



# NOBLE ENERGY



Location: Ritchie County, WV  
 Field: Ritchie  
 Facility: PEN-20 Pad

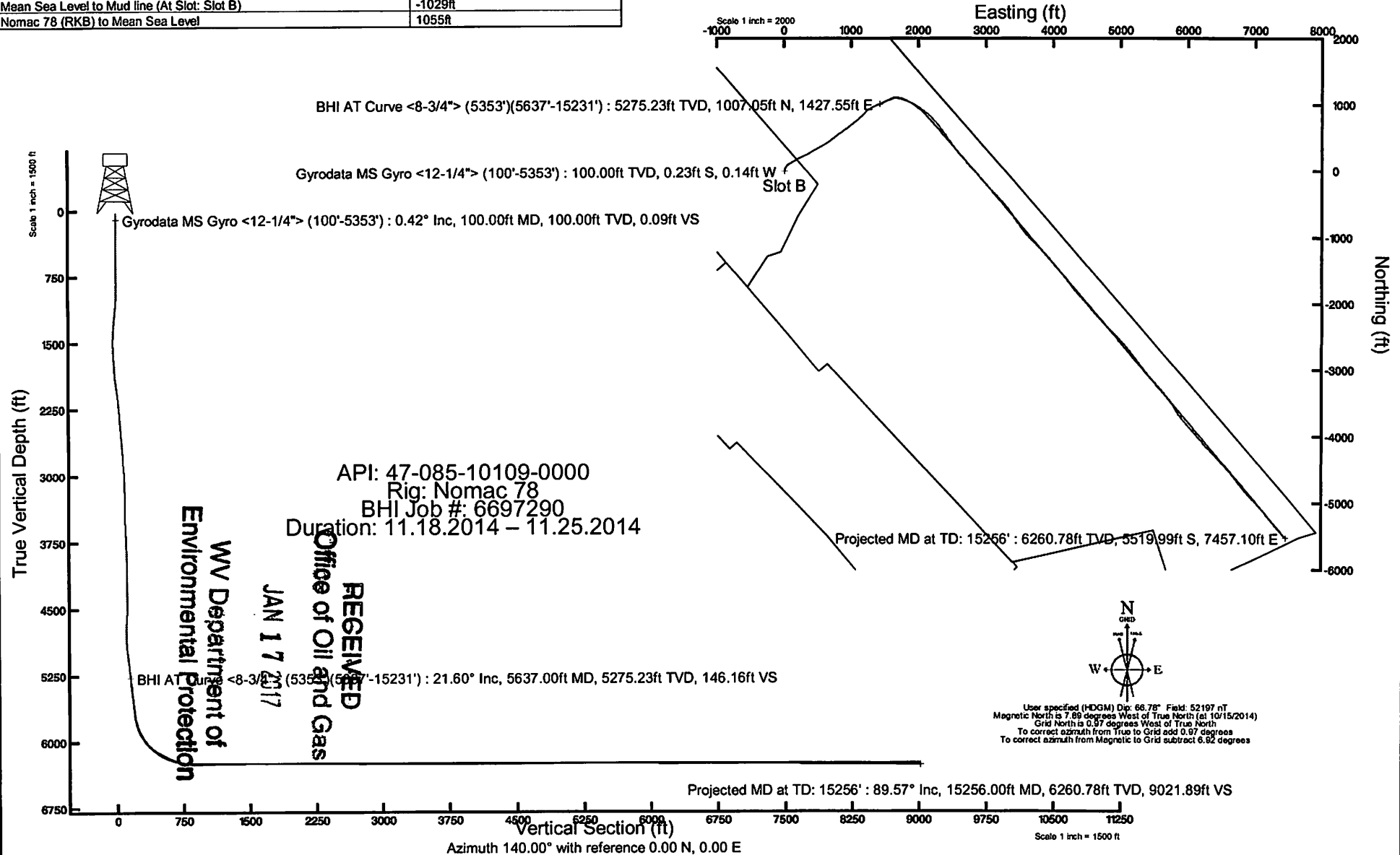
Slot: Slot B  
 Well: PEN-20B-HS  
 Wellbore: PEN-20B-HS PWB

### Location Information

Facility Name		Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	
PEN-20 Pad		1568205.800	305275.580	39°19'41.124"N	81°01'35.306"W	
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot B	-13.72	14.48	1568220.280	305261.860	39°19'40.991"N	81°01'35.119"W
Nomac 78 (RKB) to Mud line (At Slot: Slot B)				26ft		
Mean Sea Level to Mud line (At Slot: Slot B)				-1029ft		
Nomac 78 (RKB) to Mean Sea Level				1055ft		

Plot reference wellpath is PEN-20B-HS PWP Rev-C.1

True vertical depths are referenced to Nomac 78 (RKB)	Grid System: NAD27 / Lambert West Virginia SP, Northern Zone (4701), US feet
Measured depths are referenced to Nomac 78 (RKB)	North Reference: Grid north
Nomac 78 (RKB) to Mean Sea Level: 1055 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot B): -1029 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: kroschr on 12/2/2014





## Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'

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### REFERENCE WELLPATH IDENTIFICATION

Operator	NOBLE ENERGY	Slot	Slot B
Area	Ritchie County, WV	Well	PEN-20B-HS
Field	Ritchie	Wellbore	PEN-20B-HS AWB
Facility	PEN-20 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	0.999954	Report Generated	12/2/2014 at 11:05:33 AM
Convergence at slot	0.97° West	Database/Source file	WA_NorthEast/PEN-20B-HS_AWB.xml

### WELLPATH LOCATION

	Local coordinates		Grid coordinates		Geographic coordinates	
	North[ft]	East[ft]	Easting[US ft]	Northing[US ft]	Latitude	Longitude
Slot Location	-13.72	14.48	1568220.28	305261.86	39°19'40.991"N	81°01'35.119"W
Facility Reference Pt			1568205.80	305275.58	39°19'41.124"N	81°01'35.306"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 (RKB) to Facility Vertical Datum	1055.00ft
Horizontal Reference Pt	Slot	Nomac 78 (RKB) to Mean Sea Level	1055.00ft
Vertical Reference Pt	Nomac 78 (RKB)	Nomac 78 (RKB) to Mud Line at Slot (Slot B)	26.00ft
MD Reference Pt	Nomac 78 (RKB)	Section Origin	N 0.00, E 0.00 ft
Field Vertical Reference	Mean Sea Level	Section Azimuth	140.00°

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# Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'

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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot B
Area	Ritchie County, WV	Well	PEN-20B-HS
Field	Ritchie	Wellbore	PEN-20B-HS AWB
Facility	PEN-20 Pad		

**WELLPATH DATA (159 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]
0.00†	0.000	210.800	0.00	0.00	0.00	0.00	1568220.28	305261.86	39°19'40.991"N	81°01'35.119"W	0.00	0.000	0.00
26.00	0.000	210.800	26.00	0.00	0.00	0.00	1568220.28	305261.86	39°19'40.991"N	81°01'35.119"W	0.00	0.000	0.00
100.00	0.420	210.800	100.00	0.09	-0.23	-0.14	1568220.14	305261.63	39°19'40.989"N	81°01'35.121"W	0.27	210.800	0.57
200.00	0.150	233.580	200.00	0.20	-0.63	-0.43	1568219.85	305261.23	39°19'40.985"N	81°01'35.125"W	0.76	214.623	0.29
300.00	0.110	148.110	300.00	0.29	-0.78	-0.49	1568219.79	305261.08	39°19'40.983"N	81°01'35.125"W	0.92	211.798	0.18
400.00	0.170	12.980	400.00	0.29	-0.72	-0.40	1568219.88	305261.14	39°19'40.984"N	81°01'35.124"W	0.83	209.148	0.26
500.00	0.150	7.860	500.00	0.12	-0.45	-0.35	1568219.93	305261.41	39°19'40.986"N	81°01'35.124"W	0.57	218.133	0.02
600.00	0.280	67.060	600.00	0.10	-0.22	-0.11	1568220.17	305261.64	39°19'40.989"N	81°01'35.121"W	0.25	205.956	0.24
700.00	0.340	75.300	700.00	0.30	-0.05	0.40	1568220.68	305261.81	39°19'40.990"N	81°01'35.114"W	0.41	97.340	0.07
800.00	0.430	71.480	799.99	0.56	0.14	1.05	1568221.33	305262.00	39°19'40.992"N	81°01'35.106"W	1.06	82.247	0.09
900.00	1.440	19.890	899.98	0.07	1.44	1.83	1568222.11	305263.30	39°19'41.005"N	81°01'35.096"W	2.33	51.735	1.22
1000.00	4.150	4.560	999.85	-3.14	6.23	2.55	1568222.82	305268.09	39°19'41.053"N	81°01'35.088"W	6.73	22.213	2.79
1100.00	7.960	10.110	1099.28	-10.16	16.66	4.05	1568224.33	305278.52	39°19'41.156"N	81°01'35.071"W	17.15	13.659	3.85
1200.00	11.410	17.930	1197.84	-19.86	32.89	8.31	1568228.59	305294.75	39°19'41.317"N	81°01'35.021"W	33.93	14.180	3.68
1300.00	14.440	28.270	1295.31	-29.73	53.29	17.26	1568237.54	305315.15	39°19'41.520"N	81°01'34.911"W	56.02	17.950	3.80
1400.00	16.870	38.350	1391.61	-37.28	75.66	32.18	1568252.46	305337.52	39°19'41.744"N	81°01'34.726"W	82.22	23.040	3.64
1500.00	18.390	50.090	1486.94	-40.18	97.17	53.29	1568273.57	305359.02	39°19'41.960"N	81°01'34.462"W	110.82	28.741	3.86
1600.00	20.600	60.100	1581.23	-37.07	116.07	80.65	1568300.93	305377.92	39°19'42.151"N	81°01'34.118"W	141.34	34.794	4.00
1700.00	23.370	71.340	1673.95	-30.09	134.35	113.31	1568333.58	305396.21	39°19'42.338"N	81°01'33.707"W	175.75	40.144	2.81
1800.00	22.700	65.050	1765.98	-23.28	153.90	147.19	1568367.47	305415.76	39°19'42.536"N	81°01'33.280"W	212.96	43.723	1.25
1900.00	23.010	60.070	1858.13	-17.64	174.28	180.26	1568400.53	305436.13	39°19'42.743"N	81°01'32.863"W	250.73	45.966	0.38
2000.00	26.040	51.740	1949.11	-9.31	193.99	216.71	1568436.98	305455.84	39°19'42.944"N	81°01'32.404"W	290.86	48.167	4.10
2100.00	26.870	51.140	2038.64	2.94	212.14	257.39	1568477.66	305473.99	39°19'43.130"N	81°01'31.890"W	333.54	50.505	1.35
2200.00	26.350	47.660	2128.06	15.22	230.41	298.26	1568518.53	305492.25	39°19'43.318"N	81°01'31.374"W	376.89	52.314	1.23
2300.00	25.140	51.010	2218.15	24.93	250.15	336.90	1568557.17	305512.00	39°19'43.519"N	81°01'30.887"W	419.62	53.406	1.95
2400.00	24.220	51.220	2309.02	32.32	270.90	373.12	1568593.38	305532.75	39°19'43.731"N	81°01'30.430"W	461.09	54.019	1.21
2500.00	23.430	50.010	2400.50	39.05	291.33	407.95	1568628.21	305553.18	39°19'43.938"N	81°01'29.991"W	501.30	54.468	0.86
2600.00	22.550	51.270	2492.56	45.93	310.78	441.82	1568662.08	305572.62	39°19'44.136"N	81°01'29.565"W	540.17	54.877	0.88
2700.00	22.570	60.080	2584.91	52.70	329.86	475.10	1568695.36	305591.70	39°19'44.330"N	81°01'29.145"W	578.38	55.228	0.08
2800.00	23.510	60.850	2676.93	60.09	348.90	509.29	1568729.54	305610.75	39°19'44.524"N	81°01'28.715"W	617.34	55.586	1.12

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 Office of Oil and Gas



# Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'

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## REFERENCE WELLPATH IDENTIFICATION

Operator	NOBLE ENERGY	Slot	Slot B
Area	Ritchie County, WV	Well	PEN-20B-HS
Field	Ritchie	Wellbore	PEN-20B-HS AWB
Facility	PEN-20 Pad		

## WELLPATH DATA (159 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]
2900.00	24.090	60.080	2768.43	67.69	368.55	544.53	1568764.78	305630.40	39°19'44.724"N	81°01'28.270"W	657.53	55.909	0.86
3000.00	24.230	58.810	2859.67	74.40	389.36	579.77	1568800.03	305651.20	39°19'44.936"N	81°01'27.826"W	698.38	56.116	0.54
3100.00	23.880	57.530	2950.98	80.20	410.85	614.40	1568834.66	305672.69	39°19'45.154"N	81°01'27.390"W	739.12	56.229	0.63
3200.00	24.220	57.120	3042.30	85.39	432.86	648.71	1568868.96	305694.70	39°19'45.377"N	81°01'26.959"W	779.86	56.286	0.38
3300.00	23.760	53.730	3133.67	89.25	455.91	682.18	1568902.43	305717.75	39°19'45.611"N	81°01'26.538"W	820.50	56.245	1.45
3400.00	23.820	52.060	3225.17	91.28	480.24	714.35	1568934.59	305742.08	39°19'45.857"N	81°01'26.134"W	860.77	56.088	0.68
3500.00	22.270	50.710	3317.19	92.25	504.66	744.94	1568965.18	305766.50	39°19'46.103"N	81°01'25.750"W	899.79	55.884	1.64
3600.00	21.460	51.080	3410.00	92.82	528.15	773.84	1568994.08	305789.99	39°19'46.340"N	81°01'25.387"W	936.89	55.686	0.82
3700.00	19.220	54.850	3503.76	94.56	549.12	801.53	1569021.77	305810.96	39°19'46.552"N	81°01'25.039"W	971.59	55.585	2.59
3800.00	19.010	56.450	3598.25	97.78	567.60	828.56	1569048.80	305829.43	39°19'46.739"N	81°01'24.699"W	1004.33	55.587	0.56
3900.00	21.170	55.540	3692.16	101.36	586.82	857.03	1569077.27	305848.65	39°19'46.934"N	81°01'24.341"W	1038.68	55.600	2.18
4000.00	23.980	53.970	3784.48	104.51	609.00	888.36	1569108.59	305870.83	39°19'47.158"N	81°01'23.947"W	1077.06	55.568	2.87
4100.00	27.530	54.320	3874.54	107.66	634.44	923.57	1569143.81	305896.27	39°19'47.415"N	81°01'23.505"W	1120.49	55.513	3.55
4200.00	27.240	53.420	3963.33	110.76	661.56	960.73	1569180.96	305923.38	39°19'47.690"N	81°01'23.038"W	1166.47	55.449	0.51
4300.00	24.860	51.330	4053.17	112.61	688.33	995.52	1569215.75	305950.16	39°19'47.960"N	81°01'22.601"W	1210.32	55.339	2.55
4400.00	24.820	50.210	4143.92	113.18	714.90	1028.06	1569248.29	305976.72	39°19'48.228"N	81°01'22.193"W	1252.19	55.186	0.47
4500.00	23.520	50.970	4235.15	113.59	740.90	1059.69	1569279.92	306002.72	39°19'48.490"N	81°01'21.796"W	1293.01	55.040	1.34
4600.00	24.540	51.720	4326.48	114.56	766.33	1091.49	1569311.72	306028.15	39°19'48.747"N	81°01'21.397"W	1333.65	54.928	1.06
4700.00	23.570	49.110	4417.80	114.87	792.28	1122.91	1569343.14	306054.10	39°19'49.009"N	81°01'21.003"W	1374.28	54.795	1.44
4800.00	23.490	44.650	4509.49	112.70	819.55	1152.03	1569372.26	306081.37	39°19'49.283"N	81°01'20.638"W	1413.80	54.572	1.78
4900.00	24.700	41.670	4600.78	108.14	849.11	1180.18	1569400.40	306110.93	39°19'49.580"N	81°01'20.286"W	1453.90	54.266	1.48
5000.00	25.110	41.670	4691.49	104.48	878.87	1209.93	1569430.15	306140.69	39°19'49.879"N	81°01'19.914"W	1495.44	54.006	2.07
5100.00	24.860	56.000	4782.13	103.55	906.72	1241.67	1569461.90	306168.53	39°19'50.159"N	81°01'19.516"W	1537.49	53.862	1.17
5200.00	25.740	54.480	4872.55	105.28	932.82	1275.48	1569495.70	306194.63	39°19'50.423"N	81°01'19.092"W	1580.19	53.820	2.07
5300.00	23.670	62.800	4963.41	111.32	954.71	1310.97	1569531.19	306216.53	39°19'50.645"N	81°01'18.645"W	1621.76	53.936	3.94
5353.00	22.600	62.200	5012.15	116.66	963.57	1329.83	1569550.04	306225.38	39°19'50.736"N	81°01'18.407"W	1642.22	54.074	4.03
5637.00	21.000	64.670	5275.23	146.16	1007.05	1427.55	1569647.76	306268.87	39°19'51.182"N	81°01'17.173"W	1747.01	54.799	0.51
5732.00	23.620	64.430	5362.91	154.69	1023.36	1460.25	1569680.46	306285.17	39°19'51.349"N	81°01'16.760"W	1783.14	54.977	2.34
5827.00	24.340	62.990	5449.70	163.86	1040.45	1494.88	1569715.09	306302.26	39°19'51.523"N	81°01'16.323"W	1821.32	55.162	1.31
5923.00	24.110	62.550	5537.27	176.18	1055.02	1531.41	1569751.62	306316.83	39°19'51.674"N	81°01'15.861"W	1859.65	55.436	2.81

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### Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'

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REFERENCE WELLPATH IDENTIFICATION			
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Field	Ritchie	Wellbore	PEN-20B-HS AWB
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WELLPATH DATA (159 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]
6016.00	24.420	69.720	5622.05	189.64	1067.70	1567.47	1569787.67	306329.51	39°19'51.805"N	81°01'15.405"W	1896.56	55.739	0.87
6111.00	24.950	68.240	5708.37	202.54	1081.93	1604.50	1569824.70	306343.74	39°19'51.952"N	81°01'14.937"W	1935.20	56.008	0.86
6206.00	26.550	83.890	5794.03	220.67	1091.63	1644.27	1569864.47	306353.44	39°19'52.054"N	81°01'14.433"W	1973.64	56.420	7.33
6301.00	32.630	99.480	5876.73	252.06	1089.67	1690.75	1569910.95	306351.48	39°19'52.043"N	81°01'13.841"W	2011.47	57.199	10.28
6395.00	39.300	104.890	5952.79	295.74	1077.83	1744.59	1569964.79	306339.64	39°19'51.935"N	81°01'13.154"W	2050.69	58.292	7.85
6490.00	46.730	106.920	6022.20	349.41	1060.01	1806.85	1570027.04	306321.82	39°19'51.769"N	81°01'12.358"W	2094.83	59.601	7.95
6585.00	56.010	112.890	6081.48	413.62	1034.55	1876.41	1570096.60	306296.36	39°19'51.529"N	81°01'11.467"W	2142.71	61.130	10.93
6681.00	64.110	121.560	6129.42	490.25	996.35	1950.10	1570170.28	306258.17	39°19'51.164"N	81°01'10.521"W	2189.89	62.936	11.50
6774.00	63.980	126.740	6170.14	570.65	949.44	2019.27	1570239.45	306211.25	39°19'50.712"N	81°01'09.631"W	2231.34	64.818	5.01
6869.00	69.430	127.080	6207.70	655.61	897.05	2089.01	1570309.19	306158.87	39°19'50.206"N	81°01'08.732"W	2273.46	66.761	5.75
6965.00	76.130	133.470	6236.13	745.89	837.77	2158.82	1570379.00	306099.59	39°19'49.631"N	81°01'07.831"W	2315.68	68.790	9.44
7060.00	85.040	138.400	6251.66	839.26	770.48	2223.88	1570444.05	306032.30	39°19'48.977"N	81°01'06.989"W	2353.57	70.891	10.68
7156.00	92.370	141.490	6253.83	935.16	697.08	2285.59	1570505.76	305958.90	39°19'48.262"N	81°01'06.188"W	2389.52	73.039	8.28
7252.00	91.940	144.560	6250.22	1030.94	620.44	2343.28	1570563.45	305882.28	39°19'47.515"N	81°01'05.438"W	2424.03	75.170	3.23
7348.00	90.990	145.380	6247.77	1126.55	541.86	2398.37	1570618.53	305803.70	39°19'46.747"N	81°01'04.720"W	2458.82	77.269	1.31
7443.00	90.990	144.580	6246.13	1221.18	464.07	2452.87	1570673.04	305725.91	39°19'45.988"N	81°01'04.009"W	2496.39	79.286	0.84
7538.00	90.990	146.350	6244.49	1315.73	385.83	2506.72	1570726.88	305647.67	39°19'45.223"N	81°01'03.308"W	2536.24	81.250	1.86
7634.00	90.400	142.180	6243.32	1411.43	307.93	2562.77	1570782.93	305569.77	39°19'44.463"N	81°01'02.578"W	2581.21	83.149	4.39
7729.00	90.580	140.180	6242.51	1506.40	233.97	2622.38	1570842.54	305495.82	39°19'43.742"N	81°01'01.803"W	2632.80	84.902	2.22
7825.00	89.320	140.180	6242.59	1602.40	160.10	2683.69	1570903.84	305421.95	39°19'43.022"N	81°01'01.007"W	2688.46	86.586	1.40
7920.00	89.480	139.480	6243.59	1697.39	87.09	2744.47	1570964.62	305348.95	39°19'42.311"N	81°01'00.218"W	2745.85	88.182	0.68
8016.00	89.570	138.920	6244.38	1793.39	14.19	2806.92	1571027.06	305276.05	39°19'41.601"N	81°00'59.408"W	2806.95	89.710	1.04
8112.00	89.380	138.980	6245.26	1889.36	-58.21	2869.96	1571090.10	305203.66	39°19'40.896"N	81°00'58.590"W	2870.55	91.162	0.21
8207.00	89.510	140.180	6246.18	1984.36	-130.54	2931.53	1571151.67	305131.32	39°19'40.191"N	81°00'57.791"W	2934.44	92.550	1.30
8303.00	89.450	139.480	6247.05	2080.35	-203.72	2993.66	1571213.80	305058.15	39°19'39.479"N	81°00'56.985"W	3000.59	93.893	1.13
8399.00	89.820	138.920	6247.66	2176.32	-275.73	3057.15	1571277.29	304986.15	39°19'38.778"N	81°00'56.162"W	3069.56	95.154	1.18
8494.00	90.340	138.980	6247.53	2271.16	-344.96	3122.19	1571342.32	304916.92	39°19'38.104"N	81°00'55.320"W	3141.19	96.305	2.73
8589.00	89.970	137.170	6247.28	2365.96	-413.69	3187.77	1571407.89	304848.19	39°19'37.436"N	81°00'54.470"W	3214.50	97.394	1.78
8685.00	89.910	138.920	6247.38	2461.88	-484.68	3252.39	1571472.51	304777.20	39°19'36.745"N	81°00'53.633"W	3288.30	98.476	1.09
8781.00	90.090	142.180	6247.38	2557.87	-558.32	3313.95	1571534.07	304703.56	39°19'36.028"N	81°00'52.834"W	3360.65	99.563	3.95

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# Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'  
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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot B
Area	Ritchie County, WV	Well	PEN-20B-HS
Field	Ritchie	Wellbore	PEN-20B-HS AWB
Facility	PEN-20 Pad		

WELLPATH DATA (159 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]
8875.00	89.600	148.450	6247.63	2651.42	-635.49	3367.53	1571587.65	304626.40	39°19'35.274"N	81°00'52.136"W	3426.97	100.687	6.88
8971.00	89.660	149.310	6248.25	2746.27	-717.67	3417.15	1571637.26	304544.22	39°19'34.470"N	81°00'51.487"W	3491.70	101.861	0.90
9066.00	90.310	142.850	6248.28	2840.69	-796.47	3470.13	1571690.25	304465.43	39°19'33.700"N	81°00'50.796"W	3560.36	102.927	6.83
9162.00	90.220	144.250	6247.83	2936.50	-873.68	3527.17	1571747.28	304388.22	39°19'32.947"N	81°00'50.053"W	3633.76	103.912	1.46
9258.00	89.690	138.340	6247.91	3032.43	-948.57	3587.17	1571807.28	304313.34	39°19'32.217"N	81°00'49.274"W	3710.47	104.812	6.18
9353.00	89.750	135.840	6248.37	3127.30	-1018.14	3651.84	1571871.95	304243.77	39°19'31.540"N	81°00'48.436"W	3791.12	105.579	2.63
9449.00	89.940	135.430	6248.63	3223.02	-1086.77	3718.97	1571939.07	304175.14	39°19'30.873"N	81°00'47.567"W	3874.51	106.290	0.47
9545.00	89.540	136.330	6249.07	3318.77	-1155.68	3785.80	1572005.90	304106.23	39°19'30.203"N	81°00'46.702"W	3958.27	106.976	1.03
9640.00	89.450	137.020	6249.90	3413.61	-1224.79	3850.98	1572071.08	304037.13	39°19'29.531"N	81°00'45.858"W	4041.06	107.643	0.73
9736.00	89.600	138.320	6250.70	3509.52	-1295.76	3915.62	1572135.72	303966.16	39°19'28.840"N	81°00'45.021"W	4124.45	108.310	1.36
9832.00	89.660	141.020	6251.32	3605.51	-1368.93	3977.75	1572197.84	303892.99	39°19'28.128"N	81°00'44.215"W	4206.71	108.991	2.81
9927.00	89.780	141.510	6251.78	3700.48	-1443.04	4037.19	1572257.28	303818.89	39°19'27.405"N	81°00'43.442"W	4287.34	109.669	0.53
10022.00	89.750	142.810	6252.17	3795.41	-1518.06	4095.46	1572315.55	303743.87	39°19'26.673"N	81°00'42.685"W	4367.76	110.338	1.37
10117.00	89.660	140.620	6252.66	3890.36	-1592.62	4154.32	1572374.40	303669.31	39°19'25.946"N	81°00'41.920"W	4449.14	110.975	2.31
10213.00	89.850	142.710	6253.07	3986.32	-1667.92	4213.86	1572433.94	303594.02	39°19'25.212"N	81°00'41.146"W	4531.95	111.595	2.19
10309.00	90.280	145.010	6252.96	4082.09	-1745.44	4270.47	1572490.55	303516.50	39°19'24.455"N	81°00'40.410"W	4613.41	112.231	2.44
10404.00	90.220	140.370	6252.55	4176.96	-1820.98	4328.04	1572548.11	303440.97	39°19'23.719"N	81°00'39.661"W	4695.52	112.818	4.88
10500.00	90.150	137.260	6252.24	4272.93	-1893.22	4391.25	1572611.32	303368.73	39°19'23.015"N	81°00'38.841"W	4781.98	113.323	3.24
10595.00	90.890	138.590	6251.38	4367.86	-1963.73	4454.90	1572674.97	303298.22	39°19'22.329"N	81°00'38.016"W	4868.51	113.788	1.60
10691.00	90.580	139.850	6250.15	4463.84	-2036.14	4517.92	1572737.98	303225.82	39°19'21.624"N	81°00'37.199"W	4955.55	114.260	0.85
10786.00	90.340	140.260	6249.38	4558.83	-2109.23	4578.59	1572798.65	303152.73	39°19'20.912"N	81°00'36.412"W	5041.07	114.734	2.03
10882.00	90.330	139.810	6248.84	4654.82	-2183.34	4639.60	1572859.66	303078.62	39°19'20.189"N	81°00'35.620"W	5127.66	115.201	1.51
10978.00	90.250	138.800	6248.37	4750.75	-2254.73	4703.77	1572923.83	303007.24	39°19'19.495"N	81°00'34.788"W	5216.25	115.610	3.68
11073.00	90.220	137.800	6247.98	4845.48	-2322.75	4770.09	1572990.14	302939.22	39°19'18.833"N	81°00'33.930"W	5305.55	115.963	1.16
11168.00	90.060	137.200	6247.75	4940.11	-2389.87	4837.32	1573057.37	302872.11	39°19'18.181"N	81°00'33.060"W	5395.47	116.292	0.51
11264.00	90.060	135.520	6247.65	5035.76	-2457.89	4905.06	1573125.10	302804.09	39°19'17.520"N	81°00'32.184"W	5486.42	116.615	0.83
11359.00	90.060	136.800	6247.55	5130.52	-2526.11	4971.17	1573191.21	302735.87	39°19'16.857"N	81°00'31.328"W	5576.18	116.937	0.80
11455.00	90.340	138.300	6247.21	5226.39	-2596.38	5036.57	1573256.61	302665.60	39°19'16.174"N	81°00'30.481"W	5666.41	117.271	1.64
11550.00	89.970	140.000	6246.96	5321.37	-2668.62	5098.24	1573318.28	302593.36	39°19'15.470"N	81°00'29.681"W	5754.44	117.629	3.57
11646.00	90.090	140.300	6246.90	5417.35	-2743.40	5158.44	1573378.47	302518.59	39°19'14.741"N	81°00'28.899"W	5842.58	118.005	0.14

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# Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'

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## REFERENCE WELLPATH IDENTIFICATION

Operator	NOBLE ENERGY	Slot	Slot B
Area	Ritchie County, WV	Well	PEN-20B-HS
Field	Ritchie	Wellbore	PEN-20B-HS AWB
Facility	PEN-20 Pad		

## WELLPATH DATA (159 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]
11742.00	89.940	142.310	6246.88	5513.31	-2818.76	5217.91	1573437.94	302443.23	39°19'14.006"N	81°00'28.126"W	5930.60	118.378	1.24
11838.00	90.060	145.370	6246.88	5609.08	-2896.26	5274.55	1573494.58	302365.74	39°19'13.250"N	81°00'27.389"W	6017.41	118.771	3.19
11933.00	90.090	143.480	6246.76	5703.79	-2973.53	5329.81	1573549.84	302288.48	39°19'12.495"N	81°00'26.670"W	6103.18	119.157	1.99
12028.00	89.940	140.710	6246.73	5798.72	-3048.48	5388.17	1573608.19	302213.53	39°19'11.764"N	81°00'25.911"W	6190.77	119.500	2.92
12124.00	90.030	139.200	6246.76	5894.72	-3121.97	5449.94	1573669.96	302140.04	39°19'11.048"N	81°00'25.110"W	6280.80	119.806	1.58
12220.00	89.480	138.780	6247.17	5990.70	-3194.41	5512.93	1573732.95	302067.61	39°19'10.343"N	81°00'24.293"W	6371.55	120.090	0.72
12315.00	89.350	139.900	6248.14	6085.69	-3266.47	5574.82	1573794.84	301995.55	39°19'09.641"N	81°00'23.490"W	6461.31	120.367	1.19
12411.00	89.390	140.030	6249.19	6181.68	-3339.96	5636.57	1573856.58	301922.05	39°19'08.925"N	81°00'22.689"W	6551.82	120.649	0.14
12507.00	89.600	143.270	6250.04	6277.62	-3415.24	5696.13	1573916.13	301846.78	39°19'08.191"N	81°00'21.915"W	6641.51	120.946	3.38
12603.00	90.150	147.630	6250.25	6373.17	-3494.29	5750.56	1573970.56	301767.74	39°19'07.419"N	81°00'21.206"W	6728.96	121.285	4.58
12698.00	90.090	150.210	6250.05	6467.01	-3575.64	5799.60	1574019.60	301686.39	39°19'06.623"N	81°00'20.564"W	6813.26	121.655	2.72
12794.00	90.120	146.520	6249.87	6561.97	-3657.36	5849.94	1574069.94	301604.67	39°19'05.823"N	81°00'19.907"W	6899.14	122.013	3.84
12889.00	90.180	140.140	6249.62	6656.76	-3733.52	5906.64	1574126.64	301528.52	39°19'05.080"N	81°00'19.169"W	6987.68	122.297	6.72
12985.00	90.060	138.720	6249.42	6752.75	-3806.44	5969.08	1574189.07	301455.60	39°19'04.370"N	81°00'18.359"W	7079.47	122.525	1.48
13080.00	89.970	139.190	6249.40	6847.74	-3878.09	6031.46	1574251.45	301383.95	39°19'03.672"N	81°00'17.550"W	7170.64	122.740	0.50
13176.00	90.060	138.740	6249.37	6943.72	-3950.50	6094.49	1574314.47	301311.54	39°19'02.967"N	81°00'16.733"W	7262.87	122.952	0.48
13271.00	89.570	139.730	6249.68	7038.71	-4022.46	6156.52	1574376.50	301239.60	39°19'02.266"N	81°00'15.929"W	7354.10	123.159	1.16
13367.00	89.720	139.500	6250.27	7134.71	-4095.58	6218.72	1574438.70	301166.48	39°19'01.554"N	81°00'15.122"W	7446.22	123.368	0.29
13462.00	89.720	140.220	6250.74	7229.66	-4166.57	6281.83	1574501.81	301095.49	39°19'00.863"N	81°00'14.304"W	7538.02	123.555	2.40
13558.00	89.690	140.970	6251.23	7325.50	-4236.49	6347.61	1574567.59	301025.58	39°19'00.183"N	81°00'13.452"W	7631.52	123.720	0.99
13654.00	89.750	140.860	6251.70	7421.33	-4306.20	6413.62	1574633.29	300955.87	39°18'59.505"N	81°00'12.597"W	7725.14	123.878	0.62
13748.00	89.940	140.810	6252.19	7515.23	-4375.31	6477.32	1574697.59	300886.75	39°18'58.832"N	81°00'11.772"W	7816.59	124.038	1.02
13844.00	89.990	140.030	6252.73	7611.20	-4447.68	6540.39	1574760.36	300814.39	39°18'58.128"N	81°00'10.955"W	7909.40	124.217	2.32
13939.00	89.600	140.220	6253.32	7706.19	-4519.73	6602.30	1574822.26	300742.35	39°18'57.426"N	81°00'10.152"W	8001.15	124.394	1.50
14035.00	89.850	140.150	6253.78	7802.18	-4593.30	6663.96	1574883.92	300668.78	39°18'56.709"N	81°00'09.352"W	8093.62	124.578	2.96
14130.00	89.850	140.440	6254.03	7897.02	-4669.35	6720.86	1574940.82	300595.73	39°18'55.967"N	81°00'08.612"W	8183.69	124.790	3.67
14226.00	90.000	140.100	6254.10	7992.87	-4745.98	6778.66	1574998.61	300516.11	39°18'55.219"N	81°00'07.860"W	8274.93	124.997	4.10
14322.00	89.940	140.850	6254.10	8088.86	-4819.44	6840.45	1575060.40	300442.65	39°18'54.503"N	81°00'07.058"W	8367.72	125.167	2.25
14418.00	90.030	139.900	6254.13	8184.84	-4891.55	6903.83	1575123.78	300370.55	39°18'53.801"N	81°00'06.237"W	8461.09	125.319	0.36
14513.00	90.000	139.220	6254.10	8279.68	-4960.87	6968.77	1575188.71	300301.23	39°18'53.127"N	81°00'05.396"W	8554.18	125.446	3.47

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# Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'

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## REFERENCE WELLPATH IDENTIFICATION

Operator	NOBLE ENERGY	Slot	Slot B
Area	Ritchie County, WV	Well	PEN-20B-HS
Field	Ritchie	Wellbore	PEN-20B-HS AWB
Facility	PEN-20 Pad		

## WELLPATH DATA (159 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]
14609.00	89.420	134.910	6254.59	8375.33	-5028.83	7036.57	1575256.52	300233.27	39°18'52.467"N	81°00'04.519"W	8648.84	125.552	0.69
14704.00	89.350	141.130	6255.61	8470.22	-5099.41	7100.08	1575320.02	300162.70	39°18'51.780"N	81°00'03.696"W	8741.57	125.687	6.55
14800.00	89.510	142.620	6256.57	8566.16	-5174.92	7159.34	1575379.28	300087.19	39°18'51.043"N	81°00'02.926"W	8833.80	125.860	1.56
14895.00	89.540	140.980	6257.35	8661.10	-5249.57	7218.09	1575438.02	300012.54	39°18'50.315"N	81°00'02.163"W	8923.18	126.028	1.73
14991.00	89.450	139.210	6258.20	8757.10	-5323.21	7279.67	1575499.60	299938.90	39°18'49.597"N	81°00'01.364"W	9018.32	126.176	1.85
15086.00	89.420	138.570	6259.14	8852.07	-5394.78	7342.13	1575562.06	299867.33	39°18'48.900"N	81°00'00.554"W	9111.01	126.307	0.67
15181.00	89.380	137.250	6260.13	8947.00	-5465.28	7405.80	1575625.73	299796.84	39°18'48.214"N	80°59'59.729"W	9204.08	126.426	1.39
15231.00	89.570	136.640	6260.59	8996.93	-5501.81	7439.94	1575659.86	299760.31	39°18'47.859"N	80°59'59.287"W	9253.25	126.483	1.28
15256.00	89.570	136.640	6260.78	9021.89	-5519.99	7457.10	1575677.02	299742.14	39°18'47.682"N	80°59'59.065"W	9277.85	126.510	0.00

## HOLE & CASING SECTIONS - Ref Wellbore: PEN-20B-HS AWB Ref Wellpath: PEN-20B-HS AWP Proj: 15256'

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]
13.375in Casing Surface	26.00	550.00	524.00	26.00	550.00	0.00	0.00	-0.33	-0.28





# Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'

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## REFERENCE WELLPATH IDENTIFICATION

Operator	NOBLE ENERGY	Slot	Slot B
Area	Ritchie County, WV	Well	PEN-20B-HS
Field	Ritchie	Wellbore	PEN-20B-HS AWB
Facility	PEN-20 Pad		

## TARGETS

Name	MD [ft]	TVD [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Shape
PEN-20B-HS BHL Rev-4		6240.00	-5507.61	7443.72	1575663.64	299754.51	39°18'47.802"N	80°59'59.238"W	point
PEN-20B-HS LP Rev-4		6240.00	754.80	2188.93	1570409.11	306016.62	39°19'48.817"N	81°01'07.430"W	point
PEN-20 ALT Vertices		6948.00	-57.68	28.44	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon
PEN-20 Cokely Tract 1		6948.00	-57.68	28.44	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon
PEN-20 Cokely Tract 2		6948.00	-57.68	28.44	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon
PEN-20 LL		6948.00	-57.68	28.44	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon
PEN-20 Parcel 3.12-1.2		6948.00	-57.68	28.44	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon

## WELLPATH COMPOSITION - Ref Wellbore: PEN-20B-HS AWB Ref Wellpath: PEN-20B-HS AWP Proj: 15256'

Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore
26.00	5353.00	Generic gyro - northseeking (Standard)	03_Gyrodata MS Gyro <12-1/4"> (100'-5353')	PEN-20B-HS AWB
5353.00	15231.00	North Track (AT Curve Short Spaced)	04_BHI AT Curve <8-3/4"> (5353')(5637'-15231')	PEN-20B-HS AWB
15231.00	15256.00	Blind Drilling (std)	Projection to bit	PEN-20B-HS AWB

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# Actual Wellpath Report

PEN-20B-HS AWP Proj: 15256'

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**REFERENCE WELLPATH IDENTIFICATION**

Operator	NOBLE ENERGY	Slot	Slot B
Area	Ritchie County, WV	Well	PEN-20B-HS
Field	Ritchie	Wellbore	PEN-20B-HS AWB
Facility	PEN-20 Pad		

**COMMENTS**

Wellpath general comments  
 API: 47-085-10109-0000  
 BHI Job #: 6697290  
 Rig: Nomac 78  
 Duration: 11.18.2014 – 11.25.2014  
 Gyrodata MS Gyro <12-1/4"> (100'-5353')  
 BHI AT Curve <8-3/4"> (5353')(5637'-15231')  
 Projected MD at TD: 15256'