

**Actual Wellpath Report**  
PEN2DHS (AWP) Proj: 15727

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**REFERENCE WELLPATH IDENTIFICATION**

Operator	NOBLE ENERGY	Slot	Slot D
Area	Ritchie County, WV	Well	PEN2DHS
Field	Ritchie	Wellbore	PEN2DHS (AWB)
Facility	PEN-2 Pad		

**REPORT SETUP INFORMATION**

Projection System	NAD27 / Lambert West Virginia SP, Northern Zone (4701), US feet	Software System	WellArchitect@ 4.0.1
North Reference	Grid	User	Kroschr
Scale	0.999953	Report Generated	24/Jul/2014 at 09:54
Convergence at slot	0.96° West	Database/Source file	WA_Pennsylvania/PEN2DHS_AWB.xml

**WELLPATH LOCATION**

	Local coordinates		Grid coordinates		Geographic coordinates	
	North[ft]	East[ft]	Easting[US ft]	Northing[US ft]	Latitude	Longitude
Slot Location	21.32	56.16	1572169.25	308288.26	39°20'11.560"N	81°00'45.520"W
Facility Reference Pt			1572113.09	308266.94	39°20'11.340"N	81°00'46.230"W
Field Reference Pt			0.00	0.00	38°17'12.460"N	86°28'23.077"W

**WELLPATH DATUM**

Calculation method	Minimum curvature	Nomac 78 (RT) to Facility Vertical Datum	1100.46ft
Horizontal Reference Pt	Slot	Nomac 78 (RT) to Mean Sea Level	1100.46ft
Vertical Reference Pt	Nomac 78 (RT)	Nomac 78 (RT) to Mud Line at Slot (Slot D)	26.00ft
MD Reference Pt	Nomac 78 (RT)	Section Origin	N 0.00, E 0.00 ft
Field Vertical Reference	Mean Sea Level	Section Azimuth	140.00°

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Operator	NOBLE ENERGY	Slot	Slot D
Area	Ritchie County, WV	Well	PEN2DHS
Field	Ritchie	Wellbore	PEN2DHS (AWB)
Facility	PEN-2 Pad		

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 [7/100ft]
0.00ft	0.000	191.650	0.00	0.00	0.00	0.00	1572169.25	308288.26	39°20'11.560"N	81°00'45.520"W	0.00	0.000	0.00
26.00	0.000	191.650	26.00	0.00	0.00	0.00	1572169.25	308288.26	39°20'11.560"N	81°00'45.520"W	0.00	0.000	0.00
100.00	0.110	191.650	100.00	0.24	-0.07	-0.01	1572169.23	308288.19	39°20'11.559"N	81°00'45.520"W	0.07	191.650	0.16
200.00	0.370	205.560	200.00	0.04	-0.45	-0.17	1572169.07	308287.80	39°20'11.555"N	81°00'45.522"W	0.49	200.827	0.26
300.00	0.390	210.900	300.00	0.48	-1.04	-0.49	1572168.76	308287.22	39°20'11.550"N	81°00'45.526"W	1.15	205.136	0.04
400.00	0.410	210.130	399.99	0.72	-1.64	-0.84	1572168.40	308286.62	39°20'11.544"N	81°00'45.530"W	1.84	207.168	0.02
500.00	0.340	201.610	499.99	0.98	-2.22	-1.13	1572168.11	308286.03	39°20'11.538"N	81°00'45.534"W	2.50	206.932	0.09
525.00	0.360	201.650	524.99	1.05	-2.37	-1.19	1572168.06	308285.89	39°20'11.536"N	81°00'45.535"W	2.65	206.627	0.08
563.00	0.340	195.820	562.99	1.17	-2.59	-1.26	1572167.98	308285.67	39°20'11.534"N	81°00'45.535"W	2.88	206.000	0.11
594.00	0.370	193.720	593.99	1.28	-2.77	-1.31	1572167.94	308285.48	39°20'11.532"N	81°00'45.536"W	3.07	205.298	0.11
625.00	0.480	183.770	624.99	1.43	-3.00	-1.34	1572167.90	308285.26	39°20'11.530"N	81°00'45.536"W	3.29	204.117	0.43
658.00	0.740	168.810	657.99	1.72	-3.35	-1.31	1572167.94	308284.91	39°20'11.527"N	81°00'45.536"W	3.59	201.386	0.92
750.00	2.380	150.050	749.95	4.12	-5.58	-0.24	1572169.00	308282.67	39°20'11.505"N	81°00'45.522"W	5.59	182.474	1.84
846.00	3.840	149.070	845.81	9.26	-10.07	2.41	1572171.65	308278.19	39°20'11.461"N	81°00'45.487"W	10.35	166.559	1.52
942.00	4.490	146.060	941.55	16.17	-15.94	6.16	1572175.40	308272.31	39°20'11.403"N	81°00'45.438"W	17.09	158.886	0.71
1038.00	3.170	133.570	1037.34	22.55	-20.89	10.18	1572179.42	308267.37	39°20'11.355"N	81°00'45.386"W	23.24	154.025	1.62
1193.00	1.570	72.200	1192.22	27.61	-23.20	15.31	1572184.55	308265.06	39°20'11.333"N	81°00'45.320"W	27.79	146.581	1.80
1289.00	2.450	16.780	1288.17	26.98	-20.83	17.15	1572186.40	308267.43	39°20'11.357"N	81°00'45.297"W	26.98	140.533	2.11
1385.00	2.950	348.650	1384.07	23.69	-16.44	17.26	1572186.50	308271.81	39°20'11.400"N	81°00'45.297"W	23.84	133.616	1.46
1480.00	2.230	325.640	1478.97	19.70	-12.52	15.73	1572184.98	308275.74	39°20'11.439"N	81°00'45.317"W	20.11	128.513	1.32
1575.00	2.060	294.010	1573.91	16.33	-10.30	13.13	1572182.37	308277.96	39°20'11.460"N	81°00'45.351"W	16.69	128.112	1.24
1671.00	2.520	275.000	1669.83	13.29	-9.41	9.45	1572178.70	308278.84	39°20'11.469"N	81°00'45.398"W	13.34	134.886	0.92
1766.00	1.390	240.610	1764.78	11.60	-9.80	6.37	1572175.61	308278.46	39°20'11.464"N	81°00'45.437"W	11.68	146.983	1.66
1862.00	0.900	162.480	1860.76	12.08	-11.09	5.58	1572174.82	308277.17	39°20'11.451"N	81°00'45.447"W	12.41	153.290	1.55
1957.00	1.640	134.300	1955.74	14.12	-12.75	6.77	1572176.02	308275.51	39°20'11.435"N	81°00'45.431"W	14.44	152.026	0.99
2052.00	0.530	87.510	2050.72	15.74	-13.69	8.18	1572177.43	308274.57	39°20'11.426"N	81°00'45.413"W	15.94	149.128	1.41
2148.00	0.710	41.140	2146.72	15.92	-13.22	9.02	1572178.26	308275.04	39°20'11.431"N	81°00'45.402"W	16.00	145.701	0.54
2244.00	0.850	9.640	2242.71	15.37	-12.07	9.53	1572178.77	308276.19	39°20'11.442"N	81°00'45.396"W	15.38	141.712	0.46
2340.00	1.500	7.220	2338.70	14.25	-10.41	9.77	1572179.01	308277.85	39°20'11.459"N	81°00'45.393"W	14.28	136.826	0.32
2435.00	2.430	352.970	2433.68	13.23	-9.02	9.83	1572179.08	308279.24	39°20'11.472"N	81°00'45.393"W	13.34	132.534	0.67
2530.00	1.150	288.610	2527.68	12.36	-8.28	9.36	1572178.60	308279.98	39°20'11.480"N	81°00'45.399"W	12.49	131.488	0.50
2624.00	0.830	267.590	2622.67	11.43	-8.00	8.25	1572177.49	308280.26	39°20'11.482"N	81°00'45.413"W	11.49	134.120	0.54
2719.00	0.800	269.130	2717.66	10.41	-8.04	6.61	1572175.85	308280.21	39°20'11.482"N	81°00'45.434"W	10.41	140.591	0.34
2814.00	0.280	232.760	2812.65	9.80	-8.20	5.47	1572174.72	308280.06	39°20'11.480"N	81°00'45.449"W	9.86	146.284	0.99
2909.00	0.470	184.400	2908.65	10.07	-8.73	5.25	1572174.50	308279.52	39°20'11.475"N	81°00'45.451"W	10.19	148.968	0.37
3004.00	0.960	175.830	3004.64	11.00	-9.93	5.28	1572174.53	308278.33	39°20'11.463"N	81°00'45.451"W	11.25	151.984	0.52
3100.00	1.310	157.330	3099.64	11.57	-10.63	5.34	1572174.58	308277.63	39°20'11.456"N	81°00'45.450"W	11.89	153.341	1.13
3195.00	1.480	142.360	3195.64	11.13	-10.15	5.21	1572174.46	308278.10	39°20'11.461"N	81°00'45.452"W	11.41	152.832	0.39
3290.00	1.660	128.610	3291.63	10.28	-9.23	4.99	1572174.23	308279.03	39°20'11.470"N	81°00'45.455"W	10.49	151.599	0.20
3385.00	1.840	114.400	3385.62	8.86	-7.70	4.60	1572173.85	308280.55	39°20'11.485"N	81°00'45.460"W	8.97	149.148	0.65
3480.00	0.450	355.740	3480.61	7.60	-6.33	4.28	1572173.53	308281.93	39°20'11.498"N	81°00'45.464"W	7.64	145.926	0.87
3575.00	0.700	325.810	3576.60	7.09	-5.78	4.13	1572173.38	308282.48	39°20'11.504"N	81°00'45.466"W	7.11	144.418	0.28
3670.00	0.600	223.060	3672.60	6.91	-5.79	3.85	1572173.09	308282.47	39°20'11.503"N	81°00'45.470"W	6.95	146.408	0.45
3765.00	0.600	229.190	3765.60	6.95	-6.44	3.13	1572172.38	308281.82	39°20'11.497"N	81°00'45.479"W	7.16	154.059	0.64
3861.00	1.460	216.840	3861.58	7.24	-7.91	1.84	1572171.08	308280.35	39°20'11.482"N	81°00'45.495"W	8.12	166.932	0.65

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Area	Ritchie County, WV	Well	PEN2DHS
Field	Ritchie	Wellbore	PEN2DHS (AWB)
Facility	PEN-2 Pad		

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]
3958.00	1.030	222.700	3956.55	7.62	-9.30	0.53	1572169.78	308278.75	39°20'11.466"N	81°00'45.511"W	9.52	176.805	0.47
4053.00	0.250	164.430	4051.55	7.92	-10.33	0.01	1572169.25	308277.93	39°20'11.458"N	81°00'45.518"W	10.33	179.961	0.97
4148.00	0.530	162.320	4146.55	8.53	-10.96	0.20	1572169.45	308277.29	39°20'11.452"N	81°00'45.515"W	10.97	178.949	0.32
4244.00	0.430	154.720	4242.54	9.30	-11.73	0.49	1572169.74	308276.53	39°20'11.444"N	81°00'45.511"W	11.74	177.584	0.14
4339.00	0.550	158.810	4337.54	10.08	-12.48	0.81	1572170.06	308275.78	39°20'11.437"N	81°00'45.507"W	12.50	176.277	0.13
4434.00	0.240	189.620	4432.54	10.64	-13.10	0.94	1572170.19	308275.16	39°20'11.431"N	81°00'45.505"W	13.13	175.880	0.38
4530.00	0.190	191.870	4528.54	10.87	-13.45	0.88	1572170.12	308274.81	39°20'11.427"N	81°00'45.506"W	13.48	176.269	0.05
4625.00	0.410	194.840	4623.54	11.16	-13.93	0.76	1572170.00	308274.32	39°20'11.422"N	81°00'45.507"W	13.95	176.888	0.23
4721.00	0.260	249.520	4719.53	11.29	-14.34	0.47	1572169.71	308273.92	39°20'11.418"N	81°00'45.511"W	14.35	178.140	0.35
4816.00	0.280	237.130	4814.53	11.18	-14.54	0.07	1572169.31	308273.71	39°20'11.416"N	81°00'45.516"W	14.54	179.729	0.06
4912.00	0.620	230.980	4910.53	11.15	-15.00	-0.53	1572168.71	308273.26	39°20'11.412"N	81°00'45.524"W	15.01	182.031	0.36
5007.00	0.260	347.640	5005.53	10.95	-15.11	-0.98	1572168.27	308273.15	39°20'11.411"N	81°00'45.529"W	15.14	183.701	0.81
5103.00	0.200	191.190	5101.53	10.67	-14.74	-0.97	1572168.28	308273.52	39°20'11.414"N	81°00'45.529"W	14.77	183.761	0.14
5198.00	0.200	71.380	5196.53	10.64	-14.53	-0.76	1572168.49	308273.73	39°20'11.416"N	81°00'45.527"W	14.55	182.983	0.19
5294.00	0.220	353.890	5292.53	10.55	-14.29	-0.62	1572168.63	308273.96	39°20'11.419"N	81°00'45.525"W	14.31	182.476	0.27
5373.00	0.510	281.810	5371.52	10.15	-14.07	-0.98	1572168.27	308274.19	39°20'11.421"N	81°00'45.529"W	14.10	183.978	0.62
5497.00	0.160	210.040	5495.52	9.60	-13.96	-1.69	1572167.45	308274.30	39°20'11.422"N	81°00'45.539"W	14.06	186.911	0.29
5555.00	0.660	210.990	5555.52	9.56	-13.98	-1.79	1572167.45	308274.27	39°20'11.422"N	81°00'45.540"W	14.10	187.301	0.23
5652.00	8.550	58.680	5650.17	10.64	-10.35	4.23	1572173.47	308277.91	39°20'11.458"N	81°00'45.464"W	11.18	157.783	9.06
5747.00	13.300	53.640	5743.43	12.41	-0.19	19.07	1572188.31	308288.06	39°20'11.561"N	81°00'45.277"W	19.07	90.582	5.10
5843.00	15.640	72.960	5836.43	18.16	10.15	40.35	1572209.59	308298.41	39°20'11.667"N	81°00'45.009"W	41.61	75.877	5.55
5938.00	21.780	89.360	5926.43	34.36	14.11	70.26	1572239.51	308302.36	39°20'11.711"N	81°00'44.629"W	71.67	78.647	8.45
6033.00	31.190	104.600	6011.46	65.69	8.08	111.83	1572281.07	308296.34	39°20'11.658"N	81°00'44.099"W	112.13	85.866	12.15
6129.00	41.490	114.830	6088.75	114.91	-11.61	164.94	1572334.18	308276.65	39°20'11.473"N	81°00'43.419"W	165.35	94.025	12.42
6224.00	52.650	121.780	6153.40	179.51	-44.83	225.83	1572395.07	308243.42	39°20'11.155"N	81°00'42.637"W	230.24	101.229	12.90
6324.00	65.980	128.770	6204.36	262.51	-94.64	295.61	1572464.84	308193.62	39°20'10.674"N	81°00'41.738"W	310.38	107.752	14.61
6414.00	69.800	132.590	6238.24	344.76	-148.99	358.79	1572528.02	308139.27	39°20'10.147"N	81°00'40.922"W	388.49	112.552	5.79
6510.00	75.260	136.450	6267.06	435.86	-213.19	424.01	1572593.23	308075.07	39°20'09.524"N	81°00'40.079"W	474.59	116.694	6.86
6606.00	84.390	140.100	6284.01	530.19	-283.66	486.79	1572656.01	308004.61	39°20'08.838"N	81°00'39.265"W	563.40	120.230	10.22
6701.00	89.570	140.510	6289.01	625.03	-356.63	547.36	1572716.58	307931.64	39°20'08.127"N	81°00'38.478"W	653.29	123.086	5.47
6796.00	88.500	139.550	6290.57	720.01	-429.42	608.37	1572777.59	307858.85	39°20'07.417"N	81°00'37.686"W	744.66	125.217	1.47
6892.00	88.990	141.490	6292.69	815.98	-503.50	669.39	1572838.61	307784.78	39°20'06.696"N	81°00'36.894"W	837.62	126.950	2.06
6987.00	90.070	143.660	6293.51	910.87	-578.94	727.12	1572896.33	307709.35	39°20'05.960"N	81°00'36.143"W	929.45	128.527	2.59
7083.00	89.830	144.880	6293.56	1006.61	-656.86	783.18	1572952.39	307631.42	39°20'05.199"N	81°00'35.413"W	1022.17	129.987	1.30
7178.00	90.000	144.910	6293.68	1101.26	-734.58	837.81	1573007.02	307553.71	39°20'04.440"N	81°00'34.702"W	1114.25	131.244	0.16
7274.00	89.690	142.450	6293.94	1196.06	-811.12	894.08	1573063.28	307477.17	39°20'03.693"N	81°00'33.969"W	1207.18	132.215	2.61
7370.00	89.890	138.200	6294.85	1292.03	-885.04	955.28	1573124.48	307403.26	39°20'02.973"N	81°00'33.175"W	1302.26	132.814	4.35
7466.00	89.570	135.910	6295.84	1386.89	-954.63	1019.94	1573189.13	307333.67	39°20'02.296"N	81°00'32.337"W	1397.00	133.106	2.54
7562.00	89.780	136.100	6296.38	1482.66	-1023.69	1086.62	1573255.81	307264.61	39°20'01.624"N	81°00'31.474"W	1492.88	133.292	0.29
7658.00	88.990	135.600	6297.44	1577.40	-1091.85	1152.78	1573321.97	307196.46	39°20'00.962"N	81°00'30.617"W	1587.78	133.445	1.02
7754.00	88.090	131.270	6299.92	1672.72	-1157.82	1222.45	1573391.64	307130.49	39°20'00.321"N	81°00'29.717"W	1683.73	133.445	4.60
7850.00	88.400	134.330	6302.75	1766.92	-1222.33	1292.12	1573461.30	307065.99	39°19'59.695"N	81°00'28.816"W	1778.67	133.410	3.25
7946.00	90.000	145.400	6304.06	1865.75	-1297.89	1355.83	1573525.00	306990.43	39°19'58.959"N	81°00'27.990"W	1876.91	133.749	11.28
8042.00	90.090	145.410	6303.99	1958.34	-1374.45	1408.63	1573577.80	306913.88	39°19'58.211"N	81°00'27.301"W	1968.08	134.296	0.10
8138.00	89.080	140.190	6304.68	2053.19	-1450.09	1466.04	1573635.22	306838.24	39°19'57.473"N	81°00'26.555"W	2062.05	134.687	5.60

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## REFERENCE WELLPATH IDENTIFICATION

Operator	Slot	Slot D
NOBLE ENERGY	PEN2DHS	PEN2DHS
Area	Ritchie County, WV	PEN2DHS (AWB)
Field	Ritchie	
Facility	PEN-2 Pad	

## WELLPATH DATA (171 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]
8229.00	89.420	140.390	6305.93	2149.18	-1523.93	1527.37	1573696.54	306764.40	39°19'56.754"N	81°00'25.759"W	2157.60	134.935	0.41
8325.00	89.880	140.140	6306.52	2245.17	-1597.76	1588.74	1573757.91	306690.58	39°19'56.034"N	81°00'24.962"W	2253.20	135.162	0.55
8420.00	89.630	141.430	6306.93	2340.16	-1671.36	1648.80	1573817.96	306616.98	39°19'55.517"N	81°00'24.182"W	2347.76	135.389	1.05
8516.00	89.780	140.430	6307.42	2436.15	-1745.89	1709.30	1573878.46	306542.45	39°19'54.391"N	81°00'23.396"W	2443.33	135.607	1.38
8611.00	89.880	138.640	6307.70	2531.14	-1818.16	1770.95	1573940.11	306470.18	39°19'53.887"N	81°00'22.596"W	2538.11	135.754	1.89
8707.00	91.390	141.880	6306.64	2627.12	-1891.97	1832.31	1574003.47	306396.38	39°19'52.167"N	81°00'21.800"W	2633.80	135.918	3.72
8803.00	89.880	138.180	6305.57	2723.09	-1965.52	1893.97	1574066.12	306322.83	39°19'52.451"N	81°00'21.000"W	2729.54	136.062	4.16
8899.00	89.480	137.020	6306.11	2819.00	-2036.41	1958.70	1574127.85	306251.95	39°19'51.761"N	81°00'20.161"W	2825.50	136.114	1.28
8994.00	89.510	136.130	6306.95	2913.83	-2105.40	2024.00	1574193.14	306182.96	39°19'51.090"N	81°00'19.315"W	2920.49	136.129	0.94
9090.00	89.290	135.690	6307.95	3009.58	-2174.35	2090.79	1574259.93	306114.01	39°19'50.420"N	81°00'18.451"W	3016.49	136.122	0.51
9185.00	89.230	139.600	6309.18	3104.47	-2244.53	2154.77	1574323.91	306043.83	39°19'49.737"N	81°00'17.622"W	3111.43	136.169	4.12
9281.00	89.870	139.940	6309.93	3200.47	-2317.82	2216.77	1574388.51	305970.55	39°19'49.023"N	81°00'16.817"W	3207.24	136.277	0.76
9377.00	89.570	138.520	6310.39	3296.46	-2390.52	2279.46	1574448.60	305897.85	39°19'48.315"N	81°00'16.004"W	3303.11	136.362	1.51
9472.00	89.630	139.580	6311.05	3391.44	-2462.27	2341.72	1574510.85	305826.10	39°19'47.616"N	81°00'15.196"W	3398.01	136.437	1.12
9567.00	89.630	141.230	6311.66	3486.43	-2535.47	2402.27	1574571.40	305752.91	39°19'46.902"N	81°00'14.410"W	3492.78	136.545	1.74
9662.00	90.280	140.680	6311.74	3581.42	-2609.25	2462.11	1574631.24	305679.13	39°19'46.183"N	81°00'13.633"W	3587.51	136.662	0.90
9757.00	90.180	140.780	6311.84	3676.41	-2682.80	2522.24	1574691.37	305605.59	39°19'45.466"N	81°00'12.853"W	3682.27	136.767	0.72
9853.00	90.180	140.350	6312.02	3772.40	-2756.94	2583.22	1574752.34	305531.45	39°19'44.744"N	81°00'12.061"W	3778.06	136.863	0.75
9949.00	89.820	141.840	6312.02	3868.38	-2831.65	2643.51	1574812.63	305456.75	39°19'44.015"N	81°00'11.278"W	3873.81	136.968	1.60
10043.00	89.480	143.030	6312.60	3962.30	-2906.15	2700.82	1574869.93	305382.24	39°19'43.289"N	81°00'10.533"W	3967.39	137.097	1.32
10138.00	89.690	142.750	6313.28	4057.17	-2981.91	2758.13	1574927.25	305306.49	39°19'42.549"N	81°00'09.787"W	4061.91	137.233	0.37
10233.00	89.880	142.420	6313.64	4152.07	-3057.37	2815.85	1574984.96	305231.04	39°19'41.813"N	81°00'09.037"W	4156.50	137.355	0.40
10327.00	89.940	140.370	6313.79	4246.04	-3130.82	2874.50	1575043.61	305157.59	39°19'41.097"N	81°00'08.275"W	4250.27	137.444	2.18
10423.00	89.780	138.030	6314.02	4342.03	-3203.49	2937.23	1575106.33	305084.93	39°19'40.389"N	81°00'07.462"W	4346.22	137.483	2.44
10519.00	89.880	141.970	6314.31	4438.01	-3277.01	2998.92	1575168.02	305011.40	39°19'39.673"N	81°00'06.661"W	4442.11	137.537	4.11
10614.00	89.880	145.020	6314.51	4532.82	-3353.36	3055.43	1575224.53	304935.05	39°19'38.928"N	81°00'05.926"W	4536.60	137.662	3.21
10707.00	90.520	142.060	6314.18	4625.63	-3428.15	3110.69	1575279.78	304860.27	39°19'38.198"N	81°00'05.207"W	4629.10	137.780	3.26
10803.00	90.520	134.180	6313.31	4721.50	-3499.57	3174.72	1575343.81	304788.86	39°19'37.503"N	81°00'04.377"W	4725.02	137.786	8.21
10898.00	90.120	132.890	6312.78	4815.89	-3565.00	3243.59	1575412.68	304723.43	39°19'36.867"N	81°00'03.487"W	4819.76	137.703	1.42
10994.00	90.180	134.750	6312.53	4909.34	-3630.09	3311.41	1575480.49	304658.35	39°19'36.235"N	81°00'02.610"W	4913.55	137.629	1.98
11090.00	90.180	144.580	6310.06	5007.18	-3704.66	3374.74	1575543.82	304583.77	39°19'35.509"N	81°00'01.788"W	5011.33	137.668	10.35
11186.00	90.180	140.460	6307.86	5099.03	-3777.63	3430.69	1575599.77	304510.81	39°19'34.797"N	81°00'01.061"W	5102.95	137.756	5.34
11282.00	90.180	138.860	6307.76	5194.03	-3850.04	3492.18	1575661.26	304438.41	39°19'34.092"N	81°00'00.263"W	5197.90	137.790	1.69
11378.00	90.180	138.590	6307.50	5290.01	-3922.18	3555.51	1575724.58	304366.26	39°19'33.389"N	81°00'00.442"W	5293.88	137.807	0.31
11474.00	90.180	139.820	6307.21	5384.99	-3994.10	3617.58	1575786.65	304294.35	39°19'32.689"N	81°00'00.637"W	5388.85	137.832	1.30
11570.00	90.150	141.340	6306.99	5480.99	-4068.26	3678.54	1575847.60	304220.19	39°19'31.966"N	81°00'00.846"W	5484.74	137.880	1.58
11666.00	89.400	141.470	6306.53	5576.96	-4143.29	3738.42	1575907.45	304145.17	39°19'31.234"N	81°00'00.068"W	5580.56	137.941	0.29
11762.00	89.880	141.140	6306.30	5670.93	-4216.66	3797.19	1575966.25	304071.81	39°19'30.519"N	81°00'00.305"W	5674.40	137.996	0.66
11858.00	89.940	139.640	6306.45	5765.93	-4289.84	3857.75	1576026.81	303998.62	39°19'29.806"N	81°00'00.518"W	5769.32	138.036	1.58
11954.00	89.780	139.850	6306.71	5861.92	-4363.11	3919.79	1576088.84	303925.36	39°19'29.092"N	81°00'00.714"W	5865.27	138.064	0.29
12050.00	89.940	140.060	6306.99	5956.92	-4435.83	3980.91	1576149.96	303852.34	39°19'28.383"N	81°00'00.921"W	5960.22	138.094	0.28
12146.00	89.940	140.130	6307.11	6052.92	-4509.47	4042.50	1576211.54	303779.00	39°19'27.666"N	81°00'00.121"W	6056.16	138.126	0.08
12242.00	89.880	143.040	6307.26	6146.88	-4583.12	4100.90	1576269.94	303705.36	39°19'26.948"N	81°00'00.363"W	6149.99	138.178	3.10
12338.00	90.150	141.950	6307.24	6240.79	-4657.69	4158.13	1576327.17	303630.79	39°19'26.220"N	81°00'00.619"W	6243.72	138.243	1.19
12434.00	90.220	138.160	6306.93	6335.77	-4730.51	4219.11	1576388.15	303557.98	39°19'25.510"N	81°00'00.827"W	6338.66	138.270	3.99

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Actual Wellpath Report  
PEN2DDHS (AWP) Proj: 15727

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REFERENCE WELLPATH IDENTIFICATION

Operator	Slot	Slot D
NOBLE ENERGY		PEN2DDHS
Area	Ritchie County, WV	PEN2DDHS (AWB)
Field	Ritchie	
Facility	PEN-2 Pad	

MB [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]
12514.00	90.120	139.920	6306.65	6430.75	-4802.24	4281.38	1576450.42	303486.24	39°19'24.812"N	80°59'50.020"W	6433.64	138.282	1.86
12609.00	90.250	142.890	6306.34	6525.71	-4876.49	4340.64	1576509.67	303412.01	39°19'24.088"N	80°59'49.250"W	6528.49	138.327	3.13
12704.00	90.550	140.200	6305.68	6620.67	-4950.87	4460.54	1576568.74	303337.63	39°19'23.363"N	80°59'48.483"W	6623.34	138.373	2.85
12799.00	90.310	140.160	6304.97	6715.66	-5023.83	4460.54	1576629.57	303264.67	39°19'22.651"N	80°59'47.693"W	6718.29	138.399	0.26
12895.00	90.220	142.230	6304.52	6811.64	-5098.64	4520.70	1576689.73	303189.86	39°19'21.922"N	80°59'46.912"W	6814.17	138.438	2.16
12990.00	90.460	146.310	6303.96	6906.35	-5175.74	4576.17	1576745.19	303112.77	39°19'21.169"N	80°59'46.190"W	6908.66	138.518	4.30
13085.00	91.450	143.320	6302.37	7000.99	-5253.36	4630.89	1576799.91	303035.15	39°19'20.411"N	80°59'45.478"W	7003.07	138.604	3.31
13180.00	90.490	140.080	6300.77	7095.92	-5327.90	4689.75	1576858.77	302960.62	39°19'19.684"N	80°59'44.713"W	7097.91	138.645	3.56
13276.00	90.370	138.710	6300.05	7191.91	-5400.78	4752.23	1576921.25	302887.74	39°19'18.974"N	80°59'43.903"W	7193.89	138.655	1.43
13372.00	90.340	140.770	6299.45	7287.90	-5474.03	4814.27	1576983.28	302814.49	39°19'18.261"N	80°59'43.098"W	7289.87	138.669	2.15
13468.00	90.030	143.050	6299.14	7383.84	-5549.58	4873.48	1577042.49	302738.94	39°19'17.524"N	80°59'42.328"W	7385.71	138.711	2.40
13563.00	90.060	144.040	6299.07	7478.66	-5625.99	4929.93	1577098.94	302662.54	39°19'16.778"N	80°59'41.594"W	7480.38	138.773	1.04
13658.00	89.850	143.910	6299.14	7573.43	-5702.82	4985.81	1577154.81	302585.71	39°19'16.028"N	80°59'40.867"W	7574.99	138.838	0.26
13754.00	90.220	142.350	6299.08	7669.28	-5779.62	5043.40	1577212.40	302508.92	39°19'15.278"N	80°59'40.118"W	7670.72	138.891	1.67
13849.00	90.150	138.780	6298.77	7764.26	-5852.98	5103.74	1577272.74	302435.56	39°19'14.563"N	80°59'39.335"W	7765.66	138.912	3.76
13944.00	89.820	137.580	6298.80	7859.21	-5923.78	5167.08	1577336.08	302364.77	39°19'13.874"N	80°59'38.514"W	7860.65	138.903	1.31
14040.00	89.600	139.660	6299.29	7955.18	-5995.81	5230.54	1577399.53	302292.74	39°19'13.173"N	80°59'37.691"W	7956.65	138.900	2.18
14135.00	89.660	143.510	6299.90	8050.12	-6070.23	5289.55	1577458.54	302218.32	39°19'12.447"N	80°59'36.925"W	8051.52	138.931	4.05
14230.00	89.660	142.890	6300.46	8144.97	-6146.29	5346.46	1577515.45	302142.26	39°19'11.705"N	80°59'36.185"W	8146.26	138.981	0.65
14325.00	89.570	138.650	6301.10	8239.94	-6219.86	5406.53	1577575.51	302068.69	39°19'10.988"N	80°59'35.405"W	8241.19	139.002	4.46
14421.00	89.630	132.580	6301.77	8335.61	-6288.44	5473.64	1577642.62	302000.12	39°19'10.321"N	80°59'34.537"W	8336.98	138.963	6.32
14515.00	89.720	133.910	6302.31	8428.96	-6352.84	5542.11	1577711.09	301935.73	39°19'09.696"N	80°59'33.652"W	8430.51	138.899	1.42
14611.00	89.750	137.790	6302.75	8524.69	-6421.70	5608.97	1577777.94	301866.86	39°19'09.026"N	80°59'32.787"W	8526.36	138.865	4.04
14706.00	89.690	139.120	6303.21	8619.65	-6492.80	5671.97	1577840.94	301795.77	39°19'08.334"N	80°59'31.970"W	8621.35	138.860	1.40
14801.00	89.660	139.140	6303.75	8714.64	-6564.64	5734.13	1577903.10	301723.93	39°19'07.634"N	80°59'31.164"W	8716.35	138.863	0.04
14896.00	89.450	141.680	6304.49	8809.62	-6637.84	5794.67	1577963.63	301650.74	39°19'06.921"N	80°59'30.379"W	8811.31	138.880	2.68
14990.00	89.480	142.750	6305.37	8903.55	-6712.13	5852.26	1578021.22	301576.46	39°19'06.196"N	80°59'29.630"W	8905.14	138.915	1.14
15085.00	89.420	140.280	6306.28	8998.50	-6786.48	5911.37	1578080.33	301502.10	39°19'05.471"N	80°59'28.863"W	9000.03	138.942	2.60
15180.00	89.510	142.670	6307.17	9093.46	-6860.79	5970.53	1578139.49	301427.80	39°19'04.746"N	80°59'28.094"W	9094.93	138.969	2.52
15275.00	89.570	140.880	6307.93	9188.41	-6935.42	6029.31	1578198.26	301353.17	39°19'04.018"N	80°59'27.331"W	9189.81	138.998	1.89
15370.00	89.570	138.580	6308.64	9283.40	-7007.90	6090.71	1578259.66	301280.70	39°19'03.312"N	80°59'26.534"W	9284.80	139.005	2.42
15465.00	89.510	137.180	6309.41	9379.33	-7079.10	6155.10	1578324.04	301209.50	39°19'02.619"N	80°59'25.700"W	9380.77	138.994	1.46
15560.00	89.480	136.960	6310.25	9474.20	-7148.66	6219.80	1578388.74	301139.95	39°19'01.942"N	80°59'24.862"W	9475.71	138.975	0.23
15655.00	89.420	138.100	6311.18	9571.10	-7220.20	6285.29	1578454.23	301068.40	39°19'01.246"N	80°59'24.014"W	9572.68	138.960	1.18
15750.00	89.450	139.780	6311.63	9616.09	-7254.13	6314.84	1578483.78	301034.48	39°19'00.916"N	80°59'23.631"W	9617.67	138.960	3.73
15845.00	89.450	139.780	6311.86	9640.09	-7272.46	6330.34	1578499.28	301016.15	39°19'00.737"N	80°59'23.430"W	9641.67	138.962	0.00

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# Actual Wellpath Report

PEN2DHS (AWP) Proj: 15727'

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## REFERENCE WELLPATH IDENTIFICATION

Operator	NOBLE ENERGY	Slot	Slot D
Area	Ritchie County, WV	Well	PEN2DHS
Field	Ritchie	Wellbore	PEN2DHS (AWB)
Facility	PEN-2 Pad		

## TARGETS

Name	MD [ft]	TVD [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Shape
PEN2DHS LP:Rev-1		6287.00	-354.80	529.00	1572698.22	307933.47	39°20'08.142"N	81°00'38.712"W	point
PEN2DHS BHL:Rev-1		6308.00	-7266.26	6327.45	1578496.39	301022.35	39°19'00.798"N	80°59'23.468"W	point
PEN2DHS Lat target:Rev-1		6308.00	-4327.70	3862.11	1576031.17	303960.77	39°19'29.432"N	80°59'55.455"W	point
PEN2 LL 1		7006.46	-21.01	-56.48	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon
PEN2 LL 2		7006.46	-21.01	-56.48	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon
PEN2 LL 3		7006.46	-21.01	-56.48	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon
PEN2 LL 4		7006.46	-21.01	-56.48	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon
PEN2 LL 5		7006.46	-21.01	-56.48	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon

## WELLPATH COMPOSITION - Ref Wellbore: PEN2DHS (AWB) Ref Wellpath: PEN2DHS (AWP) Proj: 15727'

Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore
26.00	1038.00	Generic gyro - northseeking (Standard)		PEN2DHS (AWB)
1038.00	5373.00	ISCVSA MWD, Rev. 2 (Standard)	01 Gyro Surveys (100' - 1038')	PEN2DHS (AWB)
5373.00	15703.00	NavTrak (AT Curve Short Spaced)	02 Schlumberger MWD Surveys 12 1/4" (1193'-5373')Proj:5430'	PEN2DHS (AWB)
15703.00	15727.00	Blind Drilling (std)	03 BHIA Teurve Surveys 8 3/4" (5373')\5497'-15703') Projection to bit	PEN2DHS (AWB)

**REFERENCE WELLPATH IDENTIFICATION**

Operator	NOBLE ENERGY	Slot	Slot D
Area	Ritchie County, WV	Well	PEN2DHS
Field	Ritchie	Wellbore	PEN2DHS (AWB)
Facility	PEN-2 Pad		

**COMMENTS**

Wellpath general comments  
 API: 47-085-10069-0000  
 Rig: Nomatic 78  
 BHI Job #: 6519078  
 Duration: 07/15/2014-07/19/2014  
 Gyro Surveys (100'-1038')  
 Schlumberger MWD Surveys (1193'-5373')  
 BHIA Teurve Surveys (5373')(5497'-15703')  
 TD Projected to MD: 15727

Location: Ritchie County, WV  
 Field: Ritchie  
 Facility: PEN-2 Pad

Slot: Slot D  
 Well: PEN2DHS  
 Wellbore: PEN2DHS PWB

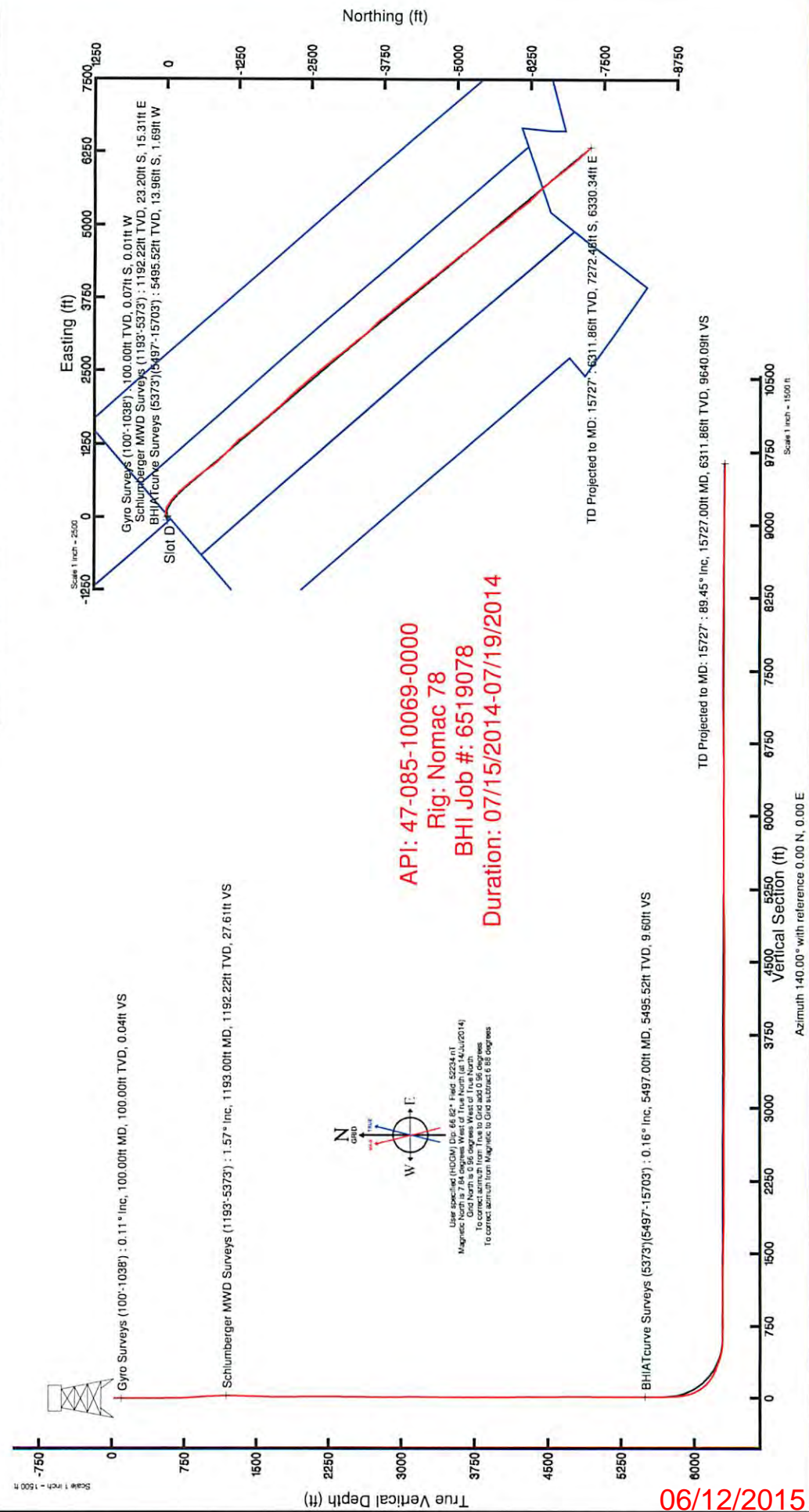
**Location information**

Facility Name	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
PEN-2 Pad	1572113.090	308266.940	39°20'11.340"N	81°00'46.230"W
Slot	Local E (ft)	Grid North (US ft)	Latitude	Longitude
Slot D	21.32	1572169.245	39°20'11.560"N	81°00'45.520"W
Normac 78 (RT) to Mud line (At Slot: Slot D)				
Mean Sea Level to Mud line (At Slot: Slot D)				
Normac 78 (RT) to Mean Sea Level				

Plot reference wellpath is PEN2DHS (PWP) Rev-A.0  
 True vertical depths are referenced to Normac 78 (RT)  
 Measured depths are referenced to Normac 78 (RT)  
 Normac 78 (RT) to Mean Sea Level: 1100.46 feet  
 Scale: True distance  
 Depths are in feet  
 Coordinates are in feet referenced to Slot  
 Created by: krosch on 24/JUL/2014

**Well Data**

Slot	Well	Wellbore	Wellpath
Slot D	PEN2DHS	PEN2DHS (AWB)	PEN2DHS (AWP) Proj: 15727
Slot D	PEN2DHS	PEN2DHS PWB	PEN2DHS (PWP) Rev-A.0



API: 47-085-10069-0000  
 Rig: Normac 78  
 BHI Job #: 6519078  
 Duration: 07/15/2014-07/19/2014

5/10/2015

Scale 1 inch = 1500 ft  
 Azimuth 140.00° with reference 0.00 N, 0.00 E