reference Pt	Patterson 347 (RKB)	Patterson 347 (RKB) to Mud Line at Slot (Slot F)	25.00ft
MD Reference Pt	Patterson 347 (RKB)	Section Origin	N 0.00, E 0.00 ft
Field Vertical Reference	Mean Sea Level	Section Azimuth	145.00°

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Planned Wellpath Report

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HG ENERGY	Slot	Slot F
Area	Marshall County, WV	Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)	Wellbore	MND1 FHS PWB
Facility	MND1 Pad		

WELLPATH DATA (190 stations) † = Interpolated/extrapolated station															
MD (ft)	Inclination [°]	Azimuth [°]	TVD (ft)	Vert Sect (ft)	North (ft)	East (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	Closure Dist (ft)	Closure Dir [°]	DLS [°/100ft]	Build Rate [°/100ft]	Turn Rate [°/100ft]
0.00	0.000	16.810	0.00	0.00	0.00	0.00	1642175.10	494139.70	39°50'58.986"N	80°46'28.158"W	0.00	0.000	0.00	0.00	0.00
25.00	0.000	16.810	25.00	0.00	0.00	0.00	1642175.10	494139.70	39°50'58.986"N	80°46'28.158"W	0.00	0.000	0.00	0.00	0.00
142.00	0.480	16.810	142.00	-0.30	0.47	0.14	1642175.24	494140.17	39°50'58.991"N	80°46'28.156"W	0.49	16.810	0.41	0.41	14.37
202.00	0.370	19.300	202.00	-0.57	0.89	0.28	1642175.38	494140.59	39°50'58.995"N	80°46'28.155"W	0.93	17.326	0.19	-0.18	4.15
262.00	0.310	17.220	262.00	-0.78	1.23	0.39	1642175.49	494140.93	39°50'58.999"N	80°46'28.153"W	1.29	17.609	0.10	-0.10	-3.47
307.00	0.370	2.490	307.00	-0.97	1.49	0.43	1642175.53	494141.19	39°50'59.001"N	80°46'28.153"W	1.55	16.180	0.23	0.13	-32.73
354.00	0.180	342.650	353.99	-1.16	1.71	0.42	1642175.52	494141.41	39°50'59.003"N	80°46'28.153"W	1.76	13.688	0.45	-0.40	-42.21
386.00	0.410	14.280	385.99	-1.29	1.87	0.43	1642175.53	494141.57	39°50'59.005"N	80°46'28.153"W	1.92	12.951	0.85	0.72	98.84
417.00	0.510	348.670	416.99	-1.49	2.12	0.43	1642175.53	494141.82	39°50'59.007"N	80°46'28.153"W	2.16	11.514	0.73	0.32	-82.61
448.00	0.270	14.040	447.99	-1.66	2.32	0.42	1642175.52	494142.02	39°50'59.009"N	80°46'28.153"W	2.36	10.291	0.94	-0.77	81.84
480.00	0.430	334.860	479.99	-1.83	2.50	0.39	1642175.49	494142.20	39°50'59.011"N	80°46'28.154"W	2.53	8.828	0.87	0.50	-122.44
511.00	0.160	6.270	510.99	-1.97	2.65	0.34	1642175.44	494142.35	39°50'59.013"N	80°46'28.154"W	2.67	7.394	0.98	-0.87	101.32
543.00	0.220	347.340	542.99	-2.07	2.76	0.34	1642175.44	494142.46	39°50'59.014"N	80°46'28.154"W	2.78	6.941	0.27	0.19	-59.16
575.00	0.320	320.710	574.99	-2.21	2.89	0.27	1642175.37	494142.59	39°50'59.015"N	80°46'28.155"W	2.90	5.258	0.49	0.31	-83.22
606.00	0.330	336.470	605.99	-2.39	3.03	0.18	1642175.28	494142.73	39°50'59.016"N	80°46'28.156"W	3.04	3.302	0.29	0.03	50.84
701.00	0.420	306.570	700.99	-2.98	3.49	-0.21	1642174.89	494143.19	39°50'59.021"N	80°46'28.161"W	3.50	356.497	0.22	0.09	-31.47
796.00	0.800	293.780	795.98	-3.88	3.97	-1.10	1642174.00	494143.67	39°50'59.026"N	80°46'28.173"W	4.12	344.499	0.42	0.40	-13.46
891.00	0.720	297.550	890.97	-4.98	4.51	-2.24	1642172.86	494144.21	39°50'59.031"N	80°46'28.188"W	5.03	333.629	0.10	-0.08	3.97
986.00	0.310	341.820	985.97	-5.75	5.03	-2.85	1642172.25	494144.73	39°50'59.036"N	80°46'28.195"W	5.78	330.506	0.57	-0.43	46.60
1081.00	0.140	130.830	1080.97	-6.89	5.20	-2.84	1642172.26	494144.90	39°50'59.037"N	80°46'28.195"W	5.92	331.372	0.46	-0.18	156.85
1170.00	0.760	195.490	1169.97	-5.41	4.56	-2.91	1642172.19	494144.26	39°50'59.031"N	80°46'28.196"W	5.41	327.421	0.80	0.70	72.65
1265.00	0.590	199.290	1264.96	-4.72	3.49	-3.24	1642171.86	494143.19	39°50'59.021"N	80°46'28.200"W	4.76	317.103	0.18	-0.18	4.00
1360.00	0.560	189.200	1359.96	-4.10	2.57	-3.48	1642171.62	494142.27	39°50'59.011"N	80°46'28.203"W	4.33	306.461	0.11	-0.03	-10.62
1455.00	0.530	185.890	1454.95	-3.44	1.68	-3.60	1642171.50	494141.38	39°50'59.003"N	80°46'28.204"W	3.97	294.967	0.05	-0.03	-3.48
1550.00	0.390	180.650	1549.95	-2.84	0.92	-3.65	1642171.45	494140.62	39°50'58.995"N	80°46'28.205"W	3.76	264.085	0.15	-0.15	-5.62
1645.00	0.410	184.680	1644.95	-2.32	0.25	-3.68	1642171.42	494139.95	39°50'58.988"N	80°46'28.205"W	3.69	273.935	0.04	0.02	4.24
1740.00	0.260	191.450	1739.94	-1.91	-0.30	-3.75	1642171.35	494139.40	39°50'58.983"N	80°46'28.206"W	3.76	265.471	0.16	-0.16	7.13
1835.00	0.300	173.920	1834.94	-1.54	-0.76	-3.77	1642171.33	494138.94	39°50'58.978"N	80°46'28.206"W	3.84	258.655	0.10	0.04	-18.45
1930.00	0.240	174.790	1929.94	-1.15	-1.20	-3.72	1642171.38	494138.50	39°50'58.974"N	80°46'28.206"W	3.91	252.113	0.06	-0.06	0.92
2025.00	0.160	199.380	2024.94	-0.90	-1.52	-3.75	1642171.35	494138.18	39°50'58.971"N	80°46'28.206"W	4.05	247.865	0.12	-0.08	25.88

08/31/2018

Planned Wellpath Report

MND1 FHS PWP Rev-C.0

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HG ENERGY	Slot	Slot F
Area	Marshall County, WV	Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)	Wellbore	MND1 FHS PWB
Facility	MND1 Pad		

WELLPATH DATA (190 stations)															
MD [m]	Inclination [°]	Azimuth [°]	TVD [m]	Vert Sect [m]	North [m]	East [m]	Grid East [US m]	Grid North [US m]	Latitude	Longitude	Closure Dist [m]	Closure Dir [°]	DLS [°/100m]	Build Rate [°/100m]	Turn Rate [°/100m]
2120.00	0.190	191.160	2119.94	-0.71	-1.80	-3.82	1642171.28	494137.90	39°50'58.965"N	80°46'28.207"W	4.23	244.731	0.04	0.03	-8.65
2214.00	0.180	212.080	2213.94	-0.55	-2.08	-3.93	1642171.17	494137.62	39°50'58.965"N	80°46'28.208"W	4.45	242.089	0.07	-0.01	22.26
2309.00	0.110	221.360	2308.94	-0.47	-2.28	-4.07	1642171.03	494137.42	39°50'58.963"N	80°46'28.210"W	4.66	240.775	0.08	-0.07	9.77
2404.00	0.160	286.190	2403.94	-0.55	-2.31	-4.26	1642170.84	494137.39	39°50'58.963"N	80°46'28.212"W	4.84	241.534	0.16	0.05	68.24
2499.00	0.140	271.490	2498.94	-0.72	-2.27	-4.50	1642170.60	494137.43	39°50'58.963"N	80°46'28.215"W	5.04	243.253	0.05	-0.02	-15.47
2551.00	0.190	58.620	2550.94	-0.76	-2.22	-4.49	1642170.61	494137.48	39°50'58.964"N	80°46'28.215"W	5.01	243.677	0.61	0.10	282.94
2641.00	0.090	103.340	2640.94	-0.70	-2.16	-4.30	1642170.80	494137.54	39°50'58.965"N	80°46'28.213"W	4.81	243.356	0.16	-0.12	49.69
2736.00	0.300	70.100	2735.94	-0.59	-2.09	-4.00	1642171.10	494137.61	39°50'58.965"N	80°46'28.209"W	4.52	242.444	0.25	0.23	-34.99
2831.00	0.340	68.560	2830.94	-0.45	-1.90	-3.51	1642171.59	494137.80	39°50'58.967"N	80°46'28.203"W	3.99	241.537	0.04	0.04	-1.62
2926.00	0.290	48.910	2925.94	-0.41	-1.66	-3.08	1642172.02	494138.04	39°50'58.970"N	80°46'28.197"W	3.50	241.745	0.14	-0.08	-20.68
3021.00	0.300	45.270	3020.94	-0.48	-1.34	-2.74	1642172.36	494138.36	39°50'58.973"N	80°46'28.193"W	3.05	243.967	0.05	0.04	-3.83
3116.00	0.320	44.100	3115.93	-0.57	-0.97	-2.38	1642172.72	494138.73	39°50'58.976"N	80°46'28.188"W	2.57	247.751	0.02	0.02	-1.23
3211.00	0.440	50.970	3210.93	-0.64	-0.55	-1.91	1642173.19	494139.15	39°50'58.981"N	80°46'28.182"W	1.99	253.850	0.13	0.13	7.23
3306.00	0.410	8.620	3305.93	-0.92	0.01	-1.58	1642173.52	494139.71	39°50'58.986"N	80°46'28.178"W	1.58	270.414	0.32	-0.03	-44.58
3400.00	0.350	15.070	3399.93	-1.34	0.62	-1.45	1642173.65	494140.32	39°50'58.992"N	80°46'28.177"W	1.58	293.119	0.08	-0.06	6.86
3496.00	0.370	23.090	3495.93	-1.70	1.19	-1.26	1642173.84	494140.89	39°50'58.998"N	80°46'28.174"W	1.73	313.413	0.06	0.02	8.35
3591.00	0.480	5.680	3590.92	-2.16	1.87	-1.10	1642174.00	494141.57	39°50'59.005"N	80°46'28.172"W	2.17	329.559	0.18	0.12	-18.33
3686.00	0.520	16.210	3685.92	-2.73	2.68	-0.94	1642174.16	494142.38	39°50'59.013"N	80°46'28.171"W	2.84	340.697	0.11	0.04	11.08
3780.00	0.600	21.990	3779.92	-3.27	3.54	-0.63	1642174.47	494143.24	39°50'59.021"N	80°46'28.167"W	3.60	349.849	0.10	0.09	6.15
3875.00	0.640	31.530	3874.91	-3.75	4.46	-0.17	1642174.93	494144.16	39°50'59.030"N	80°46'28.161"W	4.46	357.806	0.12	0.04	10.04
3970.00	0.430	11.310	3969.91	-4.21	5.26	0.18	1642175.28	494144.96	39°50'59.038"N	80°46'28.157"W	5.26	1.924	0.29	-0.22	-21.28
4066.00	0.630	9.970	4065.90	-4.83	6.13	0.34	1642175.44	494145.83	39°50'59.047"N	80°46'28.155"W	6.14	3.161	0.21	0.21	-1.40
4161.00	0.390	255.930	4160.90	-5.31	6.57	0.12	1642175.22	494146.27	39°50'59.051"N	80°46'28.158"W	6.57	1.007	0.91	-0.25	-120.04
4255.00	0.320	224.570	4254.90	-5.38	6.30	-0.38	1642174.72	494146.00	39°50'59.049"N	80°46'28.164"W	6.31	356.558	0.22	-0.07	-33.36
4350.00	0.150	251.190	4349.90	-5.37	6.07	-0.68	1642174.42	494145.77	39°50'59.046"N	80°46'28.168"W	6.11	353.584	0.21	-0.18	28.02
4445.00	0.480	1.820	4444.90	-5.72	6.43	-0.79	1642174.31	494146.13	39°50'59.050"N	80°46'28.169"W	6.48	353.015	0.58	0.35	116.45
4540.00	0.870	11.230	4539.89	-6.54	7.54	-0.63	1642174.47	494147.24	39°50'59.061"N	80°46'28.168"W	7.56	355.184	0.43	0.41	9.91
4634.00	0.590	356.310	4633.88	-7.44	8.72	-0.53	1642174.57	494148.42	39°50'59.073"N	80°46'28.166"W	8.74	356.541	0.36	-0.30	-15.87
4729.00	0.570	5.410	4728.88	-8.22	9.68	-0.51	1642174.59	494149.38	39°50'59.082"N	80°46'28.166"W	9.69	356.960	0.10	-0.02	9.58
4824.00	0.130	351.470	4823.87	-8.68	10.26	-0.49	1642174.61	494149.95	39°50'59.088"N	80°46'28.166"W	10.27	357.290	0.47	-0.46	-14.67

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HG ENERGY	Slot	Slot F
Area	Marshall County, WV	Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)	Wellbore	MND1 FHS PWB
Facility	MND1 Pad		

WELLPATH DATA (190 stations) † = interpolated/extrapolated station															
MD	Inclination	Azimuth	TVD	Vert Sect	North	East	Grid East	Grid North	Latitude	Longitude	Closure Dist	Closure Dir	DLS	Build Rate	Turn Rate
[ft]	[°]	[°]	[ft]	[ft]	[ft]	[ft]	[US ft]	[US ft]			[ft]	[°]	[°/100ft]	[°/100ft]	[°/100ft]
4919.00	0.440	208.770	4918.87	-8.61	10.04	-0.68	1642174.42	494149.74	39°50'59.086"N	80°46'28.169"W	10.06	356.143	0.58	0.33	-150.21
5013.00	0.260	142.560	5012.87	-8.24	9.56	-0.72	1642174.38	494149.26	39°50'59.081"N	80°46'28.169"W	9.58	355.685	0.44	-0.19	-70.44
5108.00	0.340	99.870	5107.87	-7.83	9.34	-0.31	1642174.79	494149.04	39°50'59.079"N	80°46'28.164"W	9.34	358.084	0.24	0.08	-44.94
5203.00	0.390	85.950	5202.87	-7.46	9.31	0.29	1642175.39	494149.01	39°50'59.079"N	80°46'28.156"W	9.32	1.771	0.11	0.05	-14.65
5321.00	0.340	37.400	5320.87	-7.35	9.62	0.90	1642176.00	494149.32	39°50'59.082"N	80°46'28.148"W	9.65	5.353	0.26	-0.04	-41.14
5411.00	0.340	37.400	5410.87	-7.52	10.04	1.23	1642176.33	494149.74	39°50'59.086"N	80°46'28.144"W	10.12	6.958	0.00	0.00	0.00
5421.00†	0.574	256.010	5420.86	-7.55	10.05	1.19	1642176.29	494149.75	39°50'59.086"N	80°46'28.145"W	10.12	6.778	8.66	2.34	-1413.90
5521.00†	9.216	242.694	5520.41	-8.80	6.25	-6.42	1642168.68	494145.95	39°50'59.047"N	80°46'28.242"W	8.96	314.232	8.66	8.64	-13.32
5621.00†	17.875	242.263	5617.53	-11.82	-4.59	-27.16	1642147.94	494135.11	39°50'58.937"N	80°46'28.605"W	27.54	260.417	8.66	8.66	-0.43
5721.00†	26.534	242.109	5710.03	-16.54	-22.21	-60.55	1642114.55	494117.49	39°50'58.758"N	80°46'28.930"W	64.49	249.856	8.66	8.66	-0.15
5821.00†	35.193	242.027	5795.79	-22.84	-46.22	-105.83	1642069.28	494093.48	39°50'58.515"N	80°46'29.506"W	115.48	246.406	8.66	8.66	-0.08
5921.00†	43.852	241.973	5872.85	-30.58	-76.07	-161.96	1642013.15	494063.63	39°50'58.212"N	80°46'30.221"W	178.94	244.841	8.66	8.66	-0.05
6021.00†	52.511	241.935	5939.47	-39.60	-111.08	-227.67	1641947.44	494028.63	39°50'57.857"N	80°46'31.057"W	253.32	243.992	8.66	8.66	-0.04
6121.00†	61.169	241.905	5994.11	-49.67	-150.45	-301.46	1641873.66	493989.26	39°50'57.457"N	80°46'31.995"W	336.92	243.478	8.66	8.66	-0.03
6221.00†	69.828	241.879	6035.54	-60.58	-193.28	-381.65	1641793.47	493946.43	39°50'57.023"N	80°46'33.016"W	427.80	243.141	8.66	8.66	-0.03
6254.97	72.770	241.871	6046.43	-64.43	-208.45	-410.02	1641765.10	493931.27	39°50'56.869"N	80°46'33.377"W	459.96	243.052	8.66	8.66	-0.02
6321.00†	72.559	235.885	6066.12	-68.69	-241.01	-463.95	1641711.17	493898.71	39°50'56.540"N	80°46'34.062"W	522.81	242.550	8.66	-0.32	-9.07
6421.00†	72.581	226.808	6096.14	-62.62	-300.53	-538.37	1641636.76	493839.19	39°50'55.941"N	80°46'35.005"W	616.57	240.829	8.66	0.02	-9.08
6521.00†	73.011	217.754	6125.77	-41.60	-371.12	-602.55	1641572.58	493768.60	39°50'55.235"N	80°46'35.815"W	707.67	238.370	8.66	0.43	-9.05
6621.00†	73.839	208.760	6154.35	-6.13	-451.18	-655.03	1641520.10	493688.54	39°50'54.436"N	80°46'36.473"W	795.38	235.441	8.66	0.83	-8.99
6721.00†	75.040	199.858	6181.22	43.00	-538.88	-694.62	1641480.51	493600.85	39°50'53.564"N	80°46'36.965"W	879.14	232.196	8.66	1.20	-8.90
6821.00†	76.581	191.068	6205.78	104.67	-632.22	-720.42	1641454.72	493507.51	39°50'52.638"N	80°46'37.279"W	958.49	228.731	8.66	1.54	-8.79
6921.00†	78.422	182.401	6227.46	177.46	-729.07	-731.83	1641443.31	493410.66	39°50'51.679"N	80°46'37.407"W	1033.02	225.108	8.66	1.84	-8.67
7021.00†	80.516	173.854	6245.77	259.73	-827.23	-728.59	1641446.54	493312.51	39°50'50.710"N	80°46'37.348"W	1102.35	221.372	8.66	2.09	-8.55
7121.00†	82.815	165.416	6260.29	349.58	-924.46	-710.79	1641464.35	493215.29	39°50'49.751"N	80°46'37.102"W	1166.13	217.556	8.66	2.30	-8.44
7221.00†	85.267	157.065	6270.69	444.98	-1018.54	-678.82	1641496.32	493121.21	39°50'48.826"N	80°46'36.675"W	1224.02	213.682	8.66	2.45	-8.35
7321.00†	87.817	148.775	6276.73	543.76	-1107.33	-633.41	1641541.72	493032.43	39°50'47.955"N	80°46'36.077"W	1275.69	209.770	8.66	2.55	-8.29
7366.65	89.000	145.000	6278.00	589.37	-1145.59	-608.46	1641566.65	492994.21	39°50'47.581"N	80°46'35.750"W	1297.13	207.976	8.66	2.59	-8.27
7421.00†	89.000	145.000	6278.95	643.70	-1190.05	-577.32	1641597.81	492949.71	39°50'47.146"N	80°46'35.342"W	1322.70	205.879	0.00	0.00	0.00
7521.00†	89.000	145.000	6280.69	743.68	-1271.96	-519.97	1641655.15	492867.81	39°50'46.344"N	80°46'34.592"W	1374.13	202.235	0.00	0.00	0.00

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HG ENERGY	Slot	Slot F
Area	Marshall County, WV	Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)	Wellbore	MND1 FHS PWB
Facility	MND1 Pad		

WELLPATH DATA (190 stations) † = Interpolated/extrapolated station															
MD [m]	Inclination [°]	Azimuth [°]	TVD [m]	Vert Sect [m]	North [m]	East [m]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Closure Dist [m]	Closure Dir [°]	DLS [°/100ft]	Build Rate [°/100ft]	Turn Rate [°/100ft]
7621.00†	89.000	145.000	6282.44	843.67	-1353.86	-462.62	1641712.50	492785.91	39°50'45.543"N	80°46'33.842"W	1430.72	198.866	0.00	0.00	0.00
7721.00†	89.000	145.000	6284.18	943.65	-1435.76	-405.28	1641769.85	492704.01	39°50'44.742"N	80°46'33.092"W	1491.87	195.763	0.00	0.00	0.00
7821.00†	89.000	145.000	6285.93	1043.64	-1517.67	-347.93	1641827.19	492622.12	39°50'43.940"N	80°46'32.342"W	1557.04	192.912	0.00	0.00	0.00
7921.00†	89.000	145.000	6287.67	1143.62	-1599.57	-290.58	1641884.54	492540.22	39°50'43.139"N	80°46'31.592"W	1625.75	190.296	0.00	0.00	0.00
8021.00†	89.000	145.000	6289.42	1243.61	-1681.47	-233.23	1641941.88	492458.32	39°50'42.338"N	80°46'30.842"W	1697.57	187.897	0.00	0.00	0.00
8121.00†	89.000	145.000	6291.17	1343.59	-1763.37	-175.88	1641999.23	492376.42	39°50'41.537"N	80°46'30.092"W	1772.12	185.696	0.00	0.00	0.00
8221.00†	89.000	145.000	6292.91	1443.58	-1845.28	-118.53	1642056.57	492294.52	39°50'40.735"N	80°46'29.342"W	1849.08	183.675	0.00	0.00	0.00
8321.00†	89.000	145.000	6294.66	1543.56	-1927.18	-61.18	1642113.92	492212.62	39°50'39.934"N	80°46'28.592"W	1928.15	181.818	0.00	0.00	0.00
8421.00†	89.000	145.000	6296.40	1643.54	-2009.08	-3.83	1642171.27	492130.72	39°50'39.133"N	80°46'27.842"W	2009.09	180.109	0.00	0.00	0.00
8521.00†	89.000	145.000	6298.15	1743.53	-2090.99	53.51	1642228.61	492048.83	39°50'38.331"N	80°46'27.092"W	2091.67	178.534	0.00	0.00	0.00
8621.00†	89.000	145.000	6299.89	1843.51	-2172.89	110.86	1642285.96	491966.93	39°50'37.530"N	80°46'26.342"W	2175.71	177.079	0.00	0.00	0.00
8721.00†	89.000	145.000	6301.64	1943.50	-2254.79	168.21	1642343.30	491885.03	39°50'36.729"N	80°46'25.592"W	2261.06	175.734	0.00	0.00	0.00
8821.00†	89.000	145.000	6303.38	2043.48	-2336.69	225.56	1642400.65	491803.13	39°50'35.927"N	80°46'24.842"W	2347.56	174.486	0.00	0.00	0.00
8921.00†	89.000	145.000	6305.13	2143.47	-2418.60	282.91	1642457.99	491721.23	39°50'35.126"N	80°46'24.092"W	2435.09	173.328	0.00	0.00	0.00
9021.00†	89.000	145.000	6306.87	2243.45	-2500.50	340.26	1642515.34	491639.33	39°50'34.325"N	80°46'23.342"W	2523.54	172.251	0.00	0.00	0.00
9121.00†	89.000	145.000	6308.62	2343.44	-2582.40	397.61	1642572.68	491557.44	39°50'33.523"N	80°46'22.592"W	2612.83	171.247	0.00	0.00	0.00
9221.00†	89.000	145.000	6310.36	2443.42	-2664.31	454.95	1642630.03	491475.54	39°50'32.722"N	80°46'21.842"W	2702.87	170.310	0.00	0.00	0.00
9321.00†	89.000	145.000	6312.11	2543.41	-2746.21	512.30	1642687.38	491393.64	39°50'31.921"N	80°46'21.092"W	2793.59	169.433	0.00	0.00	0.00
9421.00†	89.000	145.000	6313.85	2643.39	-2828.11	569.65	1642744.72	491311.74	39°50'31.119"N	80°46'20.342"W	2884.91	168.612	0.00	0.00	0.00
9521.00†	89.000	145.000	6315.60	2743.38	-2910.01	627.00	1642802.07	491229.84	39°50'30.318"N	80°46'19.592"W	2976.80	167.841	0.00	0.00	0.00
9621.00†	89.000	145.000	6317.34	2843.36	-2991.92	684.35	1642859.41	491147.94	39°50'29.517"N	80°46'18.842"W	3069.19	167.116	0.00	0.00	0.00
9721.00†	89.000	145.000	6319.09	2943.35	-3073.82	741.70	1642916.76	491066.04	39°50'28.716"N	80°46'18.092"W	3162.04	166.434	0.00	0.00	0.00
9821.00†	89.000	145.000	6320.83	3043.33	-3155.72	799.05	1642974.10	490984.15	39°50'27.914"N	80°46'17.342"W	3255.31	165.791	0.00	0.00	0.00
9921.00†	89.000	145.000	6322.58	3143.32	-3237.63	856.40	1643031.45	490902.25	39°50'27.113"N	80°46'16.592"W	3348.98	165.164	0.00	0.00	0.00
10021.00†	89.000	145.000	6324.32	3243.30	-3319.53	913.74	1643088.80	490820.35	39°50'26.312"N	80°46'15.842"W	3442.99	164.610	0.00	0.00	0.00
10121.00†	89.000	145.000	6326.07	3343.29	-3401.43	971.09	1643146.14	490738.45	39°50'25.510"N	80°46'15.092"W	3537.34	164.066	0.00	0.00	0.00
10221.00†	89.000	145.000	6327.82	3443.27	-3483.33	1028.44	1643203.49	490656.55	39°50'24.709"N	80°46'14.342"W	3631.98	163.551	0.00	0.00	0.00
10321.00†	89.000	145.000	6329.56	3543.26	-3565.24	1085.79	1643260.83	490574.65	39°50'23.908"N	80°46'13.592"W	3726.91	163.062	0.00	0.00	0.00
10421.00†	89.000	145.000	6331.31	3643.24	-3647.14	1143.14	1643318.18	490492.76	39°50'23.106"N	80°46'12.842"W	3822.09	162.597	0.00	0.00	0.00
10521.00†	89.000	145.000	6333.05	3743.22	-3729.04	1200.49	1643375.52	490410.86	39°50'22.305"N	80°46'12.092"W	3917.52	162.155	0.00	0.00	0.00

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REFERENCE WELLPATH IDENTIFICATION					
Operator	HG ENERGY			Slot	Slot F
Area	Marshall County, WV			Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)			Wellbore	MND1 FHS PWB
Facility	MND1 Pad				

WELLPATH DATA (190 stations) † = interpolated/extrapolated station															
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [ft/100ft]	Build Rate [ft/100ft]	Turn Rate [°/100ft]
10621.00†	89.000	145.000	6334.80	3843.21	-3810.95	1257.84	1643432.87	490328.96	39°50'21.504"N	80°46'11.342"W	4013.16	161.734	0.00	0.00	0.00
10721.00†	89.000	145.000	6336.54	3943.19	-3892.85	1315.18	1643490.21	490247.06	39°50'20.702"N	80°46'10.592"W	4109.01	161.333	0.00	0.00	0.00
10821.00†	89.000	145.000	6338.29	4043.18	-3974.75	1372.53	1643547.56	490165.16	39°50'19.901"N	80°46'09.842"W	4205.06	160.950	0.00	0.00	0.00
10921.00†	89.000	145.000	6340.03	4143.16	-4056.66	1429.88	1643604.91	490083.26	39°50'19.100"N	80°46'09.092"W	4301.28	160.584	0.00	0.00	0.00
11021.00†	89.000	145.000	6341.78	4243.15	-4138.56	1487.23	1643662.25	490001.36	39°50'18.298"N	80°46'08.342"W	4397.67	160.234	0.00	0.00	0.00
11121.00†	89.000	145.000	6343.52	4343.13	-4220.46	1544.58	1643719.60	489919.47	39°50'17.497"N	80°46'07.592"W	4494.22	159.899	0.00	0.00	0.00
11221.00†	89.000	145.000	6345.27	4443.12	-4302.36	1601.93	1643776.94	489837.57	39°50'16.696"N	80°46'06.843"W	4590.92	159.578	0.00	0.00	0.00
11321.00†	89.000	145.000	6347.01	4543.10	-4384.27	1659.28	1643834.29	489755.67	39°50'15.894"N	80°46'06.093"W	4687.75	159.270	0.00	0.00	0.00
11421.00†	89.000	145.000	6348.76	4643.09	-4466.17	1716.63	1643891.63	489673.77	39°50'15.093"N	80°46'05.343"W	4784.71	158.975	0.00	0.00	0.00
11521.00†	89.000	145.000	6350.50	4743.07	-4548.07	1773.97	1643948.98	489591.87	39°50'14.291"N	80°46'04.593"W	4881.80	158.692	0.00	0.00	0.00
11621.00†	89.000	145.000	6352.25	4843.06	-4629.98	1831.32	1644006.32	489509.97	39°50'13.490"N	80°46'03.843"W	4979.00	158.419	0.00	0.00	0.00
11721.00†	89.000	145.000	6353.99	4943.04	-4711.88	1888.67	1644063.67	489428.07	39°50'12.689"N	80°46'03.093"W	5076.31	158.158	0.00	0.00	0.00
11821.00†	89.000	145.000	6355.74	5043.03	-4793.78	1946.02	1644121.02	489346.18	39°50'11.887"N	80°46'02.343"W	5173.72	157.905	0.00	0.00	0.00
11921.00†	89.000	145.000	6357.48	5143.01	-4875.68	2003.37	1644178.36	489264.28	39°50'11.086"N	80°46'01.593"W	5271.22	157.663	0.00	0.00	0.00
12021.00†	89.000	145.000	6359.23	5243.00	-4957.59	2060.72	1644235.71	489182.38	39°50'10.285"N	80°46'00.843"W	5368.82	157.429	0.00	0.00	0.00
12121.00†	89.000	145.000	6360.97	5342.98	-5039.49	2118.07	1644293.05	489100.48	39°50'09.483"N	80°46'00.094"W	5466.50	157.203	0.00	0.00	0.00
12221.00†	89.000	145.000	6362.72	5442.97	-5121.39	2175.42	1644350.40	489018.58	39°50'08.682"N	80°45'59.344"W	5564.27	156.986	0.00	0.00	0.00
12321.00†	89.000	145.000	6364.47	5542.95	-5203.30	2232.76	1644407.74	488936.68	39°50'07.881"N	80°45'58.594"W	5662.11	156.776	0.00	0.00	0.00
12421.00†	89.000	145.000	6366.21	5642.94	-5285.20	2290.11	1644465.09	488854.79	39°50'07.079"N	80°45'57.844"W	5760.03	156.573	0.00	0.00	0.00
12521.00†	89.000	145.000	6367.96	5742.92	-5367.10	2347.46	1644522.44	488772.89	39°50'06.278"N	80°45'57.094"W	5858.02	156.376	0.00	0.00	0.00
12621.00†	89.000	145.000	6369.70	5842.91	-5449.00	2404.81	1644579.78	488690.99	39°50'05.477"N	80°45'56.344"W	5956.07	156.187	0.00	0.00	0.00
12721.00†	89.000	145.000	6371.45	5942.89	-5530.91	2462.16	1644637.13	488609.09	39°50'04.675"N	80°45'55.594"W	6054.18	156.003	0.00	0.00	0.00
12821.00†	89.000	145.000	6373.19	6042.87	-5612.81	2519.51	1644694.47	488527.19	39°50'03.874"N	80°45'54.845"W	6152.36	155.825	0.00	0.00	0.00
12921.00†	89.000	145.000	6374.94	6142.86	-5694.71	2576.86	1644751.82	488445.29	39°50'03.072"N	80°45'54.095"W	6250.60	155.653	0.00	0.00	0.00
13021.00†	89.000	145.000	6376.68	6242.84	-5776.62	2634.20	1644809.16	488363.39	39°50'02.271"N	80°45'53.345"W	6348.88	155.486	0.00	0.00	0.00
13121.00†	89.000	145.000	6378.43	6342.83	-5858.52	2691.55	1644866.51	488281.50	39°50'01.470"N	80°45'52.595"W	6447.22	155.325	0.00	0.00	0.00
13221.00†	89.000	145.000	6380.17	6442.81	-5940.42	2748.90	1644923.85	488199.60	39°50'00.668"N	80°45'51.845"W	6545.61	155.168	0.00	0.00	0.00
13321.00†	89.000	145.000	6381.92	6542.80	-6022.32	2806.25	1644981.20	488117.70	39°49'59.867"N	80°45'51.095"W	6644.05	155.016	0.00	0.00	0.00
13421.00†	89.000	145.000	6383.66	6642.78	-6104.23	2863.60	1645038.55	488035.80	39°49'59.066"N	80°45'50.346"W	6742.54	154.868	0.00	0.00	0.00
13521.00†	89.000	145.000	6385.41	6742.77	-6186.13	2920.95	1645095.89	487953.90	39°49'58.264"N	80°45'49.596"W	6841.06	154.724	0.00	0.00	0.00

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HG ENERGY	Slot	Slot F
Area	Marshall County, WV	Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)	Wellbore	MND1 FHS PWB
Facility	MND1 Pad		

WELLPATH DATA (190 stations) † = interpolated/extrapolated station															
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]	Build Rate [°/100ft]	Turn Rate [°/100ft]
13621.00†	89.000	145.000	6387.15	6842.75	-6268.03	2978.30	1645153.24	487872.00	39°49'57.463"N	80°45'48.846"W	6939.63	154.585	0.00	0.00	0.00
13721.00†	89.000	145.000	6388.90	6942.74	-6349.94	3035.65	1645210.58	487790.10	39°49'56.661"N	80°45'48.096"W	7038.24	154.449	0.00	0.00	0.00
13821.00†	89.000	145.000	6390.64	7042.72	-6431.84	3092.99	1645267.93	487708.21	39°49'55.860"N	80°45'47.347"W	7136.89	154.318	0.00	0.00	0.00
13921.00†	89.000	145.000	6392.39	7142.71	-6513.74	3150.34	1645325.27	487626.31	39°49'55.059"N	80°45'46.597"W	7235.57	154.189	0.00	0.00	0.00
14021.00†	89.000	145.000	6394.13	7242.69	-6595.64	3207.69	1645382.62	487544.41	39°49'54.257"N	80°45'45.847"W	7334.29	154.065	0.00	0.00	0.00
14121.00†	89.000	145.000	6395.88	7342.68	-6677.55	3265.04	1645439.96	487462.51	39°49'53.456"N	80°45'45.097"W	7433.04	153.943	0.00	0.00	0.00
14221.00†	89.000	145.000	6397.63	7442.66	-6759.45	3322.39	1645497.31	487380.61	39°49'52.655"N	80°45'44.347"W	7531.83	153.825	0.00	0.00	0.00
14321.00†	89.000	145.000	6399.37	7542.65	-6841.35	3379.74	1645554.66	487298.71	39°49'51.853"N	80°45'43.598"W	7630.64	153.710	0.00	0.00	0.00
14421.00†	89.000	145.000	6401.12	7642.63	-6923.26	3437.09	1645612.00	487216.82	39°49'51.052"N	80°45'42.848"W	7729.49	153.598	0.00	0.00	0.00
14521.00†	89.000	145.000	6402.86	7742.62	-7005.16	3494.43	1645669.35	487134.92	39°49'50.250"N	80°45'42.098"W	7828.37	153.488	0.00	0.00	0.00
14621.00†	89.000	145.000	6404.61	7842.60	-7087.06	3551.78	1645726.69	487053.02	39°49'49.449"N	80°45'41.348"W	7927.27	153.382	0.00	0.00	0.00
14721.00†	89.000	145.000	6406.35	7942.59	-7168.96	3609.13	1645784.04	486971.12	39°49'48.648"N	80°45'40.599"W	8026.20	153.278	0.00	0.00	0.00
14821.00†	89.000	145.000	6408.10	8042.57	-7250.87	3666.48	1645841.38	486889.22	39°49'47.846"N	80°45'39.849"W	8125.16	153.176	0.00	0.00	0.00
14921.00†	89.000	145.000	6409.84	8142.55	-7332.77	3723.83	1645898.73	486807.32	39°49'47.045"N	80°45'39.099"W	8224.14	153.077	0.00	0.00	0.00
15021.00†	89.000	145.000	6411.59	8242.54	-7414.67	3781.18	1645956.08	486725.42	39°49'46.243"N	80°45'38.349"W	8323.14	152.980	0.00	0.00	0.00
15121.00†	89.000	145.000	6413.33	8342.52	-7496.58	3838.53	1646013.42	486643.53	39°49'45.442"N	80°45'37.600"W	8422.17	152.886	0.00	0.00	0.00
15221.00†	89.000	145.000	6415.08	8442.51	-7578.48	3895.88	1646070.77	486561.63	39°49'44.641"N	80°45'36.850"W	8521.22	152.794	0.00	0.00	0.00
15321.00†	89.000	145.000	6416.82	8542.49	-7660.38	3953.22	1646128.11	486479.73	39°49'43.839"N	80°45'36.100"W	8620.29	152.704	0.00	0.00	0.00
15421.00†	89.000	145.000	6418.57	8642.48	-7742.28	4010.57	1646185.46	486397.83	39°49'43.038"N	80°45'35.351"W	8719.38	152.615	0.00	0.00	0.00
15521.00†	89.000	145.000	6420.31	8742.46	-7824.19	4067.92	1646242.80	486315.93	39°49'42.236"N	80°45'34.601"W	8818.50	152.529	0.00	0.00	0.00
15621.00†	89.000	145.000	6422.06	8842.45	-7906.09	4125.27	1646300.15	486234.03	39°49'41.435"N	80°45'33.851"W	8917.63	152.445	0.00	0.00	0.00
15721.00†	89.000	145.000	6423.80	8942.43	-7987.99	4182.62	1646357.49	486152.14	39°49'40.634"N	80°45'33.102"W	9016.78	152.363	0.00	0.00	0.00
15821.00†	89.000	145.000	6425.55	9042.42	-8069.90	4239.97	1646414.84	486070.24	39°49'39.832"N	80°45'32.352"W	9115.95	152.282	0.00	0.00	0.00
15921.00†	89.000	145.000	6427.29	9142.40	-8151.80	4297.32	1646472.19	485988.34	39°49'39.031"N	80°45'31.602"W	9215.14	152.204	0.00	0.00	0.00
16021.00†	89.000	145.000	6429.04	9242.39	-8233.70	4354.67	1646529.53	485906.44	39°49'38.229"N	80°45'30.852"W	9314.34	152.126	0.00	0.00	0.00
16121.00†	89.000	145.000	6430.78	9342.37	-8315.60	4412.01	1646586.88	485824.54	39°49'37.428"N	80°45'30.103"W	9413.56	152.051	0.00	0.00	0.00
16221.00†	89.000	145.000	6432.53	9442.36	-8397.51	4469.36	1646644.22	485742.64	39°49'36.627"N	80°45'29.353"W	9512.80	151.977	0.00	0.00	0.00
16321.00†	89.000	145.000	6434.28	9542.34	-8479.41	4526.71	1646701.57	485660.74	39°49'35.825"N	80°45'28.603"W	9612.05	151.905	0.00	0.00	0.00
16421.00†	89.000	145.000	6436.02	9642.33	-8561.31	4584.06	1646758.91	485578.85	39°49'35.024"N	80°45'27.854"W	9711.32	151.834	0.00	0.00	0.00
16521.00†	89.000	145.000	6437.77	9742.31	-8643.22	4641.41	1646816.26	485496.95	39°49'34.222"N	80°45'27.104"W	9810.60	151.764	0.00	0.00	0.00

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HG ENERGY	Slot	Slot F
Area	Marshall County, WV	Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)	Wellbore	MND1 FHS PWB
Facility	MND1 Pad		

WELLPATH DATA (190 stations) † = interpolated/extrapolated station															
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]	Build Rate [°/100ft]	Turn Rate [°/100ft]
16621.00†	89.000	145.000	6439.51	9842.30	-8725.12	4698.76	1646573.61	485415.05	39°49'33.421"N	80°45'26.354"W	9909.90	151.696	0.00	0.00	0.00
16721.00†	89.000	145.000	6441.26	9942.28	-8807.02	4756.11	1646930.95	485333.15	39°49'32.619"N	80°45'25.605"W	10009.21	151.629	0.00	0.00	0.00
16821.00†	89.000	145.000	6443.00	10042.27	-8888.93	4813.45	1646988.30	485251.25	39°49'31.818"N	80°45'24.855"W	10108.53	151.564	0.00	0.00	0.00
16921.00†	89.000	145.000	6444.75	10142.25	-8970.83	4870.80	1647045.64	485169.35	39°49'31.017"N	80°45'24.106"W	10207.86	151.500	0.00	0.00	0.00
17021.00†	89.000	145.000	6446.49	10242.23	-9052.73	4928.15	1647102.99	485087.45	39°49'30.215"N	80°45'23.356"W	10307.21	151.437	0.00	0.00	0.00
17121.00†	89.000	145.000	6448.24	10342.22	-9134.63	4985.50	1647160.33	485005.56	39°49'29.414"N	80°45'22.606"W	10406.57	151.375	0.00	0.00	0.00
17221.00†	89.000	145.000	6449.98	10442.20	-9216.54	5042.85	1647217.68	484923.66	39°49'28.612"N	80°45'21.857"W	10505.94	151.315	0.00	0.00	0.00
17321.00†	89.000	145.000	6451.73	10542.19	-9298.44	5100.20	1647275.02	484841.76	39°49'27.811"N	80°45'21.107"W	10605.33	151.255	0.00	0.00	0.00
17421.00†	89.000	145.000	6453.47	10642.17	-9380.34	5157.55	1647332.37	484759.86	39°49'27.009"N	80°45'20.357"W	10704.72	151.197	0.00	0.00	0.00
17486.67	89.000	145.000	6454.62	10707.84	-9434.13	5195.21	1647370.03	484706.08	39°49'26.483"N	80°45'19.865"W	10770.01	151.159	0.00	0.00	0.00

HOLE & CASING SECTIONS - Ref Wellbore: MND1 FHS PWB Ref Wellpath: MND1 FHS PWP Rev-C.0										
String/Diameter	Start MD [ft]	End MD [ft]	Interval [ft]	Start TVD [ft]	End TVD [ft]	Start N/S [ft]	Start E/W [ft]	End N/S [ft]	End E/W [ft]	
20in Conductor	25.00	65.00	40.00	25.00	65.00	0.00	0.00	0.05	0.02	0.02
17.5in Open Hole	65.00	1170.00	1105.00	65.00	1169.97	0.05	0.02	4.56	-2.91	-2.82
13.375in Casing Surface	25.00	1125.00	1100.00	25.00	1124.97	0.00	0.00	5.01	-2.82	-4.35
12.25in Open Hole	1170.00	2609.00	1439.00	1169.97	2608.94	4.56	-2.91	-2.16	-4.35	-4.53
9.625in Casing Intermediate	25.00	2525.00	2500.00	25.00	2524.94	0.00	0.00	-2.26	-4.53	5195.21
8.5in Open Hole	2609.00	17486.67	14877.67	2608.94	6454.62	-2.16	-4.35	-9434.13	5195.21	5195.17
5.5in Casing Production	25.00	17486.60	17461.60	25.00	6454.62	0.00	0.00	-9434.07	5195.17	

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HG ENERGY	Slot	Slot F
Area	Marshall County, WV	Well	MND1 FHS
Field	Marshall (NAD27 SP Northern Zone 4701)	Wellbore	MND1 FHS PWB
Facility	MND1 Pad		

TARGETS									
Name	MD [ft]	TVD [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Shape
1) MND1 West FHS LP Rev-4	7366.66	6278.00	-1145.55	-608.48	1641566.65	492994.21	39°50'47.581"N	80°46'35.750"W	point
2) MND1 West FHS BHL Rev-2	17486.67	6454.62	-9434.13	5195.21	1647370.03	484706.08	39°49'26.483"N	80°45'19.865"W	point

SURVEY PROGRAM - Ref Wellbore: MND1 FHS PWB Ref Wellpath: MND1 FHS PWP Rev-C.0				
Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore
25.00	1081.00	OWSG MWD rev2 + HRGM	01_WFD EM <17-1/2"> (130'-1069')	MND1 FHS AWB
1081.00	2551.00	OWSG MWD rev2 + HRGM	02_WFD EM <12-1/4"> (1069')(1158'-2539')	MND1 FHS AWB
2551.00	5321.00	OWSG MWD rev2 + HRGM	03_WFD EM <8-1/2"> (2539')(2629'-5309')	MND1 FHS AWB
5321.00	17486.67	BHI AutoTrak Curve (Short)	BH AT Curve <8-1/2">	MND1 FHS PWB

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