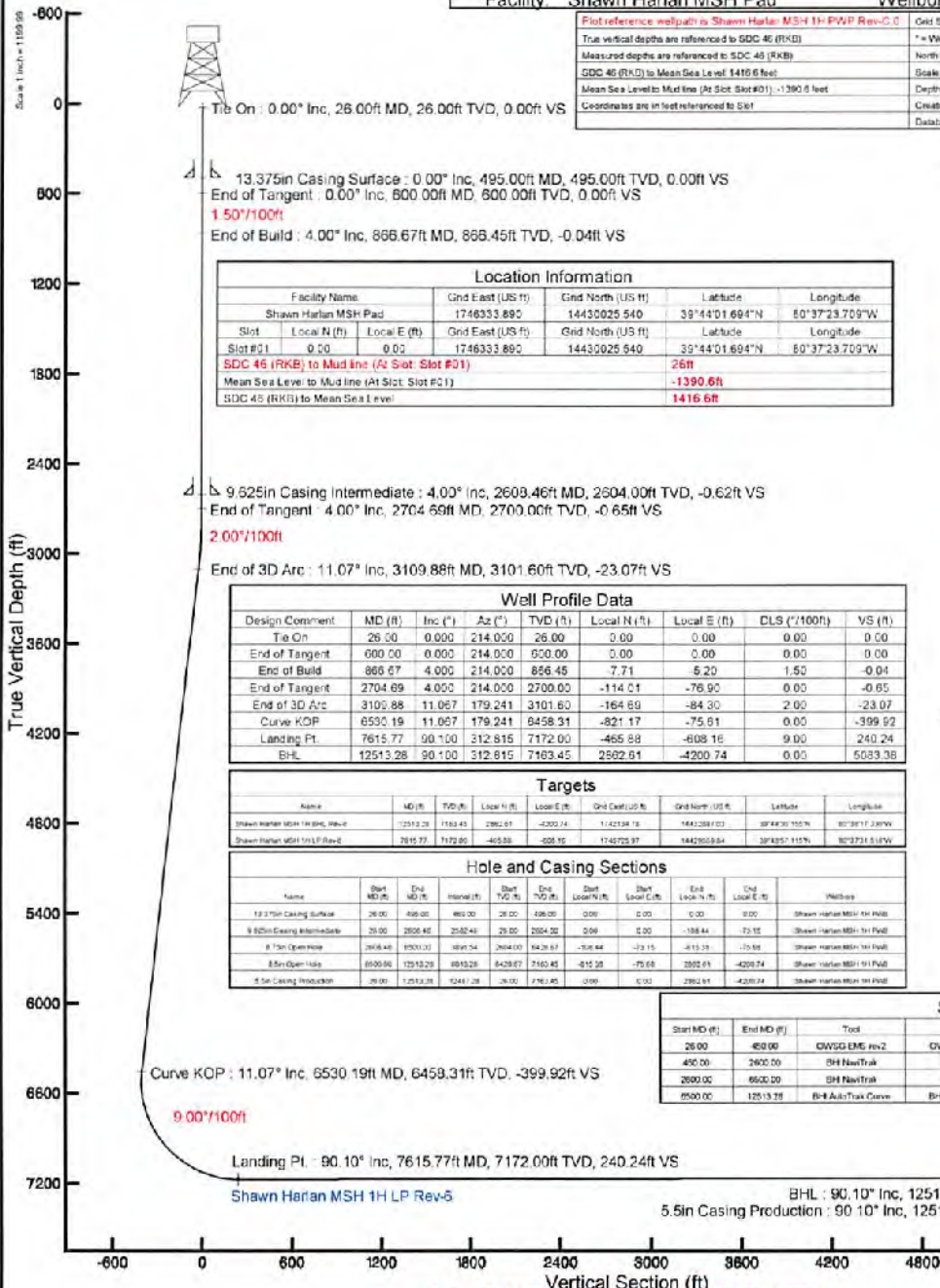


SOUTHWESTERN ENERGY

Location: Marshall County, WV Slot: Slot #01
 Field: Marshall Well: Shawn Harlan MSH 1H
 Facility: Shawn Harlan MSH Pad Wellbore: Shawn Harlan MSH 1H PWB

Plot reference wellpath is Shawn Harlan MSH 1H PWB Rev-0.0	Grid System: NAD83 / UTM Zone 17 North, US feet
True vertical depths are referenced to SDC 46 (RKB)	* = Wellpath was transformed from a different geoid datum
Measured depths are referenced to SDC 46 (RKB)	North Reference: Grid north
SDC 46 (RKB) to Mean Sea Level: 1416.6 feet	Scale: True distance
Mean Sea Level to Mudline (At Slot: Slot #01): -1390.6 feet	Depths are in feet
Coordinates are in feet referenced to GSA	Created by: edba/jar on 2016-11-21
	Database: WA_MPL_EASTERNUS_Dch



Location Information					
Facility Name	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	
Shawn Harlan MSH Pad	1746333.890	14430225.540	39°44'01.694"N	80°37'23.709"W	
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude
Slot #01	0.00	0.00	1746333.890	14430225.540	39°44'01.694"N
SDC 46 (RKB) to Mudline (At Slot: Slot #01)	26ft				
Mean Sea Level to Mudline (At Slot: Slot #01)	-1390.6ft				
SDC 46 (RKB) to Mean Sea Level	1416.6ft				

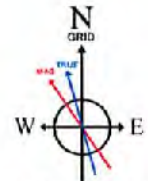
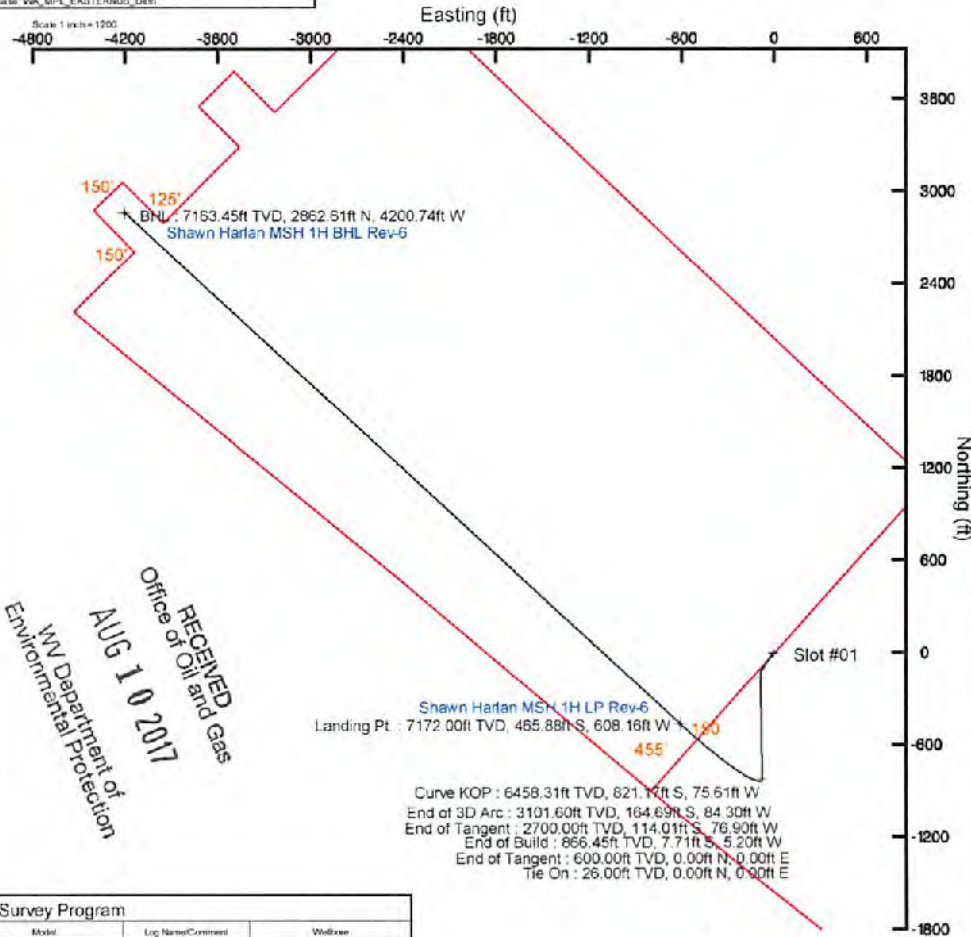
Well Profile Data								
Design Comment	MD (ft)	Inc (°)	Az (°)	TVD (ft)	Local N (ft)	Local E (ft)	DLS (°/100ft)	VS (ft)
Tie On	26.00	0.000	214.000	26.00	0.00	0.00	0.00	0.00
End of Tangent	600.00	0.000	214.000	600.00	0.00	0.00	0.00	0.00
End of Build	866.67	4.000	214.000	866.45	7.71	-5.20	1.50	-0.04
End of Tangent	2704.69	4.000	214.000	2700.00	-114.01	-76.90	0.00	-0.65
End of 3D Arc	3109.88	11.067	179.241	3101.60	-164.69	-84.30	2.00	-23.07
Curve KOP	6530.19	11.067	179.241	6458.31	-821.17	-75.61	0.00	-399.92
Landing Pt.	7615.77	90.100	312.815	7172.00	-465.88	-608.16	9.00	240.24
BHL	12513.28	90.100	312.815	7163.45	-2592.51	-4200.74	0.00	5083.38

Targets							
Name	MD (ft)	TVD (ft)	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude
Shawn Harlan MSH 1H LP Rev-5	7615.77	7172.00	312.815	-465.88	1746333.89	14430225.54	39°44'01.694"N
Shawn Harlan MSH 1H BHL Rev-6	12513.28	7163.45	312.815	-2592.51	1746333.89	14430225.54	39°44'01.694"N

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
17.375in Casing Surface	26.00	495.00	469.00	26.00	495.00	0.00	0.00	0.00	0.00	Shawn Harlan MSH 1H PWB
9.625in Casing Intermediate	26.00	2609.46	2583.46	26.00	2609.46	0.00	0.00	-164.69	-75.16	Shawn Harlan MSH 1H PWB
8.125in Open Hole	2609.46	6530.19	3920.73	2604.00	6458.31	-114.01	-76.90	-114.01	-75.61	Shawn Harlan MSH 1H PWB
8.5in Open Hole	6530.19	7615.77	1085.29	6458.31	7163.45	-821.17	-75.61	-2592.51	-4200.74	Shawn Harlan MSH 1H PWB
5.5in Casing Production	7615.77	12513.28	4897.51	7172.00	7163.45	-465.88	-608.16	-2592.51	-4200.74	Shawn Harlan MSH 1H PWB

Survey Program					
Start MD (ft)	End MD (ft)	Tool	Model	Log Name/Comment	Wellbore
26.00	495.00	QW50 EMS rev2	QW50 EMS rev2 - HRCM	MS3 <17.12>	Shawn Harlan MSH 1H PWB
495.00	2609.46	BH NavTrak	BH NavTrak (Asb)	AP3 EM <17.14>	Shawn Harlan MSH 1H PWB
2609.46	6530.19	BH NavTrak	BH NavTrak (Asb)	AP3 EM <6.24>	Shawn Harlan MSH 1H PWB
6530.19	12513.28	BH AutoTrak Curve	BH AutoTrak Curve (Craw)	AT Curve <6.12>	Shawn Harlan MSH 1H PWB

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User specified Dip: 67.04° Field: 52591 nT
 Magnetic North is 8.27 degrees West of True North (at 11/18/2016)
 Grid North is 0.24 degrees East of True North
 To correct azimuth from True to Grid subtract 0.24 degrees
 To correct azimuth from Magnetic to Grid subtract 6.51 degrees

Azimuth 304.27° with reference 0.00 N, 0.00 E

Scale 1 inch = 1200



Actual Wellpath Report

Shawn Harlan MSH 1H AWP Proj: 12492'
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REFERENCE WELLPATH IDENTIFICATION

Operator	SOUTHWESTERN ENERGY	Slot	Slot #01
Area	Marshall County, WV	Well	Shawn Harlan MSH 1H
Field	Marshall	Wellbore	Shawn Harlan MSH 1H AWB
Facility	Shawn Harlan MSH Pad		

REPORT SETUP INFORMATION

Projection System	NAD83 / UTM Zone 17 North, US feet	Software System	WellArchitect@ 5.0
North Reference	Grid	User	Edsaryar
Scale	0.999613	Report Generated	12/27/2016 at 12:27:06 PM
Convergence at slot	0.25° East	Database/Source file	WA_MPL_EASTERNU Defn/Shawn_Harlan_MSH_1H_AWP_Proj_12492_.xml

WELLPATH LOCATION

	Local coordinates		Grid coordinates		Geographic coordinates	
	North[ft]	East[ft]	Easting[US ft]	Northing[US ft]	Latitude	Longitude
Slot Location	0.00	0.00	1746333.89	14430025.54	39°44'01.694"N	80°37'23.709"W
Facility Reference Pt			1746333.89	14430025.54	39°44'01.694"N	80°37'23.709"W
Field Reference Pt			0.00	0.00	0°00'00.000"	85°29'19.478"W

WELLPATH DATUM

Calculation method	Minimum curvature	SDC 46 (RKB) to Facility Vertical Datum	1416.60ft
Horizontal Reference Pt	Slot	SDC 46 (RKB) to Mean Sea Level	1416.60ft
Vertical Reference Pt	SDC 46 (RKB)	SDC 46 (RKB) to Mud Line at Slot (Slot #01)	26.00ft
MD Reference Pt	SDC 46 (RKB)	Section Origin	N 0.00, E 0.00 ft
Field Vertical Reference	Mean Sea Level	Section Azimuth	304.27°

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Actual Wellpath Report

Shawn Harlan MSH 1H AWP Proj: 12492'
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REFERENCE WELLPATH IDENTIFICATION			
Operator	SOUTHWESTERN ENERGY	Slot	Slot #01
Area	Marshall County, WV	Well	Shawn Harlan MSH 1H
Field	Marshall	Wellbore	Shawn Harlan MSH 1H AWB
Facility	Shawn Harlan MSH Pad		

WELLPATH DATA (149 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	116.940	0.00	0.00	0.00	0.00	1746333.89	14430025.54	39°44'01.694"N	80°37'23.709"W	0.00	0.000	0.00	0.00	0.00
26.00	0.000	116.940	26.00	0.00	0.00	0.00	1746333.89	14430025.54	39°44'01.694"N	80°37'23.709"W	0.00	0.000	0.00	0.00	0.00
172.00	0.600	116.940	172.00	-0.76	-0.35	0.68	1746334.57	14430025.19	39°44'01.691"N	80°37'23.700"W	0.76	116.940	0.41	0.41	80.10
265.00	0.300	139.240	264.99	-1.48	-0.75	1.27	1746335.16	14430024.79	39°44'01.686"N	80°37'23.692"W	1.48	120.520	0.37	-0.32	23.98
357.00	0.200	328.740	356.99	-1.56	-0.80	1.35	1746335.24	14430024.74	39°44'01.686"N	80°37'23.691"W	1.57	120.570	0.54	-0.11	-185.33
450.00	0.100	145.440	449.99	-1.49	-0.72	1.31	1746335.20	14430024.82	39°44'01.687"N	80°37'23.692"W	1.50	118.944	0.32	-0.11	190.00
543.00	0.000	211.740	542.99	-1.57	-0.79	1.36	1746335.25	14430024.75	39°44'01.686"N	80°37'23.691"W	1.57	120.265	0.11	-0.11	-156.39
704.00	0.240	97.310	703.99	-1.87	-0.83	1.69	1746335.58	14430024.71	39°44'01.686"N	80°37'23.687"W	1.89	116.266	0.15	0.15	60.44
797.00	0.070	98.560	796.99	-2.09	-0.87	1.94	1746335.83	14430024.67	39°44'01.685"N	80°37'23.684"W	2.13	114.094	0.18	-0.18	1.34
890.00	0.830	179.380	889.99	-2.53	-1.55	2.00	1746335.89	14430023.99	39°44'01.679"N	80°37'23.683"W	2.53	127.719	0.88	0.82	86.90
983.00	2.820	193.680	982.94	-3.72	-4.45	1.47	1746335.36	14430021.10	39°44'01.650"N	80°37'23.690"W	4.68	161.708	2.18	2.14	15.38
1075.00	2.900	197.580	1074.82	-5.18	-8.86	0.23	1746334.12	14430016.68	39°44'01.606"N	80°37'23.706"W	8.87	178.503	0.23	0.09	4.24
1168.00	3.890	202.200	1167.66	-6.52	-14.03	-1.67	1746332.22	14430011.52	39°44'01.555"N	80°37'23.731"W	14.13	186.793	1.10	1.06	4.97
1261.00	5.090	197.550	1260.37	-8.36	-20.88	-4.11	1746329.78	14430004.67	39°44'01.488"N	80°37'23.762"W	21.28	191.127	1.35	1.29	-5.00
1353.00	6.110	197.490	1351.93	-10.95	-29.44	-6.81	1746327.08	14429996.11	39°44'01.403"N	80°37'23.797"W	30.22	193.021	1.11	1.11	-0.07
1446.00	7.440	194.000	1444.28	-14.47	-40.01	-9.75	1746324.14	14429985.55	39°44'01.299"N	80°37'23.836"W	41.18	193.701	1.50	1.43	-3.75
1539.00	8.350	189.870	1536.40	-19.34	-52.50	-12.37	1746321.53	14429973.06	39°44'01.176"N	80°37'23.870"W	53.94	193.255	1.15	0.98	-4.44
1631.00	8.950	184.930	1627.35	-25.61	-66.21	-14.13	1746319.77	14429959.35	39°44'01.040"N	80°37'23.893"W	67.70	192.044	1.04	0.65	-5.37
1724.00	9.540	183.000	1719.15	-33.15	-81.12	-15.15	1746318.74	14429944.45	39°44'00.893"N	80°37'23.907"W	82.52	190.581	0.72	0.63	-2.08
1817.00	9.560	181.200	1810.86	-41.37	-96.53	-15.72	1746318.18	14429929.04	39°44'00.741"N	80°37'23.915"W	97.81	189.248	0.32	0.02	-1.94
1910.00	7.920	183.550	1902.77	-48.86	-110.65	-16.28	1746317.62	14429914.93	39°44'00.601"N	80°37'23.923"W	111.84	188.368	1.80	-1.76	2.53
2002.00	6.360	182.400	1994.06	-54.79	-122.07	-16.88	1746317.01	14429903.52	39°44'00.488"N	80°37'23.931"W	123.23	187.874	1.70	-1.70	-1.25
2095.00	6.860	181.790	2086.44	-60.49	-132.77	-17.27	1746316.63	14429892.82	39°44'00.383"N	80°37'23.937"W	133.89	187.412	0.54	0.54	-0.66
2188.00	6.920	186.500	2178.77	-66.08	-143.89	-18.08	1746315.82	14429881.71	39°44'00.273"N	80°37'23.948"W	145.02	187.162	0.61	0.06	5.08
2281.00	7.050	191.070	2271.08	-70.94	-155.05	-19.81	1746314.09	14429870.55	39°44'00.162"N	80°37'23.970"W	156.31	187.281	0.61	0.14	4.91
2373.00	6.730	190.140	2362.41	-75.37	-165.90	-21.84	1746312.06	14429859.70	39°44'00.055"N	80°37'23.997"W	167.33	187.500	0.37	-0.35	-1.01
2466.00	5.850	183.900	2454.86	-79.99	-175.99	-23.12	1746310.77	14429849.62	39°43'59.956"N	80°37'24.014"W	177.51	187.485	1.20	-0.95	-6.71
2559.00	5.440	179.990	2547.40	-84.87	-185.13	-23.45	1746310.45	14429840.48	39°43'59.865"N	80°37'24.019"W	186.61	187.218	0.60	-0.44	-4.20
2700.00	4.790	176.960	2687.84	-92.20	-197.69	-23.13	1746310.77	14429827.92	39°43'59.741"N	80°37'24.015"W	199.04	186.674	0.50	-0.46	-2.15
2746.00	4.170	180.170	2733.70	-94.30	-201.28	-23.04	1746310.86	14429824.34	39°43'59.706"N	80°37'24.014"W	202.60	186.529	1.45	-1.35	6.98



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REFERENCE WELLPATH IDENTIFICATION			
Operator	SOUTHWESTERN ENERGY	Slot	Slot #01
Area	Marshall County, WV	Well	Shawn Harlan MSH 1H
Field	Marshall	Wellbore	Shawn Harlan MSH 1H AWB
Facility	Shawn Harlan MSH Pad		

WELLPATH DATA (149 stations)																
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]	
2839.00	7.730	179.330	2826.19	-99.78	-210.92	-22.97	1746310.93	14429814.70	39°43'59.610"N	80°37'24.014"W	212.17	186.216	3.83	3.83	-0.90	
2932.00	10.810	181.920	2917.96	-108.04	-225.90	-23.19	1746310.71	14429799.73	39°43'59.462"N	80°37'24.018"W	227.08	185.862	3.34	3.31	2.78	
3025.00	11.550	181.830	3009.19	-117.70	-243.92	-23.78	1746310.12	14429781.72	39°43'59.284"N	80°37'24.026"W	245.07	185.568	0.80	0.80	-0.10	
3117.00	12.600	187.480	3099.16	-127.16	-263.07	-25.38	1746308.52	14429762.57	39°43'59.095"N	80°37'24.048"W	264.30	185.511	1.72	1.14	6.14	
3210.00	12.950	189.030	3189.86	-136.18	-283.42	-28.34	1746305.56	14429742.23	39°43'58.894"N	80°37'24.087"W	284.84	185.710	0.53	0.38	1.67	
3303.00	12.800	190.180	3280.56	-144.76	-303.70	-31.77	1746302.14	14429721.96	39°43'58.694"N	80°37'24.132"W	305.36	185.971	0.47	-0.38	1.24	
3396.00	12.090	190.940	3371.41	-152.76	-323.24	-35.41	1746298.50	14429702.42	39°43'58.501"N	80°37'24.179"W	325.18	186.251	0.58	-0.55	0.82	
3489.00	11.790	189.810	3462.39	-160.55	-342.17	-38.87	1746295.03	14429683.50	39°43'58.314"N	80°37'24.225"W	344.37	186.482	0.41	-0.32	-1.22	
3581.00	11.200	188.000	3552.55	-168.39	-360.28	-41.72	1746292.19	14429665.40	39°43'58.135"N	80°37'24.262"W	362.69	186.605	0.75	-0.64	-1.97	
3674.00	10.370	187.430	3643.91	-176.17	-377.52	-44.06	1746289.85	14429648.16	39°43'57.965"N	80°37'24.293"W	380.09	186.657	0.90	-0.89	-0.61	
3767.00	9.860	186.270	3735.46	-183.69	-393.74	-46.01	1746287.90	14429631.95	39°43'57.805"N	80°37'24.319"W	396.42	186.665	0.59	-0.55	-1.25	
3859.00	10.470	186.280	3826.02	-191.31	-409.88	-47.79	1746286.12	14429615.82	39°43'57.645"N	80°37'24.342"W	412.65	186.650	0.66	0.66	0.01	
3952.00	10.350	184.120	3917.49	-199.47	-426.61	-49.31	1746284.60	14429599.10	39°43'57.480"N	80°37'24.363"W	429.45	186.593	0.44	-0.13	-2.32	
4045.00	9.690	182.110	4009.07	-207.83	-442.76	-50.20	1746283.71	14429582.95	39°43'57.320"N	80°37'24.375"W	445.60	186.468	0.80	-0.71	-2.16	
4138.00	9.270	179.960	4100.80	-216.22	-458.08	-50.48	1746283.43	14429567.64	39°43'57.169"N	80°37'24.379"W	460.85	186.289	0.59	-0.45	-2.31	
4230.00	9.300	187.190	4191.59	-223.78	-472.86	-51.41	1746282.50	14429552.86	39°43'57.023"N	80°37'24.392"W	475.65	186.204	1.27	0.03	7.86	
4323.00	9.230	189.380	4283.38	-230.34	-487.68	-53.56	1746280.35	14429538.05	39°43'56.877"N	80°37'24.420"W	490.61	186.268	0.39	-0.08	2.35	
4416.00	8.830	187.300	4375.23	-236.72	-502.12	-55.69	1746278.23	14429523.62	39°43'56.734"N	80°37'24.448"W	505.19	186.328	0.56	-0.43	-2.24	
4508.00	10.520	184.460	4465.92	-244.10	-517.49	-57.24	1746276.68	14429508.25	39°43'56.582"N	80°37'24.469"W	520.65	186.311	1.91	1.84	-3.09	
4601.00	10.750	190.280	4557.32	-251.85	-534.49	-59.44	1746274.47	14429491.26	39°43'56.414"N	80°37'24.498"W	537.79	186.346	1.18	0.25	6.26	
4694.00	9.990	189.360	4648.80	-258.77	-550.99	-62.30	1746271.61	14429474.77	39°43'56.251"N	80°37'24.536"W	554.50	186.451	0.84	-0.82	-0.99	
4787.00	10.460	189.020	4740.33	-265.77	-567.28	-64.94	1746268.98	14429458.48	39°43'56.090"N	80°37'24.570"W	570.99	186.530	0.51	0.51	-0.37	
4879.00	10.130	184.170	4830.85	-273.39	-583.60	-66.84	1746267.08	14429442.17	39°43'55.929"N	80°37'24.595"W	587.42	186.533	1.01	-0.36	-5.27	
4972.00	10.270	181.660	4922.38	-281.96	-600.04	-67.67	1746266.24	14429425.73	39°43'55.767"N	80°37'24.607"W	603.85	186.434	0.50	0.15	-2.70	
5065.00	8.770	179.330	5014.09	-290.49	-615.42	-67.83	1746266.09	14429410.36	39°43'55.615"N	80°37'24.610"W	619.15	186.289	1.66	-1.61	-2.51	
5158.00	8.780	179.570	5106.00	-298.59	-629.61	-67.69	1746266.22	14429396.18	39°43'55.475"N	80°37'24.609"W	633.24	186.137	0.04	0.01	0.26	
5251.00	9.840	177.710	5197.78	-307.36	-644.65	-67.32	1746266.59	14429381.14	39°43'55.326"N	80°37'24.605"W	648.15	185.962	1.18	1.14	-2.00	
5347.00	8.560	172.390	5292.54	-317.02	-659.93	-66.05	1746267.87	14429365.87	39°43'55.175"N	80°37'24.589"W	663.22	185.715	1.60	-1.33	-5.54	
5439.00	7.610	180.340	5383.63	-324.99	-672.80	-65.18	1746268.74	14429353.00	39°43'55.048"N	80°37'24.579"W	675.95	185.533	1.59	-1.03	8.64	
5532.00	8.020	177.590	5475.77	-332.30	-685.44	-64.94	1746268.97	14429340.36	39°43'54.923"N	80°37'24.577"W	688.51	185.412	0.60	0.44	-2.96	



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Actual Wellpath Report

Shawn Harlan MSH 1H AWP Proj: 12492
WV Department of Environmental Protection



BAKER HUGHES

REFERENCE WELLPATH IDENTIFICATION			
Operator	SOUTHWESTERN ENERGY	Slot	Slot #01
Area	Marshall County, WV	Well	Shawn Harlan MSH 1H
Field	Marshall	Wellbore	Shawn Harlan MSH 1H AWB
Facility	Shawn Harlan MSH Pad		

WELLPATH DATA (149 stations)															
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)	(°N)	(°W)	(ft)	(°)	(ft/100ft)	(°/100ft)	(°/100ft)
6626.00	8.200	186.790	5667.84	-339.24	-698.51	-65.45	1746268.46	14429327.30	39°43'54.794"N	80°37'24.584"W	701.57	185.353	1.41	0.19	9.89
5717.00	8.970	188.990	5658.81	-345.33	-712.11	-67.35	1746266.57	14429313.71	39°43'54.659"N	80°37'24.609"W	715.29	185.403	0.91	0.84	2.39
5810.00	7.570	185.220	5750.84	-351.40	-725.37	-69.04	1746264.88	14429300.45	39°43'54.528"N	80°37'24.631"W	728.65	185.437	1.61	-1.51	-4.05
5903.00	7.350	180.620	5843.05	-357.67	-737.42	-69.66	1746264.26	14429288.40	39°43'54.409"N	80°37'24.640"W	740.71	185.396	0.68	-0.24	-4.95
5985.00	7.650	199.840	5934.28	-362.46	-749.07	-71.80	1746262.11	14429276.76	39°43'54.294"N	80°37'24.668"W	752.50	185.475	2.73	0.33	20.89
6088.00	8.810	194.930	6026.32	-366.36	-761.77	-75.74	1746258.18	14429264.06	39°43'54.169"N	80°37'24.719"W	765.53	185.678	1.46	1.25	-5.28
6181.00	10.660	190.650	6117.98	-372.17	-777.11	-79.16	1746254.76	14429248.73	39°43'54.017"N	80°37'24.764"W	781.13	185.817	2.13	1.99	-4.60
6274.00	10.820	192.800	6209.35	-378.81	-794.08	-82.69	1746251.23	14429231.77	39°43'53.850"N	80°37'24.810"W	798.37	185.945	0.46	0.17	2.31
6366.00	12.370	184.660	6298.48	-386.84	-812.32	-85.40	1746248.52	14429213.53	39°43'53.670"N	80°37'24.845"W	816.80	186.002	2.45	1.68	-8.85
6424.00	13.420	184.300	6356.02	-393.27	-825.23	-86.41	1746247.51	14429200.64	39°43'53.542"N	80°37'24.859"W	829.74	185.978	1.82	1.81	-0.62
6517.00	12.610	185.590	6446.63	-403.53	-846.09	-88.21	1746245.72	14429179.78	39°43'53.336"N	80°37'24.883"W	850.68	185.952	0.93	-0.87	1.39
6564.00	11.970	214.040	6492.59	-406.02	-855.24	-91.44	1746242.49	14429170.63	39°43'53.246"N	80°37'24.925"W	860.12	186.103	12.83	-1.36	60.53
6610.00	12.810	238.840	6537.55	-403.91	-861.84	-98.48	1746235.45	14429164.04	39°43'53.181"N	80°37'25.015"W	867.45	186.519	11.62	1.83	53.91
6657.00	11.360	261.120	6583.53	-398.37	-865.25	-107.52	1746226.42	14429160.62	39°43'53.147"N	80°37'25.131"W	871.91	187.083	10.32	-3.09	47.40
6703.00	12.080	266.610	6628.60	-390.47	-864.58	-116.61	1746217.32	14429161.30	39°43'53.154"N	80°37'25.248"W	872.40	187.682	11.27	1.57	55.41
6749.00	13.370	305.140	6673.49	-380.56	-860.14	-125.58	1746208.36	14429165.74	39°43'53.199"N	80°37'25.362"W	869.25	188.306	9.26	2.80	40.28
6796.00	15.710	306.390	6718.98	-368.77	-853.23	-135.14	1746198.80	14429172.64	39°43'53.267"N	80°37'25.484"W	863.87	189.000	5.02	4.98	2.66
6842.00	19.420	304.790	6762.83	-354.89	-845.17	-145.44	1746187.50	14429180.70	39°43'53.347"N	80°37'25.628"W	857.76	189.830	8.13	8.07	-3.48
6888.00	23.660	304.980	6805.61	-338.01	-835.51	-170.29	1746173.66	14429190.35	39°43'53.444"N	80°37'26.020"W	850.75	190.860	9.22	9.22	0.41
6935.00	27.750	303.840	6847.95	-317.63	-824.01	-177.11	1746166.84	14429201.85	39°43'53.558"N	80°37'26.020"W	842.83	192.131	8.77	8.70	-2.43
6981.00	31.770	302.760	6887.87	-294.80	-811.49	-196.20	1746157.77	14429214.37	39°43'53.682"N	80°37'26.264"W	834.87	193.592	8.82	8.74	-2.35
6981.00	36.730	303.510	6926.71	-268.37	-797.02	-218.34	1746155.64	14429228.83	39°43'53.826"N	80°37'26.546"W	826.39	195.320	10.59	10.55	1.60
7074.00	41.570	305.060	6962.38	-239.33	-780.65	-242.31	1746091.67	14429245.19	39°43'53.989"N	80°37'26.852"W	817.39	197.244	10.73	10.52	3.37
7121.00	46.660	306.640	6996.11	-206.64	-761.48	-268.81	1746065.18	14429264.35	39°43'54.180"N	80°37'27.180"W	807.53	199.443	11.08	10.83	3.36
7167.00	51.500	306.950	7026.23	-171.93	-740.67	-296.63	1746037.37	14429285.16	39°43'54.387"N	80°37'27.645"W	797.86	201.826	10.53	10.52	0.67
7213.00	55.680	307.820	7053.53	-134.97	-718.19	-326.04	1746007.98	14429307.63	39°43'54.610"N	80°37'27.920"W	788.73	204.417	9.21	9.09	1.89
7260.00	59.930	308.440	7078.56	-95.30	-693.63	-357.31	1745976.72	14429332.18	39°43'54.854"N	80°37'28.319"W	780.25	207.255	9.11	9.04	1.32
7306.00	65.520	308.140	7099.64	-54.53	-668.31	-389.39	1745944.65	14429357.49	39°43'55.105"N	80°37'28.729"W	773.48	210.227	12.17	12.15	-0.65
7352.00	68.440	308.570	7117.62	-12.30	-642.04	-422.59	1745911.47	14429383.75	39°43'55.366"N	80°37'29.152"W	768.63	213.353	6.41	6.35	0.93
7399.00	70.820	309.340	7133.98	31.60	-614.34	-456.85	1745877.22	14429411.44	39°43'55.642"N	80°37'29.589"W	765.59	216.695	5.29	5.06	1.64



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Shawn Harlan MSH 1H AWP Proj: 12492'
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REFERENCE WELLPATH IDENTIFICATION

Operator	SOUTHWESTERN ENERGY	Slot	Slot #01
Area	Marshall County, WV	Well	Shawn Harlan MSH 1H
Field	Marshall	Wellbore	Shawn Harlan MSH 1H AWB
Facility	Shawn Harlan MSH Pad		

WELLPATH DATA (149 stations)

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]
7445.00	73.230	310.090	7148.18	75.16	-586.38	-490.50	1745843.58	14429439.39	39°43'55.919"N	80°37'30.018"W	764.48	219.912	5.46	5.24	1.63
7492.00	76.380	311.750	7160.49	120.20	-556.67	-524.76	1745809.33	14429469.08	39°43'58.214"N	80°37'30.455"W	765.02	223.310	7.52	6.70	3.53
7538.00	80.390	315.050	7169.76	164.67	-525.72	-557.48	1745776.62	14429500.03	39°43'56.522"N	80°37'30.872"W	766.27	226.680	11.20	8.72	7.17
7584.00	83.310	316.670	7176.28	209.27	-493.04	-589.19	1745744.93	14429532.69	39°43'56.846"N	80°37'31.277"W	768.27	230.077	7.24	6.35	3.52
7631.00	85.470	315.860	7180.87	255.02	-459.25	-621.52	1745712.61	14429566.47	39°43'57.181"N	80°37'31.689"W	772.79	233.538	4.91	4.60	-1.72
7677.00	88.120	315.300	7183.44	300.05	-426.45	-653.67	1745680.48	14429599.26	39°43'57.507"N	80°37'32.098"W	780.47	236.880	5.89	5.76	-1.22
7724.00	88.180	315.350	7184.96	346.16	-393.05	-686.69	1745647.46	14429632.65	39°43'57.838"N	80°37'32.519"W	791.22	240.214	0.17	0.13	0.11
7816.00	88.180	313.340	7187.88	436.69	-328.78	-752.45	1745581.73	14429696.89	39°43'58.476"N	80°37'33.357"W	821.14	246.398	2.18	0.00	-2.18
7909.00	89.940	312.560	7189.41	528.61	-265.42	-820.51	1745513.70	14429760.22	39°43'59.105"N	80°37'34.225"W	862.37	252.075	2.07	1.89	-0.84
8002.00	89.970	311.990	7189.48	620.70	-202.86	-889.32	1745444.91	14429822.76	39°43'59.726"N	80°37'35.103"W	912.17	257.150	0.61	0.03	-0.61
8094.00	90.120	312.020	7189.41	711.86	-141.29	-957.69	1745376.58	14429884.30	39°44'00.337"N	80°37'35.974"W	968.05	261.607	0.17	0.16	0.03
8187.00	90.370	312.020	7189.01	804.01	-79.04	-1026.78	1745307.51	14429946.53	39°44'00.955"N	80°37'36.855"W	1029.82	265.598	0.27	0.27	0.00
8280.00	90.340	311.100	7188.43	896.26	-17.35	-1096.36	1745237.95	14430008.20	39°44'01.568"N	80°37'37.743"W	1096.50	269.094	0.99	-0.03	-0.99
8373.00	90.400	312.540	7187.83	988.45	44.66	-1165.67	1745168.68	14430070.18	39°44'02.184"N	80°37'38.627"W	1166.52	272.194	1.55	0.06	1.55
8466.00	90.340	309.710	7187.23	1080.77	105.82	-1235.71	1745098.66	14430131.32	39°44'02.791"N	80°37'39.520"W	1240.24	274.895	3.04	-0.06	-3.04
8559.00	90.520	308.430	7186.54	1173.44	164.43	-1307.91	1745026.49	14430189.91	39°44'03.373"N	80°37'40.441"W	1318.21	277.166	1.39	0.19	-1.38
8651.00	90.650	312.370	7185.60	1264.89	224.04	-1377.96	1744956.47	14430249.50	39°44'03.965"N	80°37'41.334"W	1396.05	279.235	4.28	0.14	4.28
8744.00	90.650	312.750	7184.54	1356.92	286.94	-1446.45	1744888.00	14430312.37	39°44'04.589"N	80°37'42.208"W	1474.84	281.220	0.41	0.00	0.41
8837.00	90.520	312.450	7183.59	1448.93	349.89	-1514.91	1744819.57	14430375.29	39°44'05.214"N	80°37'43.081"W	1554.79	283.005	0.35	-0.14	-0.32
8930.00	90.580	312.080	7182.70	1541.02	412.43	-1583.73	1744750.78	14430437.81	39°44'05.835"N	80°37'43.958"W	1636.55	284.597	0.40	0.06	-0.40
9023.00	90.460	315.820	7181.85	1632.68	476.96	-1650.67	1744683.86	14430502.32	39°44'06.476"N	80°37'44.812"W	1718.20	286.117	4.02	-0.13	4.02
9115.00	90.150	315.150	7181.36	1722.92	542.57	-1715.17	1744619.39	14430567.89	39°44'07.127"N	80°37'45.634"W	1798.94	287.554	0.80	-0.34	-0.73
9208.00	89.970	312.870	7181.27	1814.57	607.18	-1782.05	1744552.53	14430632.48	39°44'07.768"N	80°37'46.487"W	1882.65	288.815	2.46	-0.19	-2.45
9301.00	90.180	312.610	7181.15	1906.56	670.29	-1850.35	1744484.26	14430695.57	39°44'08.394"N	80°37'47.358"W	1968.02	289.913	0.36	0.23	-0.28
9393.00	90.120	314.300	7180.90	1997.37	733.57	-1917.13	1744417.50	14430768.82	39°44'09.022"N	80°37'48.209"W	2052.69	290.939	1.84	-0.07	1.84
9486.00	90.030	315.070	7180.78	2088.84	798.96	-1983.26	1744351.41	14430824.19	39°44'09.672"N	80°37'49.052"W	2138.14	291.942	0.83	-0.10	0.83
9579.00	90.060	311.750	7180.71	2180.65	862.87	-2050.81	1744283.88	14430888.07	39°44'10.306"N	80°37'49.913"W	2224.94	292.819	3.57	0.03	-3.57
9672.00	90.090	310.570	7180.59	2272.97	924.07	-2120.82	1744213.89	14430949.25	39°44'10.914"N	80°37'50.806"W	2313.40	293.543	1.27	0.03	-1.27
9764.00	90.220	313.910	7180.34	2364.07	985.91	-2188.92	1744145.82	14431011.07	39°44'11.527"N	80°37'51.675"W	2400.71	294.247	3.63	0.14	3.63
9857.00	90.030	312.080	7180.14	2455.99	1049.33	-2256.94	1744077.83	14431074.46	39°44'12.157"N	80°37'52.542"W	2488.95	294.935	1.98	-0.20	-1.97



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REFERENCE WELLPATH IDENTIFICATION			
Operator	SOUTHWESTERN ENERGY	Slot	Slot #01
Area	Marshall County, WV	Well	Shawn Harlan MSH 1H
Field	Marshall	Wellbore	Shawn Harlan MSH 1H AWB
Facility	Shawn Harlan MSH Pad		

WELLPATH DATA (149 stations)															
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)
9950.00	90.220	312.820	7179.93	2548.04	1112.10	-2325.56	1744009.23	14431137.20	39°44'12.780"N	80°37'53.417"W	2577.79	295.557	0.82	-0.20	0.80
10043.00	90.120	315.030	7179.66	2639.72	1176.61	-2392.54	1743942.28	14431201.69	39°44'13.420"N	80°37'54.271"W	2666.21	296.187	2.38	-0.11	2.38
10135.00	90.490	315.660	7179.17	2730.01	1242.05	-2457.20	1743877.65	14431267.11	39°44'14.070"N	80°37'55.095"W	2753.28	296.815	0.79	0.40	0.68
10228.00	90.150	315.040	7178.65	2821.27	1308.21	-2522.56	1743812.31	14431333.24	39°44'14.726"N	80°37'55.929"W	2841.60	297.411	0.76	-0.37	-0.67
10321.00	90.060	314.700	7178.48	2912.68	1373.82	-2588.47	1743746.43	14431398.83	39°44'15.377"N	80°37'56.769"W	2930.45	297.957	0.38	-0.10	-0.37
10414.00	90.120	314.990	7178.33	3004.10	1439.41	-2654.41	1743680.52	14431464.39	39°44'16.028"N	80°37'57.609"W	3019.56	298.470	0.32	0.06	0.31
10506.00	90.120	315.470	7178.14	3094.42	1504.72	-2719.20	1743615.75	14431529.67	39°44'16.676"N	80°37'58.435"W	3107.77	298.959	0.52	0.00	0.52
10599.00	90.090	313.920	7177.97	3185.89	1570.13	-2785.31	1743549.67	14431595.06	39°44'17.325"N	80°37'59.278"W	3197.38	299.411	1.67	-0.03	-1.67
10692.00	90.060	311.890	7177.85	3277.83	1633.44	-2853.42	1743481.58	14431658.34	39°44'17.954"N	80°38'00.147"W	3287.88	299.789	2.18	-0.03	-2.18
10785.00	90.090	311.330	7177.72	3370.06	1695.19	-2922.96	1743412.07	14431720.07	39°44'18.567"N	80°38'01.034"W	3378.96	300.112	0.60	0.03	-0.60
10877.00	90.030	311.720	7177.63	3461.33	1756.18	-2991.83	1743343.22	14431781.04	39°44'19.172"N	80°38'01.912"W	3469.19	300.413	0.43	-0.07	0.42
10970.00	90.030	311.450	7177.58	3553.57	1817.91	-3061.40	1743273.69	14431842.74	39°44'19.785"N	80°38'02.799"W	3560.47	300.703	0.29	0.00	-0.29
11062.00	90.030	311.470	7177.53	3644.85	1878.82	-3130.34	1743204.77	14431903.63	39°44'20.390"N	80°38'03.679"W	3650.89	300.972	0.02	0.00	0.02
11155.00	90.180	311.320	7177.36	3737.13	1940.32	-3200.11	1743135.03	14431965.11	39°44'21.000"N	80°38'04.569"W	3742.40	301.230	0.23	0.16	-0.16
11248.00	90.220	310.600	7177.04	3829.49	2001.28	-3270.34	1743064.83	14432026.05	39°44'21.606"N	80°38'05.464"W	3834.09	301.465	0.78	0.04	-0.77
11340.00	90.150	309.350	7176.74	3921.04	2060.39	-3340.84	1742994.35	14432085.13	39°44'22.193"N	80°38'06.364"W	3925.10	301.663	1.36	-0.08	-1.36
11433.00	90.280	309.420	7176.39	4013.67	2119.40	-3412.72	1742922.50	14432144.11	39°44'22.779"N	80°38'07.281"W	4017.27	301.842	0.16	0.14	0.08
11526.00	90.370	307.770	7175.86	4106.40	2177.41	-3485.40	1742849.85	14432202.10	39°44'23.355"N	80°38'08.208"W	4109.64	301.994	1.78	0.10	-1.77
11618.00	89.780	311.010	7175.74	4198.02	2235.79	-3556.49	1742778.78	14432260.45	39°44'23.935"N	80°38'09.115"W	4200.88	302.155	3.58	-0.64	3.52
11711.00	89.290	317.870	7176.50	4289.50	2300.86	-3622.85	1742712.45	14432325.50	39°44'24.581"N	80°38'09.961"W	4291.74	302.419	7.39	-0.53	7.38
11804.00	88.800	320.130	7178.05	4379.42	2371.03	-3683.85	1742651.47	14432395.65	39°44'25.277"N	80°38'10.739"W	4380.93	302.766	2.49	-0.53	2.43
11897.00	88.980	316.330	7179.85	4469.64	2440.37	-3745.78	1742589.57	14432464.96	39°44'25.964"N	80°38'11.528"W	4470.60	303.084	4.09	0.19	-4.09
11990.00	88.950	316.430	7181.53	4560.56	2507.68	-3809.93	1742525.45	14432532.25	39°44'26.632"N	80°38'12.345"W	4561.14	303.353	0.11	-0.03	0.11
12082.00	89.910	314.280	7182.45	4650.83	2573.13	-3874.57	1742460.83	14432597.67	39°44'27.281"N	80°38'13.170"W	4651.16	303.588	2.56	1.04	-2.34
12175.00	90.090	314.320	7182.45	4742.41	2638.08	-3941.13	1742394.30	14432662.60	39°44'27.926"N	80°38'14.018"W	4742.57	303.797	0.20	0.19	0.04
12268.00	89.970	311.620	7182.40	4834.33	2701.47	-4009.17	1742326.28	14432725.96	39°44'28.555"N	80°38'14.886"W	4834.39	303.973	2.91	-0.13	-2.90
12360.00	90.000	311.920	7182.42	4925.54	2762.75	-4077.79	1742257.69	14432787.22	39°44'29.164"N	80°38'15.761"W	4925.56	304.118	0.33	0.03	0.33
12453.00	90.490	312.150	7182.02	5017.69	2825.02	-4146.86	1742188.64	14432849.46	39°44'29.782"N	80°38'16.642"W	5017.69	304.264	0.58	0.53	0.25
12492.00	90.490	312.150	7181.69	5056.32	2851.19	-4175.77	1742159.74	14432875.62	39°44'30.042"N	80°38'17.011"W	5056.32	304.325	0.00	0.00	0.00

HOLE & CASING SECTIONS - Ref Wellbore: Shawn Harlan MSH 1H AWB Ref Wellpath: Shawn Harlan MSH 1H AWP Proj: 12492'									
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]
17.5in Open Hole	26.00	609.00	583.00	26.00	608.99	0.00	0.00	-0.80	1.41
13.375in Casing Surface	26.00	592.00	566.00	26.00	591.99	0.00	0.00	-0.80	1.39
12.25in Open Hole	609.00	2680.00	2071.00	608.99	2667.91	-0.80	1.41	-196.01	-23.21
9.625in Casing Intermediate	26.00	2680.00	2654.00	26.00	2667.91	0.00	0.00	-196.01	-23.21
8.75in Open Hole	2680.00	6500.00	3820.00	2667.91	6430.04	-196.01	-23.21	-842.37	-87.85
8.5in Open Hole	6500.00	12492.00	5992.00	6430.04	7181.69	-842.37	-87.85	2851.19	-4175.77
5.5in Casing Production	26.00	12492.00	12466.00	26.00	7181.69	0.00	0.00	2851.19	-4175.77

TARGETS								
Name	TVD [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Shape
Shawn Harlan MSH 1H BHL Rev-6	7163.45	2862.61	-4200.74	1742134.78	14432887.03	39°44'30.155"N	80°38'17.330"W	point
Shawn Harlan MSH 1H LP Rev-6	7172.00	-465.88	-608.16	1745725.97	14429559.84	39°43'57.115"N	80°37'31.518"W	point

WELLPATH COMPOSITION - Ref Wellbore: Shawn Harlan MSH 1H AWB Ref Wellpath: Shawn Harlan MSH 1H AWP Proj: 12492'					
Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore	
26.00	543.00	OWSG EMS rev2 + HRGM	01_MSS <17-1/2"> (172'-543')	Shawn Harlan MSH 1H AWB	
543.00	2559.00	BHI NaviTrak (Axial)	02_APS EM <12-1/4"> (543')(704'-2559')	Shawn Harlan MSH 1H AWB	
2559.00	6424.00	BHI NaviTrak (Axial)	03_APS EM <8-3/4"> (2559')(2700'-6424')	Shawn Harlan MSH 1H AWB	
6424.00	12453.00	BHI AutoTrak Curve (Short)	04_BHI AT Curve <8-1/2"> (6424')(6517'-12453')	Shawn Harlan MSH 1H AWB	
12453.00	12492.00	Blind Drilling (std)	Projection to bit	Shawn Harlan MSH 1H AWB	

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Actual Wellpath Report

Shawn Harlan MSH 1H AWP Proj: 12492'
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REFERENCE WELLPATH IDENTIFICATION			
Operator	SOUTHWESTERN ENERGY	Slot	Slot #01
Area	Marshall County, WV	Well	Shawn Harlan MSH 1H
Field	Marshall	Wellbore	Shawn Harlan MSH 1H AWB
Facility	Shawn Harlan MSH Pad		

COMMENTS
<p>Wellpath general comments API: 47-051-01881-0000 BHI Job #: 8285793 Rig: SDC 46 Duration: 12/10/2016-12/19/2016 MSS <17-1/2"> (172'-543') APS EM <12-1/4"> (543')(704'-2559') APS EM <8-3/4"> (2559')(2700'-6424') BHI AT Curve <8-1/2"> (6424')(6517'-12453') Projected MD at TD: 12492'</p>

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