

State of West Virginia
Department of Environmental Protection - Office of Oil and Gas
Well Operator's Report of Well Work

API 47-085-10123FH6A County Ritchie District Clay
Quad Ellenboro 7.5' Pad Name PEN20HS Field/Pool Name Pennsboro
Farm Name COKELEY, LAWRENCE & ANGELA Well Number PEN20FHS - Fracture
Operator (as registered with the OOG) CNX Gas Company LLC
Address P.O. Box 1248 City Jane Lew State WV Zip 26378

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top Hole Northing 4,353,174.81 m Easting 497,755.32 m
Landing Point of Curve Northing 4,353,538.42 m Easting 498,050.50 m
Bottom Hole Northing 4,354,990.42 m Easting 496,789.07 m

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Elevation (ft) 1081' GL Type of Well New Existing Type of Report Interim Final
Permit Type Deviated Horizontal Horizontal 6A Vertical Depth Type Deep Shallow
Type of Operation Convert Deepen Drill Plug Back Redrilling Rework Stimulate
Well Type Brine Disposal CBM Gas Oil Secondary Recovery Solution Mining Storage Other _____
Type of Completion Single Multiple Fluids Produced Brine Gas NGL Oil Other _____
Drilled with Cable Rotary

Drilled Media Surface hole Air Mud Fresh Water Intermediate hole Air Mud Fresh Water Brine
Production hole Air Mud Fresh Water Brine

Mud Type(s) and Additive(s)

Synthetic Oil Based.

Date Permit Issued 03/13/2017 Date drilling commenced 12/29/2014 Date drilling ceased 01/13/2015
Date completion activities began 07/07/2017 Date completion activities ceased 7/16/2017
Verbal plugging (Y/N) N Date permission granted N/A Granted by N/A

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

Freshwater depth(s) ft 398' Open mine(s) (Y/N) depths N
Salt water depth(s) ft None Noted for Offsets Void(s) encountered (Y/N) depths N
Coal depth(s) ft N/A Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed by: MS

REVIEWED

02/16/2018

API 47-085-10123FH6A Farm name COKELEY, LAWRENCE & ANGELA Well number PEN20FHS - Fracture

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number Of Perforations	Formation(s)
					SEE ATTACHED

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Avg Pump Rate (BPM)	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen / other (gals)
								See Attached
								See Attached

See Attached
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Please insert additional pages as applicable.

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number Of Perforations	Formation(s)
1	7/7/2017	13080	13236	40	Marcellus
2	7/8/2017	12887	13045	40	Marcellus
3	7/8/2017	12689	12847	40	Marcellus
4	7/8/2017	12491	12649	40	Marcellus
5	7/9/2017	12293	12451	40	Marcellus
6	7/9/2017	12095	12253	40	Marcellus
7	7/9/2017	11897	12055	40	Marcellus
8	7/10/2017	11699	11857	40	Marcellus
9	7/10/2017	11501	11659	40	Marcellus
10	7/10/2017	10887	10975	40	Marcellus
11	7/10/2017	10689	10848	40	Marcellus
12	7/11/2017	10491	10650	40	Marcellus
13	7/11/2017	10293	10452	40	Marcellus
14	7/11/2017	10095	10254	40	Marcellus
15	7/12/2017	9897	10056	40	Marcellus
16	7/12/2017	9699	9858	40	Marcellus
17	7/12/2017	9501	9660	40	Marcellus
18	7/13/2017	9303	9462	40	Marcellus
19	7/13/2017	9105	9264	40	Marcellus
20	7/13/2017	8907	9066	40	Marcellus
21	7/13/2017	8709	8868	40	Marcellus
22	7/14/2017	8511	8670	40	Marcellus
23	7/14/2017	8313	8472	40	Marcellus
24	7/14/2017	8115	8274	40	Marcellus
25	7/14/2017	7917	8076	40	Marcellus
26	7/15/2017	7719	7878	40	Marcellus
27	7/15/2017	7521	7680	40	Marcellus
28	7/15/2017	7323	7482	40	Marcellus
29	7/15/2017	7125	7284	40	Marcellus
30	7/16/2017	6927	7086	40	Marcellus
31	7/16/2017	6729	6888	40	Marcellus

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STIMULATION INFORMATION PER STAGE

Stage No.	Stimulations Date	Avg Pump Rate (BPM)	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen / other (gals)
1	7/8/2017	69.8	8395	6486	4522	228354	15136	9812
2	7/8/2017	89.4	7907	5287	3450	399903	8599	4573
3	7/8/2017	81.2	7794	5626	3919	400686	8426	4672
4	7/9/2017	88.7	8074	4903	3403	400457	7973	4453
5	7/9/2017	93.3	7308	4182	4421	400322	7811	4430
6	7/9/2017	87.9	7848	5319	4179	400111	9883	8956
7	7/9/2017	92.8	7763	5100	3962	401583	7739	4382
8	7/10/2017	87.9	7302	5441	3800	400068	8026	9484
9	7/10/2017	90.7	7790	4668	3781	400465	9433	4217
10	7/10/2017	91.6	7735	5623	3756	324978	7001	4395
11	7/11/2017	89.7	7356	5806	3733	401110	7987	4435
12	7/11/2017	92.4	7830	4165	3924	400728	7706	4351
13	7/11/2017	93.8	7245	4140	3838	401041	7450	4297
14	7/11/2017	91.1	7246	6127	3896	399739	7450	4421
15	7/12/2017	90.9	7445	5858	3630	402504	8010	4441
16	7/12/2017	90.6	7748	6231	3715	400158	7859	4400
17	7/12/2017	87.3	7537	5918	3915	406347	11817	12702
18	7/13/2017	88.7	7389	5719	3861	399520	8644	4604
19	7/13/2017	93.0	7377	6129	4443	400492	7670	4328
20	7/13/2017	93.1	7354	6495	3601	402138	7668	4315
21	7/13/2017	92.1	7182	5890	3706	400157	7620	4404
22	7/14/2017	91.3	7017	6297	4004	399477	7767	4480
23	7/14/2017	90.6	6866	6862	4211	401792	6828	4354
24	7/14/2017	90.2	6951	4388	4015	402310	6427	4233
25	7/14/2017	92.8	7181	5465	3838	400607	7433	4364
26	7/15/2017	91.0	6960	5601	4293	401918	7425	4264
27	7/15/2017	91.3	7070	5752	4560	403238	6557	4247
28	7/15/2017	90.0	7280	5665	3958	401029	6402	4241
29	7/15/2017	93.9	7150	5690	4491	401212	7253	4293
30	7/16/2017	93.8	6981	6673	3687	402955	7146	4250
31	7/16/2017	94.1	6379	6557	3384	404521	6629	4209

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PRODUCING FORMATION(S)	DEPTHS
<u>MARCELLUS</u>	<u>6195'</u> ' TVD <u>13384'</u> ' MD

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 404 psi Bottom Hole 1833 psi DURATION OF TEST 15.5 hrs

OPEN FLOW Gas 5865.62 mcfpd Oil 144 bpd NGL N/A bpd Water 720 bpd

GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY / FORMATION	TOP DEPTH IN FT TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY TYPE OF FLUID (FRESHWATER,BRINE,GAS,H2S, ETC)
					SEE ATTACHED

Please insert additional pages as applicable.

Drilling Contractor Nomac 78 Drilling
Address 171 Locust Ave. Ext. City Mt. Morris State PA Zip 15349

Logging Company Baker Hughes
Address 400 Technology Drive City Canonsburg State PA Zip 15317

Cementing Company Schlumberger
Address 4600 J. Barry Ct., Suite 200 City Canonsburg State PA Zip 15317

Stimulating Company U.S. Well Service
Address 533 Industrial Park Drive City Jane Lew State WY Zip 26378

Please insert additional pages as applicable.

Completed by CNX Gas WV Operations Company, LLC - Drilling and Completions Telephone 304-884-2000
Signature [Signature] Title Adam Shutler - Completions Superintendent-Gas WV Date 12/20/17

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LITHOLOGY / FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY TYPE OF FLUID (FRESHWATER,BRINE,GAS,H2S, ETC)
	DEPTH IN FT	DEPTH IN FT	DEPTH IN FT	DEPTH IN FT	
	TVD	TVD	MD	MD	
SHALE/SANDSTONE	0	1222			
SANDSTONE	1222	1346			
SHALE/SANDSTONE	1346	1506			
SANDSTONE	1506	1548			
SHALE/SANDSTONE	1548	1650			
MAXTON SAND	1650	1733			
SHALE/SANDSTONE	1733	1856			
BIG LIME	1856	1911			
BIG INJUN	1911	2046			
PRICE	2046	2318			
WEIR	2318	2357			
SHALE	2357	2637			
GORDON	2637	2654			
SHALE/SANDSTONE	2654	2834			
5TH SAND	2834	2846			
SHALE	2846	2989			
SANDSTONE	2989	3003			
SHALE/SANDSTONE	3003	3411			
BENSON	4838	4900			
SHALE	4900	5060			
ALEXANDER	5060	5128			
SHALE	5128	5638			
RHINESTREET	5638	5964			
CASHAQUA	5964	6056			
MIDDLESEX SHALE	6056	6085			
WEST RIVER	6085	6129			
BURKETT	6129	6172			
TULLY LIMESTONE	6172	6173			
HAMILTON SHALE	6173	6174			
MARCELLUS	6174	6233			
ONONDAGA	6233				

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NOBLE ENERGY

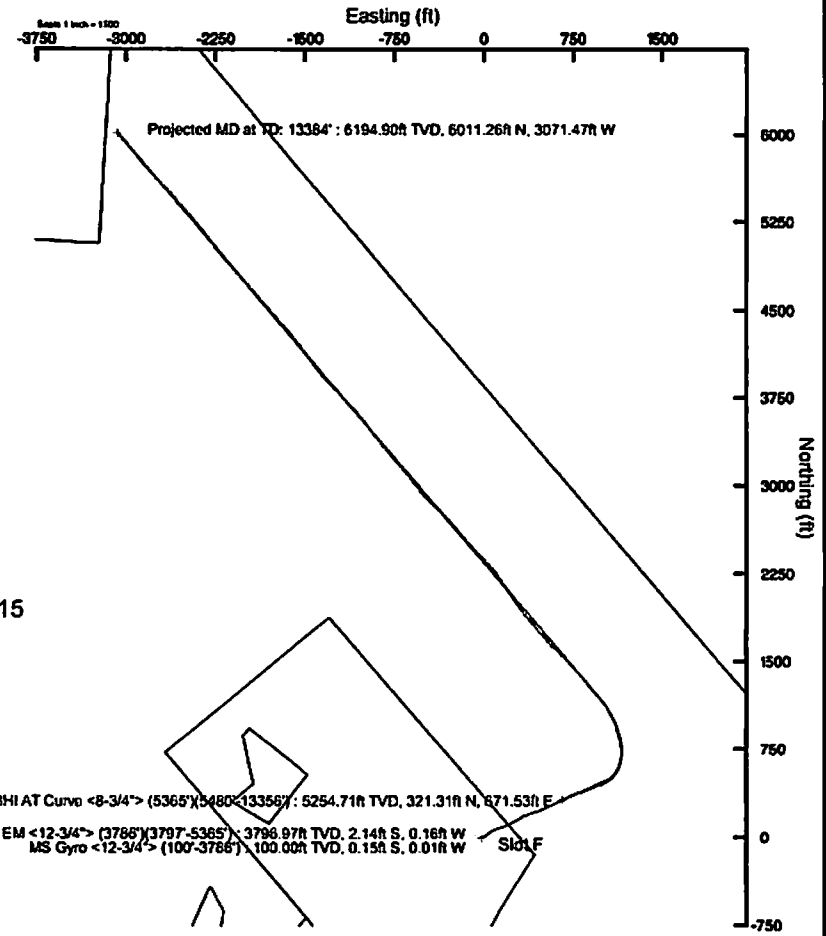
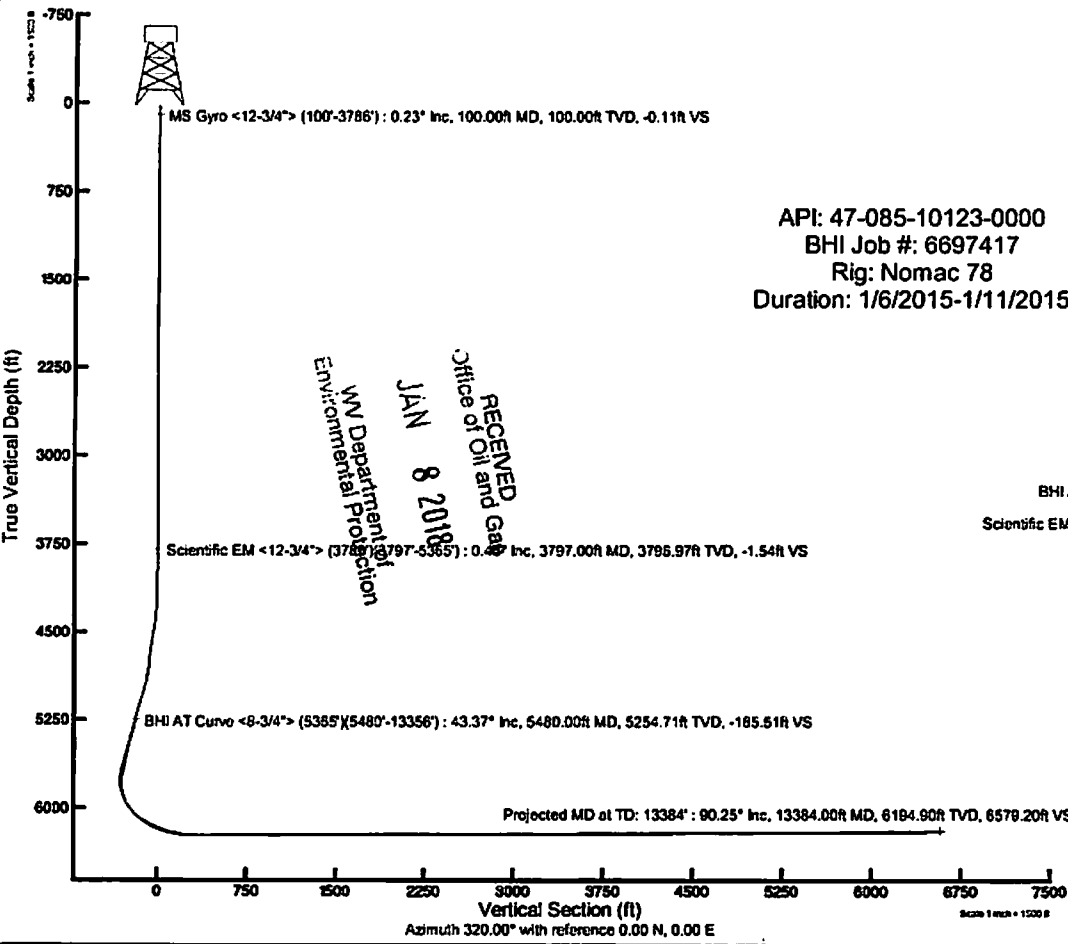


Location: Ritchie County, WV
 Field: Ritchie
 Facility: PEN-20 Pad

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

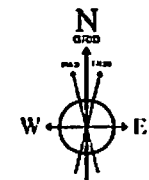
Plot reference wellbore is PEN-20F-HS PWB Prod D	
True vertical depths are referenced to Mean 78 (RKB)	Grid System: NAD83 / Lambert West Virginia SP, Northern Zone (1101), UG feet
Measured depths are referenced to Mean 78 (RKB)	North Reference: Grid north
Normac 78 (RKB) to Mean Sea Level: 1023 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot F) = 1029 feet	Depths are in feet
Coordinates are in feet reference to Slot	Created by: cchayler on 15-Jan-2015

Location Information						
Facility Name	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude		
PEN-20 Pad	1568270.600	305275.500	39°19'41.124"N	81°01'33.306"W		
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot F	-67.00	73.26	1568270.600	305207.660	39°19'40.495"N	81°01'34.380"W
Normac 78 (RKB) to Mud line (At Slot: Slot F)	26ft					
Mean Sea Level to Mud line (At Slot: Slot F)	-1029ft					
Normac 78 (RKB) to Mean Sea Level	1053ft					



API: 47-085-10123-0000
 BHI Job #: 6697417
 Rig: Nomac 78
 Duration: 1/6/2015-1/11/2015

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User specified (MDGM) Dip: 68.78° Field: 52155 nT
 Magnetic North is 7.83 degrees West of True North (at 29/Dec/2014)
 Grid North is 0.97 degrees West of True North
 To correct azimuth from True to Grid add 0.97 degrees
 To correct azimuth from Magnetic to Grid subtract 0.96 degrees



Actual Wellpath Report

PEN-20F-HS AWP Proj: 13384'

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REFERENCE WELLPATH IDENTIFICATION

Operator	NOBLE ENERGY	Slot	Slot F
Area	Ritchie County, WV	Well	PEN-20F-HS
Field	Ritchie	Wellbore	PEN-20F-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	Edsaryar
Scale	0.999954	Report Generated	15/Jan/2015 at 15:44
Convergence at slot	0.97° West	Database/Source file	WellArchitectEasternDB/PEN-20F-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	-67.90	73.26	1568279.06	305207.68	39°19'40.465"N	81°01'34.360"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 F)	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	320.00°

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15/Jan/2015

Actual Wellpath Report

PEN-20F-HS AWP Proj: 13384'
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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot F
Area	Ritchie County, WV	Well	PEN-20F-HS
Field	Ritchie	Wellbore	PEN-20F-HS AWB
Facility	PEN-20 Pad		

WELLPATH DATA (143 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	184.620	0.00	0.00	0.00	0.00	1568279.06	305207.68	39°19'40.465"N	81°01'34.360"W	0.00	0.000	0.00	0.00	0.00
26.00	0.000	184.620	26.00	0.00	0.00	0.00	1568279.06	305207.68	39°19'40.465"N	81°01'34.360"W	0.00	0.000	0.00	0.00	0.00
100.00	0.230	184.620	100.00	-0.11	-0.15	-0.01	1568279.05	305207.53	39°19'40.464"N	81°01'34.360"W	0.15	184.620	0.31	0.31	0.00
200.00	0.380	243.820	200.00	-0.17	-0.49	-0.33	1568278.73	305207.19	39°19'40.460"N	81°01'34.364"W	0.59	213.377	0.33	0.15	59.20
300.00	0.380	235.580	300.00	-0.06	-0.83	-0.90	1568278.16	305206.85	39°19'40.457"N	81°01'34.371"W	1.22	227.281	0.05	0.00	-8.24
400.00	0.170	162.920	400.00	-0.16	-1.16	-1.13	1568277.93	305206.52	39°19'40.454"N	81°01'34.374"W	1.62	224.233	0.37	-0.21	-72.66
500.00	0.260	46.910	500.00	-0.29	-1.14	-0.92	1568278.14	305206.54	39°19'40.454"N	81°01'34.371"W	1.47	218.727	0.37	0.09	-116.01
600.00	0.320	21.740	599.99	-0.14	-0.73	-0.65	1568278.41	305206.95	39°19'40.458"N	81°01'34.368"W	0.98	221.621	0.14	0.06	-25.17
700.00	0.280	7.100	699.99	0.16	-0.23	-0.51	1568278.55	305207.45	39°19'40.463"N	81°01'34.366"W	0.56	246.115	0.09	-0.04	-14.64
800.00	0.280	313.810	799.99	0.57	0.18	-0.66	1568278.40	305207.86	39°19'40.467"N	81°01'34.368"W	0.69	285.529	0.25	0.00	-53.29
900.00	0.160	230.340	899.99	0.81	0.26	-0.94	1568278.12	305207.94	39°19'40.468"N	81°01'34.372"W	0.98	285.595	0.31	-0.12	-83.47
1000.00	0.210	182.970	999.99	0.68	-0.01	-1.06	1568278.00	305207.67	39°19'40.465"N	81°01'34.373"W	1.06	269.545	0.16	0.05	-47.37
1100.00	0.320	42.360	1099.99	0.58	0.01	-0.88	1568278.18	305207.69	39°19'40.465"N	81°01'34.371"W	0.88	270.967	0.50	0.11	-140.61
1200.00	0.290	80.130	1199.99	0.49	0.26	-0.45	1568278.61	305207.94	39°19'40.468"N	81°01'34.365"W	0.52	300.704	0.20	-0.03	37.77
1300.00	0.260	123.310	1299.99	0.14	0.18	-0.01	1568279.05	305207.86	39°19'40.467"N	81°01'34.360"W	0.18	357.921	0.20	-0.03	43.18
1400.00	0.240	123.150	1399.99	-0.27	-0.06	0.36	1568279.42	305207.62	39°19'40.465"N	81°01'34.355"W	0.36	98.840	0.02	-0.02	-0.16
1500.00	0.150	178.920	1499.99	-0.58	-0.30	0.54	1568279.60	305207.38	39°19'40.462"N	81°01'34.353"W	0.61	119.322	0.20	-0.09	55.77
1600.00	0.340	249.490	1599.99	-0.58	-0.54	0.26	1568279.32	305207.14	39°19'40.460"N	81°01'34.356"W	0.60	154.061	0.32	0.19	70.57
1700.00	0.430	274.610	1699.98	-0.22	-0.61	-0.39	1568278.67	305207.07	39°19'40.459"N	81°01'34.364"W	0.72	212.685	0.19	0.09	25.12
1800.00	0.290	309.110	1799.98	0.30	-0.42	-0.96	1568278.10	305207.26	39°19'40.461"N	81°01'34.372"W	1.05	246.408	0.25	-0.14	34.50
1900.00	0.240	58.940	1899.98	0.51	-0.15	-0.98	1568278.08	305207.53	39°19'40.464"N	81°01'34.372"W	0.99	261.156	0.43	-0.05	109.83
2000.00	0.210	168.800	1999.98	0.32	-0.22	-0.76	1568278.30	305207.46	39°19'40.463"N	81°01'34.369"W	0.80	253.652	0.37	-0.03	109.86
2100.00	0.080	321.620	2099.98	0.23	-0.35	-0.77	1568278.29	305207.33	39°19'40.462"N	81°01'34.369"W	0.85	245.654	0.28	-0.13	152.82
2200.00	0.370	87.700	2199.98	0.10	-0.28	-0.49	1568278.57	305207.40	39°19'40.462"N	81°01'34.366"W	0.57	240.241	0.42	0.29	126.08
2300.00	0.330	131.510	2299.98	-0.38	-0.46	0.05	1568279.11	305207.22	39°19'40.461"N	81°01'34.359"W	0.46	174.252	0.26	-0.04	43.81
2400.00	0.220	13.890	2399.98	-0.55	-0.46	0.31	1568279.37	305207.22	39°19'40.461"N	81°01'34.356"W	0.56	146.411	0.47	-0.11	-117.62
2500.00	0.350	86.660	2499.98	-0.62	-0.26	0.66	1568279.72	305207.42	39°19'40.463"N	81°01'34.351"W	0.71	111.498	0.35	0.13	72.77
2600.00	0.280	200.010	2599.98	-0.93	-0.47	0.88	1568279.94	305207.21	39°19'40.461"N	81°01'34.348"W	1.00	118.167	0.53	-0.07	113.35
2700.00	0.350	260.720	2699.97	-0.89	-0.75	0.50	1568279.56	305206.93	39°19'40.458"N	81°01'34.353"W	0.90	146.570	0.32	0.07	60.71
2800.00	0.220	314.150	2799.97	-0.55	-0.67	0.06	1568279.12	305207.01	39°19'40.459"N	81°01'34.359"W	0.67	175.188	0.28	-0.13	53.43

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PEN-20F-HS AWP Proj: 13384'
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REFERENCE WELLPATH IDENTIFICATION

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

WELLPATH DATA (143 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]
2900.00	0.220	180.080	2899.97	-0.50	-0.72	-0.08	1568278.98	305206.96	39°19'40.458"N	81°01'34.360"W	0.73	186.461	0.41	0.00	-134.07
3000.00	0.330	189.740	2999.97	-0.83	-1.20	-0.13	1568278.93	305206.48	39°19'40.453"N	81°01'34.361"W	1.21	186.230	0.12	0.11	9.66
3100.00	0.290	264.220	3099.97	-0.88	-1.51	-0.43	1568278.63	305206.17	39°19'40.450"N	81°01'34.365"W	1.57	195.956	0.38	-0.04	74.48
3200.00	0.150	62.710	3199.97	-0.77	-1.47	-0.57	1568278.49	305206.21	39°19'40.451"N	81°01'34.366"W	1.58	201.030	0.43	-0.14	158.49
3300.00	0.260	178.720	3299.97	-0.97	-1.64	-0.45	1568278.61	305206.04	39°19'40.449"N	81°01'34.365"W	1.70	195.186	0.35	0.11	116.01
3400.00	0.200	351.090	3399.97	-1.00	-1.70	-0.47	1568278.59	305205.98	39°19'40.448"N	81°01'34.365"W	1.76	195.412	0.46	-0.06	172.37
3500.00	0.310	122.620	3499.97	-1.11	-1.67	-0.27	1568278.79	305206.01	39°19'40.449"N	81°01'34.363"W	1.69	189.077	0.47	0.11	131.53
3600.00	0.240	214.820	3599.97	-1.42	-1.99	-0.16	1568278.90	305205.69	39°19'40.446"N	81°01'34.361"W	1.99	184.558	0.40	-0.07	92.20
3700.00	0.060	222.330	3699.97	-1.48	-2.20	-0.31	1568278.75	305205.48	39°19'40.443"N	81°01'34.363"W	2.22	188.113	0.18	-0.18	7.51
3786.00	0.190	60.340	3785.97	-1.51	-2.16	-0.22	1568278.84	305205.52	39°19'40.444"N	81°01'34.362"W	2.17	185.806	0.29	0.15	-188.36
3797.00	0.480	80.970	3796.97	-1.54	-2.14	-0.16	1568278.90	305205.54	39°19'40.444"N	81°01'34.361"W	2.15	184.223	2.81	2.64	187.55
3892.00	3.940	59.950	3891.88	-2.31	-0.45	3.06	1568282.12	305207.23	39°19'40.461"N	81°01'34.321"W	3.09	98.304	3.68	3.64	-22.13
3987.00	9.510	56.600	3986.19	-3.78	5.51	12.45	1568291.50	305213.19	39°19'40.522"N	81°01'34.202"W	13.61	66.110	5.88	5.86	-3.53
4081.00	14.200	52.470	4078.16	-5.17	16.82	28.08	1568307.14	305224.50	39°19'40.636"N	81°01'34.006"W	32.73	59.083	5.07	4.99	-4.39
4175.00	17.170	55.390	4168.65	-6.97	31.72	48.65	1568327.71	305239.40	39°19'40.787"N	81°01'33.747"W	58.08	56.890	3.27	3.16	3.11
4270.00	19.430	57.030	4258.84	-10.22	48.29	73.45	1568352.51	305255.97	39°19'40.955"N	81°01'33.435"W	87.90	56.676	2.44	2.38	1.73
4364.00	20.880	63.750	4347.10	-16.12	64.21	101.59	1568380.65	305271.89	39°19'41.117"N	81°01'33.081"W	120.19	57.706	2.90	1.54	7.15
4459.00	21.050	72.800	4435.83	-26.75	76.75	133.08	1568412.14	305284.42	39°19'41.246"N	81°01'32.683"W	153.63	60.029	3.41	0.18	9.53
4554.00	24.900	70.100	4523.28	-40.24	88.60	168.20	1568447.25	305296.28	39°19'41.369"N	81°01'32.239"W	190.11	62.221	4.20	4.05	-2.84
4649.00	28.820	68.000	4608.02	-54.20	104.00	208.25	1568487.30	305311.67	39°19'41.528"N	81°01'31.732"W	232.78	63.464	4.24	4.13	-2.21
4743.00	30.330	60.340	4689.80	-65.46	124.24	249.90	1568528.95	305331.91	39°19'41.735"N	81°01'31.207"W	279.08	63.566	4.33	1.61	-8.15
4838.00	32.070	57.550	4771.06	-73.08	149.64	292.03	1568571.08	305357.31	39°19'41.993"N	81°01'30.676"W	328.14	62.869	2.38	1.83	-2.94
4933.00	33.630	62.900	4850.88	-82.27	175.17	336.75	1568615.79	305382.84	39°19'42.253"N	81°01'30.113"W	379.58	62.518	3.47	1.64	5.63
5028.00	35.260	69.310	4929.25	-97.22	196.85	385.84	1568664.88	305404.52	39°19'42.475"N	81°01'29.493"W	433.15	62.970	4.18	1.72	6.75
5123.00	39.510	70.810	5004.72	-117.03	216.48	440.06	1568719.10	305424.15	39°19'42.678"N	81°01'28.807"W	490.42	63.806	4.57	4.47	1.58
5217.00	44.760	67.670	5074.41	-137.72	238.90	498.96	1568778.00	305446.57	39°19'42.910"N	81°01'28.063"W	553.20	64.415	6.02	5.59	-3.34
5312.00	49.520	65.030	5139.02	-157.25	266.88	562.69	1568841.73	305474.54	39°19'43.197"N	81°01'27.258"W	622.77	64.626	5.41	5.01	-2.78
5365.00	47.600	64.150	5174.09	-167.27	283.92	598.58	1568877.61	305491.59	39°19'43.371"N	81°01'26.805"W	662.50	64.624	3.83	-3.62	-1.66
5480.00	43.370	61.480	5254.71	-185.51	321.31	671.53	1568950.56	305528.97	39°19'43.753"N	81°01'25.885"W	744.44	64.430	4.03	-3.68	-2.32
5543.00	42.120	63.180	5300.97	-194.64	341.17	709.39	1568988.42	305548.83	39°19'43.956"N	81°01'25.407"W	787.17	64.316	2.70	-1.98	2.70

Actual Wellpath Report

PEN-20F-HS AWP Proj: 13384'

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REFERENCE WELLPATH IDENTIFICATION

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

WELLPATH DATA (143 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]
5638.00	42.000	68.960	5371.53	-212.23	366.96	767.51	1569046.53	305574.63	39°19'44.220"N	81°01'24.673"W	850.72	64.446	4.08	-0.13	6.08
5732.00	39.940	68.180	5442.51	-231.87	389.47	824.88	1569103.90	305597.13	39°19'44.452"N	81°01'23.948"W	912.20	64.725	2.26	-2.19	-0.83
5827.00	39.770	63.800	5515.45	-248.63	414.23	880.46	1569159.48	305621.89	39°19'44.706"N	81°01'23.246"W	973.04	64.805	2.96	-0.18	-4.61
5922.00	39.800	62.870	5588.45	-262.66	441.51	934.79	1569213.80	305649.17	39°19'44.985"N	81°01'22.561"W	1033.81	64.718	0.63	0.03	-0.98
6016.00	39.650	66.580	5660.76	-277.92	467.15	989.09	1569268.10	305674.81	39°19'45.248"N	81°01'21.876"W	1093.86	64.718	2.53	-0.16	3.95
6112.00	39.910	62.750	5734.55	-293.46	493.43	1044.58	1569323.59	305701.09	39°19'45.517"N	81°01'21.175"W	1155.26	64.715	2.57	0.27	-3.99
6206.00	36.750	46.060	5808.48	-298.19	526.85	1091.78	1569370.79	305734.50	39°19'45.855"N	81°01'20.582"W	1212.25	64.240	11.48	-3.36	-17.76
6302.00	37.750	30.010	5885.07	-286.14	572.33	1127.24	1569406.25	305779.99	39°19'46.310"N	81°01'20.140"W	1264.22	63.082	10.15	1.04	-16.72
6396.00	42.530	17.120	5957.04	-259.00	627.74	1151.04	1569430.05	305835.39	39°19'46.862"N	81°01'19.849"W	1311.09	61.393	10.18	5.09	-13.71
6490.00	49.250	4.230	6022.57	-216.09	693.83	1163.06	1569442.07	305901.48	39°19'47.517"N	81°01'19.711"W	1354.29	59.181	12.14	7.15	-13.71
6585.00	58.910	353.320	6078.35	-156.06	770.45	1160.97	1569439.98	305978.10	39°19'48.274"N	81°01'19.754"W	1393.36	56.431	13.76	10.17	-11.48
6680.00	65.140	346.950	6122.93	-83.52	852.99	1146.48	1569425.49	306060.63	39°19'49.087"N	81°01'19.956"W	1428.99	53.351	8.83	6.56	-6.71
6775.00	68.560	341.620	6160.29	-3.93	937.01	1122.79	1569401.80	306144.64	39°19'49.913"N	81°01'20.276"W	1462.41	50.154	6.29	3.60	-5.61
6870.00	72.850	333.700	6191.72	81.43	1019.81	1088.67	1569367.68	306227.44	39°19'50.726"N	81°01'20.728"W	1491.72	46.871	9.07	4.52	-8.34
6965.00	77.930	327.840	6215.69	171.68	1099.94	1043.77	1569322.78	306307.57	39°19'51.510"N	81°01'21.316"W	1516.35	43.499	8.01	5.35	-6.17
7061.00	85.010	321.090	6229.94	266.21	1177.07	988.62	1569267.63	306384.69	39°19'52.263"N	81°01'22.035"W	1537.16	40.027	10.13	7.37	-7.03
7156.00	89.880	318.920	6234.17	361.09	1249.75	927.64	1569206.66	306457.37	39°19'52.971"N	81°01'22.826"W	1556.41	36.585	5.61	5.13	-2.28
7252.00	91.020	323.120	6233.42	457.04	1324.36	867.27	1569146.29	306531.97	39°19'53.698"N	81°01'23.610"W	1583.06	33.219	4.53	1.19	4.37
7348.00	91.420	319.730	6231.38	552.98	1399.38	807.43	1569086.46	306606.99	39°19'54.430"N	81°01'24.388"W	1615.62	29.985	3.55	0.42	-3.53
7444.00	91.080	316.950	6229.28	648.91	1471.08	743.64	1569022.67	306678.69	39°19'55.128"N	81°01'25.215"W	1648.36	26.817	2.92	-0.35	-2.90
7539.00	90.680	314.140	6227.82	743.60	1538.87	677.12	1568956.15	306746.48	39°19'55.786"N	81°01'26.076"W	1681.26	23.750	2.99	-0.42	-2.96
7634.00	90.060	314.430	6227.21	838.12	1605.20	609.12	1568888.15	306812.81	39°19'56.430"N	81°01'26.956"W	1716.89	20.780	0.72	-0.65	0.31
7730.00	90.180	318.330	6227.01	933.91	1674.69	542.90	1568821.94	306882.29	39°19'57.106"N	81°01'27.813"W	1760.49	17.962	4.06	0.12	4.06
7825.00	90.280	320.500	6226.63	1028.90	1746.83	481.10	1568760.14	306954.43	39°19'57.809"N	81°01'28.615"W	1811.87	15.398	2.29	0.11	2.28
7921.00	89.880	318.870	6226.49	1124.90	1820.03	418.99	1568698.03	307027.62	39°19'58.521"N	81°01'29.422"W	1867.63	12.964	1.75	-0.42	-1.70
8016.00	89.970	320.980	6226.62	1219.89	1892.72	357.84	1568636.88	307100.31	39°19'59.230"N	81°01'30.215"W	1926.25	10.706	2.22	0.09	2.22
8112.00	90.030	324.820	6226.62	1315.75	1969.27	299.94	1568578.99	307176.86	39°19'59.976"N	81°01'30.969"W	1991.98	8.660	4.00	0.06	4.00
8207.00	90.280	326.980	6226.36	1410.24	2047.93	246.68	1568525.73	307255.51	39°20'00.745"N	81°01'31.663"W	2062.73	6.868	2.29	0.26	2.27
8303.00	90.520	329.090	6225.69	1505.29	2129.37	195.87	1568474.92	307336.95	39°20'01.541"N	81°01'32.328"W	2138.36	5.255	2.21	0.25	2.20
8399.00	90.650	326.610	6224.71	1600.38	2210.64	144.79	1568423.84	307418.21	39°20'02.336"N	81°01'32.995"W	2215.37	3.747	2.59	0.14	-2.58

Actual Wellpath Report

PEN-20F-HS AWP Proj: 13384'
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REFERENCE WELLPATH IDENTIFICATION

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

WELLPATH DATA (143 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]
8494.00	90.920	321.460	6223.41	1695.10	2287.49	89.02	1568368.07	307495.07	39°20'03.086"N	81°01'33.721"W	2289.23	2.229	5.43	0.28	-5.42
8590.00	90.680	315.870	6222.06	1791.03	2359.54	25.65	1568304.70	307567.11	39°20'03.787"N	81°01'34.543"W	2359.68	0.623	5.83	-0.25	-5.82
8685.00	90.250	316.300	6221.29	1885.80	2427.97	-40.24	1568238.82	307635.54	39°20'04.452"N	81°01'35.397"W	2428.31	359.050	0.64	-0.45	0.45
8781.00	89.970	319.570	6221.11	1981.73	2499.23	-104.55	1568174.51	307706.79	39°20'05.146"N	81°01'36.230"W	2501.42	357.605	3.42	-0.29	3.41
8876.00	90.340	320.760	6220.85	2076.73	2572.18	-165.41	1568113.66	307779.74	39°20'05.856"N	81°01'37.020"W	2577.49	356.321	1.31	0.39	1.25
8971.00	89.970	319.950	6220.59	2171.72	2645.33	-226.02	1568053.05	307852.88	39°20'06.569"N	81°01'37.808"W	2654.97	355.117	0.94	-0.39	-0.85
9066.00	90.000	318.310	6220.62	2266.71	2717.17	-288.18	1567990.90	307924.72	39°20'07.269"N	81°01'38.614"W	2732.41	353.946	1.73	0.03	-1.73
9162.00	90.060	313.460	6220.57	2362.43	2786.07	-354.98	1567924.09	307993.62	39°20'07.938"N	81°01'39.479"W	2808.59	352.739	5.05	0.06	-5.05
9258.00	89.600	312.540	6220.85	2457.71	2851.54	-425.19	1567853.89	308059.08	39°20'08.573"N	81°01'40.387"W	2883.07	351.519	1.07	-0.48	-0.96
9353.00	89.970	317.130	6221.21	2552.30	2918.50	-492.54	1567786.54	308126.04	39°20'09.224"N	81°01'41.258"W	2959.77	350.421	4.85	0.39	4.83
9449.00	89.880	324.020	6221.34	2648.24	2992.61	-553.47	1567725.61	308200.15	39°20'09.946"N	81°01'42.050"W	3043.37	349.522	7.18	-0.09	7.18
9545.00	90.030	322.870	6221.41	2744.07	3069.73	-610.65	1567668.44	308277.26	39°20'10.698"N	81°01'42.794"W	3129.88	348.749	1.21	0.16	-1.20
9641.00	90.280	319.650	6221.15	2840.03	3144.60	-670.72	1567608.38	308352.13	39°20'11.428"N	81°01'43.574"W	3215.33	347.960	3.36	0.26	-3.35
9736.00	90.180	320.230	6220.77	2935.03	3217.31	-731.86	1567547.24	308424.83	39°20'12.136"N	81°01'44.368"W	3299.50	347.185	0.62	-0.11	0.61
9832.00	90.220	320.310	6220.44	3031.03	3291.14	-793.22	1567485.88	308498.66	39°20'12.856"N	81°01'45.165"W	3385.38	346.449	0.09	0.04	0.08
9927.00	90.150	321.690	6220.13	3126.01	3364.96	-853.00	1567426.10	308572.48	39°20'13.575"N	81°01'45.942"W	3471.40	345.775	1.45	-0.07	1.45
10022.00	90.180	323.560	6219.86	3220.90	3440.45	-910.66	1567368.44	308647.97	39°20'14.312"N	81°01'46.692"W	3558.94	345.174	1.97	0.03	1.97
10117.00	90.400	323.580	6219.37	3315.72	3516.89	-967.08	1567312.03	308724.40	39°20'15.057"N	81°01'47.426"W	3647.43	344.625	0.23	0.23	0.02
10213.00	90.370	322.030	6218.73	3411.60	3593.36	-1025.11	1567254.00	308800.86	39°20'15.803"N	81°01'48.181"W	3736.72	344.078	1.61	-0.03	-1.61
10309.00	90.280	317.520	6218.18	3507.57	3666.63	-1087.09	1567192.02	308874.14	39°20'16.517"N	81°01'48.986"W	3824.39	343.486	4.70	-0.09	-4.70
10404.00	90.250	315.880	6217.75	3602.41	3735.77	-1152.24	1567126.88	308943.27	39°20'17.189"N	81°01'49.830"W	3909.43	342.858	1.73	-0.03	-1.73
10500.00	90.430	316.140	6217.18	3698.18	3804.84	-1218.91	1567060.21	309012.33	39°20'17.861"N	81°01'50.693"W	3995.31	342.237	0.33	0.19	0.27
10595.00	90.310	317.130	6216.56	3793.01	3873.90	-1284.14	1566994.98	309081.39	39°20'18.532"N	81°01'51.538"W	4081.19	341.660	1.05	-0.13	1.04
10691.00	90.550	319.690	6215.84	3888.96	3945.69	-1347.86	1566931.27	309153.18	39°20'19.231"N	81°01'52.365"W	4169.56	341.140	2.68	0.25	2.67
10787.00	90.520	323.190	6214.94	3984.91	4020.74	-1407.69	1566871.44	309228.23	39°20'19.962"N	81°01'53.143"W	4260.04	340.705	3.65	-0.03	3.65
10882.00	90.650	326.500	6213.97	4079.55	4098.40	-1462.38	1566816.75	309305.88	39°20'20.721"N	81°01'53.855"W	4351.49	340.363	3.49	0.14	3.48
10978.00	90.740	324.860	6212.81	4175.07	4177.68	-1516.50	1566762.64	309385.16	39°20'21.495"N	81°01'54.561"W	4444.41	340.049	1.71	0.09	-1.71
11073.00	90.590	321.290	6211.71	4269.91	4253.61	-1573.56	1566705.58	309461.08	39°20'22.236"N	81°01'55.304"W	4535.33	339.699	3.76	-0.16	-3.76
11168.00	90.520	318.790	6210.79	4364.90	4326.41	-1634.56	1566644.58	309533.89	39°20'22.945"N	81°01'56.096"W	4624.89	339.303	2.63	-0.07	-2.63
11264.00	90.250	319.230	6210.14	4460.88	4398.87	-1697.53	1566581.61	309606.34	39°20'23.650"N	81°01'56.913"W	4715.05	338.898	0.54	-0.28	0.46



Actual Wellpath Report

PEN-20F-HS AWP Proj: 13384'
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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot F
Area	Ritchie County, WV	Well	PEN-20F-HS
Field	Ritchie	Wellbore	PEN-20F-HS AWB
Facility	PEN-20 Pad		

WELLPATH DATA (143 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]
11360.00	90.150	319.770	6209.81	4556.88	4471.87	-1759.88	1566519.27	309679.34	39°20'24.361"N	81°01'57.722"W	4805.71	338.518	0.57	-0.10	0.56
11455.00	90.340	319.300	6209.40	4651.88	4544.15	-1821.53	1566457.62	309751.61	39°20'25.065"N	81°01'58.523"W	4895.64	338.157	0.53	0.20	-0.49
11551.00	90.370	317.200	6208.81	4747.82	4615.76	-1885.45	1566393.70	309823.22	39°20'25.762"N	81°01'59.352"W	4986.00	337.781	2.19	0.03	-2.19
11646.00	90.460	317.430	6208.12	4842.72	4685.60	-1949.85	1566329.30	309893.05	39°20'26.441"N	81°02'00.186"W	5075.11	337.406	0.26	0.09	0.24
11742.00	90.620	319.160	6207.21	4938.67	4757.26	-2013.72	1566265.44	309964.71	39°20'27.139"N	81°02'01.015"W	5165.91	337.057	1.81	0.17	1.80
11838.00	90.220	317.880	6206.51	5034.63	4829.18	-2077.30	1566201.86	310036.63	39°20'27.839"N	81°02'01.839"W	5257.01	336.725	1.40	-0.42	-1.33
11933.00	90.250	318.960	6206.12	5129.59	4900.24	-2140.35	1566138.81	310107.69	39°20'28.530"N	81°02'02.657"W	5347.28	336.405	1.14	0.03	1.14
12029.00	89.850	320.980	6206.04	5225.59	4973.74	-2202.09	1566077.07	310181.19	39°20'29.246"N	81°02'03.459"W	5439.42	336.119	2.15	-0.42	2.10
12124.00	90.060	323.760	6206.11	5320.50	5048.97	-2260.09	1566019.08	310256.41	39°20'29.980"N	81°02'04.213"W	5531.74	335.885	2.93	0.22	2.93
12220.00	90.400	325.750	6205.72	5416.16	5127.37	-2315.48	1565963.69	310334.81	39°20'30.745"N	81°02'04.935"W	5625.96	335.696	2.10	0.35	2.07
12315.00	90.770	322.250	6204.75	5510.91	5204.21	-2371.31	1565907.86	310411.64	39°20'31.495"N	81°02'05.663"W	5719.00	335.504	3.70	0.39	-3.68
12411.00	90.370	318.940	6203.80	5606.88	5278.38	-2432.24	1565846.94	310485.80	39°20'32.218"N	81°02'06.454"W	5811.80	335.260	3.47	-0.42	-3.45
12507.00	90.340	317.810	6203.20	5702.84	5350.13	-2496.01	1565783.17	310557.56	39°20'32.916"N	81°02'07.281"W	5903.73	334.989	1.18	-0.03	-1.18
12603.00	90.770	319.710	6202.27	5798.81	5422.31	-2559.29	1565719.90	310629.74	39°20'33.619"N	81°02'08.102"W	5995.95	334.733	2.03	0.45	1.98
12699.00	90.650	319.560	6201.08	5894.80	5495.45	-2621.46	1565657.73	310702.87	39°20'34.331"N	81°02'08.909"W	6088.68	334.498	0.20	-0.12	-0.16
12794.00	90.680	316.870	6199.98	5989.74	5566.28	-2684.75	1565594.44	310773.69	39°20'35.020"N	81°02'09.730"W	6179.91	334.251	2.83	0.03	-2.83
12890.00	90.680	315.850	6198.84	6085.54	5635.75	-2750.99	1565528.20	310843.16	39°20'35.696"N	81°02'10.588"W	6271.33	333.981	1.06	0.00	-1.06
12985.00	90.590	318.260	6197.79	6180.40	5705.28	-2815.71	1565463.49	310912.69	39°20'36.372"N	81°02'11.427"W	6362.27	333.732	2.54	-0.09	2.54
13081.00	90.650	322.330	6196.75	6276.37	5779.12	-2877.02	1565402.18	310986.52	39°20'37.091"N	81°02'12.223"W	6455.65	333.534	4.24	0.06	4.24
13176.00	90.370	321.650	6195.90	6371.31	5853.96	-2935.52	1565343.68	311061.36	39°20'37.821"N	81°02'12.984"W	6548.75	333.368	0.77	-0.29	-0.72
13272.00	90.250	319.840	6195.39	6467.30	5928.30	-2996.26	1565282.94	311135.69	39°20'38.545"N	81°02'13.773"W	6642.46	333.187	1.89	-0.13	-1.89
13356.00	90.250	316.590	6195.02	6551.25	5990.92	-3052.22	1565226.98	311198.32	39°20'39.154"N	81°02'14.499"W	6723.63	333.002	3.87	0.00	-3.87
13384.00	90.250	316.590	6194.90	6579.20	6011.26	-3071.47	1565207.74	311218.66	39°20'39.352"N	81°02'14.749"W	6750.50	332.935	0.00	0.00	0.00

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Actual Wellpath Report
 PEN-20F-HS AWP Proj: 13384'
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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot F
Area	Ritchie County, WV	Well	PEN-20F-HS
Field	Ritchie	Wellbore	PEN-20F-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-20F-HS BHL Rev-3		6202.27	6014.59	-3066.43	1565212.78	311221.98	39°20'39.386"N	81°02'14.685"W	point
PEN-20F-HS LP Rev-3		6237.00	1200.00	973.50	1569252.51	306407.62	39°19'52.487"N	81°01'22.232"W	point
PEN-20 ALT Vertices		6948.00	-3.50	-30.34	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon
PEN-20 Cokely Tract 1		6948.00	-3.50	-30.34	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon
PEN-20 Cokely Tract 2		6948.00	-3.50	-30.34	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon
PEN-20 LL		6948.00	-3.50	-30.34	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon
PEN-20 Parcel 3.12-1.2		6948.00	-3.50	-30.34	1568248.72	305204.18	39°19'40.426"N	81°01'34.745"W	polygon

WELLPATH COMPOSITION - Ref Wellbore: PEN-20F-HS AWB Ref Wellpath: PEN-20F-HS AWP Proj: 13384'				
Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore
26.00	3786.00	Generic gyro - northseeking (Standard)	01_MS Gyro <12-3/4"> (100'-3786')	PEN-20F-HS AWB
3786.00	5365.00	ISCWSA MWD, Rev. 2 (Standard)	02_Scientific EM <12-3/4"> (3786')(3797'-5365') Proj:5455'	PEN-20F-HS AWB
5365.00	13356.00	NaviTrak (AT Curve Short Spaced)	03_BHI AT Curve <8-3/4"> (5365')(5480'-13356')	PEN-20F-HS AWB
13356.00	13384.00	Blind Drilling (std)	Projection to bit	PEN-20F-HS AWB

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PEN-20F-HS AWP Proj: 13384'

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REFERENCE WELLPATH IDENTIFICATION

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

COMMENTS

Wellpath general comments
API: 47-085-10123-0000
BHI Job #: 6697417
Rig: Nomac 78
Duration: 1/6/2015-1/11/2015
MS Gyro <12-3/4"> (100'-3786')
Scientific EM <12-3/4"> (3786')(3797'-5365')
BHI AT Curve <8-3/4"> (5365')(5480'-13356')
Projected MD at TD: 13384'

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Hydraulic Fracturing Fluid Product Component Information Disclosure



Job Start Date:	7/7/2017
Job End Date:	7/16/2017
State:	West Virginia
County:	Ritchie
API Number:	47-085-10123-00-00
Operator Name:	CONSOL Energy Inc.
Well Name and Number:	PEN20FHS
Latitude:	39.32795000
Longitude:	-81.02624000
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,195
Total Base Water Volume (gal):	10,356,906
Total Base Non Water Volume:	0

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Consol	Carrier/Base Fluid	Water	7732-18-5	100.00000	86.82786	None
Sand	UPP	Proppant	Crystalline Silica in the form of Quartz	14808-60-7	99.90000	11.76888	None
HCL Acid (7.5%)	UPP	Acidizing	Hydrochloric Acid	7647-01-0	7.50000	0.08651	None
Unislick ST50	UPP	Friction reducer	Petroleum distillates, hydrotreated light	64742-47-8	30.00000	0.02185	None
			Ammonium acetate	631-61-8	13.00000	0.00947	None
			Alcohols, ethoxylated	68002-97-1	5.00000	0.00364	None
			Alcohols, ethoxylated	68439-50-9	5.00000	0.00364	None
			Alcohols, ethoxylated	68551-12-2	5.00000	0.00364	None
K-Bac 1020	UPP	Biocide	Polyethylene glycol	25322-68-3	50.00000	0.01063	None
			Water	7732-18-5	30.00000	0.00638	None
			2,2-Dibromo-3-nitripropionamide	10222-01-2	21.00000	0.00446	None

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HCL Acid (15%)	UPP	Acidizing					
			Hydrochloric Acid	7647-01-0	15.00000	0.01779	None
WGA-7	UPP	Viscosifier					
			Guar Gum	9000-30-0	55.00000	0.00750	None
			Distillates (petroleum), hydrotreated light	64742-47-8	55.00000	0.00750	None
Scale Inhibitor E	UPP	Scale Inhibitor					
			Copolymer of Maleic and Acrylic Acid	52255-49-9	20.00000	0.00208	None
			DETA phosphonate	15827-60-8	5.00000	0.00052	None
			Hexamethylene Triamine Penta (Methylene Phosphonic Acid)	34690-00-1	5.00000	0.00052	None
Unihib G	UPP	Acid inhibitor					
			Butyl diglycol	112-34-5	75.00000	0.00082	None
			Alcohols, C10-16, ethoxylated	68002-97-1	50.00000	0.00054	None
			Methanol	67-56-1	5.00000	0.00005	None
			Thiourea	62-56-6	1.00000	0.00001	None
			Formaldehyde	50-00-0	1.00000	0.00001	None
AP Breaker	UPP	Gel breaker					
			Ammonium peroxydisulfate	7727-54-0	100.00000	0.00024	None
			Sulfuric acid	7664-93-9	0.50000	0.00000	None
Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.							
Other Chemical(s)	Listed Above	See Trade Name(s) List					
			Polyethylene glycol	25322-68-3	50.00000	0.01063	
			Ammonium acetate	631-61-8	13.00000	0.00947	
			Distillates (petroleum), hydrotreated light	64742-47-8	55.00000	0.00750	
			Water	7732-18-5	30.00000	0.00638	
			Alcohols, ethoxylated	68551-12-2	5.00000	0.00364	
			Alcohols, ethoxylated	68439-50-9	5.00000	0.00364	
			Alcohols, ethoxylated	68002-97-1	5.00000	0.00364	
			Alcohols, C10-16, ethoxylated	68002-97-1	50.00000	0.00054	
			DETA phosphonate	15827-60-8	5.00000	0.00052	
			Hexamethylene Triamine Penta (Methylene Phosphonic Acid)	34690-00-1	5.00000	0.00052	
			Methanol	67-56-1	5.00000	0.00005	
			Thiourea	62-56-6	1.00000	0.00001	
			Formaldehyde	50-00-0	1.00000	0.00001	
			Sulfuric acid	7664-93-9	0.50000	0.00000	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided.

Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

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02/16/2018

DATE: NOVEMBER 2, 2017

OPERATOR'S WELL #: PEN 20 FHS-AS DRILLED

API WELL #: 47 STATE: 85 COUNTY: PERMIT: 10123

WELL TYPE: Oil Waste Disposal Production Deep Shallow

WATERSHED: NORTH FORK HUGHES RIVER

COUNTY/DISTRICT: RITCHIE / CLAY

QUADRANGLE: ELLENBORO, W 7.5'

SURFACE OWNER: LAWRENCE & ANGELA COKELEY

OIL & GAS ROYALTY OWNER: LAWRENCE B. & ANGELA COKELEY

AGREAGE: 126.17±

AGREAGE: 523.671±

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE

PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG & ABANDON

CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): AS DRILLED

TARGET FORMATION: MARCELLUS

ESTIMATED DEPTH: TVD: 6,195± TMD: 13,384±

DESIGNATED AGENT: CHRIS TURNER

WELL OPERATOR: CNX GAS COMPANY LLC

Address: 1000 CONSOL ENERGY DRIVE

City: CANONSBURG State: PA Zip Code: 15317

City: JANE LEW State: WV Zip Code: 26378



FILE #: PEN 20 FHS-AS DRILLED

DRAWING #: PEN 20 FHS-AS DRILLED

SCALE: 1" = 2000'

MINIMUM DEGREE: 1/2500

OF ACCURACY: 1/2500

PROVEN SOURCE: U.S.G.S. MONUMENT THOMAS 1498.81'

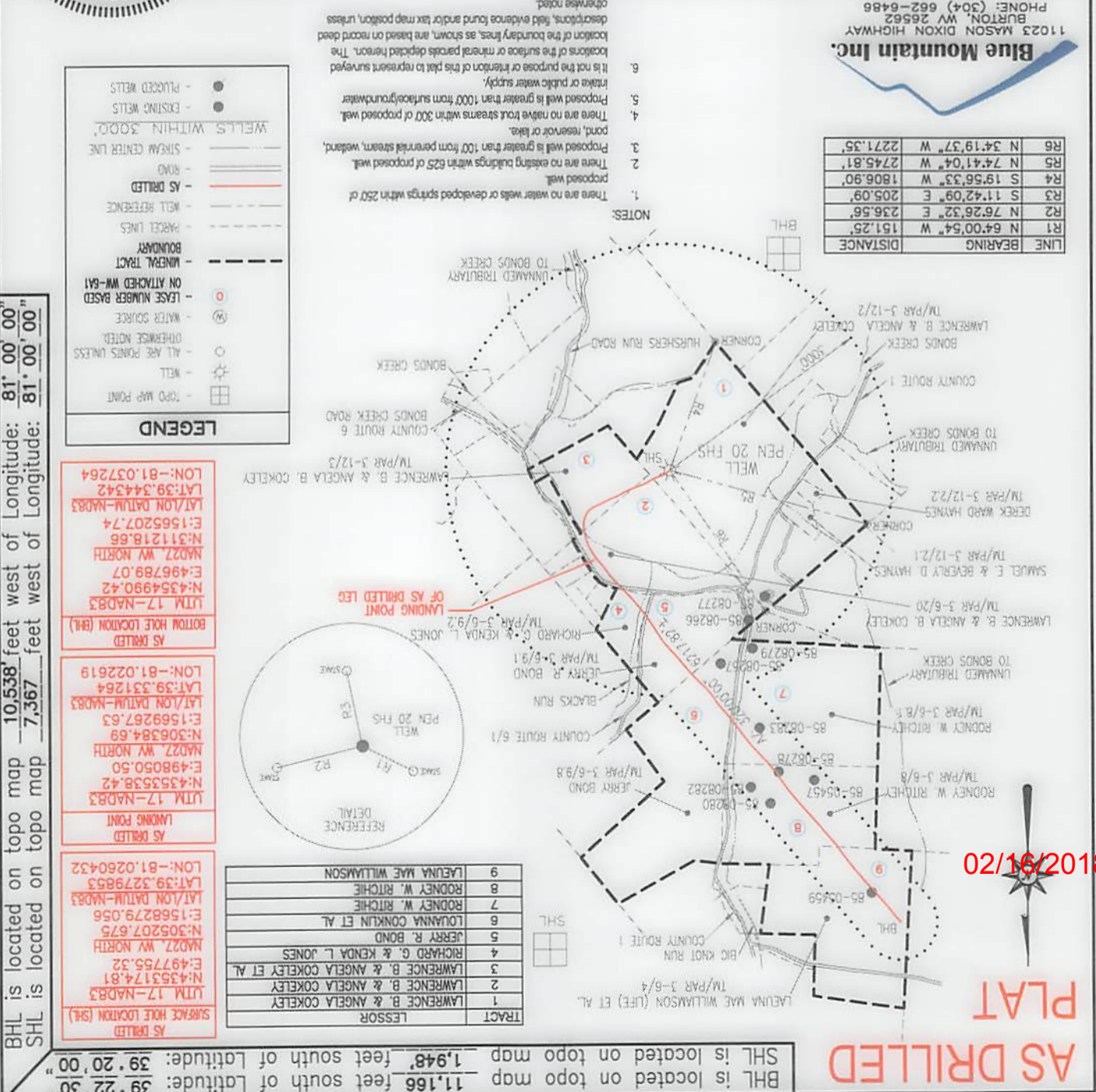
OF ELEVATION: 1498.81'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAN 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: *George D. Six*

R.P.E.: L.L.S.: P.S. No. 2000

PLACE SEAL HERE



BHL is located on topo map 11.166 feet south of Latitude: 39° 22' 30" SHL is located on topo map 1.948 feet south of Latitude: 39° 20' 00"

BHL is located on topo map 10,538 feet west of Longitude: 81° 00' 00" SHL is located on topo map 7,367 feet west of Longitude: 81° 00' 00"

AS DRILLED SURFACE HOLE LOCATION (SHL)

UTM 17-NAD83 N:4353174.81 E:497755.32

AS DRILLED LANDING POINT

UTM 17-NAD83 N:4353538.42 E:498050.50

AS DRILLED BOTTOM HOLE LOCATION (BHL)

UTM 17-NAD83 N:4354990.42 E:496789.07

AS DRILLED

UTM 17-NAD83 N:306384.69 E:1569267.63

AS DRILLED

UTM 17-NAD83 N:311218.66 E:1565207.74

AS DRILLED

UTM 17-NAD83 N:3934434.2 E:1565207.74