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

API 47 - 085 - 09999 County Ritchie District Union
Quad Pullman 7.5' Pad Name Ness Pad Field/Pool Name ---
Farm name Ness, Ashley E., Jr. Well Number Deberry Unit 1H
Operator (as registered with the OOG) Antero Resources Corporation
Address 1615 Wynkoop Street City Denver State CO Zip 80202

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4338471m Easting 508546m
Landing Point of Curve Northing 4338303.28m Easting 508527.65m
Bottom Hole Northing 4335663.56m Easting 509695.00m

Elevation (ft) 1075' 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

Drilling 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)
Air- Foam & 4% KCL
Mud- Polymer

Date permit issued 11/16/2012 Date drilling commenced 4/15/2013 Date drilling ceased 2/23/2014
Date completion activities began 4/19/2014 Date completion activities ceased 7/14/2014
Verbal plugging (Y/N) N/A 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 62' Open mine(s) (Y/N) depths No
Salt water depth(s) ft 1620', 1838' Void(s) encountered (Y/N) depths No
Coal depth(s) ft 456' Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

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Reviewed by:
AC 5/26/15
W.S. 6/02/15

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CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	24"	20"	40'	New	94# H-40	N/A	Y
Surface	17- 1/2"	13- 3/8"	546'	New	68# J-55	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2615'	New	36# J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4" & 8-1/2"	5-1/2"	16283'	New	23# P-110	N/A	Y
Tubing		2-3/8"	6603'		4.7# N-80	N/A	
Packer type and depth set		N/A					

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor	Class A	203 sx	15.1	1.18	38	0'	8 Hrs.
Surface	Class A	664 sx	15.6	1.18	379	0'	8 Hrs.
Coal							
Intermediate 1	Class A	1011 sx	15.6	1.18	819	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	935 sx (Lead) 1507 sx (Tail)	14.5 Lead 15.2 Tail	1.44 Lead 1.80 Tail	3246	~500 into intermediate casing	8 Hrs.
Tubing							

Drillers TD (ft) 16287' MD, 6533' TVD (BHL), 6542' TVD (Deepest Point Drilled) Loggers TD (ft) 16230' MD

Deepest formation penetrated Marcellus Plug back to (ft) N/A

Plug back procedure N/A

Kick off depth (ft) 5722'

** This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Rufus Unit 1H API# 47-085-10046). Please reference the wireline logs submitted with Form WR-35 for the Rufus Unit 1H). A Cement Bond Long was included with this submittal.

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction ☐ neutron ☐ resistivity ☐ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ■ No ☐ Conventional ☐ Sidewall Were cuttings collected ☐ Yes ■ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

Conductor- 0

Surface- 1 above guide shoe, 1 aboce insert float, 1 every 4th joint to surface

Intermediate- 1 above float joint, 1 above float collar, 1 every 4th joint to surface

Production- 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 09999 Farm name Ness, Ashley E., Jr. Well number Deberry Unit 1H

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
	* PLEASE SEE EXHIBIT 1				

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	* PLEASE SEE EXHIBIT 2							

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Please insert additional pages as applicable.

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PRODUCING FORMATION(S)	DEPTHS			
Marcellus	6464' (TOP)	TVD	6672' (TOP)	MD

Please insert additional pages as applicable.

GAS TEST □ Build up □ Drawdown ■ Open Flow OIL TEST ■ Flow □ Pump

SHUT-IN PRESSURE Surface 3000 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	9598 mcfpd	52 bpd	--- bpd	643 bpd	□ Estimated ■ Orifice □ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		

*** PLEASE SEE EXHIBIT 3**

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Please insert additional pages as applicable.

Drilling Contractor Patterson - UTI Drilling Company LLC
Address 207 Carlton Drive City Eight Four State PA Zip 15330

Logging Company Casedhole Solutions
Address 100 Arentzen Blvd. City Charleroi State PA Zip 15022

Cementing Company Allied Oil & Gas Services, LLC
Address 1036 East Main St. City Bridgeport State WV Zip 26330

Stimulating Company Baker Hughes
Address 837 Philippi Pike City Clarksburg State WV Zip 26301

Please insert additional pages as applicable.

Completed by Kara Quackenbush Telephone 303-357-7233
Signature Kara Quackenbush Title Permit Representative Date 1/21/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

API 47-085-09999 Farm Name Ness, Ashley E., Jr. Well Number Deberry Unit 1H					
EXHIBIT 1					
Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	20-May-14	16,066	10,192	60	Marcellus
2	20-May-14	15,917	16,043	60	Marcellus
3	21-May-14	15,768	15,894	60	Marcellus
4	21-May-14	15,619	15,745	60	Marcellus
5	21-May-14	15,470	15,596	60	Marcellus
6	21-May-14	15,322	15,448	60	Marcellus
7	21-May-14	15,173	15,299	60	Marcellus
8	21-May-14	15,024	15,150	60	Marcellus
9	22-May-14	14,875	15,001	60	Marcellus
10	22-May-14	14,726	14,852	60	Marcellus
11	23-May-14	14,578	14,704	60	Marcellus
12	23-May-14	14,429	14,555	60	Marcellus
13	23-May-14	14,280	14,406	60	Marcellus
14	23-May-14	14,131	14,257	60	Marcellus
15	23-May-14	13,982	14,082	60	Marcellus
16	24-May-14	13,834	13,960	60	Marcellus
17	24-May-14	13,685	13,811	60	Marcellus
18	24-May-14	13,536	13,662	60	Marcellus
19	24-May-14	13,387	13,513	60	Marcellus
20	25-May-14	13,239	13,365	60	Marcellus
21	25-May-14	13,090	13,216	60	Marcellus
22	25-May-14	12,941	13,067	60	Marcellus
23	17-Jun-14	12,792	12,918	60	Marcellus
24	17-Jun-14	12,643	12,769	60	Marcellus
25	17-Jun-14	12,495	12,621	60	Marcellus
26	18-Jun-14	12,346	12,472	60	Marcellus
27	18-Jun-14	12,197	12,323	60	Marcellus
28	22-Jun-14	12,048	12,174	60	Marcellus
29	22-Jun-14	11,899	12,025	60	Marcellus
30	22-Jun-14	11,751	11,877	60	Marcellus
31	22-Jun-14	11,602	11,728	60	Marcellus
32	23-Jun-14	11,453	11,579	60	Marcellus
33	23-Jun-14	11,304	11,430	60	Marcellus
34	23-Jun-14	11,156	11,281	60	Marcellus
35	24-Jun-14	11,007	11,133	60	Marcellus
36	24-Jun-14	10,858	10,984	60	Marcellus
37	24-Jun-14	10,709	10,835	60	Marcellus
38	24-Jun-14	10,560	10,686	60	Marcellus
39	25-Jun-14	10,412	10,538	60	Marcellus
40	25-Jun-14	10,263	10,389	60	Marcellus
41	26-Jun-14	10,114	10,240	60	Marcellus
42	26-Jun-14	9,965	10,091	60	Marcellus
43	26-Jun-14	9,816	9,942	60	Marcellus
44	26-Jun-14	9,668	9,794	60	Marcellus
45	26-Jun-14	9,519	9,645	60	Marcellus
46	27-Jun-14	9,370	9,496	60	Marcellus
47	27-Jun-14	9,221	9,347	60	Marcellus
48	27-Jun-14	9,072	9,198	60	Marcellus
49	29-Jun-14	8,924	9,050	60	Marcellus
50	30-Jun-14	8,775	8,901	60	Marcellus
51	30-Jun-14	8,626	8,752	60	Marcellus
52	30-Jun-14	8,477	8,603	60	Marcellus
53	30-Jun-14	8,329	8,455	60	Marcellus
54	30-Jun-14	8,180	8,306	60	Marcellus
55	1-Jul-14	8,031	8,157	60	Marcellus
56	1-Jul-14	7,882	8,008	60	Marcellus
57	1-Jul-14	7,733	7,859	60	Marcellus
58	1-Jul-14	7,585	7,711	60	Marcellus
59	1-Jul-14	7,436	7,562	60	Marcellus
60	2-Jul-14	7,287	7,413	60	Marcellus
61	2-Jul-14	7,138	7,261	60	Marcellus
62	2-Jul-14	6,989	7,115	60	Marcellus
63	2-Jul-14	6,841	6,967	60	Marcellus
64	3-Jul-14	6,692	6,818	60	Marcellus

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EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	20-May-14	24.0	8,917	N/A	8,120	2,133	5,895	N/A
2	20-May-14	66.0	8,079	6,246	5,123	110,165	5,928	N/A
3	21-May-14	74.0	7,875	5,140	2,567	215,565	5,906	N/A
4	21-May-14	46.0	7,945	6,080	4,950	6,400	6,171	N/A
5	21-May-14	73.0	8,234	5,808	5,322	191,513	5,863	N/A
6	21-May-14	76.0	7,826	5,947	3,348	216,420	6,101	N/A
7	21-May-14	78.0	7,854	6,196	4,320	215,929	5,947	N/A
8	21-May-14	75.0	7,832	5,965	5,466	218,903	5,966	N/A
9	22-May-14	77.0	7,735	5,629	4,510	207,255	5,976	N/A
10	22-May-14	77.0	7,780	5,922	5,525	216,225	5,917	N/A
11	23-May-14	76.0	7,996	6,327	3,935	218,891	6,599	N/A
12	23-May-14	77.0	7,332	5,784	4,025	218,180	5,986	N/A
13	23-May-14	69.0	7,920	5,928	5,400	174,851	6,480	N/A
14	23-May-14	73.0	7,644	5,536	5,961	212,359	5,866	N/A
15	23-May-14	73.0	7,775	5,862	4,353	215,770	5,805	N/A
16	24-May-14	75.0	7,774	5,610	5,218	214,756	5,777	N/A
17	24-May-14	78.0	7,457	6,180	5,883	199,182	5,580	N/A
18	24-May-14	77.0	7,542	5,622	5,903	213,066	5,789	N/A
19	24-May-14	75.0	7,832	5,476	4,615	218,689	5,780	N/A
20	25-May-14	76.0	7,563	5,379	5,372	214,446	5,689	N/A
21	25-May-14	69.0	7,045	5,384	5,785	185,580	6,553	N/A
22	25-May-14	78.0	7,679	5,859	5,758	130,099	5,858	N/A
23	17-Jun-14	66.0	8,404	6,783	5,462	43,063	5,942	N/A
24	17-Jun-14	78.1	7,460	6,085	3,719	136,857	1,217	N/A
25	17-Jun-14	81.0	7,780	5,407	4,383	218,170	5,803	N/A
26	18-Jun-14	76.0	7,543	5,643	4,881	171,627	6,195	N/A
27	18-Jun-14	77.1	7,690	5,631	2,954	196,795	3,379	N/A
28	22-Jun-14	71.0	8,169	7,234	4,250	67,290	6,101	N/A
29	22-Jun-14	80.0	8,259	6,244	4,887	89,850	5,728	N/A
30	22-Jun-14	75.0	7,364	5,698	4,924	184,707	5,859	N/A
31	22-Jun-14	45.0	7,345	5,865	7,177	9,117	5,199	N/A
32	23-Jun-14	75.6	7,316	5,632	4,866	214,119	5,613	N/A
33	23-Jun-14	77.2	7,170	5,283	5,302	216,955	5,922	N/A
34	23-Jun-14	77.0	7,346	5,514	5,643	221,943	5,811	N/A
35	24-Jun-14	77.3	7,277	5,763	5,566	220,000	5,570	N/A
36	24-Jun-14	68.5	7,154	5,325	4,511	145,170	6,059	N/A
37	24-Jun-14	73.5	7,539	5,769	4,601	218,835	5,826	N/A
38	24-Jun-14	73.5	7,018	5,622	5,571	221,360	5,806	N/A
39	25-Jun-14	68.5	7,154	5,759	5,238	95,764	5,500	N/A
40	25-Jun-14	68.5	7,154	5,584	3,288	218,787	5,500	N/A
41	26-Jun-14	76.8	6,906	5,409	2,919	219,898	5,614	N/A
42	26-Jun-14	75.3	7,055	5,509	3,811	216,956	5,476	N/A
43	26-Jun-14	83.8	7,124	5,490	3,658	218,690	5,523	N/A
44	26-Jun-14	78.7	6,872	5,634	4,680	218,639	5,499	N/A
45	26-Jun-14	79.3	7,236	5,713	4,870	191,500	5,919	N/A
46	27-Jun-14	79.5	7,076	5,924	4,555	212,821	5,443	N/A
47	27-Jun-14	76.6	6,915	5,368	3,472	213,109	5,480	N/A
48	27-Jun-14	66.8	7,339	5,967	3,762	217,586	5,160	N/A
49	29-Jun-14	74.9	7,633	N/A	4,924	121,926	5,854	N/A
50	30-Jun-14	37.2	8,564	6,375	5,460	2,153	4,865	N/A
51	30-Jun-14	72.0	6,916	6,112	3,910	210,257	5,218	N/A
52	30-Jun-14	73.0	6,729	5,840	2,816	219,859	5,432	N/A
53	30-Jun-14	81.3	7,000	5,557	4,710	212,870	5,343	N/A
54	30-Jun-14	75.0	7,002	5,938	4,040	147,316	5,646	N/A
55	1-Jul-14	77.9	6,780	5,535	3,307	211,722	5,343	N/A
56	1-Jul-14	77.3	6,782	5,261	5,137	203,806	5,066	N/A
57	1-Jul-14	74.7	6,855	5,505	3,130	220,337	5,601	N/A
58	1-Jul-14	73.9	7,014	6,093	4,930	154,324	5,506	N/A
59	1-Jul-14	75.2	7,162	5,863	3,900	219,466	5,450	N/A
60	2-Jul-14	76.8	6,864	5,719	3,322	213,828	5,470	N/A
61	2-Jul-14	76.0	6,694	5,359	3,095	220,936	5,565	N/A
62	2-Jul-14	74.2	6,937	5,616	4,805	219,085	5,441	N/A
63	2-Jul-14	73.4	6,605	5,928	5,160	211,210	5,704	N/A
64	3-Jul-14	82.8	6,526	5,860	3,260	213,930	5,616	N/A
AVG=		73	7,428	5,779	4,630	11,619,010	359,696	TOTAL

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API 47-085-09999 Farm Name Ness, Ashley E., Jr. Well Number Deberry Unit 1H				
EXHIBIT 3				
LITHOLOGY/ FORMATION	**TOP DEPTH (TVD) From Surface**	**BOTTOM DEPTH (TVD) From Surface**	**TOP DEPTH (MD) From Surface**	**BOTTOM DEPTH (MD) From Surface**
Fresh Water	62	--	--	--
Siltstone	0	456	0	456
Coal	est. 456	486	est. 456	486
Sand	est. 486	516	est. 486	516
Shale	est. 516	1266	est. 516	1266
Sandstone	est. 1266	1296	est. 1266	1296
Shale	est. 1296	1356	est. 1296	1356
Sandstone	est. 1356	1386	est. 1356	1386
Shale	est. 1386	1506	est. 1386	1506
Sandstone	est. 1506	1906	est. 1506	1906
Limestone	est. 1906	2004	est. 1906	2010
Big Lime	est. 2004	2063	est. 2004	2063
Big Injun	est. 2063	2336	est. 2063	2336
Gantz Sand	est. 2336	2518	est. 2336	2518
Fifty Foot Sandstone	2518	2709	2518	2709
Gordon	2709	2973	2709	2973
Fifth Sandstone	2973	3076	2973	3076
Bayard	3076	3437	3076	3437
Warren	3437	3814	3437	3814
Speechley	3814	4024	3814	4024
Baltown	4024	4520	4024	4520
Bradford	4520	4915	4520	4915
Benson	4915	5150	4915	5150
Alexander	5150	5362	5150	5362
Elk	5362	5753	5362	5754
Rhinestreet	5753	6120	5754	6150
Sycamore	6120	6282	6150	6350
Middlesex	6282	6388	6350	6518
Burkett	6388	6420	6518	6586
Tully	6420	6440	6586	6648
Marcellus	6440	NA	6648	16263

*Please note Antero determines formation tops based on mud and wireline logs that are only run on one well on a multi-well pad (Please reference Rufus Unit 1H API# 47-085-10046). The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	5/20/2014
Job End Date:	7/3/2014
State:	West Virginia
County:	Ritchie
API Number:	47-085-09999-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Deberry Unit 1H
Longitude:	-80.90119700
Latitude:	39.19536900
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,542
Total Base Water Volume (gal):	16,180,920
Total Base Non Water Volume:	0

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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	Operator	Carrier					
			Water	7732-18-5	100.00000	91.25940	
Sand, White, 40/70	Baker Hughes	Proppant					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		4.85852	
Sand, White, 20/40	Baker Hughes	Proppant					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		2.85462	
Sand, White, 100 mesh	Baker Hughes	Proppant					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.50523	
HCl, 10.1 - 15%	Baker Hughes	Acidizing					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.23126	SmartCare Product
GW-3LDF	Baker Hughes	Gelling Agent					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.10083	SmartCare Product
FRW-18	Baker Hughes	Friction Reducer					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.06231	SmartCare Product
Scaletrol 720	Baker Hughes	Scale Inhibitor					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.01681	SmartCare Product

Alpha 1427	Baker Hughes	Biocide					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.01382	SmartCare Product
Enzyme G-NE	Baker Hughes	Breaker					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.01376	SmartCare Product
Ferrotrol 300L	Baker Hughes	Iron Control					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.00158	SmartCare Product
CI-14	Baker Hughes	Corrosion Inhibitor					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.00037	SmartCare Product
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.							
Ingredients in Additive (s) (MSDS and non-MSDS)	Baker Hughes	See Trade Name(s) List					
			Crystalline Silica (Quartz)	14808-60-7	100.00000	8.21104	
			Water	7732-18-5	95.00000	0.25183	
			Mineral Oil	8042-47-5	70.00000	0.07052	
			Guar Gum	9000-30-0	60.00000	0.06044	
			Hydrochloric Acid	7647-01-0	15.00000	0.03466	
			Paraffinic Petroleum Distillate	64742-55-8	30.00000	0.03022	
			Poly (acrylamide-co-acrylic acid) partial sodium salt	62649-23-4	30.00000	0.01868	
			Hydrotreated Light Distillate	64742-47-8	30.00000	0.01868	
			Ethylene Glycol	107-21-1	45.00000	0.00756	
			1-butoxy-2-propanol	5131-66-8	5.00000	0.00504	
			Isotridecanol, ethoxylated	9043-30-5	5.00000	0.00504	
			Crystalline Silica: Quartz	14808-60-7	5.00000	0.00504	
			Glutaraldehyde	111-30-8	30.00000	0.00414	
			2-Propenoic, Polymer with Sodium Phosphinate, Sodium Salt	71050-62-9	20.00000	0.00336	
			Sodium Chloride	7647-14-5	5.00000	0.00328	
			Ammonium Chloride	12125-02-9	3.00000	0.00187	
			Didecyl Dimethyl Ammonium Chloride	7173-51-5	10.00000	0.00138	
			Oleamide DEA	93-83-4	2.00000	0.00125	
			Alcohols, C12-16, ethoxylated	68551-12-2	2.00000	0.00125	
			Citric Acid	77-92-9	60.00000	0.00095	
			Calcium Chloride	10043-52-4	5.00000	0.00084	
			Quaternary Ammonium Compound	68424-85-1	5.00000	0.00069	
			Ethanol	64-17-5	5.00000	0.00069	
			Hemicellulase Enzyme Concentrate	9025-56-3	5.00000	0.00069	
			Methanol	67-56-1	100.00000	0.00037	
			Polyoxythylene Sorbitan Monooleate	9005-65-6	0.50000	0.00031	
			Sorbitan Monooleate	1338-43-8	0.50000	0.00031	
			Potassium Chloride	7447-40-7	1.00000	0.00017	

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			Polyoxyalkylenes	68951-67-7	30.00000	0.00011	
			2-butoxy-1-propanol	15821-83-7	0.10000	0.00010	
			Fatty Acids	61790-12-3	10.00000	0.00004	
			Modified Thiourea Polymer	68527-49-1	7.00000	0.00003	
			Propargyl Alcohol	107-19-7	5.00000	0.00002	
			Olefin	64743-02-8	5.00000	0.00002	
			Formaldehyde	50-00-0	1.00000	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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Antero Resources

Antero Resources
DeBerry Unit 1H
Ritchie County WV
Northing: 14233087.17
Easting: 1668409.26
As Drilled

WELL DETAILS: DeBerry Unit 1H

Ground Level: 1075.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	14233087.17	1668409.26	39° 11' 43.333 N	80° 54' 4.310 W	

PROJECT DETAILS: Ritchie County WV

Geodetic System: Universal Transverse Mercator (US Survey Feet)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well DeBerry Unit 1H, Grid North
Vertical (TVD) Reference: DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Calculation Method: Minimum Curvature

Genie Lightfoot
11:02, March 04 2014

Scientific Drilling
421 South Eagle Lane
Oklahoma City OK 73128

Scientific Drilling

Azimuths to Grid North
True North: -0.06°
Magnetic North: -8.38°

Magnetic Field
Strength: 52400.1snT
Dip Angle: 66.86°
Date: 4/24/2013
Model: IGRF2010

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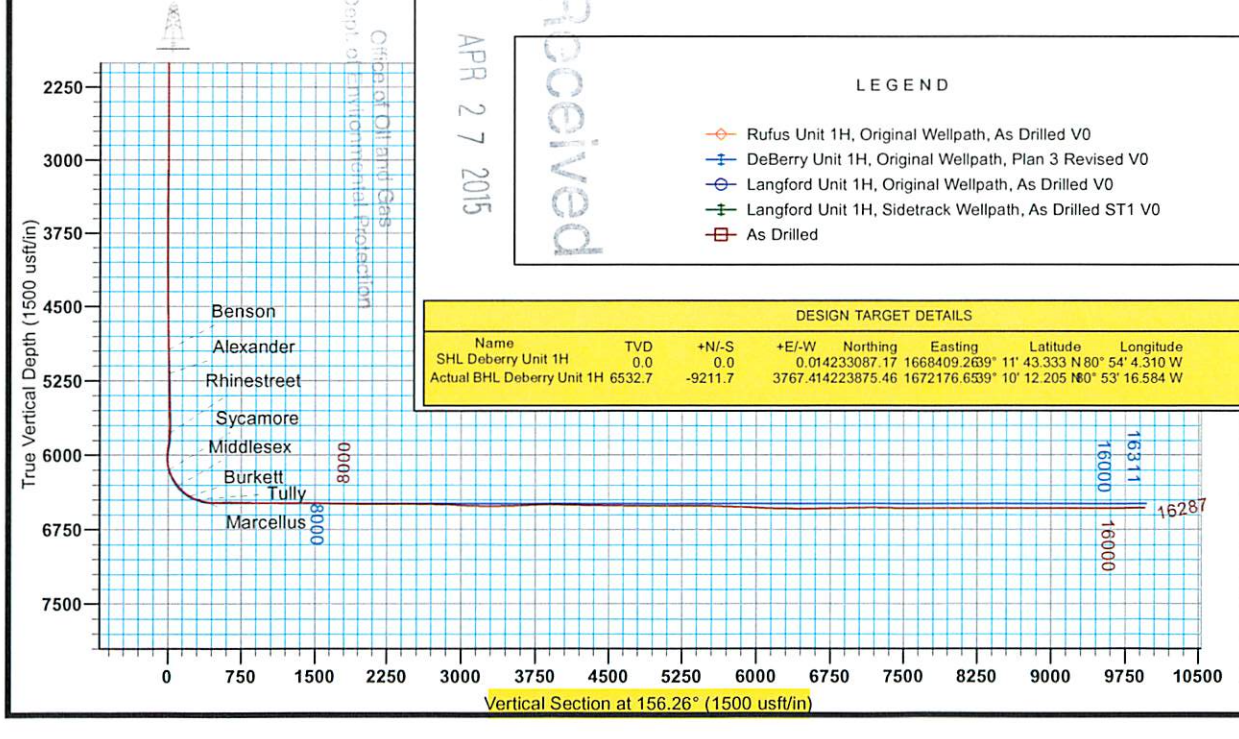
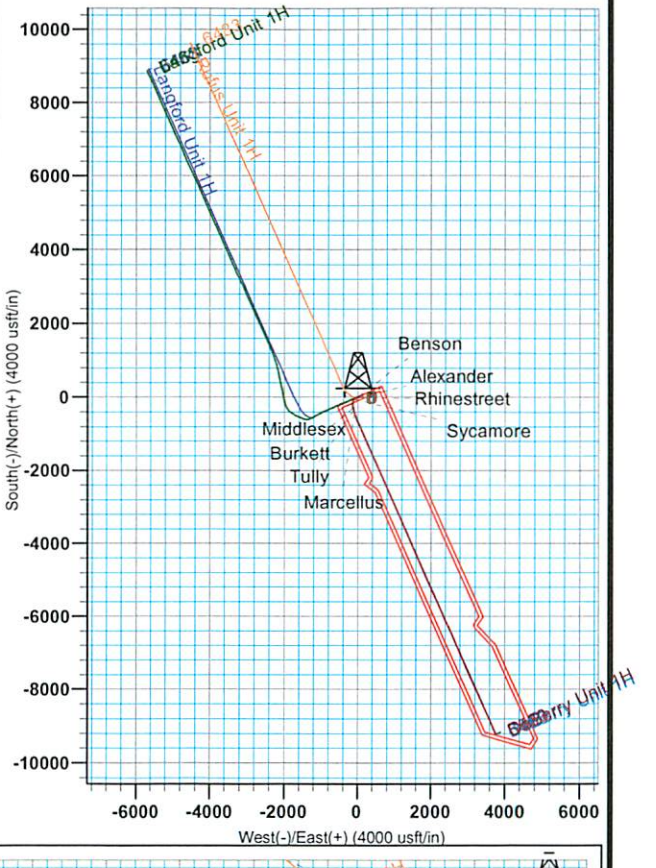
LEGEND

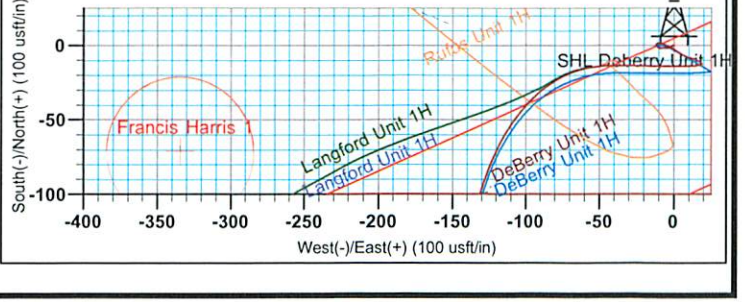
- Rufus Unit 1H, Original Wellpath, As Drilled V0
- DeBerry Unit 1H, Original Wellpath, Plan 3 Revised V0
- Langford Unit 1H, Original Wellpath, As Drilled V0
- Langford Unit 1H, Sidetrack Wellpath, As Drilled ST1 V0
- As Drilled

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL Deberry Unit 1H	0.0	0.0	0.0	14233087.17	1668409.26	39° 11' 43.333 N	80° 54' 4.310 W
Actual BHL Deberry Unit 1H	6532.7	-9211.7	3767.41	14223875.46	1672176.65	39° 10' 12.205 N	80° 53' 16.584 W







Antero Resources

Ritchie County WV
DeBerry/Rufus/Langford
DeBerry Unit 1H
Original Wellpath

Design: As Drilled

EOW Completion Report

04 March, 2014

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Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well DeBerry Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Well:	DeBerry Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Project Ritchie County WV, Ritchie County WV, WV North

Map System:	Universal Transverse Mercator (US Survey Fee	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site DeBerry/Rufus/Langford, Site Center: Deberry 1H

Site Position:		**Northing:**	14,233,087.17 usft	**Latitude:**	39° 11' 43.333 N
From:	Map	**Easting:**	1,668,409.26 usft	**Longitude:**	80° 54' 4.310 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	0.06 °

Well DeBerry Unit 1H, Marcellus

Well Position	**+N/-S**	0.0 usft	**Northing:**	14,233,087.17 usft	**Latitude:**	39° 11' 43.333 N
	+E/-W	0.0 usft	**Easting:**	1,668,409.26 usft	**Longitude:**	80° 54' 4.310 W
Position Uncertainty		2.0 usft	**Wellhead Elevation:**	1,099.0 usft	**Ground Level:**	1,075.0 usft

Wellbore Original Wellpath

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/24/2013	-8.32	66.86	52,400

Design As Drilled

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	156.26

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Survey Program **Date** 3/4/2014

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
111.0	2,507.9	Survey #1 Def Gyro to Int (Original Wellpa	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
2,650.0	4,629.0	Survey #2 Gyro SS (Original Wellpath)	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
4,849.0	16,287.0	Survey #4 MWD (Original Wellpath)	MWD SDI	MWD - Standard ver 1.0.1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
111.0	0.30	265.37	111.0	0.0	-0.3	-0.1	0.27
211.0	0.28	264.72	211.0	-0.1	-0.8	-0.3	0.02
311.0	0.18	254.63	311.0	-0.1	-1.2	-0.4	0.11
411.0	0.12	258.44	411.0	-0.2	-1.4	-0.4	0.06
511.0	0.14	208.51	511.0	-0.3	-1.6	-0.4	0.11
611.0	0.14	222.02	611.0	-0.5	-1.7	-0.2	0.03
711.0	0.07	182.78	711.0	-0.7	-1.8	-0.1	0.10
811.0	0.12	176.17	811.0	-0.8	-1.8	0.0	0.05
911.0	0.13	193.44	911.0	-1.1	-1.8	0.2	0.04

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Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well DeBerry Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Well:	DeBerry Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,011.0	0.14	180.26	1,011.0	-1.3	-1.9	0.4	0.03
1,111.0	0.05	254.49	1,111.0	-1.4	-1.9	0.5	0.14
1,211.0	0.11	241.23	1,211.0	-1.5	-2.0	0.5	0.06
1,311.0	0.08	303.48	1,311.0	-1.5	-2.2	0.5	0.10
1,411.0	0.09	288.81	1,411.0	-1.4	-2.3	0.4	0.02
1,511.0	0.17	222.18	1,511.0	-1.5	-2.5	0.4	0.16
1,611.0	0.13	244.22	1,611.0	-1.7	-2.7	0.4	0.07
1,711.0	0.18	282.69	1,711.0	-1.7	-2.9	0.4	0.11
1,811.0	0.14	250.87	1,811.0	-1.7	-3.2	0.2	0.10
1,911.0	0.11	213.50	1,911.0	-1.8	-3.4	0.3	0.08
2,011.0	0.07	285.35	2,011.0	-1.9	-3.5	0.3	0.11
2,111.0	0.10	239.88	2,111.0	-1.9	-3.6	0.3	0.07
2,211.0	0.01	222.49	2,211.0	-1.9	-3.7	0.3	0.09
2,311.0	0.08	300.99	2,311.0	-1.9	-3.8	0.2	0.08
2,411.0	0.09	254.40	2,411.0	-1.9	-3.9	0.2	0.07
2,507.9	0.20	272.46	2,507.9	-1.9	-4.2	0.1	0.12
2,650.0	0.39	316.56	2,650.0	-1.6	-4.7	-0.5	0.20
2,857.0	0.47	249.36	2,857.0	-1.3	-6.0	-1.2	0.23
3,045.0	0.43	263.80	3,045.0	-1.7	-7.4	-1.4	0.06
3,215.0	0.46	250.53	3,215.0	-2.0	-8.7	-1.7	0.06
3,405.0	0.35	303.48	3,405.0	-1.9	-9.9	-2.2	0.20
3,592.0	0.44	308.64	3,592.0	-1.2	-11.0	-3.4	0.05
3,873.0	0.32	328.45	3,873.0	0.2	-12.2	-5.1	0.06
4,180.0	0.68	68.93	4,180.0	1.6	-11.0	-5.8	0.26
4,347.0	0.97	108.99	4,346.9	1.5	-8.7	-4.8	0.38
4,629.0	1.28	115.41	4,628.9	-0.7	-3.6	-0.8	0.12
4,849.0	1.95	123.23	4,848.8	-3.8	1.8	4.2	0.32
4,881.0	1.74	135.26	4,880.8	-4.4	2.6	5.1	1.37
4,913.0	1.58	115.99	4,912.8	-4.9	3.3	5.9	1.80
4,939.0	1.54	129.00	4,938.8	-5.3	3.9	6.4	1.37
Benson							
4,943.0	1.54	131.04	4,942.8	-5.4	4.0	6.5	1.37
5,036.0	1.90	114.80	5,035.7	-6.9	6.3	8.8	0.65
5,130.0	1.38	114.76	5,129.7	-8.0	8.8	10.8	0.55
5,174.0	1.41	108.35	5,173.7	-8.4	9.7	11.6	0.36
Alexander							
5,225.0	1.46	101.32	5,224.6	-8.7	11.0	12.4	0.36
5,319.0	1.22	96.99	5,318.6	-9.1	13.1	13.6	0.28
5,413.0	0.90	130.74	5,412.6	-9.7	14.7	14.8	0.73
5,507.0	0.51	92.24	5,506.6	-10.2	15.7	15.6	0.63
5,601.0	1.35	127.31	5,600.6	-10.9	17.0	16.8	1.04
5,634.0	1.74	131.52	5,633.6	-11.4	17.7	17.6	1.23
5,675.0	1.67	124.44	5,674.6	-12.2	18.6	18.6	0.54
5,722.0	2.41	241.95	5,721.5	-13.0	18.3	19.3	7.47
5,769.0	8.19	266.29	5,768.3	-13.7	14.1	18.2	12.93

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Company:	Antero Resources	**Local Co-ordinate Reference:**	Well DeBerry Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Well:	DeBerry Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,778.0	9.11	267.14	5,777.2	-13.8	12.7	17.7	10.32
Rhinestreet							
5,816.0	13.01	269.41	5,814.5	-14.0	5.5	15.0	10.32
5,863.0	17.85	270.99	5,859.8	-13.9	-7.0	9.9	10.34
5,910.0	22.80	270.52	5,903.9	-13.7	-23.4	3.1	10.54
5,957.0	24.01	270.20	5,947.0	-13.6	-42.0	-4.5	2.59
6,004.0	23.22	256.37	5,990.1	-15.7	-60.6	-10.0	11.88
6,051.0	23.84	240.57	6,033.2	-22.6	-77.9	-10.7	13.45
6,098.0	25.48	227.19	6,076.0	-34.1	-93.6	-6.4	12.35
6,145.0	27.60	216.11	6,118.0	-49.8	-107.4	2.3	11.44
6,174.0	29.16	210.22	6,143.6	-61.4	-115.0	9.9	11.05
Sycamore							
6,192.0	30.25	206.86	6,159.2	-69.2	-119.2	15.3	11.05
6,239.0	33.25	198.39	6,199.2	-92.0	-128.6	32.4	11.42
6,286.0	35.69	190.97	6,237.9	-117.7	-135.3	53.3	10.33
6,333.0	39.51	186.43	6,275.2	-146.0	-139.6	77.5	10.04
6,374.0	42.25	181.69	6,306.2	-172.8	-141.5	101.2	10.10
Middlesex							
6,380.0	42.67	181.04	6,310.6	-176.8	-141.6	104.9	10.10
6,427.0	47.13	176.37	6,343.9	-210.0	-140.8	135.5	11.80
6,475.0	52.15	174.08	6,375.0	-246.4	-137.7	170.1	11.07
6,522.0	57.77	170.00	6,402.0	-284.5	-132.3	207.1	13.91
6,542.0	59.30	169.44	6,412.4	-301.3	-129.3	223.7	7.99
Burkett							
6,569.0	61.36	168.72	6,425.8	-324.3	-124.8	246.6	7.99
6,610.0	66.63	167.16	6,443.7	-360.3	-117.1	282.7	13.30
Tully							
6,616.0	67.40	166.94	6,446.1	-365.7	-115.9	288.1	13.30
6,663.0	73.49	167.06	6,461.8	-408.8	-105.9	331.6	12.96
6,672.0	74.31	166.55	6,464.3	-417.2	-104.0	340.1	10.56
Marcellus							
6,710.0	77.76	164.45	6,473.5	-452.9	-94.7	376.5	10.56
6,757.0	84.82	161.80	6,480.6	-497.4	-81.2	422.6	16.02
6,814.0	92.51	159.63	6,481.9	-551.1	-62.4	479.3	14.02
6,851.0	92.62	157.27	6,480.3	-585.5	-48.9	516.3	6.38
6,945.0	89.83	155.06	6,478.2	-671.4	-10.9	610.2	3.79
7,039.0	89.03	155.51	6,479.2	-756.8	28.4	704.2	0.98
7,134.0	88.59	155.78	6,481.2	-843.3	67.6	799.2	0.54
7,227.0	88.39	156.16	6,483.6	-928.2	105.4	892.1	0.46
7,322.0	90.30	156.20	6,484.7	-1,015.1	143.8	987.1	2.01
7,416.0	90.80	156.93	6,483.8	-1,101.4	181.2	1,081.1	0.94
7,511.0	90.37	157.94	6,482.8	-1,189.1	217.6	1,176.1	1.16
7,605.0	90.64	155.89	6,482.0	-1,275.6	254.5	1,270.1	2.20
7,699.0	89.66	154.75	6,481.7	-1,361.0	293.7	1,364.1	1.60
7,793.0	88.56	154.96	6,483.2	-1,446.1	333.7	1,458.0	1.19

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Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well DeBerry Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Well:	DeBerry Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
7,887.0	88.39	155.20	6,485.7	-1,531.3	373.3	1,552.0	0.31
7,982.0	87.62	154.81	6,489.0	-1,617.3	413.4	1,646.9	0.91
8,076.0	90.27	156.77	6,490.7	-1,703.0	451.9	1,740.9	3.51
8,170.0	89.40	154.56	6,491.0	-1,788.7	490.7	1,834.9	2.53
8,264.0	89.87	156.05	6,491.6	-1,874.1	529.9	1,928.8	1.66
8,358.0	88.79	155.27	6,492.7	-1,959.7	568.7	2,022.8	1.42
8,452.0	90.30	156.11	6,493.5	-2,045.4	607.4	2,116.8	1.84
8,546.0	89.16	156.63	6,493.9	-2,131.5	645.0	2,210.8	1.33
8,641.0	90.13	156.69	6,494.5	-2,218.7	682.7	2,305.8	1.02
8,735.0	90.22	156.03	6,494.2	-2,304.8	720.4	2,399.8	0.71
8,829.0	89.43	156.82	6,494.5	-2,391.0	758.0	2,493.8	1.19
8,922.0	89.03	156.64	6,495.7	-2,476.4	794.7	2,586.8	0.47
9,016.0	88.76	155.88	6,497.6	-2,562.4	832.5	2,680.8	0.86
9,110.0	88.42	155.37	6,499.9	-2,648.0	871.3	2,774.7	0.65
9,205.0	87.85	155.38	6,503.0	-2,734.3	910.9	2,869.7	0.60
9,298.0	87.32	154.80	6,506.9	-2,818.6	950.0	2,962.6	0.84
9,393.0	87.48	155.28	6,511.2	-2,904.7	990.1	3,057.5	0.53
9,487.0	89.26	156.96	6,513.9	-2,990.6	1,028.1	3,151.4	2.60
9,580.0	89.36	156.40	6,515.0	-3,076.0	1,064.9	3,244.4	0.61
9,675.0	91.58	157.43	6,514.2	-3,163.3	1,102.1	3,339.4	2.58
9,769.0	91.07	158.15	6,512.0	-3,250.3	1,137.7	3,433.3	0.94
9,863.0	90.74	159.04	6,510.5	-3,337.9	1,172.0	3,527.2	1.01
9,957.0	92.28	155.64	6,508.1	-3,424.5	1,208.2	3,621.2	3.97
10,051.0	92.52	156.07	6,504.1	-3,510.3	1,246.6	3,715.1	0.52
10,145.0	90.47	155.21	6,501.7	-3,595.8	1,285.3	3,809.0	2.36
10,239.0	90.03	154.42	6,501.3	-3,680.9	1,325.3	3,903.0	0.96
10,333.0	90.27	154.42	6,501.0	-3,765.7	1,365.9	3,997.0	0.26
10,427.0	88.92	156.54	6,501.7	-3,851.2	1,404.9	4,090.9	2.67
10,522.0	89.23	157.11	6,503.2	-3,938.5	1,442.3	4,185.9	0.68
10,616.0	88.99	157.19	6,504.7	-4,025.1	1,478.8	4,279.9	0.27
10,710.0	89.63	155.82	6,505.8	-4,111.3	1,516.3	4,373.9	1.61
10,804.0	88.66	157.21	6,507.2	-4,197.5	1,553.7	4,467.9	1.80
10,898.0	88.59	156.38	6,509.5	-4,283.9	1,590.8	4,561.8	0.89
10,992.0	89.83	156.08	6,510.8	-4,369.9	1,628.7	4,655.8	1.36
11,086.0	89.60	157.77	6,511.2	-4,456.4	1,665.5	4,749.8	1.81
11,180.0	89.80	157.30	6,511.7	-4,543.3	1,701.4	4,843.8	0.54
11,271.0	89.06	156.65	6,512.6	-4,627.0	1,737.0	4,934.8	1.08
11,363.0	89.36	156.65	6,513.9	-4,711.5	1,773.5	5,026.8	0.33
11,454.0	90.17	156.71	6,514.3	-4,795.0	1,809.5	5,117.8	0.89
11,544.0	90.30	156.13	6,513.9	-4,877.5	1,845.5	5,207.8	0.66
11,636.0	89.40	156.57	6,514.1	-4,961.8	1,882.4	5,299.8	1.09
11,727.0	89.70	156.10	6,514.9	-5,045.1	1,918.9	5,390.8	0.61
11,817.0	89.90	156.32	6,515.2	-5,127.5	1,955.2	5,480.8	0.33
11,909.0	89.70	155.88	6,515.5	-5,211.6	1,992.5	5,572.8	0.53

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Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well DeBerry Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Well:	DeBerry Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Office of Oil and Gas
WV Dept. of Environmental Protection

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
12,000.0	89.29	155.36	6,516.3	-5,294.5	2,030.1	5,663.7	0.73
12,091.0	87.89	153.55	6,518.5	-5,376.6	2,069.3	5,754.7	2.51
12,182.0	87.11	156.75	6,522.5	-5,459.0	2,107.5	5,845.6	3.62
12,273.0	87.71	156.99	6,526.6	-5,542.6	2,143.2	5,936.5	0.71
12,367.0	87.04	156.47	6,530.9	-5,628.9	2,180.3	6,030.3	0.90
12,461.0	87.62	156.48	6,535.3	-5,715.0	2,217.8	6,124.2	0.62
12,555.0	88.59	156.64	6,538.4	-5,801.2	2,255.1	6,218.2	1.05
12,648.0	89.23	156.45	6,540.2	-5,886.5	2,292.1	6,311.2	0.72
12,742.0	88.86	155.42	6,541.7	-5,972.3	2,330.5	6,405.2	1.16
12,837.0	90.81	155.96	6,542.0	-6,058.9	2,369.6	6,500.1	2.13
12,931.0	89.93	152.06	6,541.4	-6,143.4	2,410.8	6,594.1	4.25
13,025.0	92.55	154.66	6,539.4	-6,227.3	2,452.9	6,687.9	3.93
13,119.0	91.68	155.19	6,535.9	-6,312.4	2,492.7	6,781.8	1.08
13,213.0	92.11	155.81	6,532.8	-6,397.9	2,531.7	6,875.7	0.80
13,307.0	89.90	156.79	6,531.1	-6,484.0	2,569.4	6,969.7	2.57
13,401.0	89.46	157.33	6,531.7	-6,570.5	2,606.1	7,063.7	0.74
13,496.0	89.63	158.50	6,532.4	-6,658.6	2,641.8	7,158.7	1.24
13,590.0	90.23	156.57	6,532.5	-6,745.4	2,677.7	7,252.6	2.15
13,684.0	89.03	157.66	6,533.1	-6,832.0	2,714.3	7,346.6	1.72
13,778.0	88.39	156.45	6,535.3	-6,918.5	2,750.9	7,440.6	1.46
13,872.0	89.73	158.52	6,536.8	-7,005.4	2,786.9	7,534.5	2.62
13,966.0	90.10	158.01	6,536.9	-7,092.7	2,821.7	7,628.5	0.67
14,060.0	91.04	157.30	6,536.0	-7,179.6	2,857.4	7,722.5	1.25
14,154.0	89.36	156.20	6,535.7	-7,266.0	2,894.5	7,816.4	2.14
14,248.0	88.66	155.89	6,537.3	-7,351.9	2,932.7	7,910.4	0.81
14,342.0	89.60	156.64	6,538.7	-7,437.9	2,970.5	8,004.4	1.28
14,436.0	89.29	156.96	6,539.6	-7,524.3	3,007.6	8,098.4	0.47
14,530.0	90.67	158.83	6,539.7	-7,611.4	3,042.9	8,192.4	2.47
14,625.0	91.68	155.81	6,537.7	-7,699.0	3,079.5	8,287.3	3.35
14,718.0	89.63	156.07	6,536.7	-7,783.9	3,117.5	8,380.3	2.22
14,812.0	88.35	155.27	6,538.3	-7,869.6	3,156.2	8,474.3	1.61
14,906.0	90.30	155.50	6,539.4	-7,955.0	3,195.3	8,568.3	2.09
15,000.0	91.38	156.91	6,538.1	-8,041.0	3,233.2	8,662.2	1.89
15,094.0	90.27	154.88	6,536.7	-8,126.8	3,271.6	8,756.2	2.46
15,189.0	89.43	153.80	6,536.9	-8,212.4	3,312.8	8,851.2	1.44
15,282.0	88.86	155.25	6,538.3	-8,296.4	3,352.8	8,944.1	1.68
15,376.0	90.00	155.39	6,539.3	-8,381.8	3,392.0	9,038.1	1.22
15,470.0	91.04	157.04	6,538.4	-8,467.8	3,429.9	9,132.1	2.07
15,564.0	91.04	155.97	6,536.7	-8,554.0	3,467.4	9,226.1	1.14
15,658.0	90.24	156.15	6,535.7	-8,639.9	3,505.5	9,320.1	0.87
15,752.0	89.90	154.65	6,535.5	-8,725.3	3,544.6	9,414.0	1.64
15,846.0	89.73	155.04	6,535.9	-8,810.4	3,584.6	9,508.0	0.45
15,940.0	90.74	156.39	6,535.5	-8,896.1	3,623.3	9,602.0	1.79
16,034.0	90.34	156.54	6,534.6	-8,982.3	3,660.8	9,696.0	0.45

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Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well DeBerry Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	DeBerry 1H 1075 GL + 24 KB @ 1099.0usft
Well:	DeBerry Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

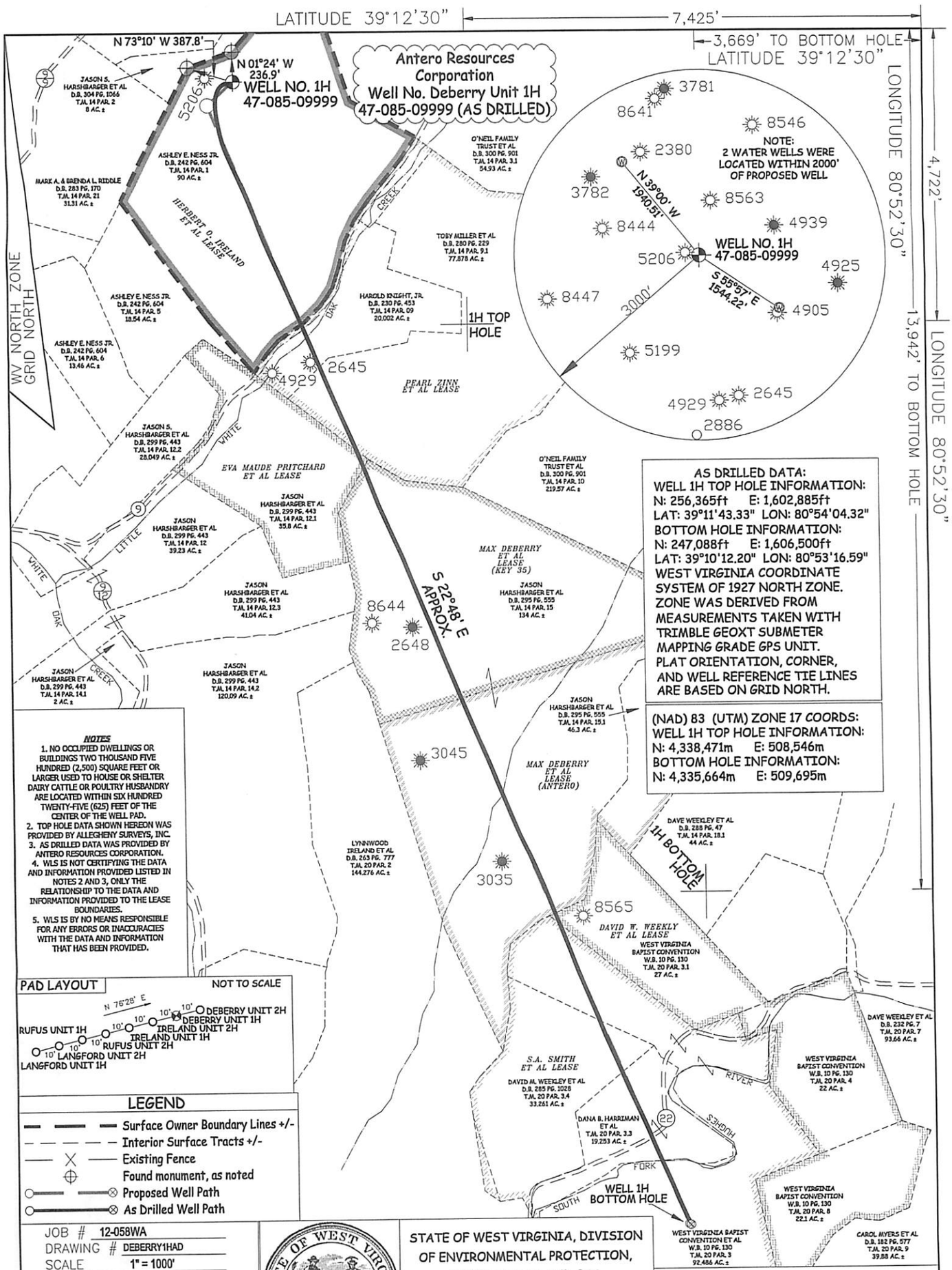
Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
16,128.0	90.44	154.98	6,533.9	-9,068.0	3,699.4	9,790.0	1.66
16,230.0	90.47	154.53	6,533.1	-9,160.2	3,742.9	9,892.0	0.44
16,287.0	90.47	154.53	6,532.7	-9,211.7	3,767.4	9,948.9	0.00

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
4,939.0	4,938.8	-5.3	3.9	Benson
5,174.0	5,173.7	-8.4	9.7	Alexander
5,778.0	5,777.2	-13.8	12.7	Rhinestreet
6,174.0	6,143.6	-61.4	-115.0	Sycamore
6,374.0	6,306.2	-172.8	-141.5	Middlesex
6,542.0	6,412.4	-301.3	-129.3	Burkett
6,610.0	6,443.7	-360.3	-117.1	Tully
6,672.0	6,464.3	-417.2	-104.0	Marcellus

Checked By: _____ Approved By: _____ Date: _____



JOB # 12-058WA
DRAWING # DEBERRY1HAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO
WEST VIRGINIA 26415

DATE 03/30/15
OPERATOR'S WELL# DEBERRY UNIT #1H

STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

API WELL # 47 – 085 – 09999
STATE COUNTY PERMIT

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION: ORIGINAL GROUND ELEV. 1,080' AS DRILLED ELEV. 1,076' WATERSHED SOUTH FORK HUGHES RIVER
QUADRANGLE PULLMAN 7.5' DISTRICT UNION COUNTY RITCHIE
COUNTY NAME

SURFACE OWNER ASHLEY E. NESS JR. ACREAGE 90 ACRES +/-
OIL & GAS ROYALTY OWNER HERBERT O. IRELAND ET AL; PEARL ZINN ET AL; EVA MAUDE PRITCHARD ET AL; MAX DEBARRY ET AL (KEY 35); MAX DEBERRY ET AL (ANTERO); DAVID W. WEEKLY ET AL; S.A. SMITH ET AL
LEASE ACREAGE 90 ACRES±; 100 ACRES±; 35 ACRES±; 80 ACRES±; 100 ACRES±; 71 ACRES±; 145 ACRES±

PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE IN WELL
(SPECIFY) (X) AS DRILLED PLUG & ABANDON CLEAN OUT & REPLUG

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,533' TVD 16,287' MD

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS CT CORPORATION SYSTEM
DENVER, CO 80202 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

FORM WW-6

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

API 47 - 085 - 10005 County Ritchie District Union
Quad Pullman 7.5' Pad Name Ness Pad Field/Pool Name ---
Farm name Ness, Ashley E., Jr. Well Number Ireland Unit 1H
Operator (as registered with the OOG) Antero Resources Corporation
Address 1615 Wynkoop St. City Denver State CO Zip 80202

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4338470 m Easting 508541 m
Landing Point of Curve Northing 4338227.45m Easting 508131.45m
Bottom Hole Northing 4336024.85m Easting 509094.94m

Elevation (ft) 1075' 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

Drilling 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)
Air- Foam & 4% KCL
Mud- Polymer

Date permit issued 1/31/2013 Date drilling commenced 4/15/2013 Date drilling ceased 4/3/2014
Date completion activities began 4/12/2014 Date completion activities ceased 7/23/2014
Verbal plugging (Y/N) N/A 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 62' Open mine(s) (Y/N) depths No
Salt water depth(s) ft 1620', 1838' Void(s) encountered (Y/N) depths No
Coal depth(s) ft 456' Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

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WV Dept. of Environmental Protection

Reviewed by:
AL 5/28/15 ✓
W.S. 6/02/15

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API 47- 085 - 10005 Farm name Ness, Ashley E., Jr. Well number Ireland Unit 1H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	28"	20"	40'	New	94# H-40	N/A	Y
Surface	17- 1/2"	13- 3/8"	392'	New	48# H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2535'	New	36# J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4" & 8-1/2"	5-1/2"	15017'	New	23# P-110	N/A	Y
Tubing		2-3/8"	6506'		4.7# N-80	N/A	
Packer type and depth set		N/A					

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft^3/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor	Class A	203 sx	15.6	1.18	38	0'	8 Hrs.
Surface	Class A	499 sx	15.6	1.18	297	0'	8 Hrs.
Coal							
Intermediate 1	Class A	997 sx	15.6	1.18	805	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	1001 sx (Lead) 1284 sx (Tail)	14.5 Lead 15.2 Tail	1.30 Lead 1.86 Tail	2966	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 15017' MD, 6520' TVD Loggers TD (ft) 14968'

Deepest formation penetrated Marcellus Plug back to (ft) N/A

Plug back procedure N/A

Kick off depth (ft) 6326'

** This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Rufus Unit 1H API #47-085-10046). Please reference the wireline logs submitted with Form WR-35 for Rufus Unit 1H. A Cement Bond Log has been included with this submittal.

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction ☐ neutron ☐ resistivity ☐ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ■ No ☐ Conventional ☐ Sidewall Were cuttings collected ☐ Yes ■ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

Conductor- 0

Surface- 1 above guide shoe, 1 aboce insert float, 1 every 4th joint to surface

Intermediate- 1 above float joint, 1 above float collar, 1 every 4th joint to surface

Production- 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10005 Farm name Ness, Ashley E., Jr. Well number Ireland Unit 1H

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
		*PLEASE SEE EXHIBIT 1			

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
			*PLEASE SEE EXHIBIT 2					

Please insert additional pages as applicable.

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API 47- 085 - 10005 Farm name Ness, Ashley E., Jr. Well number Ireland Unit 1H

PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6418' (TOP) TVD	6818' (TOP) MD	

Please insert additional pages as applicable.

GAS TEST □ Build up □ Drawdown ■ Open Flow OIL TEST ■ Flow □ Pump

SHUT-IN PRESSURE Surface 3000 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW Gas 10117 mcfpd Oil 47 bpd NGL --- bpd Water --- bpd GAS MEASURED BY □ Estimated ■ Orifice □ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		

*PLEASE SEE EXHIBIT 3

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WV Dept. of Environmental Protection

Please insert additional pages as applicable.

Drilling Contractor Patterson - UTI Drilling Company LLC
Address 207 Carolton Dr. City Eighty Four State PA Zip 15330

Logging Company Casedhole Solutions
Address 100 Arentzen Blvd. City Chareloi State PA Zip 15022

Cementing Company Nabors Completion & Production Services, Co.
Address 1650 Hackers Creek City Jane Lew State WV Zip 26378

Stimulating Company Baker Hughes
Address 837 Philippi Pike City Clarksburg State WV Zip 26301

Please insert additional pages as applicable.

Completed by Kara Quackenbush Telephone 303-357-7233
Signature Kara Quackenbush Title Permitting Agent Date 1/20/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

API 47-085-10005 Farm Name Ness, Ashley E., Jr. Well Number Ireland Unit 1H					
EXHIBIT 1					
Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	12-Apr-14	14,801	14,927	60	Marcellus
2	26-May-14	14,653	14,778	60	Marcellus
3	27-May-14	14,504	14,630	60	Marcellus
4	27-May-14	14,355	14,481	60	Marcellus
5	27-May-14	14,207	14,333	60	Marcellus
6	27-May-14	14,058	14,184	60	Marcellus
7	28-May-14	13,910	14,036	60	Marcellus
8	28-May-14	13,761	13,887	60	Marcellus
9	28-May-14	13,613	13,739	60	Marcellus
10	29-May-14	13,464	13,590	60	Marcellus
11	30-May-14	13,316	13,442	60	Marcellus
12	30-May-14	13,167	13,293	60	Marcellus
13	30-May-14	13,019	13,146	60	Marcellus
14	30-May-14	12,870	12,996	60	Marcellus
15	31-May-14	12,722	12,848	60	Marcellus
16	31-May-14	12,573	12,699	60	Marcellus
17	31-May-14	12,425	12,551	60	Marcellus
18	1-Jun-14	12,276	12,402	60	Marcellus
19	1-Jun-14	12,128	12,253	60	Marcellus
20	1-Jun-14	11,979	12,105	60	Marcellus
21	1-Jun-14	11,831	11,956	60	Marcellus
22	2-Jun-14	11,682	11,808	60	Marcellus
23	2-Jun-14	11,534	11,659	60	Marcellus
24	3-Jun-14	11,385	11,511	60	Marcellus
25	3-Jun-14	11,237	11,362	60	Marcellus
26	3-Jun-14	11,088	11,214	60	Marcellus
27	3-Jun-14	10,940	11,065	60	Marcellus
28	4-Jun-14	10,791	10,917	60	Marcellus
29	4-Jun-14	10,643	10,765	60	Marcellus
30	4-Jun-14	10,494	10,620	60	Marcellus
31	5-Jun-14	10,345	10,471	60	Marcellus
32	5-Jun-14	10,197	10,323	60	Marcellus
33	5-Jun-14	10,048	10,174	60	Marcellus
34	6-Jun-14	9,900	10,026	60	Marcellus
35	6-Jun-14	9,751	9,877	60	Marcellus
36	6-Jun-14	9,603	9,729	60	Marcellus
37	6-Jun-14	9,454	9,580	60	Marcellus
38	6-Jun-14	9,306	9,432	60	Marcellus
39	7-Jun-14	9,157	9,283	60	Marcellus
40	7-Jun-14	9,009	9,135	60	Marcellus
41	7-Jun-14	8,860	8,986	60	Marcellus
42	8-Jun-14	8,712	8,838	60	Marcellus
43	8-Jun-14	8,563	8,689	60	Marcellus
44	8-Jun-14	8,415	8,541	60	Marcellus
45	8-Jun-14	8,266	8,392	60	Marcellus
46	8-Jun-14	8,118	8,243	60	Marcellus
47	9-Jun-14	7,969	8,095	60	Marcellus
48	9-Jun-14	7,821	7,946	60	Marcellus
49	10-Jun-14	7,672	7,798	60	Marcellus
50	10-Jun-14	7,524	7,649	60	Marcellus
51	10-Jun-14	7,375	7,501	60	Marcellus
52	10-Jun-14	7,227	7,352	60	Marcellus
53	10-Jun-14	7,078	7,204	60	Marcellus
54	10-Jun-14	6,930	7,055	60	Marcellus

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API 47-085-10005 Farm Name Ness, Ashley E., Jr. Mary F. Well Number Ireland Unit 1H

EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	26-May-14	31.0	8,726	N/A	7,422	2,079	5,739	N/A
2	26-May-14	75.0	8,250	5,785	6,203	199,556	5,587	N/A
3	27-May-14	78.0	7,284	5,610	5,593	199,233	6,413	N/A
4	27-May-14	76.0	7,498	5,655	4,858	183,544	6,105	N/A
5	27-May-14	75.0	7,654	5,313	5,003	221,133	5,953	N/A
6	27-May-14	74.0	7,494	5,831	5,498	229,076	5,912	N/A
7	28-May-14	76.0	7,364	5,536	4,130	220,995	5,893	N/A
8	28-May-14	77.0	7,401	5,158	3,464	224,863	5,872	N/A
9	28-May-14	76.0	7,619	6,130	5,267	224,928	5,910	N/A
10	29-May-14	71.0	7,938	5,531	6,995	134,574	6,079	N/A
11	30-May-14	76.0	7,616	5,654	6,280	185,646	6,356	N/A
12	30-May-14	76.0	7,650	5,605	6,207	225,009	5,766	N/A
13	30-May-14	75.0	7,224	5,605	5,434	219,182	5,686	N/A
14	30-May-14	75.0	7,805	5,442	5,358	221,242	5,757	N/A
15	31-May-14	78.0	7,007	5,544	5,518	227,579	5,779	N/A
16	31-May-14	75.0	7,518	5,703	6,280	222,374	5,727	N/A
17	31-May-14	76.0	7,534	5,247	4,892	169,553	6,085	N/A
18	1-Jun-14	77.0	7,455	5,282	6,425	177,963	6,161	N/A
19	1-Jun-14	78.0	7,540	5,512	5,887	202,607	5,494	N/A
20	1-Jun-14	74.0	7,780	5,741	5,148	222,856	5,724	N/A
21	1-Jun-14	73.0	7,489	5,956	2,938	224,376	5,730	N/A
22	2-Jun-14	68.0	7,524	6,711	5,082	179,728	6,480	N/A
23	2-Jun-14	52.0	7,949	6,066	6,316	36,903	6,009	N/A
24	3-Jun-14	64.0	6,970	5,585	5,219	103,564	5,981	N/A
25	3-Jun-14	73.0	7,146	5,617	4,796	218,047	5,750	N/A
26	3-Jun-14	73.0	7,238	5,482	4,668	223,317	5,860	N/A
27	3-Jun-14	74.0	7,169	5,402	2,963	228,124	5,730	N/A
28	4-Jun-14	79.0	7,107	5,666	4,900	225,253	5,786	N/A
29	4-Jun-14	76.0	7,191	6,028	4,500	220,225	5,699	N/A
30	4-Jun-14	75.0	7,291	5,562	4,174	214,554	5,522	N/A
31	5-Jun-14	76.0	7,150	5,760	2,920	222,306	5,663	N/A
32	5-Jun-14	78.0	7,170	5,500	5,105	198,949	5,303	N/A
33	5-Jun-14	72.0	7,353	5,666	4,963	195,274	5,418	N/A
34	6-Jun-14	73.0	7,663	5,578	5,342	212,061	5,518	N/A
35	6-Jun-14	79.0	7,002	5,211	4,237	221,615	5,543	N/A
36	6-Jun-14	78.0	6,847	5,574	3,543	219,435	5,566	N/A
37	6-Jun-14	72.0	6,662	5,402	4,818	219,643	5,505	N/A
38	6-Jun-14	73.0	6,879	5,385	4,797	224,323	5,358	N/A
39	7-Jun-14	73.0	6,651	5,512	4,377	218,769	5,294	N/A
40	7-Jun-14	79.6	6,818	5,345	5,307	222,257	5,290	N/A
41	7-Jun-14	72.0	6,787	5,462	4,745	204,938	5,450	N/A
42	8-Jun-14	79.8	6,921	5,533	5,191	224,191	5,340	N/A
43	8-Jun-14	78.5	7,046	5,226	4,617	227,694	5,500	N/A
44	8-Jun-14	79.4	6,939	5,425	4,007	225,656	5,453	N/A
45	8-Jun-14	78.7	6,751	5,225	4,968	228,056	5,343	N/A
46	8-Jun-14	79.7	6,925	5,590	3,621	222,605	5,245	N/A
47	9-Jun-14	79.7	6,925	5,590	3,621	217,100	5,431	N/A
48	9-Jun-14	72.0	6,906	5,590	5,945	217,100	5,231	N/A
49	10-Jun-14	72.0	6,580	5,675	4,459	218,327	5,494	N/A
50	10-Jun-14	80.2	6,605	5,782	4,053	223,907	5,495	N/A
51	10-Jun-14	82.4	6,390	5,594	5,247	224,484	5,265	N/A
52	10-Jun-14	81.4	6,628	5,356	5,204	220,732	5,431	N/A
53	10-Jun-14	73.0	6,295	5,371	5,223	228,881	5,493	N/A
54	10-Jun-14	72.0	6,490	5,396	4,700	206,226	5,129	N/A
	AVG=	74	7,219	5,579	4,971	11,032,612	306,303	TOTAL

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API 47-085-10005 Farm Name Ness, Ashley E., Jr. Well Number Ireland Unit 1H				
EXHIBIT 3				
LITHOLOGY/ FORMATION	**TOP DEPTH (TVD) From Surface**	**BOTTOM DEPTH (TVD) From Surface**	**TOP DEPTH (MD) From Surface**	**BOTTOM DEPTH (MD) From Surface**
Siltstone	0	456	0	456
Coal	est 456	486	est 456	486
Sand	est 486	516	est 486	516
Shale	est 516	1,266	est 516	1,266
Sandstone	est 1266	1,296	est 1266	1,296
Shale	est 1296	1,356	est 1296	1,356
Sandstone	est 1356	1,386	est 1356	1,386
Shale	est 1386	1,506	est 1386	1,506
Sandstone	est 1506	1,906	est 1506	1,906
Limestone	est 1906	2004	est 1906	2,004
Big Lime	2,004	2,004	2,004	2,004
Big Injun	2,004	2,336	2,004	2,336
Gantz Sand	2,336	2,518	2,336	2,518
Fifty Foot Sandstone	2,518	2,709	2,518	2,709
Gordon	2,709	2,994	2,709	2,994
Fifth Sandstone	2,994	3,091	2,994	3,091
Bayard	3,091	3,450	3,091	3,457
Warren	3,450	3,830	3,457	3,866
Speechley	3,830	4,039	3,866	4,095
Baltown	4,039	4,517	4,095	4,618
Bradford	4,517	4,910	4,618	5,048
Benson	4,910	5,144	5,048	5,304
Alexander	5,144	5,361	5,304	5,543
Elk	5,361	5,744	5,543	5,957
Rhinestreet	5,744	6,099	5,957	6,347
Sycamore	6,099	6,264	6,347	6,549
Middlesex	6,264	6,368	6,549	6,707
Burkett	6,368	6,398	6,707	6,767
Tully	6,398	6,418	6,767	6,818
Marcellus	6,418	NA	6,818	14,993

*Please note Antero determines formation tops based on wireline logs that are only run on one well on a multi-well pad (Please reference Rufus Unit 1H API# 47-085-10046). The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

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Ireland Unit 1H
Ritchie County WV
Northing: 14233081.84
Easting: 1668389.35
As Drilled

Antero Resources

Scientific Drilling

To convert Magnetic North to Grid, Subtract 8.42°
To convert True North to Grid, Subtract 0.06°

Azimuths to Grid North
True North: -0.06°
Magnetic North: -8.42°

Magnetic Field
Strength: 52299.5snT
Dip Angle: 66.78°
Date: 2/18/2014
Model: IGRF2010

WELL DETAILS Ireland Unit 1H
Ground Level: 1075.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	14233081.84	1668389.35	39° 11' 43.280 N	80° 54' 4.563 W

Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Gr: 1075.0

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LEGEND
- Ireland Unit 1H, Original Wellpath, Plan 4 V0
- As Drilled

PROJECT DETAILS: Ritchie County WV

Geodetic System: Universal Transverse Mercator (US Survey Feet)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: Zone 17N (84 W to 78 W)
System Datum: Mean Sea Level

Genie Lightfoot
8:26, April 01 2014

Scientific Drilling
421 South Eagle Lane
Oklahoma City, OK 73128

SITE DETAILS: DeBerry/Rufus/Langford

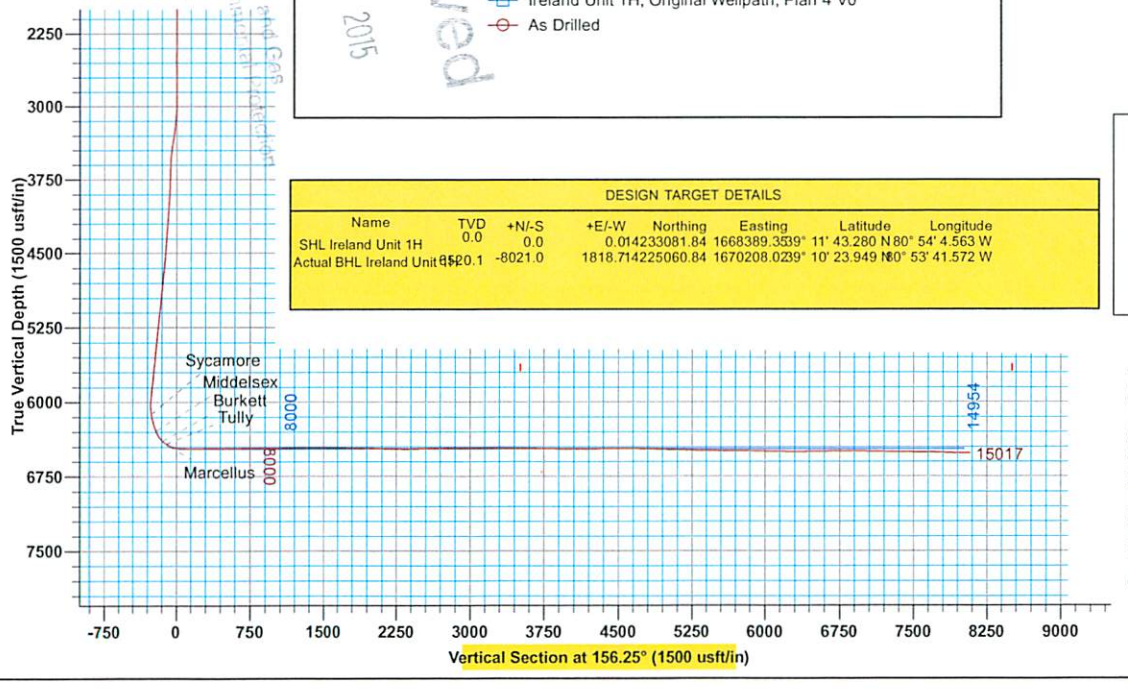
Site Center: Deberry 1H
Ness Pad

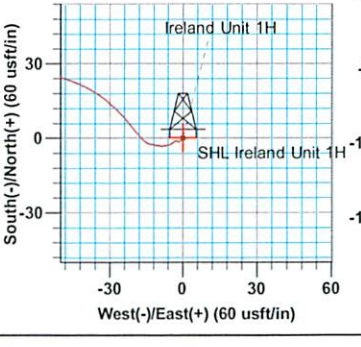
Site Centre Northing: 14233087.17
Easting: 1668409.26

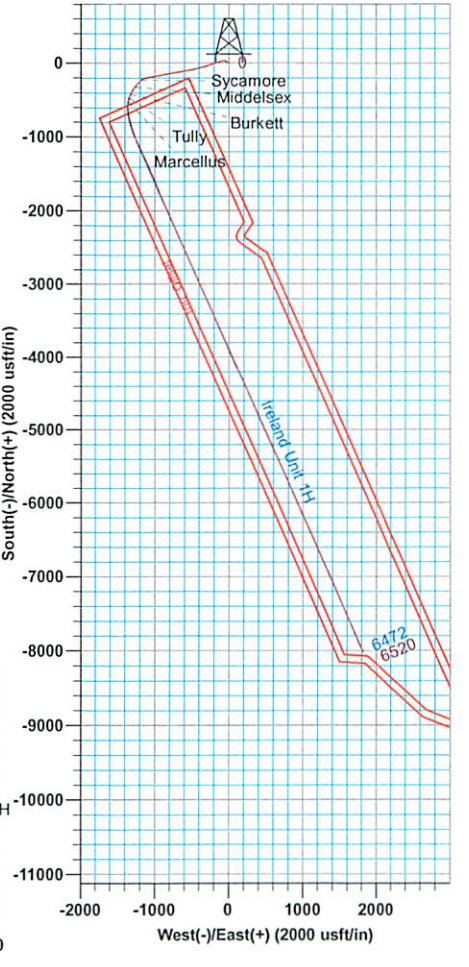
Positional Uncertainity: 0.0
Convergence: 0.06
Local North: Grid

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL Ireland Unit 1H	0.0	0.0	0.0	14233081.84	1668389.35	39° 11' 43.280 N	80° 54' 4.563 W
Actual BHL Ireland Unit 1H	6520.1	-8021.0	1818.71	14225060.84	1670208.02	39° 10' 23.949 N	80° 53' 41.572 W







Antero Resources

Ritchie County WV
DeBerry/Rufus/Langford
Ireland Unit 1H
Original Wellpath

Design: As Drilled

EOW Completion Report

31 March, 2014

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WV Dept. of Environmental Protection

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Ireland Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Well:	Ireland Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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Project Ritchie County WV, Ritchie County WV, WV North

Map System:	Universal Transverse Mercator (US Survey Fee	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site DeBerry/Rufus/Langford, Site Center: Deberry 1H

Site Position:		**Northing:**	14,233,087.17 usft	**Latitude:**	39° 11' 43.333 N
From:	Map	**Easting:**	1,668,409.26 usft	**Longitude:**	80° 54' 4.310 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	0.06 °

Well Ireland Unit 1H, Marcellus

Well Position	**+N/-S**	0.0 usft	**Northing:**	14,233,081.84 usft	**Latitude:**	39° 11' 43.280 N
	+E/-W	0.0 usft	**Easting:**	1,668,389.35 usft	**Longitude:**	80° 54' 4.563 W
Position Uncertainty		2.0 usft	**Wellhead Elevation:**	1,099.0 usft	**Ground Level:**	1,075.0 usft

Wellbore Original Wellpath

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/18/2014	-8.36	66.78	52,299

Design As Drilled

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	156.25

Survey Program **Date** 3/31/2014

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	2,835.3	Survey #2 Gyro to INT (Original Wellpath)	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
2,900.0	4,819.8	Survey #3 Gyro to KOP (Original Wellpath	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
4,819.8	15,017.0	Survey #4 SDI MWD (Original Wellpath)	SDI MWD	Scientific Drilling Intl. MWD - Standard ver 1.0.1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
100.0	0.14	231.07	100.0	-0.1	-0.1	0.0	0.14
200.0	0.17	208.54	200.0	-0.3	-0.3	0.2	0.07
300.0	0.11	214.70	300.0	-0.5	-0.4	0.3	0.06
400.0	0.15	228.69	400.0	-0.7	-0.5	0.4	0.05
500.0	0.12	207.16	500.0	-0.8	-0.7	0.5	0.06
600.0	0.11	214.98	600.0	-1.0	-0.8	0.6	0.02
700.0	0.11	207.03	700.0	-1.2	-0.9	0.7	0.02
800.0	0.11	232.46	800.0	-1.3	-1.0	0.8	0.05
900.0	0.11	212.83	900.0	-1.5	-1.1	0.9	0.04

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WV Dept. of Environmental Protection

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Ireland Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Well:	Ireland Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,000.0	0.12	245.85	1,000.0	-1.6	-1.3	0.9	0.07
1,100.0	0.12	259.38	1,100.0	-1.6	-1.5	0.9	0.03
1,200.0	0.10	286.16	1,200.0	-1.6	-1.7	0.8	0.05
1,300.0	0.11	305.01	1,300.0	-1.6	-1.8	0.7	0.04
1,400.0	0.13	308.59	1,400.0	-1.4	-2.0	0.5	0.02
1,500.0	0.05	330.55	1,500.0	-1.3	-2.1	0.4	0.09
1,600.0	0.04	358.42	1,600.0	-1.3	-2.1	0.3	0.02
1,700.0	0.06	252.55	1,700.0	-1.2	-2.2	0.2	0.08
1,800.0	0.07	266.26	1,800.0	-1.3	-2.3	0.2	0.02
1,900.0	0.06	218.60	1,900.0	-1.3	-2.4	0.2	0.05
2,000.0	0.07	306.49	2,000.0	-1.3	-2.5	0.2	0.09
2,100.0	0.17	296.58	2,100.0	-1.2	-2.6	0.0	0.10
2,200.0	0.09	220.24	2,200.0	-1.2	-2.8	0.0	0.17
2,300.0	0.09	262.32	2,300.0	-1.3	-3.0	0.0	0.06
2,400.0	0.15	277.90	2,400.0	-1.3	-3.2	-0.1	0.07
2,500.0	0.24	218.34	2,500.0	-1.4	-3.4	-0.1	0.21
2,600.0	0.22	236.26	2,600.0	-1.7	-3.7	0.0	0.07
2,700.0	0.23	231.54	2,700.0	-1.9	-4.0	0.1	0.02
2,800.0	0.50	230.90	2,800.0	-2.3	-4.5	0.3	0.27
2,835.3	0.63	236.83	2,835.3	-2.5	-4.8	0.4	0.40
2,900.0	0.87	253.40	2,900.0	-2.8	-5.6	0.4	0.50
3,000.0	2.79	262.63	2,999.9	-3.4	-8.7	-0.4	1.94
3,100.0	3.73	293.73	3,099.8	-2.4	-14.1	-3.5	1.97
3,200.0	7.27	324.20	3,199.3	4.1	-20.8	-12.1	4.47
3,300.0	10.45	309.76	3,298.1	15.0	-31.5	-26.4	3.86
3,400.0	12.73	286.72	3,396.1	24.0	-49.0	-41.7	5.11
3,500.0	16.46	267.96	3,492.9	26.7	-73.7	-54.1	5.98
3,600.0	18.81	254.90	3,588.3	21.9	-103.5	-61.8	4.59
3,700.0	22.41	250.16	3,681.9	11.3	-137.0	-65.5	3.97
3,800.0	25.59	249.73	3,773.2	-2.7	-175.2	-68.1	3.18
3,900.0	25.56	249.36	3,863.4	-17.8	-215.6	-70.6	0.16
4,000.0	24.58	255.70	3,954.0	-30.5	-256.0	-75.2	2.86
4,100.0	24.19	254.69	4,045.1	-41.1	-295.9	-81.6	0.57
4,200.0	24.45	253.41	4,136.2	-52.4	-335.5	-87.2	0.59
4,300.0	23.04	255.21	4,227.7	-63.3	-374.3	-92.8	1.59
4,400.0	23.19	255.75	4,319.7	-73.1	-412.3	-99.1	0.26
4,500.0	24.32	256.51	4,411.2	-82.8	-451.4	-106.0	1.17
4,600.0	23.59	255.73	4,502.6	-92.5	-490.8	-113.0	0.80
4,700.0	24.54	257.13	4,593.9	-102.1	-530.4	-120.2	1.11
4,800.0	24.16	260.85	4,685.0	-110.0	-570.9	-129.3	1.58
4,819.8	23.91	260.92	4,703.1	-111.2	-578.8	-131.3	1.27
4,901.0	22.83	259.60	4,777.7	-116.7	-610.6	-139.1	1.48
4,995.0	23.60	260.72	4,864.1	-123.0	-647.1	-148.0	0.94
5,088.0	24.33	259.87	4,949.0	-129.4	-684.3	-157.2	0.87
5,182.0	24.39	260.57	5,034.7	-136.0	-722.5	-166.6	0.31

Received
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Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Ireland Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Well:	Ireland Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,276.0	24.22	261.35	5,120.3	-142.0	-760.7	-176.4	0.39
5,370.0	25.43	259.72	5,205.6	-148.5	-799.7	-186.1	1.48
5,465.0	24.10	258.08	5,291.9	-156.2	-838.7	-194.8	1.58
5,560.0	23.03	259.12	5,379.0	-163.7	-875.9	-202.9	1.21
5,653.0	22.25	260.82	5,464.8	-169.9	-911.2	-211.4	1.09
5,747.0	22.31	259.81	5,551.8	-175.9	-946.3	-220.1	0.41
5,841.0	22.85	260.25	5,638.6	-182.2	-981.9	-228.7	0.60
5,934.0	22.12	259.24	5,724.5	-188.5	-1,016.9	-237.0	0.89
6,029.0	23.88	259.76	5,812.0	-195.3	-1,053.3	-245.5	1.86
6,122.0	26.10	260.80	5,896.3	-201.9	-1,092.1	-255.0	2.43
6,186.0	24.42	259.07	5,954.1	-206.6	-1,119.0	-261.5	2.87
6,232.0	23.09	257.67	5,996.2	-210.4	-1,137.1	-265.4	3.14
6,279.0	23.47	246.89	6,039.4	-216.0	-1,154.7	-267.3	9.09
6,326.0	24.96	233.88	6,082.3	-225.5	-1,171.4	-265.3	11.76
6,371.0	26.82	225.30	6,122.8	-238.3	-1,186.3	-259.7	9.28
Sycamore							
6,373.0	26.91	224.95	6,124.6	-238.9	-1,186.9	-259.3	9.28
6,420.0	30.23	222.72	6,165.9	-255.1	-1,202.4	-250.7	7.42
6,467.0	34.11	222.39	6,205.7	-273.6	-1,219.4	-240.7	8.26
6,514.0	38.11	222.17	6,243.6	-294.1	-1,238.0	-229.4	8.52
6,561.0	41.99	220.75	6,279.6	-316.7	-1,258.0	-216.7	8.48
6,573.0	42.60	219.22	6,288.5	-322.9	-1,263.2	-213.2	10.00
Middelsex							
6,608.0	44.50	214.95	6,313.8	-342.2	-1,277.7	-201.4	10.00
6,655.0	47.94	210.18	6,346.4	-370.8	-1,295.9	-182.6	10.35
6,702.0	53.75	207.42	6,376.0	-402.7	-1,313.4	-160.4	13.17
6,731.0	56.95	205.15	6,392.5	-424.1	-1,324.0	-145.1	12.77
Burkett							
6,749.0	58.95	203.82	6,402.1	-438.0	-1,330.3	-134.9	12.77
6,791.0	63.71	199.63	6,422.2	-472.2	-1,343.9	-109.0	14.30
Tully							
6,796.0	64.28	199.16	6,424.4	-476.4	-1,345.4	-105.8	14.30
6,842.0	70.44	193.48	6,442.1	-517.2	-1,357.3	-73.3	17.59
Marcellus							
6,843.0	70.58	193.36	6,442.5	-518.1	-1,357.5	-72.5	17.59
6,890.0	75.55	187.07	6,456.2	-562.3	-1,365.4	-35.3	16.60
6,937.0	80.57	180.16	6,465.9	-608.1	-1,368.3	5.6	17.91
6,955.0	82.50	177.66	6,468.5	-625.9	-1,368.0	22.0	17.43
7,018.0	88.69	172.29	6,473.4	-688.5	-1,362.5	81.4	12.99
7,126.0	90.40	166.31	6,474.2	-794.5	-1,342.4	186.6	5.76
7,220.0	91.18	161.68	6,472.9	-884.8	-1,316.5	279.7	4.99
7,314.0	91.41	157.38	6,470.8	-972.9	-1,283.6	373.5	4.58
7,409.0	90.47	155.29	6,469.3	-1,059.9	-1,245.5	468.5	2.41
7,503.0	89.19	152.77	6,469.5	-1,144.4	-1,204.4	562.4	3.01
7,597.0	91.31	155.45	6,469.1	-1,228.9	-1,163.3	656.3	3.64

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Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Ireland Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Well:	Ireland Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
7,691.0	91.71	154.98	6,466.7	-1,314.2	-1,123.9	750.3	0.66
7,786.0	91.41	157.25	6,464.1	-1,401.0	-1,085.5	845.2	2.41
7,880.0	90.17	157.62	6,462.8	-1,487.8	-1,049.4	939.2	1.38
7,974.0	90.57	157.10	6,462.2	-1,574.6	-1,013.2	1,033.2	0.70
8,068.0	89.70	157.88	6,461.9	-1,661.4	-977.2	1,127.1	1.24
8,162.0	89.50	157.39	6,462.6	-1,748.4	-941.5	1,221.1	0.56
8,256.0	89.39	156.40	6,463.5	-1,834.8	-904.6	1,315.1	1.06
8,351.0	89.56	156.48	6,464.4	-1,921.9	-866.6	1,410.1	0.20
8,445.0	90.13	156.70	6,464.6	-2,008.1	-829.3	1,504.1	0.65
8,539.0	90.74	155.02	6,463.9	-2,093.9	-790.8	1,598.1	1.90
8,633.0	88.96	157.14	6,464.2	-2,179.8	-752.7	1,692.1	2.94
8,728.0	88.99	156.85	6,465.9	-2,267.3	-715.6	1,787.1	0.31
8,822.0	88.32	156.62	6,468.1	-2,353.6	-678.5	1,881.0	0.75
8,915.0	88.22	157.49	6,470.9	-2,439.2	-642.3	1,974.0	0.94
9,009.0	88.79	156.55	6,473.3	-2,525.7	-605.6	2,067.9	1.17
9,100.0	88.66	154.85	6,475.4	-2,608.6	-568.1	2,158.9	1.87
9,191.0	88.53	155.91	6,477.6	-2,691.3	-530.2	2,249.9	1.17
9,282.0	89.13	156.15	6,479.4	-2,774.5	-493.3	2,340.8	0.71
9,373.0	93.46	157.03	6,477.4	-2,857.9	-457.1	2,431.8	4.86
9,464.0	91.98	156.87	6,473.1	-2,941.6	-421.5	2,522.7	1.64
9,555.0	90.44	155.77	6,471.1	-3,024.9	-385.0	2,613.7	2.08
9,647.0	91.51	156.60	6,469.6	-3,109.0	-347.9	2,705.6	1.47
9,737.0	91.18	156.21	6,467.5	-3,191.5	-311.8	2,795.6	0.57
9,828.0	90.74	154.59	6,465.9	-3,274.2	-274.0	2,886.6	1.84
9,919.0	89.09	154.76	6,466.1	-3,356.5	-235.0	2,977.5	1.82
10,010.0	90.10	156.94	6,466.7	-3,439.5	-197.8	3,068.5	2.64
10,103.0	88.56	156.17	6,467.8	-3,524.8	-160.8	3,161.5	1.85
10,197.0	89.93	157.99	6,469.1	-3,611.4	-124.2	3,255.5	2.42
10,291.0	89.36	158.41	6,469.6	-3,698.6	-89.3	3,349.4	0.75
10,385.0	89.90	156.48	6,470.2	-3,785.5	-53.3	3,443.4	2.13
10,479.0	89.66	157.14	6,470.6	-3,871.9	-16.2	3,537.4	0.75
10,573.0	89.40	156.52	6,471.4	-3,958.3	20.7	3,631.4	0.72
10,667.0	89.09	154.74	6,472.6	-4,043.9	59.5	3,725.4	1.92
10,761.0	89.56	154.94	6,473.7	-4,129.0	99.5	3,819.4	0.54
10,855.0	89.33	154.61	6,474.6	-4,214.0	139.5	3,913.3	0.43
10,949.0	89.93	156.26	6,475.2	-4,299.5	178.6	4,007.3	1.87
11,044.0	89.46	156.81	6,475.7	-4,386.6	216.4	4,102.3	0.76
11,138.0	89.60	157.10	6,476.5	-4,473.1	253.2	4,196.3	0.34
11,231.0	91.01	157.11	6,476.0	-4,558.8	289.4	4,289.3	1.52
11,326.0	91.08	157.28	6,474.3	-4,646.3	326.2	4,384.2	0.19
11,420.0	90.24	157.15	6,473.2	-4,733.0	362.6	4,478.2	0.90
11,514.0	90.87	157.05	6,472.3	-4,819.6	399.2	4,572.2	0.68
11,608.0	88.79	156.32	6,472.6	-4,905.9	436.4	4,666.2	2.35
11,702.0	89.03	156.17	6,474.4	-4,991.9	474.3	4,760.2	0.30
11,796.0	87.85	155.31	6,476.9	-5,077.6	512.9	4,854.1	1.55

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Project:	Ritchie County WV	**TVD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Well:	Ireland Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
11,890.0	88.36	154.93	6,480.0	-5,162.8	552.4	4,948.1	0.68
11,984.0	87.78	155.19	6,483.2	-5,248.0	592.0	5,042.0	0.68
12,078.0	88.32	155.73	6,486.4	-5,333.5	631.0	5,135.9	0.81
12,173.0	88.29	154.74	6,489.2	-5,419.7	670.8	5,230.9	1.04
12,267.0	89.46	157.27	6,491.0	-5,505.5	709.0	5,324.8	2.96
12,361.0	89.03	157.14	6,492.3	-5,592.2	745.4	5,418.8	0.48
12,455.0	88.69	156.10	6,494.2	-5,678.5	782.7	5,512.8	1.16
12,549.0	88.99	155.40	6,496.1	-5,764.1	821.3	5,606.8	0.81
12,643.0	90.74	156.68	6,496.3	-5,850.0	859.5	5,700.8	2.31
12,737.0	88.79	156.05	6,496.7	-5,936.2	897.2	5,794.8	2.18
12,831.0	88.09	155.51	6,499.2	-6,021.8	935.7	5,888.7	0.94
12,924.0	88.99	157.72	6,501.6	-6,107.2	972.6	5,981.7	2.57
13,019.0	88.53	154.61	6,503.7	-6,194.0	1,011.0	6,076.7	3.31
13,113.0	90.03	154.69	6,504.8	-6,279.0	1,051.3	6,170.6	1.60
13,207.0	89.77	154.91	6,505.0	-6,364.0	1,091.3	6,264.6	0.36
13,301.0	90.57	157.00	6,504.7	-6,449.9	1,129.6	6,358.6	2.38
13,395.0	90.77	158.35	6,503.6	-6,536.8	1,165.3	6,452.5	1.45
13,489.0	91.34	157.29	6,501.9	-6,623.8	1,200.8	6,546.5	1.28
13,583.0	90.50	156.63	6,500.4	-6,710.3	1,237.5	6,640.5	1.14
13,678.0	90.50	155.76	6,499.5	-6,797.2	1,275.9	6,735.5	0.92
13,772.0	89.40	155.09	6,499.6	-6,882.7	1,315.0	6,829.4	1.37
13,866.0	90.13	156.56	6,500.0	-6,968.5	1,353.5	6,923.4	1.75
13,960.0	89.43	156.95	6,500.4	-7,054.8	1,390.6	7,017.4	0.85
14,054.0	89.09	156.37	6,501.6	-7,141.1	1,427.8	7,111.4	0.72
14,148.0	89.06	156.30	6,503.1	-7,227.2	1,465.5	7,205.4	0.08
14,242.0	88.99	156.39	6,504.7	-7,313.3	1,503.2	7,299.4	0.12
14,336.0	89.83	155.86	6,505.7	-7,399.3	1,541.3	7,393.4	1.06
14,430.0	88.76	156.25	6,506.8	-7,485.2	1,579.4	7,487.4	1.21
14,524.0	89.53	156.09	6,508.2	-7,571.2	1,617.4	7,581.4	0.84
14,618.0	87.71	155.84	6,510.5	-7,657.0	1,655.7	7,675.3	1.95
14,712.0	88.35	156.41	6,513.7	-7,742.9	1,693.7	7,769.3	0.91
14,806.0	88.49	154.95	6,516.3	-7,828.5	1,732.4	7,863.2	1.56
14,900.0	88.79	155.40	6,518.6	-7,913.8	1,771.9	7,957.2	0.58
14,958.0	89.26	156.40	6,519.5	-7,966.7	1,795.5	8,015.2	1.90
15,017.0	89.74	157.42	6,520.1	-8,021.0	1,818.7	8,074.2	1.91

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Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Ireland Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Ireland 1H 1075 GL + 24 KB @ 1099.0usft
Well:	Ireland Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
6,371.0	6,122.8	-238.3	-1,186.3	Sycamore
6,573.0	6,288.5	-322.9	-1,263.2	Middelsex
6,731.0	6,392.5	-424.1	-1,324.0	Burkett
6,791.0	6,422.2	-472.2	-1,343.9	Tully
6,842.0	6,442.1	-517.2	-1,357.3	Marcellus

Checked By: _____ Approved By: _____ Date: _____

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	5/27/2014
Job End Date:	6/11/2014
State:	West Virginia
County:	Ritchie
API Number:	47-085-10005-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Ireland Unit 1H
Longitude:	-80.90126700
Latitude:	39.19535600
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,520
Total Base Water Volume (gal):	13,741,602
Total Base Non Water Volume:	0

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

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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	Operator	Carrier					
			Water	7732-18-5	100.00000	90.77043	
Sand, White, 40/70	Baker Hughes	Proppant					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		5.27130	
Sand, White, 20/40	Baker Hughes	Proppant					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		3.00487	
Sand, White, 100 mesh	Baker Hughes	Proppant					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.46894	
HCl, 10.1 - 15%	Baker Hughes	Acidizing					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.22175	SmartCare Product
GW-3LDF	Baker Hughes	Gelling Agent					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.08874	SmartCare Product
FRW-18	Baker Hughes	Friction Reducer					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.05891	SmartCare Product
Scaletrol 720	Baker Hughes	Scale Inhibitor					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.01558	SmartCare Product

Enzyme G-NE	Baker Hughes	Breaker					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.01288	SmartCare Product
Alpha 1427	Baker Hughes	Biocide					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.01265	SmartCare Product
Ferrotrol 300L	Baker Hughes	Iron Control					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.00153	SmartCare Product
CI-14	Baker Hughes	Corrosion Inhibitor					
			MSDS and Non-MSDS Ingredients Listed Below	N/A		0.00036	SmartCare Product
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.							
Ingredients in Additive (s) (MSDS and non-MSDS)	Baker Hughes	See Trade Name(s) List					
			Crystalline Silica (Quartz)	14808-60-7	100.00000	8.73818	
			Water	7732-18-5	95.00000	0.24026	
			Mineral Oil	8042-47-5	70.00000	0.06207	
			Guar Gum	9000-30-0	60.00000	0.05320	
			Hydrochloric Acid	7647-01-0	15.00000	0.03324	
			Paraffinic Petroleum Distillate	64742-55-8	30.00000	0.02660	
			Poly (acrylamide-co-acrylic acid) partial sodium salt	62649-23-4	30.00000	0.01766	
			Hydrotreated Light Distillate	64742-47-8	30.00000	0.01766	
			Ethylene Glycol	107-21-1	45.00000	0.00701	
			Crystalline Silica: Quartz	14808-60-7	5.00000	0.00443	
			Isotridecanol, ethoxylated	9043-30-5	5.00000	0.00443	
			1-butoxy-2-propanol	5131-66-8	5.00000	0.00443	
			Glutaraldehyde	111-30-8	30.00000	0.00379	
			2-Propenoic, Polymer with Sodium Phosphinate, Sodium Salt	71050-62-9	20.00000	0.00311	
			Sodium Chloride	7647-14-5	5.00000	0.00310	
			Ammonium Chloride	12125-02-9	3.00000	0.00177	
			Didecyl Dimethyl Ammonium Chloride	7173-51-5	10.00000	0.00126	
			Alcohols, C12-16, ethoxylated	68551-12-2	2.00000	0.00118	
			Oleamide DEA	93-83-4	2.00000	0.00118	
			Citric Acid	77-92-9	60.00000	0.00092	
			Calcium Chloride	10043-52-4	5.00000	0.00078	
			Hemicellulase Enzyme Concentrate	9025-56-3	5.00000	0.00064	
			Quaternary Ammonium Compound	68424-85-1	5.00000	0.00063	
			Ethanol	64-17-5	5.00000	0.00063	
			Methanol	67-56-1	100.00000	0.00036	
			Polyoxythylene Sorbitan Monooleate	9005-65-6	0.50000	0.00029	
			Sorbitan Monooleate	1338-43-8	0.50000	0.00029	
			Potassium Chloride	7447-40-7	1.00000	0.00016	

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			Polyoxyalkylenes	68951-67-7	30.00000	0.00011	
			2-butoxy-1-propanol	15821-83-7	0.10000	0.00009	
			Fatty Acids	61790-12-3	10.00000	0.00004	
			Modified Thiourea Polymer	68527-49-1	7.00000	0.00002	
			Olefin	64743-02-8	5.00000	0.00002	
			Propargyl Alcohol	107-19-7	5.00000	0.00002	
			Formaldehyde	50-00-0	1.00000	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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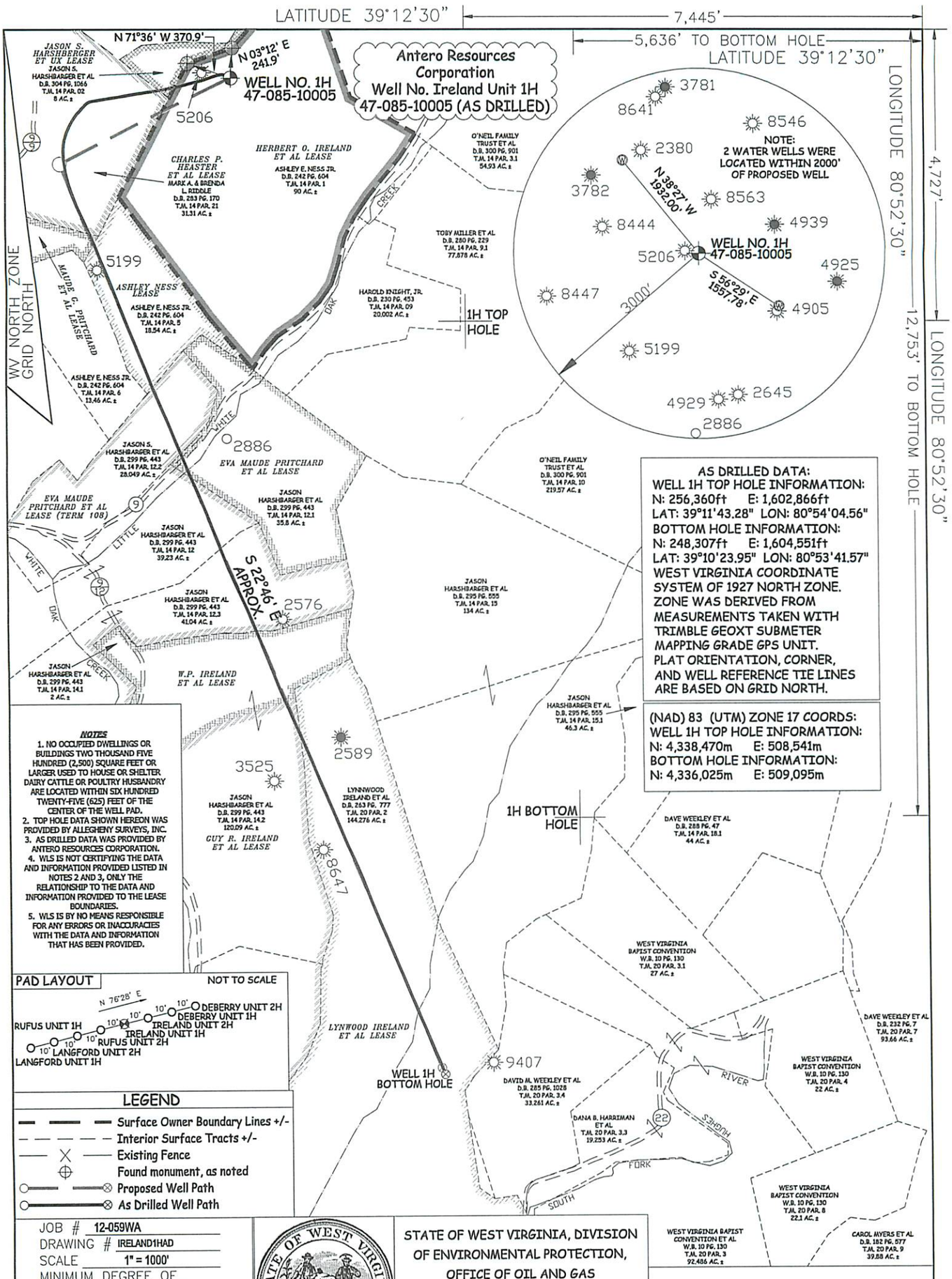

JOB # 12-059WA
DRAWING # IRELAND1HAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO
WEST VIRGINIA 26415

DATE 03/30/15
OPERATOR'S WELL# IRELAND UNIT #1H

STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

API WELL # 47 – 085 – 010005
STATE COUNTY PERMIT

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION: ORIGINAL GROUND ELEV. 1,080' AS DRILLED ELEV. 1,076' WATERSHED SOUTH FORK HUGHES RIVER
QUADRANGLE PULLMAN 7.5' DISTRICT UNION COUNTY RITCHIE
SURFACE OWNER ASHLEY E. NESS JR. ACREAGE 90 ACRES +/-
OIL & GAS ROYALTY OWNER HERBERT O. IRELAND ET AL; JASON S. HARSHBERGER ET UX; CHARLES P. HEASTER ET AL; MAUDE G. PRITCHARD ET AL; ASHLEY NESS; EVA MAUDE PRITCHARD ET AL (TERM 108); EVA MAUDE PRITCHARD ET AL; W.P. IRELAND ET AL; GUY R. IRELAND ET AL; LYNWOOD IRELAND ET AL LEASE ACREAGE 90 AC.±; 8 AC.±; 234.5 AC.±; 137 AC.±; 18.54 AC±; 108 AC.±; 35 AC.±; 34 AC.±; 222 AC.±; 415 AC.±
PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE IN WELL (SPECIFY) (X) AS DRILLED PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,520' TVD 15,017' MD

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS CT CORPORATION SYSTEM
DENVER, CO 80202 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

COUNTY NAME PERMIT

FORM WW-6

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

API 47 - 085 - 10016 County Ritchie District Murphy
Quad Harrisville Pad Name N/A Field/Pool Name N/A
Farm name Marion Roby Well Number W-1642H
Operator (as registered with the OOG) Haught Energy Corporation
Address 12864 Staunton TPKE City Smithville State WV Zip 26178

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 39.170667 Easting 81.068739
Landing Point of Curve Northing See Deviation Survey Easting See Deviation Survey
Bottom Hole Northing See Deviation Survey Easting See Deviation Survey

Elevation (ft) 832' 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

Drilling 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)
N/A

Date permit issued 12/11/2012 Date drilling commenced 06/28/2014 Date drilling ceased 07/16/2014
Date completion activities began 07/23/2014 Date completion activities ceased 07/23/2014
Verbal plugging (Y/N) No Date permission granted N/A Granted by _____

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

Freshwater depth(s) ft 40' Open mine(s) (Y/N) depths No
Salt water depth(s) ft N/A Void(s) encountered (Y/N) depths No
Coal depth(s) ft N/A Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

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Reviewed by:
A.L. 5/19/15
W.S. 6/01/15

API 47- 085 - 10016 Farm name Marion Roby Well number W-1642H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	22"	20"	20'	New	94#	N/A	Yes
Surface	17"	13 3/8"	190'	New	54.5#	N/A	Yes
Coal							
Intermediate 1	15"	9 5/8"	885	New	36#	N/A	Yes
Intermediate 2	12 1/4"	7"	1977	New	20#	800'	Yes
Intermediate 3							
Production	6 1/4"	4 1/2"	2911.8	New	11.6#	N/A	Yes
Tubing							
Packer type and depth set	Run 2911.8' of 4 1/2" casing. Iso packer @ 1951'. 2380' pkr, 2475' slv, 2569' pkr, 2620' slv, 2715' pkr, 2766' slv, 2860' pkr.						

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor	Type 1	20	Grouted	Grouted	Grouted	Surface	8
Surface	Class A/Type 1	120	15.6	1.18	82.6	To Surface	10
Coal							
Intermediate 1	Class A/Type 1	250	14.8	1.40	350	To Surface	12
Intermediate 2	Class A/Type 1	275	14.8	1.40	385	To Surface	13
Intermediate 3							
Production	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tubing							

Drillers TD (ft) 3010' Loggers TD (ft) N/A

Deepest formation penetrated Squaw Plug back to (ft) 850'

Plug back procedure Set bottom plug: 550' fill up. 165 sks 50/50 poz. :Set top plug: 600' fill up. 245 sks Type 1 cement. Total fill up 1150'. Plug up to 850'. : Let cure for 24 hours

Kick off depth (ft) 1100'

Check all wireline logs run ☐ caliper ■ density ☐ deviated/directional ■ induction ■ neutron ☐ resistivity ■ gamma ray ■ temperature ☐ sonic

Well cored ☐ Yes ■ No Conventional Sidewall Were cuttings collected ■ Yes ☐ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING None

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10016 Farm name Marion Roby Well number W-1642H

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
N/A	N/A	N/A	N/A	N/A	No perforations

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
1/2	07/23/14	12.1	2870	3033	2000	70000	227	1083584
2	07/23/14	13.1	2808	2967	2000	40000	275	509190
3	07/23/14	15	2878	2977	1900	50000	306	529368

Please insert additional pages as applicable.

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WR-35
Rev. 8/23/13

API 47- 085 - 10016 Farm name Marion Roby Well number W-1642H

PRODUCING FORMATION(S)	DEPTHS		
Big Injun	1892' TVD	3011' MD	

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ■ Open Flow OIL TEST ■ Flow ☐ Pump

SHUT-IN PRESSURE Surface 800 psi Bottom Hole 1450 psi DURATION OF TEST 12 hrs

OPEN FLOW Gas 250 mcfpd Oil 5 bpd NGL 0 bpd Water 10 bpd GAS MEASURED BY ■ Estimated ☐ Orifice ☐ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
See Attached					

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Please insert additional pages as applicable.

Drilling Contractor Top Drilling Corporation
Address 107 Lancaster Street City Marietta State OH Zip 45750

Logging Company Nabors Completion & Production Services Co.
Address P.O. Box 975682 City Dallas State TX Zip 75397

Cementing Company Universal Well Services
Address P.O. Box 200969 City Dallas State TX Zip 75320

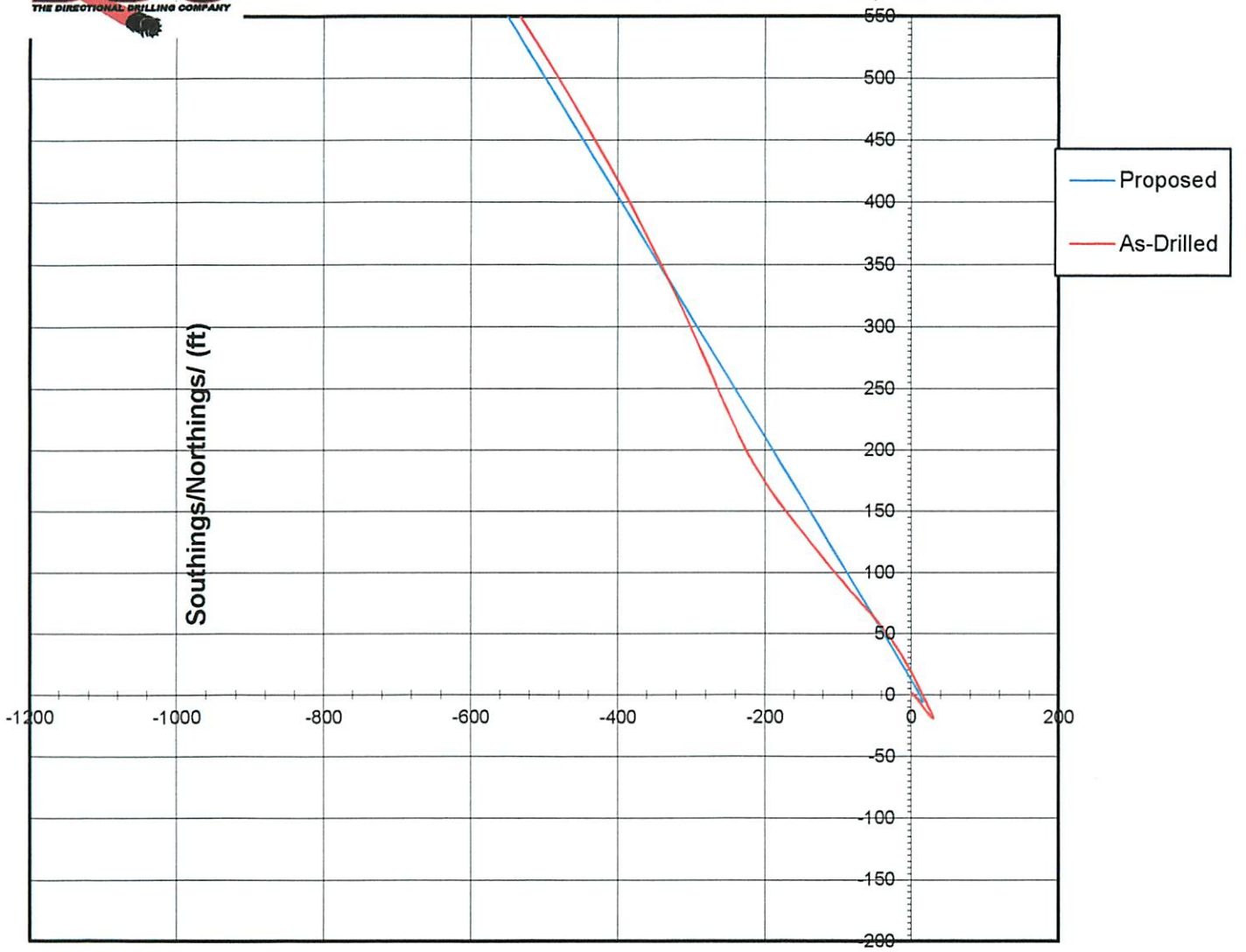
Stimulating Company Universal Well Services, Inc.
Address P.O. Box 200969 City Dallas State TX Zip 75320

Please insert additional pages as applicable.

Completed by WARREN R. HAUGHT Telephone 304-477-3333
Signature Warren R. Haught Title AGENT Date 2/12/15

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

ROBY W-1642H
Plane View 313° Az, 90° Inc



Westings/Eastings (ft)

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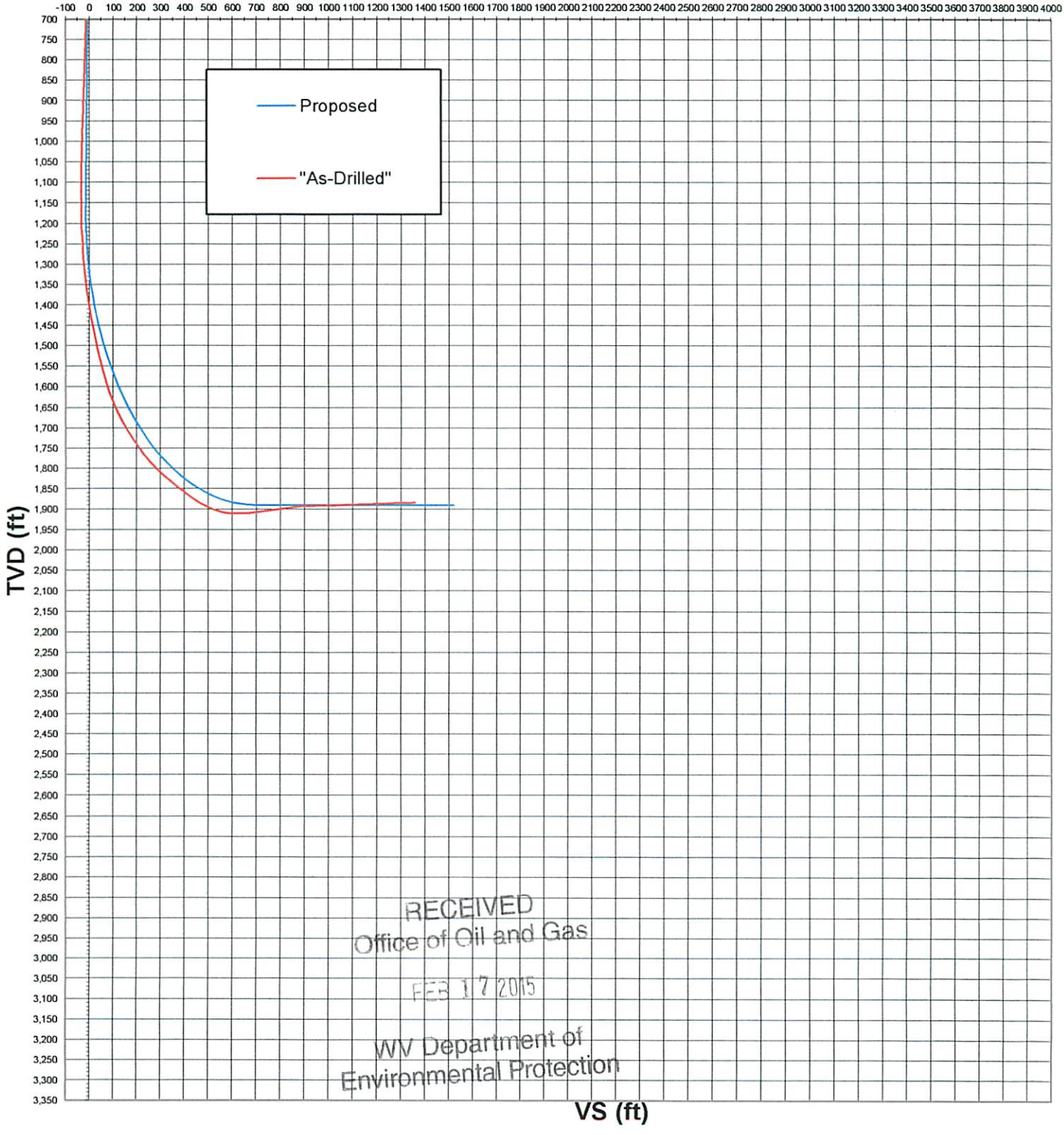
ROBY W-1642H
VS View 313° Az, 90° INC



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DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot	N / S	E / W	Hole Size	Calculation by	Date
Roby W-1642H	314.46	Coordinate	0.00	0.00	8.750		#NAME?
Job Number	.	Tie-in Point				Directional Co.	
AM-140637	EM MWD	PLAN AT SURFACE >>><<<				ADC	

Meaured Depth	Hole Angle	Hole Direction	Course Length	True Vertical Depth	Vertical Section	Total Coordinate N + / S -	Total Coordinate E + / W -	Dogleg Severity	Build Up °/100 ft	Walk/ °/100 ft
0.00	0.00	0.00		0.00	0.00	0.00	0.00	TIE-IN POINT		
100	0.6	29.6	100	100.00	0.14	0.48	0.27	0.63	0.63	29.64
200	0.9	105.1	100	199.99	-0.40	0.75	1.30	0.96	0.27	75.43
300	0.7	119.4	100	299.98	-1.64	0.27	2.55	0.31	-0.25	14.33
400	0.8	117.9	100	399.97	-2.85	-0.34	3.67	0.15	0.15	-1.52
500	2.0	130.1	100	499.94	-5.23	-1.76	5.59	1.19	1.16	12.25
600	2.5	128.7	100	599.87	-9.09	-4.22	8.59	0.53	0.53	-1.48
700	3.0	126.8	100	699.75	-13.85	-7.15	12.39	0.52	0.51	-1.86
800	3.5	130.0	100	799.59	-19.47	-10.66	16.81	0.51	0.48	3.18
900	3.7	126.1	100	899.40	-25.65	-14.49	21.71	0.30	0.18	-3.87
1000	2.3	123.9	100	999.26	-30.81	-17.51	25.98	1.33	-1.33	-2.16
1100	1.5	111.0	100	1,099.20	-34.04	-19.13	28.92	0.90	-0.79	-12.92
1183	1.7	338.1	83	1,182.19	-33.93	-18.38	29.50	3.58	0.19	273.59
1213	3.4	326.7	30	1,212.16	-32.66	-17.23	28.85	5.89	5.67	-38.00
1243	5.3	321.8	30	1,242.07	-30.41	-15.40	27.50	6.45	6.33	-16.33
1273	7.4	320.4	30	1,271.88	-27.12	-12.82	25.41	7.02	7.00	-4.67
1303	9.4	320.3	30	1,301.56	-22.76	-9.44	22.62	6.67	6.67	-0.33
1333	11.4	320.4	30	1,331.07	-17.37	-5.27	19.16	6.67	6.67	0.33
1363	13.3	320.3	30	1,360.37	-10.99	-0.33	15.07	6.33	6.33	-0.33
1393	15.1	320.2	30	1,389.45	-3.67	5.32	10.36	6.00	6.00	-0.33
1423	16.9	320.7	30	1,418.29	4.56	11.70	5.10	6.02	6.00	1.67
1453	18.5	318.9	30	1,446.87	13.64	18.66	-0.79	5.64	5.33	-6.00
1483	19.8	316.6	30	1,475.21	23.46	25.94	-7.41	5.01	4.33	-7.67
1513	21.3	314.3	30	1,503.30	33.99	33.44	-14.81	5.68	5.00	-7.67
1543	22.5	312.9	30	1,531.13	45.18	41.15	-22.91	4.36	4.00	-4.67
1573	23.9	307.9	30	1,558.71	56.95	48.79	-31.91	8.05	4.67	-16.67
1603	27.6	307.0	30	1,585.73	69.88	56.71	-42.26	12.40	12.33	-3.00
1633	31.9	304.6	30	1,611.77	84.59	65.40	-54.34	14.87	14.33	-8.00
1663	36.6	304.3	30	1,636.56	101.21	74.95	-68.26	15.68	15.67	-1.00
1693	39.9	304.6	30	1,660.11	119.50	85.45	-83.57	11.02	11.00	1.00
1723	42.9	305.1	30	1,682.61	139.06	96.79	-99.85	10.06	10.00	1.67
1753	45.7	306.1	30	1,704.08	159.76	108.99	-116.88	9.62	9.33	3.33
1783	48.7	306.6	30	1,724.46	181.55	122.04	-134.61	10.07	10.00	1.67
1813	51.0	306.7	30	1,743.81	204.27	135.72	-153.01	7.67	7.67	0.33
1843	52.7	307.8	30	1,762.34	227.67	150.00	-171.78	6.36	5.67	3.67
1873	55.7	311.4	30	1,779.89	251.91	165.52	-190.51	13.95	10.00	12.00
1903	59.1	314.4	30	1,796.05	277.16	182.73	-209.01	14.12	11.33	10.00
1933	62.2	317.8	30	1,810.76	303.29	201.57	-227.13	14.29	10.33	11.33
1993	65.3	326.3	60	1,837.33	356.55	243.98	-260.13	13.71	5.17	14.17
2023	65.1	323.3	30	1,849.92	383.34	266.23	-275.83	9.10	-0.67	-10.00
2053	66.1	323.0	30	1,862.31	410.35	288.09	-292.21	3.46	3.33	-1.00
2083	68.3	321.8	30	1,873.94	437.74	310.00	-309.09	8.21	7.33	-4.00
2113	71.2	321.1	30	1,884.32	465.67	332.01	-326.63	9.91	9.67	-2.33
2143	74.1	320.0	30	1,893.26	494.14	354.11	-344.82	10.28	9.67	-3.67
2173	77.7	319.2	30	1,900.57	523.11	376.27	-363.68	12.28	12.00	-2.67
2203	81.6	318.1	30	1,905.96	552.54	398.41	-383.17	13.49	13.00	-3.67
2233	85.6	317.0	30	1,909.30	582.30	420.41	-403.29	13.82	13.33	-3.67
2263	89.7	316.6	30	1,910.53	612.25	442.25	-423.81	13.73	13.67	-1.33
2293	92.0	314.8	30	1,910.09	642.23	463.72	-444.75	9.73	7.67	-6.00

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2323	92.7	314.7	30	1,908.86	672.21	484.82	-466.04	2.36	2.33	-0.33
2353	93.7	314.5	30	1,907.18	702.16	505.85	-487.37	3.40	3.33	-0.67
2383	94.2	313.3	30	1,905.12	732.09	526.61	-508.93	4.32	1.67	-4.00
2413	94.7	312.8	30	1,902.79	761.99	547.02	-530.79	2.35	1.67	-1.67
2443	95.1	312.6	30	1,900.23	791.86	567.29	-552.76	1.49	1.33	-0.67
2473	95.4	312.8	30	1,897.48	821.72	587.55	-574.71	1.20	1.00	0.67
2503	94.5	313.0	30	1,894.89	851.60	607.90	-596.61	3.07	-3.00	0.67
2533	92.1	312.2	30	1,893.17	881.53	628.17	-618.65	8.43	-8.00	-2.67
2563	90.6	311.8	30	1,892.46	911.49	648.24	-640.94	5.17	-5.00	-1.33
2593	90.6	311.5	30	1,892.15	941.46	668.17	-663.35	1.00	0.00	-1.00
2623	90.9	311.1	30	1,891.75	971.41	687.97	-685.89	1.67	1.00	-1.33
2653	90.1	310.7	30	1,891.49	1,001.35	707.61	-708.56	2.98	-2.67	-1.33
2683	91.7	310.8	30	1,891.02	1,031.28	727.19	-731.29	5.34	5.33	0.33
2713	91.9	311.8	30	1,890.08	1,061.22	746.98	-753.81	3.40	0.67	3.33
2743	90.8	312.1	30	1,889.37	1,091.18	767.03	-776.12	3.80	-3.67	1.00
2773	91.1	311.8	30	1,888.87	1,121.15	787.08	-798.43	1.41	1.00	-1.00
2803	90.9	311.1	30	1,888.35	1,151.10	806.94	-820.91	2.43	-0.67	-2.33
2833	91.5	311.4	30	1,887.72	1,181.05	826.71	-843.46	2.24	2.00	1.00
2863	92.2	311.4	30	1,886.75	1,210.99	846.54	-865.95	2.33	2.33	0.00
2893	91.1	311.1	30	1,885.89	1,240.93	866.31	-888.50	3.80	-3.67	-1.00
2923	91.6	312.6	30	1,885.18	1,270.89	886.32	-910.84	5.27	1.67	5.00
2953	90.4	311.9	30	1,884.66	1,300.86	906.49	-933.04	4.63	-4.00	-2.33
3011	90.4	311.9	58	1,884.25	1,358.80	945.22	-976.21	0.00	0.00	0.00

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Directional Survey Calculation
Minimum Curvature Method - version 2.0

For Microsoft Excel Version 3.0 for Macintosh
and Microsoft Excel Version 3.0 for Windows (IBM)

4.00	Direction,	Interval's	Ratio	D	D	D	Closure	Closure
2.00	Azimuth	Dog Leg	Factor	N / S	E / S	TVD	Distance	Direction
3.00	0.00						0.00	#DIV/0!
0.30	29.64	0.63	1.00	0.48	0.27	100.00	0.55	29.64
	105.07	0.96	1.00	0.27	1.03	99.99	1.50	60.01
	119.40	0.31	1.00	-0.48	1.25	99.99	2.57	83.99
	117.88	0.15	1.00	-0.60	1.11	99.99	3.68	95.24
	130.13	1.19	1.00	-1.43	1.92	99.97	5.86	107.52
	128.65	0.53	1.00	-2.46	3.00	99.92	9.58	116.17
	126.79	0.52	1.00	-2.92	3.79	99.88	14.30	119.99
	129.97	0.51	1.00	-3.52	4.42	99.84	19.91	122.39
	126.10	0.30	1.00	-3.83	4.90	99.81	26.11	123.72
	123.94	1.33	1.00	-3.02	4.27	99.86	31.33	123.98
	111.02	0.90	1.00	-1.62	2.94	99.94	34.67	123.48
	338.10	2.97	1.00	0.74	0.58	82.99	34.76	121.93
	326.70	1.77	1.00	1.16	-0.65	29.97	33.60	120.85
	321.80	1.93	1.00	1.83	-1.35	29.91	31.52	119.24
	320.40	2.11	1.00	2.58	-2.09	29.81	28.46	116.77
	320.30	2.00	1.00	3.37	-2.80	29.68	24.51	112.66
	320.40	2.00	1.00	4.17	-3.46	29.51	19.87	105.39
	320.30	1.90	1.00	4.94	-4.09	29.30	15.07	91.27
	320.20	1.80	1.00	5.66	-4.71	29.08	11.65	62.81
	320.70	1.81	1.00	6.38	-5.26	28.84	12.76	23.54
	318.90	1.69	1.00	6.96	-5.89	28.58	18.68	-2.44
	316.60	1.50	1.00	7.28	-6.62	28.34	26.98	-15.95
	314.30	1.70	1.00	7.50	-7.39	28.09	36.57	-23.88
	312.90	1.31	1.00	7.71	-8.10	27.83	47.10	-29.11
	307.90	2.42	1.00	7.64	-9.00	27.58	58.30	-33.19
	307.00	3.72	1.00	7.92	-10.35	27.02	70.73	-36.69
	304.60	4.46	1.00	8.69	-12.08	26.04	85.03	-39.72
	304.90	4.70	1.00	9.55	-13.92	24.79	101.37	-42.33
	304.60	3.31	1.00	10.51	-15.31	23.56	119.53	-44.36
	305.10	3.02	1.00	11.34	-16.28	22.50	139.06	-45.89
	306.10	2.89	1.00	12.20	-17.03	21.47	159.81	-47.00
	306.60	3.02	1.00	13.05	-17.73	20.38	181.69	-47.80
	306.70	2.30	1.00	13.69	-18.40	19.34	204.53	-48.43
	307.80	1.91	1.00	14.28	-18.78	18.53	228.06	-48.87
	311.40	4.19	1.00	15.51	-18.73	17.55	252.37	-49.02
	314.40	4.24	1.00	17.21	-18.50	16.16	277.62	-48.84
	317.80	4.29	1.00	18.84	-18.12	14.71	303.68	-48.41
	326.30	8.23	1.00	42.41	-33.00	26.57	356.64	-46.84
	323.30	2.73	1.00	22.25	-15.70	12.59	383.35	-46.01
3.50	323.00	1.04	1.00	21.86	-16.38	12.39	410.35	-45.41
1.25	321.80	2.46	1.00	21.91	-16.87	11.63	437.76	-44.92
	321.10	2.97	1.00	22.01	-17.54	10.38	465.74	-44.53
	320.00	3.08	1.00	22.11	-18.19	8.95	494.27	-44.24
	319.20	3.68	1.00	22.15	-18.86	7.31	523.30	-44.03
	318.10	4.05	1.00	22.15	-19.49	5.39	552.77	-43.88
	317.00	4.15	1.00	21.99	-20.12	3.34	582.57	-43.81
	316.60	4.12	1.00	21.85	-20.51	1.23	612.54	-43.78
	314.80	2.92	1.00	21.47	-20.95	-0.45	642.53	-43.80

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314.70	0.71	1.00	21.10	-21.29	-1.23	672.49	-43.87
314.50	1.02	1.00	21.03	-21.33	-1.67	702.44	-43.93
313.30	1.30	1.00	20.75	-21.56	-2.07	732.34	-44.02
312.80	0.71	1.00	20.42	-21.86	-2.33	762.22	-44.14
312.60	0.45	1.00	20.27	-21.97	-2.56	792.06	-44.26
312.80	0.36	1.00	20.26	-21.95	-2.75	821.90	-44.37
313.00	0.92	1.00	20.35	-21.89	-2.59	851.75	-44.46
312.20	2.53	1.00	20.27	-22.04	-1.73	881.66	-44.56
311.80	1.55	1.00	20.07	-22.29	-0.71	911.60	-44.68
311.50	0.30	1.00	19.94	-22.42	-0.31	941.54	-44.79
311.10	0.50	1.00	19.80	-22.54	-0.39	971.47	-44.91
310.70	0.89	1.00	19.64	-22.67	-0.26	1,001.39	-45.04
310.80	1.60	1.00	19.58	-22.72	-0.47	1,031.30	-45.16
311.80	1.02	1.00	19.79	-22.53	-0.94	1,061.23	-45.26
312.10	1.14	1.00	20.05	-22.31	-0.71	1,091.19	-45.34
311.80	0.42	1.00	20.05	-22.31	-0.50	1,121.15	-45.41
311.10	0.73	1.00	19.86	-22.48	-0.52	1,151.10	-45.49
311.40	0.67	1.00	19.78	-22.55	-0.63	1,181.05	-45.57
311.40	0.70	1.00	19.83	-22.49	-0.97	1,210.99	-45.65
311.10	1.14	1.00	19.77	-22.55	-0.86	1,240.94	-45.72
312.60	1.58	1.00	20.01	-22.34	-0.71	1,270.90	-45.78
311.90	1.39	1.00	20.17	-22.20	-0.52	1,300.88	-45.83
311.90	0.00	1.00	38.73	-43.17	-0.40	1,358.84	-45.92

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Roby W-1642H
API # 47-085-10018

Formation	Top TVD	Bottom TVD	Top TMD	Bottom TMD	Remarks
Red Rock & Shale	0	434	0	434	
Sand	434	579	434	579	
Slate & Shells	579	767	579	767	
Red Rock	767	904	767	904	
Dunkard Sand	904	923	904	923	
Slate & Shells	923	961	923	961	
Gas Sand	961	980	961	980	
Slate & Shells	980	1055	980	1055	
Gas Sand #2	1055	1063	1055	1063	
Shale	1063	1207	1063	1208	
Long Streak	1207	1289	1208	1291	
Shale	1289	1430	1291	1435	
1st and 2nd Salt Sands	1430	1551	1435	1566	
Shale	1551	1579	1566	1595	
3rd Salt Sand	1579	1587	1595	1605	
Slate & Shells	1587	1643	1605	1670	
Maxton	1643	1708	1670	1758	
Shale	1708	1718	1758	1776	
Big Lime	1718	1783	1776	1877	
Big Injun Sand	1783	1892	1877	2143	
TD	1892				

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

API 47 - 085 - 10046 County Ritchie District Union
Quad Pullman 7.5' Pad Name Ness Pad Field/Pool Name ---
Farm name Ness, Ashley E., Jr. Well Number Rufus Unit 1H
Operator (as registered with the OOG) Antero Resources Corporation
Address 1615 Wynkoop Street City Denver State CO Zip 80202

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4338468m Easting 508353m
Landing Point of Curve Northing 4338580.98m Easting 508408.32m
Bottom Hole Northing 4341407.82m Easting 507164.67m

Elevation (ft) 1075' 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

Drilling 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)
Air - Foam & 4% KCL
Mud - Polymer

Date permit issued 7/23/2013 Date drilling commenced 8/31/2013 Date drilling ceased 10/28/2013
Date completion activities began 4/12/2014 Date completion activities ceased 12/26/2014
Verbal plugging (Y/N) N/A 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 62' Open mine(s) (Y/N) depths No
Salt water depth(s) ft 1620', 1838' Void(s) encountered (Y/N) depths No
Coal depth(s) ft 456' Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

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Reviewed by:
AL 5/26/15
W.S. 6/02/15

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API 47- 085 - 10046 Farm name Ness, Ashley E., Jr. Well number Rufus Unit 1H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	24"	20"	40'	New	94# H-40	N/A	Y
Surface	12-1/4	13-3/8"	415'	New	48# H-40	N/A	Y
Coal							
Intermediate 1	8-3/4	9-5/8"	2527'	New	36# J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-1/2	5-1/2"	17014'	New	20# P-110	N/A	Y
Tubing		2-3/8"	6537'		4.7# N-80	N/A	
Packer type and depth set		N/A					

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft ^{3})	Cement Top (MD)	WOC (hrs)
Conductor	Class A	122 sx	15.6	1.18	38	0'	8 Hrs.
Surface	Class A	480 sx	15.6	1.18	288	0'	8 Hrs.
Coal							
Intermediate 1	Class A	766 sx	15.6	1.18	791	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	963 sx lead 1610 sx tail	13.5 lead 15.2 tail	1.30 lead 1.8 tail	3434	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 17014' MD, 6483' TVD (BHL); 6512' TVD (Deepest point drilled) Loggers TD (ft) 16976' MD

Deepest formation penetrated Marcellus Plug back to (ft) N/A

Plug back procedure N/A

Kick off depth (ft) 5984'

Check all wireline logs run ■ caliper □ density ■ deviated/directional ■ induction ■ neutron □ resistivity □ gamma ray ■ temperature □sonic

Well cored □ Yes ■ No Conventional Sidewall Were cuttings collected □ Yes ■ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

Conductor - 0

Surface - 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface

Intermediate - 1 above float joint, 1 above float collar, 1 every 4th joint to surface

Production - 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

WAS WELL COMPLETED AS SHOT HOLE □ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? □ Yes ■ No DETAILS

WERE TRACERS USED □ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10046 Farm name Ness, Ashley E., Jr. Well number Rufus Unit 1H

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
			SEE ATTACHED EXHIBIT 1		

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
				SEE ATTACHED EXHIBIT 2				

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Please insert additional pages as applicable.

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API 47- 085 - 10046 Farm name Ness, Ashley E., Jr. Well number Rufus Unit 1H

PRODUCING FORMATION(S)	DEPTHS			
Marcellus	6462' (TOP)	TVD	6713' (TOP)	MD

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ■ Open Flow OIL TEST ■ Flow ☐ Pump

SHUT-IN PRESSURE Surface 3000 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	7621 mcfpd	44 bpd	--- bpd	437 bpd	☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
					SEE ATTACHED EXHIBIT 3

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Please insert additional pages as applicable.

Drilling Contractor Patterson - UTI Drilling Company, LLC
Address 207 Carlton Dr. City Eighty Four State PA Zip 15330

Logging Company Cased Hole Solutions
Address 100 Arentzen Blvd. City Charleroi State PA Zip 15022

Cementing Company Nabors Completion & Production Services, Co.
Address 1650 Hackers Creek City Jane Lew State WV Zip 26378

Stimulating Company Nabors Completion & Production Services, Co.
Address 1650 Hackers Creek City Jane Lew State WV Zip 26378
Please insert additional pages as applicable.

Completed by Kara Quackenbush Telephone 303-357-7233
Signature Kara Quackenbush Title Permit Representative Date 2/11/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

API 47-085-10046 Farm Name Ness, Ashley E., Jr. Well Number Rufus Unit 1H					
EXHIBIT 1					
Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	12-Apr-14	16,800	16,927	60	Marcellus
2	6-Oct-14	16,650	16,777	60	Marcellus
3	6-Oct-14	16,499	16,626	60	Marcellus
4	7-Oct-14	16,349	16,476	60	Marcellus
5	7-Oct-14	16,199	16,326	60	Marcellus
6	8-Oct-14	16,049	13,176	60	Marcellus
7	8-Oct-14	15,898	16,025	60	Marcellus
8	9-Oct-14	15,748	15,875	60	Marcellus
9	9-Oct-14	15,598	15,725	60	Marcellus
10	10-Oct-14	15,448	15,575	60	Marcellus
11	10-Oct-14	15,297	15,424	60	Marcellus
12	10-Oct-14	15,147	15,274	60	Marcellus
13	11-Oct-14	14,997	15,124	60	Marcellus
14	11-Oct-14	14,847	14,974	60	Marcellus
15	11-Oct-14	14,696	14,823	60	Marcellus
16	11-Oct-14	14,546	14,673	60	Marcellus
17	12-Oct-14	14,396	14,523	60	Marcellus
18	12-Oct-14	14,246	14,373	60	Marcellus
19	12-Oct-14	14,095	14,222	60	Marcellus
20	12-Oct-14	13,945	14,072	60	Marcellus
21	13-Oct-14	13,795	13,922	60	Marcellus
22	13-Oct-14	13,644	13,772	60	Marcellus
23	14-Oct-14	13,494	13,621	60	Marcellus
24	14-Oct-14	13,344	13,471	60	Marcellus
25	14-Oct-14	13,194	13,321	60	Marcellus
26	15-Oct-14	13,043	13,171	60	Marcellus
27	15-Oct-14	12,893	13,020	60	Marcellus
28	15-Oct-14	12,743	12,870	60	Marcellus
29	16-Oct-14	12,593	12,720	60	Marcellus
30	16-Oct-14	12,442	12,570	60	Marcellus
31	16-Oct-14	12,292	12,419	60	Marcellus
32	16-Oct-14	12,142	12,269	60	Marcellus
33	17-Oct-14	11,992	12,119	60	Marcellus
34	17-Oct-14	11,841	11,969	60	Marcellus
35	17-Oct-14	11,691	11,818	60	Marcellus
36	17-Oct-14	11,541	11,668	60	Marcellus
37	18-Oct-14	11,391	11,518	60	Marcellus
38	18-Oct-14	11,240	11,368	60	Marcellus
39	18-Oct-14	11,090	11,217	60	Marcellus
40	18-Oct-14	10,940	11,067	60	Marcellus
41	19-Oct-14	10,790	10,917	60	Marcellus
42	19-Oct-14	10,639	10,767	60	Marcellus
43	19-Oct-14	10,489	10,616	60	Marcellus
44	19-Oct-14	10,339	10,466	60	Marcellus
45	20-Oct-14	10,189	10,316	60	Marcellus
46	20-Oct-14	10,038	10,166	60	Marcellus
47	20-Oct-14	9,888	10,015	60	Marcellus
48	20-Oct-14	9,738	9,865	60	Marcellus
49	20-Oct-14	9,587	9,715	60	Marcellus
50	21-Oct-14	9,437	9,565	60	Marcellus
51	21-Oct-14	9,287	9,414	60	Marcellus
52	21-Oct-14	9,137	9,264	60	Marcellus
53	21-Oct-14	8,987	9,114	60	Marcellus
54	21-Oct-14	8,836	8,964	60	Marcellus
55	22-Oct-14	8,686	8,813	60	Marcellus
56	22-Oct-14	8,536	8,663	60	Marcellus
57	22-Oct-14	8,386	8,513	60	Marcellus
58	22-Oct-14	8,235	8,363	60	Marcellus
59	22-Oct-14	8,085	8,212	60	Marcellus
60	23-Oct-14	7,935	8,062	60	Marcellus
61	23-Oct-14	7,785	7,912	60	Marcellus
62	23-Oct-14	7,634	7,762	60	Marcellus
63	23-Oct-14	7,484	7,611	60	Marcellus
64	23-Oct-14	7,334	7,461	60	Marcellus
65	24-Oct-14	7,184	7,311	60	Marcellus
66	24-Oct-14	7,033	7,161	60	Marcellus
67	24-Oct-14	6,883	7,010	60	Marcellus
68	24-Oct-14	6,733	6,860	60	Marcellus

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API 47-085-10046 Farm Name Ness, Ashley E., Jr. Well Number Rufus Unit 1H

EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	5-Oct-14	62.6	6,972	5,403	4,893	80,700	6,683	N/A
2	5-Oct-14	61.3	6,893	5,635	4,871	141,300	6,899	N/A
3	6-Oct-14	64.0	6,848	6,442	5,275	209,600	6,531	N/A
4	7-Oct-14	63.8	6,824	5,423	5,180	205,300	6,253	N/A
5	8-Oct-14	59.2	6,540	5,405	5,124	44,000	5,826	N/A
6	9-Oct-14	62.9	7,164	5,654	5,237	143,500	6,971	N/A
7	9-Oct-14	65.5	6,838	5,574	5,260	211,000	6,298	N/A
8	9-Oct-14	66.7	6,689	5,370	4,963	207,900	6,743	N/A
9	10-Oct-14	64.3	6,758	5,445	5,085	209,500	6,254	N/A
10	10-Oct-14	64.8	6,794	5,487	5,237	207,300	6,140	N/A
11	10-Oct-14	65.7	6,919	5,692	5,253	208,500	6,204	N/A
12	11-Oct-14	65.7	6,914	5,559	4,997	211,500	6,221	N/A
13	11-Oct-14	65.1	7,140	5,755	5,313	212,600	6,217	N/A
14	11-Oct-14	63.0	7,610	5,947	5,353	213,800	6,197	N/A
15	11-Oct-14	65.7	7,232	5,825	5,440	209,400	6,205	N/A
16	12-Oct-14	63.7	6,972	5,730	5,687	213,100	6,152	N/A
17	12-Oct-14	64.7	6,623	5,400	5,021	212,700	6,144	N/A
18	12-Oct-14	66.4	6,870	5,711	4,953	210,100	6,110	N/A
19	12-Oct-14	66.7	6,681	5,351	5,017	210,100	6,070	N/A
20	13-Oct-14	63.7	6,700	5,373	4,952	210,700	6,133	N/A
21	13-Oct-14	66.1	6,799	5,445	4,912	211,000	6,103	N/A
22	14-Oct-14	66.0	6,748	5,407	5,237	210,500	6,017	N/A
23	14-Oct-14	64.1	6,676	5,370	5,028	210,200	6,018	N/A
24	14-Oct-14	65.6	6,832	5,749	5,156	210,600	5,988	N/A
25	15-Oct-14	65.6	6,720	5,237	5,067	209,200	6,003	N/A
26	15-Oct-14	64.5	6,831	5,426	4,857	209,600	5,908	N/A
27	15-Oct-14	62.0	7,160	5,654	4,971	210,800	5,945	N/A
28	15-Oct-14	66.1	7,004	5,483	5,408	209,000	5,921	N/A
29	16-Oct-14	64.2	6,906	5,654	5,275	210,700	5,893	N/A
30	16-Oct-14	64.7	7,131	5,787	4,689	210,400	5,923	N/A
31	16-Oct-14	63.8	6,831	5,625	5,233	214,200	5,929	N/A
32	16-Oct-14	63.1	7,039	5,940	5,148	212,800	5,997	N/A
33	17-Oct-14	65.0	6,582	5,616	5,218	211,700	5,970	N/A
34	17-Oct-14	63.9	6,827	5,787	5,203	211,000	5,860	N/A
35	17-Oct-14	64.4	7,031	5,616	5,237	210,900	5,863	N/A
36	17-Oct-14	61.2	6,686	5,440	5,449	180,000	5,516	N/A
37	18-Oct-14	64.5	6,541	5,341	5,324	207,200	5,750	N/A
38	18-Oct-14	64.6	6,875	5,887	4,168	211,200	5,835	N/A
39	18-Oct-14	64.8	6,991	5,874	5,751	208,500	5,783	N/A
40	18-Oct-14	63.5	6,701	5,394	5,051	211,000	5,763	N/A
41	19-Oct-14	68.6	6,513	5,313	4,888	210,300	5,795	N/A
42	19-Oct-14	66.5	6,432	5,295	5,109	210,000	5,683	N/A
43	19-Oct-14	65.3	6,289	5,092	4,844	210,900	5,725	N/A
44	19-Oct-14	65.5	6,003	5,039	4,962	207,300	5,682	N/A
45	20-Oct-14	64.8	6,025	5,251	4,524	210,100	5,673	N/A
46	20-Oct-14	67.0	6,252	5,407	4,693	210,300	5,613	N/A
47	20-Oct-14	65.6	6,300	5,870	4,766	209,400	5,591	N/A
48	20-Oct-14	68.5	6,292	5,786	4,977	210,600	5,605	N/A
49	20-Oct-14	64.9	6,075	5,405	4,948	208,400	5,555	N/A
50	21-Oct-14	65.8	6,150	5,351	5,001	208,800	5,462	N/A
51	21-Oct-14	66.2	6,503	5,962	5,186	210,600	5,521	N/A
52	21-Oct-14	65.4	6,328	5,629	4,856	210,500	5,493	N/A
53	21-Oct-14	64.8	6,074	5,515	4,877	210,800	5,522	N/A
54	22-Oct-14	64.8	6,044	5,616	4,754	209,500	5,479	N/A
55	22-Oct-14	65.1	6,227	5,537	5,183	210,300	5,462	N/A
56	22-Oct-14	65.1	6,184	5,481	5,086	211,000	5,448	N/A
57	22-Oct-14	63.7	6,352	5,870	5,314	209,700	5,422	N/A
58	22-Oct-14	66.1	6,147	5,777	4,783	216,900	5,592	N/A
59	23-Oct-14	63.6	6,420	5,259	4,944	210,000	5,411	N/A
60	23-Oct-14	64.9	6,463	5,759	4,977	210,300	5,395	N/A
61	23-Oct-14	65.1	6,115	5,648	4,946	210,200	5,364	N/A
62	23-Oct-14	64.9	6,206	5,574	5,070	209,800	5,317	N/A
63	23-Oct-14	63.7	6,206	5,296	5,277	209,700	5,327	N/A
64	23-Oct-14	64.6	6,105	6,037	5,166	209,400	5,312	N/A
65	24-Oct-14	63.6	5,948	5,698	5,211	210,300	5,299	N/A
66	24-Oct-14	63.0	5,943	5,969	4,877	210,900	5,409	N/A
67	24-Oct-14	63.3	6,466	7,318	4,029	210,900	5,316	N/A
68	24-Oct-14	63.8	6,589	6,074	4,907	210,300	5,255	N/A
AVG=		65	6,611	5,614	5,054	13,840,300	397,964	TOTAL

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API 47-085-10046 Farm Name Ness, Ashley E., Jr. Well Number Rufus Unit 1H				
EXHIBIT 3				
LITHOLOGY/ FORMATION	**TOP DEPTH (TVD) From Surface**	**BOTTOM DEPTH (TVD) From Surface**	**TOP DEPTH (MD) From Surface**	**BOTTOM DEPTH (MD) From Surface**
Fresh Water	62	--	--	--
Siltstone	0	456	0	456
Coal	est. 456	486	est. 456	486
Sand	est. 486	516	est. 486	516
Shale	est. 516	1266	est. 516	1266
Sandstone	est. 1266	1296	est. 1266	1296
Shale	est. 1296	1356	est. 1296	1356
Sandstone	est. 1356	1386	est. 1356	1386
Shale	est. 1386	1506	est. 1386	1506
Sandstone	est. 1506	1906	est. 1506	1906
Limestone	est. 1906	2010	est. 1906	2010
Big Lime	2010	2068	2010	2068
Big Injun	2068	2317	2068	2317
Gantz Sand	2317	2488	2317	2488
Fifty Foot Sandstone	2488	2696	2488	2696
Gordon	2696	2488	2696	2488
Fifth Sandstone	2488	3075	2488	3075
Bayard	3075	3444	3075	3444
Warren	3444	3827	3444	3827
Speechley	3827	4034	3827	4034
Baltown	4034	4537	4034	4537
Bradford	4537	4913	4537	4914
Benson	4913	5150	4914	5150
Alexander	5150	5369	5150	5370
Elk	5369	5753	5370	5755
Rhinestreet	5753	6118	5755	6128
Sycamore	6118	6278	6128	3623
Middlesex	6278	6387	3623	6522
Burkett	6387	6420	6522	6613
Tully	6420	6438	6613	6689
Marcellus	6438	NA	6689	16990

*Please note Antero determines formation tops based on mud and wireline logs that are only run on one well on a multi-well pad (Please reference Rufus Unit 1H API# 47-085-10046). The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	10/5/2014
Job End Date:	10/24/2014
State:	West Virginia
County:	Ritchie
API Number:	47-085-10046-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Rufus Unit 1H
Longitude:	-80.90133600
Latitude:	39.19534400
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,512
Total Base Water Volume (gal):	16,714,488
Total Base Non Water Volume:	0

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FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

INTERSTATE Oil & Gas COMPACT COMMISSION

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	ANTERO RESOURCES	Water					
			Water	7732-18-5	100.00000	90.52898	
Sand	Nabors Completion and Production Services	Sand - Bulk - West Virginia					
			Crystalline Silica, quartz	14808-60-7	99.90000	5.12188	
			Aluminum Oxide	1344-28-1	1.10000	0.05640	
			Titanium Oxide	13463-67-7	0.10000	0.00513	
			Iron Oxide	1309-37-1	0.10000	0.00513	
Sand	Nabors Completion and Production Services	Sand - Bulk - West Virginia					
			Crystalline Silica, quartz	14808-60-7	99.90000	1.96559	
			Aluminum Oxide	1344-28-1	1.10000	0.02164	
			Titanium Oxide	13463-67-7	0.10000	0.00197	
			Iron Oxide	1309-37-1	0.10000	0.00197	
Sand	Nabors Completion and Production Services	Sand - Bulk - West Virginia					
			Crystalline Silica, quartz	14808-60-7	99.90000	1.28840	
			Aluminum Oxide	1344-28-1	1.10000	0.01419	

			Iron Oxide	1309-37-1	0.10000	0.00129	
			Titanium Oxide	13463-67-7	0.10000	0.00129	
Sand	Nabors Completion and Production Services	Sand - Bulk - West Virginia					
			Crystalline Silica, quartz	14808-60-7	99.90000	0.60369	
			Aluminum Oxide	1344-28-1	1.10000	0.00665	
			Iron Oxide	1309-37-1	0.10000	0.00060	
			Titanium Oxide	13463-67-7	0.10000	0.00060	
HCl Acid (12.5-18.0%), 22 Baume	Nabors Completion and Production Services	Bulk Acid					
			Water	7732-18-5	87.50000	0.18661	
			Hydrochloric Acid	7647-01-0	18.00000	0.03839	
LSG-100L	Nabors Completion and Production Services	Gelling Agents					
			Petroleum Distillates	64742-47-8	70.00000	0.11834	
WFR-6W	Nabors Completion and Production Services	Friction Reducer					
			Anionic Water-Soluble Polymer Emulsion	Proprietary	100.00000	0.06725	
AQUCAR DB 20	Nabors Completion and Production Services	Biocides					
			Polyethylene glycol	25322-68-3	54.50000	0.00763	
			2,2-Dibromo-3-nitrilo-propionamide (DBNPA)	10222-01-2	20.00000	0.00280	
			Sodium bromide	7647-15-6	4.00000	0.00056	
			Dibromoacetonitrile	3252-43-5	3.00000	0.00042	
Super TSC 2 LT	Nabors Completion and Production Services	Paraffin & Scale Additives					
			Bis(hexamethylene triaminepenta (methylenephosphonic acid))	Proprietary	10.00000	0.00159	
OB-2 LT	Nabors Completion and Production Services	Gel Breakers					
			Ammonium Persulfate	7727-54-0	85.00000	0.00126	
			Crystalline Silica (in the form of quartz)	14808-60-7	10.00000	0.00015	
Super GREEN SOLV-M	Nabors Completion and Production Services	Paraffin & Scale Additives					
			Aliphatic Hydrocarbons	Proprietary	95.00000	0.00067	
			Dodecane	Proprietary	14.00000	0.00010	
			tetradecane	Proprietary	11.00000	0.00008	
			Tridecane	Proprietary	9.00000	0.00006	
			Undecane	Proprietary	8.00000	0.00006	

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Acid Inhibitor 2 (AI-2)	Nabors Completion and Production Services	Acid Corrosion Inhibitors					
			Glycol Ethers	111-46-6	40.00000	0.00016	
			Propargyl Alcohol	107-19-7	40.00000	0.00016	
			Isopropyl Alcohol	67-63-0	40.00000	0.00016	
			Ethoxylated Nonylphenol	68412-54-4	13.00000	0.00005	
			Tar bases, quinoline derivs, benzyl chloride-quaternized	72480-70-7	10.00000	0.00004	
EB-4L	Nabors Completion and Production Services	Gel Breakers					
			Ethylene Glycol	107-21-1	40.00000	0.00019	
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 Ingredients	Nabors Completion and Production Services	Other Ingredients					
			guar gum	9000-30-0	50.00000	0.08453	
			Copolymer	Proprietary	100.00000	0.06725	
			Water	7732-18-5	40.00000	0.02690	
			Isoparaffinic Solvent	64742-47-8	26.00000	0.01749	
			Water	7732-18-5	90.00000	0.01427	
			Water	7732-18-5	32.00000	0.00448	
			Surfactant	68439-51-0	2.00000	0.00338	
			Crystalline Silica (in the form of quartz)	14808-60-7	2.00000	0.00338	
			Ethylene Glycol	107-21-1	4.00000	0.00269	
			Ethoxylated alcohols	Proprietary	4.00000	0.00269	
			Surfactant Blend	Proprietary	3.00000	0.00202	
			Sugar	57-50-1	100.00000	0.00046	
			Proprietary	Proprietary	100.00000	0.00046	
			Water	7732-18-5	100.00000	0.00023	
			Alkali Chloride salt	Proprietary	15.00000	0.00022	
			Water	7732-18-5	48.00000	0.00020	
			Sodium Hydroxide	1310-73-2	1.00000	0.00016	
			Monobromo-3-nitrilopropionamide	1113-55-9	1.00000	0.00014	
			2,2-Dibromomalonamide	73003-80-2	1.00000	0.00014	
			2-Propenamide as residual	79-06-1	0.10000	0.00007	
			2-Butoxyethanol	111-76-2	13.00000	0.00005	
			Proprietary	Proprietary	1.00000	0.00001	
			Proprietary	Proprietary	1.00000	0.00001	
			Proprietary	Proprietary	1.00000	0.00001	
			Proprietary	Proprietary	1.00000	0.00001	
			Dioxane	123-91-1	1.00000	0.00000	
			Organophylic Clay	68953-58-2			

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* 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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Antero Resources

Antero Resources
Rufus Unit 1H
Ritchie County WV
Northing: 14233077.53
Easting: 1668370.43
As Drilled

WELL DETAILS: Rufus Unit 1H

Ground Level: 1075.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	14233077.53	1668370.43	39° 11' 43.238 N	80° 54' 4.803 W	

PROJECT DETAILS: Ritchie County WV

Geodetic System: Universal Transverse Mercator (US Survey Feet)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Rufus Unit 1H, Grid North
Vertical (TVD) Reference: Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Calculation Method: Minimum Curvature

Scientific Drilling

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LEGEND

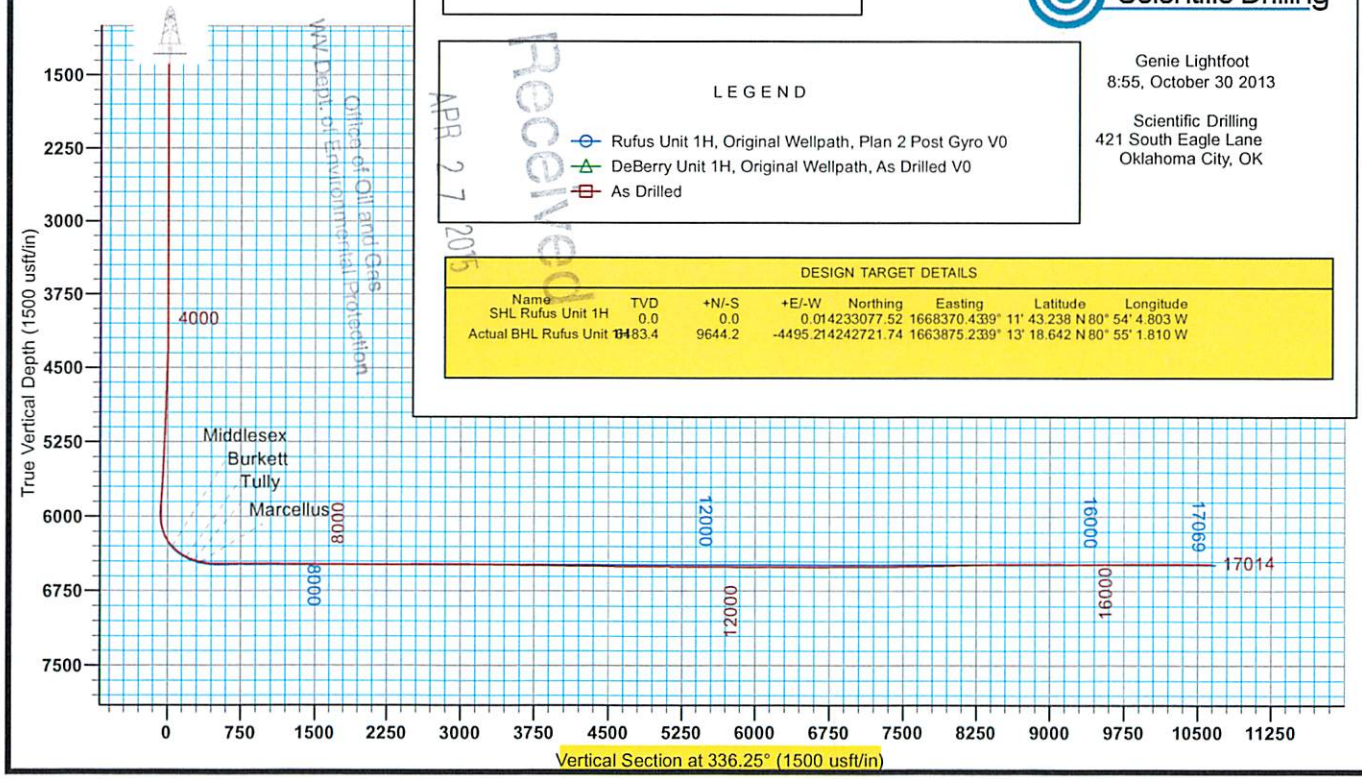
- Rufus Unit 1H, Original Wellpath, Plan 2 Post Gyro V0
- DeBerry Unit 1H, Original Wellpath, As Drilled V0
- As Drilled

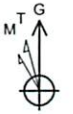
Genie Lightfoot
8:55, October 30 2013

Scientific Drilling
421 South Eagle Lane
Oklahoma City, OK

DESIGN TARGET DETAILS

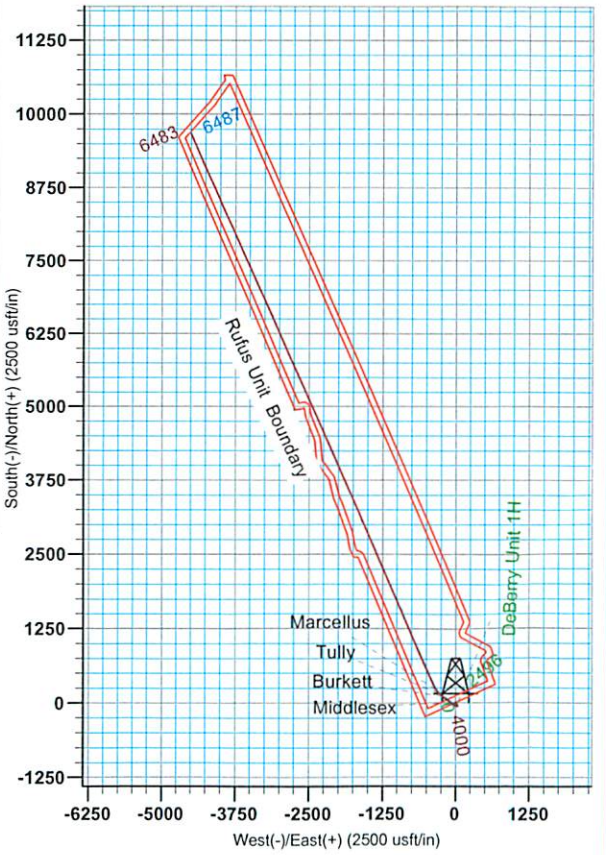
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL Rufus Unit 1H	0.0	0.0	0.0	14233077.52	1668370.43	39° 11' 43.238 N	80° 54' 4.803 W
Actual BHL Rufus Unit 1H	6483.4	9644.2	-4495.21	4242721.74	1663875.23	39° 13' 18.642 N	80° 55' 1.810 W





Azimuths to Grid North
True North: -0.06°
Magnetic North: -8.40°

Magnetic Field
Strength: 52357.5snT
Dip Angle: 66.83°
Date: 8/29/2013
Model: IGRF2010



Antero Resources

Ritchie County WV
DeBerry/Rufus/Langford
Rufus Unit 1H
Original Wellpath

Design: As Drilled

EOW Completion Report

25 October, 2013

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Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Rufus Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Well:	Rufus Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Project Ritchie County WV, Ritchie County WV, WV North

Map System:	Universal Transverse Mercator (US Survey Fee	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site DeBerry/Rufus/Langford, Site Center: Deberry 1H

Site Position:		**Northing:**	14,233,087.17 usft	**Latitude:**	39° 11' 43.333 N
From:	Map	**Easting:**	1,668,409.26 usft	**Longitude:**	80° 54' 4.310 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	0.06 °

Well Rufus Unit 1H, Marcellus

Well Position	**+N/-S**	0.0 usft	**Northing:**	14,233,077.53 usft	**Latitude:**	39° 11' 43.238 N
	+E/-W	0.0 usft	**Easting:**	1,668,370.43 usft	**Longitude:**	80° 54' 4.803 W
Position Uncertainty		2.0 usft	**Wellhead Elevation:**	1,099.0 usft	**Ground Level:**	1,075.0 usft

Wellbore Original Wellpath

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/29/2013	-8.34	66.83	52,358

Design As Drilled

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	336.25

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Survey Program **Date** 10/25/2013

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	5,698.0	Survey #3 Def Gyro to KOP (Original Well	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
5,698.0	17,014.0	Survey #4 MWD (Original Wellpath)	SDI MWD	Scientific Drilling Intl. MWD - Standard ver 1.0.1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
100.0	0.11	175.80	100.0	-0.1	0.0	-0.1	0.11
200.0	0.09	166.26	200.0	-0.3	0.0	-0.3	0.03
300.0	0.10	53.50	300.0	-0.3	0.1	-0.3	0.16
400.0	0.11	143.21	400.0	-0.3	0.2	-0.4	0.15
500.0	0.15	163.27	500.0	-0.5	0.3	-0.6	0.06
600.0	0.11	184.82	600.0	-0.7	0.4	-0.8	0.06
700.0	0.16	160.58	700.0	-1.0	0.4	-1.1	0.07
800.0	0.06	195.83	800.0	-1.1	0.4	-1.2	0.12
900.0	0.12	269.92	900.0	-1.2	0.3	-1.2	0.12
1,000.0	0.17	243.52	1,000.0	-1.3	0.1	-1.2	0.08

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Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Rufus Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Well:	Rufus Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,100.0	0.21	261.20	1,100.0	-1.4	-0.2	-1.2	0.07
1,200.0	0.22	269.88	1,200.0	-1.4	-0.6	-1.0	0.03
1,300.0	0.17	263.04	1,300.0	-1.4	-0.9	-0.9	0.06
1,400.0	0.20	271.63	1,400.0	-1.4	-1.3	-0.8	0.04
1,500.0	0.21	307.45	1,500.0	-1.3	-1.6	-0.6	0.13
1,600.0	0.08	307.15	1,600.0	-1.2	-1.8	-0.3	0.13
1,700.0	0.04	341.67	1,700.0	-1.1	-1.8	-0.2	0.05
1,800.0	0.06	343.88	1,800.0	-1.0	-1.9	-0.2	0.02
1,900.0	0.05	118.62	1,900.0	-1.0	-1.8	-0.1	0.10
2,000.0	0.11	5.84	2,000.0	-0.9	-1.8	-0.1	0.14
2,100.0	0.14	186.02	2,100.0	-0.9	-1.8	-0.1	0.25
2,200.0	0.10	274.16	2,200.0	-1.0	-1.9	-0.2	0.17
2,300.0	0.14	340.35	2,300.0	-0.9	-2.0	0.0	0.14
2,400.0	0.15	315.35	2,400.0	-0.7	-2.2	0.2	0.06
2,500.0	0.24	266.40	2,500.0	-0.6	-2.5	0.4	0.18
2,600.0	0.22	264.23	2,600.0	-0.7	-2.9	0.6	0.02
2,700.0	0.29	256.89	2,700.0	-0.7	-3.3	0.7	0.08
2,800.0	0.37	256.24	2,800.0	-0.9	-3.9	0.8	0.08
2,900.0	0.32	258.59	2,900.0	-1.0	-4.5	0.9	0.05
3,000.0	0.32	247.88	3,000.0	-1.2	-5.0	0.9	0.06
3,100.0	0.37	238.87	3,100.0	-1.4	-5.5	0.9	0.07
3,200.0	0.40	225.32	3,200.0	-1.8	-6.0	0.8	0.10
3,300.0	0.39	239.93	3,300.0	-2.3	-6.6	0.6	0.10
3,400.0	0.46	256.49	3,400.0	-2.5	-7.3	0.6	0.14
3,500.0	0.48	244.94	3,500.0	-2.8	-8.0	0.7	0.10
3,600.0	0.30	249.36	3,600.0	-3.1	-8.7	0.7	0.18
3,700.0	0.16	267.64	3,700.0	-3.2	-9.0	0.8	0.16
3,800.0	0.19	283.06	3,800.0	-3.1	-9.4	0.9	0.06
3,900.0	0.12	110.62	3,900.0	-3.1	-9.4	0.9	0.31
4,000.0	0.23	79.88	4,000.0	-3.1	-9.1	0.8	0.14
4,100.0	0.47	83.14	4,100.0	-3.0	-8.5	0.6	0.24
4,200.0	0.52	103.30	4,200.0	-3.1	-7.7	0.3	0.18
4,300.0	1.07	107.67	4,300.0	-3.5	-6.3	-0.6	0.55
4,400.0	1.59	114.81	4,399.9	-4.4	-4.2	-2.3	0.54
4,500.0	1.86	123.58	4,499.9	-5.8	-1.6	-4.7	0.38
4,600.0	2.42	133.27	4,599.8	-8.2	1.3	-8.0	0.66
4,700.0	2.16	137.01	4,699.7	-11.0	4.1	-11.7	0.30
4,800.0	2.46	134.40	4,799.7	-13.9	7.0	-15.5	0.32
4,900.0	2.34	137.55	4,899.6	-16.9	9.9	-19.4	0.18
5,000.0	2.41	135.72	4,999.5	-19.9	12.7	-23.3	0.10
5,100.0	2.43	132.36	5,099.4	-22.8	15.7	-27.2	0.14
5,200.0	2.43	134.36	5,199.3	-25.7	18.8	-31.1	0.08
5,300.0	2.19	131.68	5,299.2	-28.5	21.8	-34.9	0.26
5,400.0	2.42	130.93	5,399.1	-31.2	24.8	-38.5	0.23

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Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Rufus Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Well:	Rufus Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,500.0	2.49	138.49	5,499.0	-34.2	27.8	-42.5	0.33
5,600.0	3.31	144.79	5,598.9	-38.1	30.9	-47.4	0.88
5,698.0	4.37	157.81	5,696.7	-43.9	34.0	-53.9	1.39
5,749.0	4.15	161.96	5,747.6	-47.5	35.3	-57.7	0.74
5,796.0	4.02	165.81	5,794.4	-50.7	36.2	-61.0	0.65
5,843.0	3.86	162.75	5,841.3	-53.8	37.1	-64.2	0.56
5,880.0	3.46	166.75	5,878.2	-56.1	37.7	-66.5	1.28
5,937.0	3.14	210.98	5,935.2	-59.1	37.3	-69.1	4.39
5,984.0	9.04	241.61	5,981.9	-61.9	33.4	-70.1	13.90
6,031.0	14.84	255.21	6,027.9	-65.2	24.3	-69.5	13.63
6,078.0	18.73	276.73	6,072.9	-65.9	11.0	-64.7	15.47
6,125.0	20.52	293.08	6,117.2	-61.8	-4.1	-54.9	12.24
6,172.0	25.41	299.65	6,160.5	-53.6	-20.5	-40.8	11.73
6,220.0	30.94	304.60	6,202.8	-41.4	-39.6	-22.0	12.50
6,267.0	36.00	306.20	6,242.0	-26.4	-60.7	0.3	10.93
6,314.0	41.16	307.43	6,278.7	-8.8	-84.1	25.8	11.10
6,347.0	44.93	308.25	6,302.8	5.0	-101.9	45.6	11.55
Middlesex							
6,361.0	46.53	308.56	6,312.6	11.2	-109.8	54.5	11.55
6,408.0	52.27	308.28	6,343.1	33.4	-137.7	86.0	12.22
6,455.0	58.23	308.95	6,369.9	57.5	-167.9	120.2	12.73
6,502.0	64.38	308.57	6,392.5	83.3	-200.0	156.8	13.10
6,546.0	65.11	307.65	6,411.3	107.8	-231.3	191.9	2.51
Burkett							
6,549.0	65.16	307.59	6,412.5	109.5	-233.5	194.2	2.51
6,596.0	69.35	312.54	6,430.7	137.4	-266.6	233.1	13.18
6,637.0	73.35	317.55	6,443.8	164.9	-294.0	269.3	15.15
Tully							
6,643.0	73.95	318.27	6,445.5	169.1	-297.9	274.8	15.15
6,691.0	77.14	324.08	6,457.5	205.3	-327.0	319.7	13.47
6,713.0	76.98	326.46	6,462.4	223.0	-339.2	340.7	10.57
Marcellus							
6,738.0	76.82	329.17	6,468.1	243.6	-352.2	364.8	10.57
6,785.0	81.80	333.11	6,476.8	284.0	-374.5	410.8	13.42
6,830.0	87.12	335.00	6,481.1	324.3	-394.0	455.5	12.54
6,880.0	90.34	335.31	6,482.3	369.6	-415.0	505.5	6.47
6,942.0	90.94	336.02	6,481.6	426.1	-440.6	567.5	1.50
7,036.0	90.20	337.62	6,480.6	512.5	-477.6	661.5	1.88
7,131.0	90.40	338.08	6,480.1	600.5	-513.4	756.4	0.53
7,225.0	90.22	336.04	6,479.6	687.1	-550.0	850.4	2.18
7,319.0	89.36	336.07	6,480.0	773.0	-588.2	944.4	0.92
7,413.0	89.43	336.29	6,481.0	859.0	-626.1	1,038.4	0.25
7,507.0	89.30	335.53	6,482.0	944.8	-664.5	1,132.4	0.82
7,601.0	89.70	335.50	6,482.8	1,030.3	-703.5	1,226.4	0.43
7,695.0	88.99	336.34	6,483.9	1,116.1	-741.8	1,320.4	1.17

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Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Rufus Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Well:	Rufus Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
7,789.0	89.60	335.26	6,485.0	1,201.9	-780.3	1,414.4	1.32
7,884.0	90.13	336.39	6,485.3	1,288.5	-819.3	1,509.3	1.31
7,978.0	89.49	337.34	6,485.6	1,375.0	-856.2	1,603.3	1.22
8,072.0	89.70	335.69	6,486.2	1,461.2	-893.6	1,697.3	1.77
8,166.0	90.40	334.93	6,486.2	1,546.6	-932.9	1,791.3	1.10
8,259.0	90.13	337.42	6,485.7	1,631.6	-970.5	1,884.3	2.69
8,354.0	90.57	336.43	6,485.2	1,719.0	-1,007.7	1,979.3	1.14
8,448.0	89.66	336.72	6,485.0	1,805.3	-1,045.1	2,073.3	1.02
8,542.0	89.63	335.58	6,485.5	1,891.3	-1,083.1	2,167.3	1.21
8,636.0	89.97	335.80	6,485.9	1,976.9	-1,121.8	2,261.3	0.43
8,730.0	90.20	336.54	6,485.7	2,062.9	-1,159.8	2,355.3	0.82
8,824.0	89.93	335.31	6,485.6	2,148.7	-1,198.1	2,449.3	1.34
8,918.0	90.24	336.08	6,485.5	2,234.4	-1,236.8	2,543.3	0.88
9,012.0	90.91	336.21	6,484.5	2,320.4	-1,274.8	2,637.3	0.73
9,106.0	90.20	336.37	6,483.6	2,406.4	-1,312.6	2,731.3	0.77
9,200.0	89.80	337.49	6,483.6	2,492.9	-1,349.4	2,825.3	1.27
9,294.0	89.87	336.74	6,483.9	2,579.5	-1,386.0	2,919.2	0.80
9,388.0	90.64	336.20	6,483.5	2,665.7	-1,423.5	3,013.2	1.00
9,482.0	88.83	336.77	6,483.9	2,751.9	-1,461.0	3,107.2	2.02
9,576.0	89.33	336.70	6,485.4	2,838.2	-1,498.1	3,201.2	0.54
9,670.0	89.16	335.37	6,486.7	2,924.1	-1,536.3	3,295.2	1.43
9,765.0	89.50	334.56	6,487.8	3,010.2	-1,576.5	3,390.2	0.92
9,859.0	89.40	337.07	6,488.7	3,095.9	-1,615.0	3,484.2	2.67
9,953.0	88.82	337.49	6,490.1	3,182.6	-1,651.3	3,578.1	0.76
10,047.0	89.80	337.38	6,491.3	3,269.4	-1,687.4	3,672.1	1.05
10,141.0	88.32	337.74	6,492.8	3,356.3	-1,723.3	3,766.1	1.62
10,235.0	89.33	335.66	6,494.7	3,442.6	-1,760.4	3,860.0	2.46
10,329.0	88.93	335.13	6,496.2	3,528.0	-1,799.6	3,954.0	0.71
10,424.0	89.23	334.94	6,497.7	3,614.1	-1,839.7	4,049.0	0.37
10,518.0	89.16	335.89	6,499.0	3,699.6	-1,878.8	4,143.0	1.01
10,612.0	89.73	336.61	6,499.9	3,785.7	-1,916.6	4,237.0	0.98
10,706.0	88.79	337.11	6,501.1	3,872.1	-1,953.6	4,330.9	1.13
10,800.0	89.97	336.55	6,502.2	3,958.5	-1,990.5	4,424.9	1.39
10,894.0	88.02	337.85	6,503.8	4,045.1	-2,027.0	4,518.9	2.49
10,988.0	88.45	337.52	6,506.7	4,132.0	-2,062.6	4,612.8	0.58
11,082.0	89.70	335.86	6,508.2	4,218.4	-2,099.8	4,706.8	2.21
11,176.0	89.39	335.70	6,509.0	4,304.1	-2,138.4	4,800.8	0.37
11,267.0	89.93	334.71	6,509.5	4,386.7	-2,176.5	4,891.8	1.24
11,358.0	90.00	336.35	6,509.6	4,469.5	-2,214.2	4,982.8	1.80
11,449.0	89.63	335.00	6,509.9	4,552.4	-2,251.7	5,073.8	1.54
11,540.0	89.70	336.00	6,510.4	4,635.2	-2,289.5	5,164.8	1.10
11,631.0	90.27	336.77	6,510.4	4,718.6	-2,325.9	5,255.8	1.05
11,722.0	89.93	336.73	6,510.3	4,802.2	-2,361.8	5,346.7	0.38
11,813.0	89.43	336.28	6,510.8	4,885.7	-2,398.1	5,437.7	0.74

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Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Rufus Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Well:	Rufus Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
11,903.0	89.77	335.36	6,511.4	4,967.8	-2,435.0	5,527.7	1.09
11,994.0	89.46	335.68	6,512.0	5,050.6	-2,472.7	5,618.7	0.49
12,085.0	90.37	336.92	6,512.1	5,133.9	-2,509.3	5,709.7	1.69
12,177.0	90.23	336.70	6,511.7	5,218.5	-2,545.5	5,801.7	0.28
12,268.0	90.20	336.41	6,511.3	5,302.0	-2,581.7	5,892.7	0.32
12,362.0	89.87	334.71	6,511.3	5,387.5	-2,620.6	5,986.7	1.84
12,456.0	89.76	335.93	6,511.6	5,473.0	-2,659.8	6,080.7	1.30
12,551.0	90.03	335.95	6,511.7	5,559.7	-2,698.6	6,175.7	0.28
12,644.0	89.90	335.45	6,511.8	5,644.5	-2,736.8	6,268.7	0.56
12,738.0	91.11	336.23	6,511.0	5,730.2	-2,775.3	6,362.7	1.53
12,832.0	89.97	337.48	6,510.1	5,816.7	-2,812.2	6,456.7	1.80
12,926.0	89.70	337.58	6,510.4	5,903.5	-2,848.2	6,550.6	0.31
13,020.0	90.27	336.64	6,510.4	5,990.1	-2,884.7	6,644.6	1.17
13,115.0	90.77	336.09	6,509.5	6,077.1	-2,922.8	6,739.6	0.78
13,209.0	89.06	335.76	6,509.7	6,163.0	-2,961.2	6,833.6	1.85
13,303.0	89.12	336.49	6,511.1	6,248.9	-2,999.2	6,927.6	0.78
13,397.0	90.00	336.74	6,511.9	6,335.2	-3,036.5	7,021.6	0.97
13,491.0	89.93	336.87	6,511.9	6,421.6	-3,073.5	7,115.6	0.16
13,584.0	90.07	336.98	6,511.9	6,507.1	-3,110.0	7,208.6	0.19
13,679.0	90.87	336.09	6,511.1	6,594.3	-3,147.8	7,303.6	1.26
13,773.0	90.67	334.81	6,509.9	6,679.8	-3,186.9	7,397.6	1.38
13,866.0	90.97	334.74	6,508.6	6,763.9	-3,226.5	7,490.5	0.33
13,960.0	90.84	334.51	6,507.1	6,848.8	-3,266.8	7,584.5	0.28
14,054.0	91.11	335.58	6,505.5	6,934.0	-3,306.4	7,678.4	1.17
14,148.0	91.34	336.77	6,503.5	7,020.0	-3,344.4	7,772.4	1.29
14,242.0	91.17	335.91	6,501.4	7,106.1	-3,382.1	7,866.4	0.93
14,336.0	92.55	337.02	6,498.3	7,192.2	-3,419.6	7,960.3	1.88
14,430.0	91.48	337.32	6,495.0	7,278.8	-3,456.1	8,054.3	1.18
14,524.0	92.01	336.02	6,492.2	7,365.1	-3,493.3	8,148.2	1.49
14,619.0	92.18	335.39	6,488.7	7,451.6	-3,532.3	8,243.2	0.69
14,713.0	91.14	336.71	6,486.0	7,537.5	-3,570.5	8,337.1	1.79
14,807.0	90.67	336.85	6,484.5	7,623.8	-3,607.5	8,431.1	0.52
14,901.0	90.84	336.49	6,483.3	7,710.1	-3,644.7	8,525.1	0.42
14,995.0	89.16	338.05	6,483.3	7,796.8	-3,681.1	8,619.1	2.44
15,089.0	89.77	337.07	6,484.1	7,883.7	-3,716.9	8,713.0	1.23
15,183.0	90.23	336.83	6,484.1	7,970.2	-3,753.7	8,807.0	0.55
15,277.0	89.43	336.07	6,484.4	8,056.4	-3,791.3	8,901.0	1.17
15,371.0	89.50	335.08	6,485.3	8,142.0	-3,830.2	8,995.0	1.06
15,465.0	89.23	334.99	6,486.3	8,227.2	-3,869.8	9,089.0	0.30
15,559.0	89.66	335.62	6,487.2	8,312.6	-3,909.1	9,183.0	0.81
15,653.0	90.37	335.58	6,487.2	8,398.2	-3,947.9	9,277.0	0.76
15,747.0	89.77	336.87	6,487.1	8,484.2	-3,985.8	9,371.0	1.51
15,841.0	89.53	336.34	6,487.7	8,570.5	-4,023.2	9,464.9	0.62
15,935.0	90.37	335.59	6,487.8	8,656.3	-4,061.4	9,558.9	1.20
16,030.0	90.30	336.04	6,487.2	8,743.0	-4,100.4	9,653.9	0.48

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Rufus Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Site:	DeBerry/Rufus/Langford	**MD Reference:**	Rufus Unit 1H GL 1075 + 24' RKB @ 1099.0usft
Well:	Rufus Unit 1H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
16,124.0	90.54	335.83	6,486.5	8,828.8	-4,138.7	9,747.9	0.34
16,217.0	89.63	336.30	6,486.4	8,913.8	-4,176.4	9,840.9	1.10
16,311.0	89.93	336.61	6,486.7	9,000.0	-4,214.0	9,934.9	0.46
16,404.0	90.27	335.58	6,486.6	9,085.0	-4,251.7	10,027.9	1.17
16,499.0	91.04	336.25	6,485.5	9,171.7	-4,290.4	10,122.9	1.07
16,593.0	90.20	335.96	6,484.5	9,257.6	-4,328.5	10,216.9	0.95
16,687.0	90.57	337.57	6,483.8	9,344.0	-4,365.6	10,310.9	1.76
16,781.0	89.70	336.65	6,483.6	9,430.6	-4,402.1	10,404.9	1.35
16,875.0	90.44	337.04	6,483.5	9,517.0	-4,439.1	10,498.9	0.89
16,965.0	89.70	335.90	6,483.4	9,599.6	-4,475.0	10,588.9	1.51
17,014.0	90.20	335.50	6,483.4	9,644.2	-4,495.2	10,637.9	1.31

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
6,347.0	6,302.8	5.0	-101.9	Middlesex
6,546.0	6,411.3	107.8	-231.3	Burkett
6,637.0	6,443.8	164.9	-294.0	Tully
6,713.0	6,462.4	223.0	-339.2	Marcellus

Checked By: _____ Approved By: _____ Date: _____

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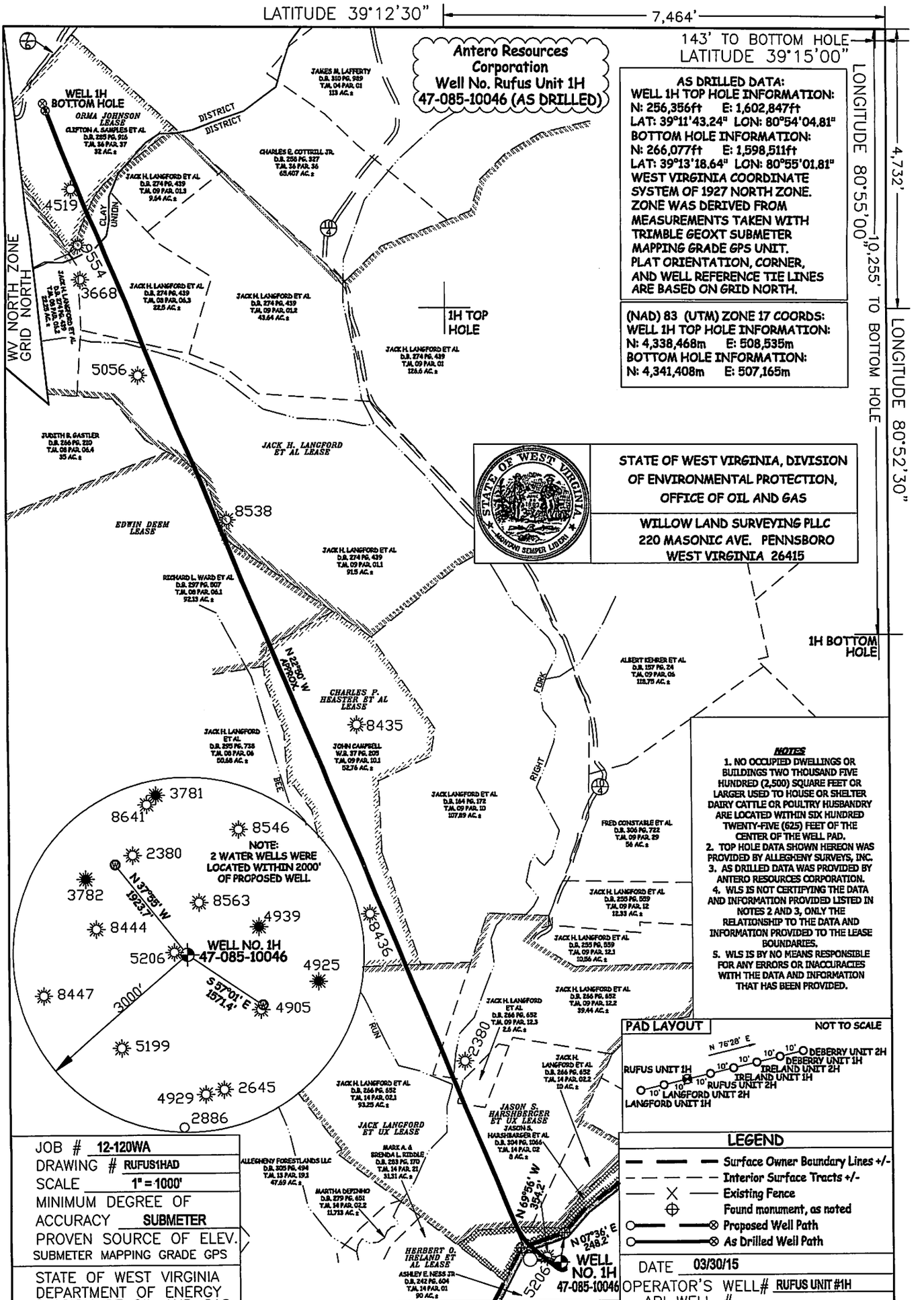

JOB # 12-120WA
DRAWING # RUFUS1HAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

DATE 03/30/15
OPERATOR'S WELL# RUFUS UNIT #1H
API WELL # 47 – 085 – 10046
(STATE – COUNTY – PERMIT)

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION: ELEVATION 1,080' ORIGINAL - 1,076' AS DRILLED WATERSHED SOUTH FORK HUGHES RIVER
QUADRANGLE PULLMAN 7.5' DISTRICT UNION COUNTY RITCHIE
SURFACE OWNER ASHLEY E. NESS, JR. ACREAGE 90 ACRES +/-
OIL & GAS ROYALTY OWNER HERBERT O. IRELAND ET AL; JASON S. HARSHBERGER ET UX; JACK LANGFORD ET UX; CHARLES P. HEASTER ET AL; EDWIN DEEM; JACK H. LANGFORD ET AL; ORMA JOHNSON LEASE ACREAGE 90 ACRES±; 8 ACRES±; 145.28 ACRES±; 52.76 ACRES±; 92.13 ACRES±; 448.5 ACRES±; 32 ACRES±
PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE IN WELL (SPECIFY) (X) AS DRILLED PLUG & ABANDON ___ CLEAN OUT & REPLUG ___
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,483' TVD 17,014' MD

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
DENVER, CO 80202 CHARLESTON, WV 25313

FORM WW-6

COUNTY NAME PERMIT

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

API 47- 085 - 10055 County Ritche District Clay
Quad Pennsboro Pad Name PEN 2 Field/Pool Name NA
Farm name Terry & Helen Kiessling Well Number PEN 2 CHS
Operator (as registered with the OOG) Noble Energy, Inc.
Address 1000 Noble Energy Drive City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4354130.66 Easting 498919.04
Landing Point of Curve Northing 4353946.77 Easting 498851.25
Bottom Hole Northing 4351704.84 Easting 500791.23

Elevation (ft) 1074.85 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

Drilling 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 10/24/2013 Date drilling commenced 01/17/2014 Date drilling ceased 06/15/2014
Date completion activities began 12/31/2014 Date completion activities ceased 3/14/2015
Verbal plugging (Y/N) N Date permission granted _____ Granted by _____

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

Freshwater depth(s) ft 454 Open mine(s) (Y/N) depths none
Salt water depth(s) ft None noted for Offsets Void(s) encountered (Y/N) depths none
Coal depth(s) ft no coal Cavern(s) encountered (Y/N) depths none
Is coal being mined in area (Y/N) N

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A.C. 5/26/15
W.S. 6/01/15

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API 47- 085 - 10055 Farm name Terry & Helen Kiessling Well number PEN 2 CHS

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	36	30	66	N	K-55 94#		Y
Surface	17 1/2	13 3/8	595.6	N	J-55 54.5#		Y
Coal							
Intermediate 1	12 3/8	9 5/8	5,527.0	N	K-55 36#		Y
Intermediate 2							
Intermediate 3							
Production	8 3/4	5 1/2	16,466.20	N	P-110 20#		Y
Tubing							
Packer type and depth set							

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor							
Surface	TYPE 1	532	15.6	1.20	111	0	8
Coal							
Intermediate 1	Class A	Lead 938 Tail 302	Lead 12.0 Tail 15.6	Lead 1.94 Tail 1.19	Lead 202 Tail 417	0	8
Intermediate 2							
Intermediate 3							
Production	Class A	Lead 415 Tail 2047	Lead 13.0 Tail 14.8	Lead 1.62 Tail 1.37	Lead 167 Tail 901	5546	8
Tubing							

Drillers TD (ft) 16,485 Loggers TD (ft) 16,458

Deepest formation penetrated Marcellus Plug back to (ft) Not a Pilot Hole

Plug back procedure Not a Pilot Hole

Kick off depth (ft) 6,703

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction
☐ neutron ☐ resistivity ■ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ☐ No ☐ Conventional ☐ Sidewall Were cuttings collected ■ Yes ☐ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING Conductor - No centralizers used. Fresh Water/Surface-
Surface - 5 centralizers used, one every third joint Intermediate - 66 centralizers - bow spring centralizers on every joint to KOP, on every third joint from KOP to 100' from surface.
Production - 282 centralizers - rigid bow spring every third joint from KOP to TOC, rigid bow spring every joint to KOP.

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10055 Farm name Terry & Helen Kiessling Well number PEN 2 CHS

PERFORATION RECORD

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

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	SEE ATTACHED STIMULATION							
	INFORMATION PER STAGE							
	RECORD							

Please insert additional pages as applicable.

Perforation Record

API: 47-085-10055 Farm name: KIESSLING, TERRY & HELEN Well Name: PEN-2C-HS

Stage No.	Perf Date	Top Perf	Bottom Perf	# of Perfs	Formation
Toe Prep Inj Test	12/30/2014	0	-	-	Marcellus
1	12/30/2014	16078	16,324	40	Marcellus
2	12/31/2014	15773	16,019	50	Marcellus
3	12/31/2014	15468	15,714	50	Marcellus
4	12/31/2014	15163	15,409	50	Marcellus
5	1/1/2015	14858	15,104	50	Marcellus
6	1/1/2015	14553	14,799	50	Marcellus
7	1/2/2015	14248	14,494	50	Marcellus
8	1/2/2015	13943	14,189	50	Marcellus
9	1/3/2015	13638	13,884	50	Marcellus
10	1/3/2015	13333	13,579	50	Marcellus
11	1/14/2015	13028	13,274	50	Marcellus
12	1/14/2015	12723	12,969	50	Marcellus
13	1/15/2015	12418	12,664	50	Marcellus
14	1/15/2015	12113	12,359	50	Marcellus
15	1/16/2015	11808	12,054	50	Marcellus
16	1/16/2015	11206	11,452	50	Marcellus
17	1/17/2015	10901	11,147	50	Marcellus
18	1/17/2015	10596	10,842	50	Marcellus
18B	1/18/2015	0	-	-	Marcellus
19	1/18/2015	10291	10,537	50	Marcellus
20	1/18/2015	9986	10,232	50	Marcellus
21	1/18/2015	9681	9,927	50	Marcellus
22	1/19/2015	9376	9,622	50	Marcellus
23	1/19/2015	9071	9,317	50	Marcellus
24	1/20/2015	8766	9,012	50	Marcellus
25	1/20/2015	8461	8,707	50	Marcellus
26	1/20/2015	8156	8,402	50	Marcellus
27	1/20/2015	7851	8,097	50	Marcellus
28	1/21/2015	7546	7,792	50	Marcellus
29	1/21/2015	7241	7,487	50	Marcellus
30	1/21/2015	6936	7,182	50	Marcellus
31	1/22/2015	6595	6,877	50	Marcellus

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STIMULATION INFORMATION PER STAGE

API: 47-085-10055 Farm name: KIESSLING, TERRY & HELEN Well Name: PEN-2C-HS

Stage No.	Stim Date	Avg Rate (bpm)	ATP (psi)	Max BD Pressure	ISIP (psi)	Proppant (lbs)	Water (BBLS)	Amount of N^2/ other (units)
Toe Prep Inj Test	12/30/2014	20.4	7376.00	0.00	0.00	0.00	385.00	
1	12/31/2014	78.3	8,101.00	6,148.00	3,004.00	602,950.00	15,035.00	
2	12/31/2014	80.8	8,145.00	6,859.00	3,401.00	607,900.00	12,901.00	
3	12/31/2014	79.9	8,161.00	7,067.00	3,587.00	600,220.00	16,240.00	
4	12/31/2014	77.8	8,103.00	6,938.00	3,877.00	601,800.00	12,734.00	
5	1/1/2015	81.3	8,054.00	7,392.00	3,541.00	598,840.00	12,430.00	
6	1/1/2015	80.7	8,188.00	7,514.00	4,152.00	602,100.00	12,729.00	
7	1/2/2015	81.9	8,246.00	6,266.00	3,809.00	600,060.00	12,756.00	
8	1/2/2015	83.4	8,251.00	5,997.00	3,777.00	601,000.00	12,676.00	
9	1/3/2015	81.8	8,088.00	6,123.00	3,855.00	598,460.00	12,599.00	
10	1/3/2015	83.9	8,117.00	6,423.00	3,905.00	604,005.00	12,710.00	
11	1/14/2015	80.2	8,189.00	5,983.00	3,469.00	601,600.00	13,479.00	
12	1/15/2015	80.5	8,012.00	6,610.00	3,401.00	600,000.00	13,516.00	
13	1/15/2015	82.6	8,340.00	5,674.00	4,148.00	550,700.00	19,174.00	
14	1/16/2015	78.5	8,141.00	6,615.00	4,735.00	595,200.00	15,637.00	
15	1/16/2015	89	8,505.00	5,495.00	4,713.00	605,500.00	14,518.00	
16	1/16/2015	89.2	7,904.00	5,786.00	3,737.00	600,700.00	12,481.00	
17	1/17/2015	88.8	7,898.00	6,645.00	3,952.00	602,900.00	12,457.00	
18	1/17/2015	89.6	8,075.00	6,154.00	4,088.00	395,000.00	10,309.00	
18B	1/17/2015	89.3	7,904.00	-	4,570.00	205,500.00	5,706.00	
19	1/18/2015	75.5	8,703.00	5,651.00	4,413.00	601,950.00	12,844.00	
20	1/18/2015	83.4	8,545.00	5,218.00	4,882.00	527,600.00	14,331.00	
21	1/18/2015	83.8	8,843.00	5,460.00	3,748.00	671,400.00	13,604.00	
22	1/19/2015	76.9	8,612.00	5,603.00	3,923.00	599,800.00	15,297.00	
23	1/19/2015	90	6,954.00	6,453.00	3,879.00	601,050.00	12,350.00	
24	1/19/2015	89.5	7,201.00	8,310.00	3,953.00	599,400.00	12,372.00	
25	1/20/2015	87	8,125.00	6,301.00	3,601.00	626,200.00	17,322.00	
26	1/20/2015	88.3	7,790.00	6,591.00	4,517.00	601,960.00	13,156.00	
27	1/21/2015	89.5	7,698.00	6,530.00	3,419.00	600,740.00	12,274.00	
28	1/21/2015	90	7,185.00	6,301.00	3,483.00	601,000.00	12,291.00	
29	1/21/2015	90.7	7,139.00	6,773.00	3,579.00	600,350.00	12,523.00	
30	1/21/2015	89.9	6,487.00	5,984.00	3,377.00	600,150.00	12,182.00	
31	1/22/2015	81	6,600.00	5,615.00	7,768.00	525,000.00	11,762.00	

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API 47- 085 - 10055 Farm name Terry & Helen Kiessling Well number PEN 2 AHS

PRODUCING FORMATION(S)	DEPTHS			
Marcellus	6,287	TVD	16,485	MD

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ☐ Open Flow OIL TEST ☐ Flow ☐ Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	3769 mcfpd	116 bpd	423 bpd	908 bpd	☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
	SEE ATTACHED FORMATION SHEET				

Please insert additional pages as applicable.

Drilling Contractor NOMAC
Address 171 Locust Avenue Ext. City Mt. Morris State PA Zip 15349

Logging Company Baker Hughes
Address 400 Technology Drive, Suite 120 City Canonsburg State PA Zip 15317

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

Stimulating Company U. S Well Service
Address 533 Industrial Park Drive City Jane Lew State WV Zip 26378
Please insert additional pages as applicable.

Completed by Regina A. Logue Telephone 724-820-3558
Signature Regina A. Logue Title Regulatory Analyst Date 4/6/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

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PEN 2 CHS 47-085-10055

Formations	Top TVD	Base TVD	Top MD	Base MD	Fluid
Shale and Sandstone	0	1309	0	1309	
Sandstone	1309	1433	1309	1423	
Shale and Sandstone	1423	1593	1423	1593	
Sandstone	1593	1635	1593	1635	
Shale and Sandstone	1635	1737	1635	1737	
Maxton Sand	1737	1820	1737	1820	
Shale and Sandstone	1820	1943	1820	1943	
Big Lime	1943	1998	1943	1998	
Big Injun	1998	2133	1998	2133	
Price	2133	2405	2133	2405	
Weir	2405	2444	2405	2444	
Shale	2444	2724	2444	2724	
Gordon	2724	2741	2724	6301	
Shale and Sandstone	2741	2921	2741	6302	
5th Sand	2921	2933	2921	6371	
Shale	2933	3076	2933	not encountered	
Sandstone	3076	3090	3076	not encountered	
Shale	3090	3498	3090	not encountered	
Warren	3498	3560	3500	6300	
Shale	3560	3894	3562	6301	
Sandstone	3894	3931	3900	6302	
Shale and Sandstone	3931	4925	3937	6371	
Benson	4925	4987	4941	not encountered	
Shale	4987	5147	5004	not encountered	
Alexander	5147	5215	5166	not encountered	
Shale	5215	5725	5234	not encountered	
Rheinstreet	5725	6051	5750	not encountered	
Cashaqua	6051	6143	6080	not encountered	
Middlesex	6143	6172	6176	not encountered	
West River	6172	6216	6206	not encountered	
Burkett	6216	6259	6253	not encountered	
Tully Limestone	6259	6260	6300	not encountered	
Hamilton	6260	6261	6301	6302	Gas
Marcellus	6261	6320	6302	6371	
Onondaga	6320		6371	not encountered	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	12/31/2014
Job End Date:	1/22/2015
State:	West Virginia
County:	Ritchie
API Number:	47-085-10055-00-00
Operator Name:	Noble Energy, Inc.
Well Name and Number:	Pen 2 C
Longitude:	-81.01271100
Latitude:	39.33652200
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,287
Total Base Water Volume (gal):	17,756,760
Total Base Non Water Volume:	919,752

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

INTERSTATE Oil & Gas COMPACT COMMISSION

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	Noble Engery	Base Fluid					
			Water	7732-18-5	100.00000	88.58268	
40/70 Sand	U.S. Well Services	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	7.69597	
100 Mesh Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	3.38865	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.15154	
			Hydrogen Chloride	7647-01-0	18.00000	0.03620	
WFRA-1000	U.S. Well Services, LLC	Friction Reducer					
			Anionic Polyacrylamide	Proprietary	40.00000	0.02088	
			Water	7732-18-5	40.00000	0.02088	
			Petroleum Distillates	64742-47-8	40.00000	0.01681	
			Crystalline Salt	12125-02-9	5.00000	0.00261	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00261	
WFRA-405	U.S. Well Services	Friction Reducer					
			Anionic Polyacrylamide	Proprietary	40.00000	0.01131	
			Water	7732-18-5	40.00000	0.01131	

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			Sodium Chloride	7647-14-5	20.00000	0.00566	
			Petroleum Distillates	64742-47-8	20.00000	0.00455	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00141	
SI-1100	U.S. Well Services	Scale Inhibitor					
			Di Water	7732-18-5	80.00000	0.01371	
			Ethylene Glycol	107-21-1	40.00000	0.00775	
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00231	
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00221	
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00214	
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00202	
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00197	
			Acrylic polymer	52255-49-9	5.00000	0.00086	
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00832	
			Deionized Water	7732-18-5	28.00000	0.00475	
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Diethylene Glycol	111-46-6	30.00000	0.00023	
			Methenamine	100-97-0	20.00000	0.00018	
			Hydrogen Chloride	7647-01-0	10.00000	0.00008	
			Polyethylene polyamine	68603-67-8	10.00000	0.00007	
			Coco amine	61791-14-8	5.00000	0.00003	
ICA-800	U.S. Well Services	Iron Control Additive					
			Erythorbic Acid	89-65-6	100.00000	0.00019	
ICA-4000	U.S. Well Services	Iron Control Additive					
			Ethylene Glycol	107-21-1	20.00000	0.00004	
			Triethanolamine hydroxyacetate	68299-02-5	20.00000	0.00003	
			Glycolic Acid	79-14-1	2.50000	0.00001	

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.

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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PATHFINDER
A Schlumberger Company

noble energy

Noble Energy PEN2CHS Gyro+MWD 0ft to 16485ft MD Survey Report

(Def Survey)

Report Date:	June 13, 2014 - 08:20 AM	**Survey / DLS Computation:**	Minimum Curvature / Lubinski
Client:	Noble Energy	**Vertical Section Azimuth:**	143.249 ° (Grid North)
Field:	WV Ritchie County (NAD27)	**Vertical Section Origin:**	0.000 ft, 0.000 ft
Structure / Slot:	Noble Energy PEN2 Pad / PEN2CHS	**TVD Reference Datum:**	KB
Well:	PEN2CHS	**TVD Reference Elevation:**	1101.190 ft above MSL
Borehole:	Original Borehole	**Seabed / Ground Elevation:**	1075.190 ft above MSL
UWI / API#:	Unknown / Unknown	**Magnetic Declination:**	-7.864 °
Survey Name:	Noble Energy PEN2CHS Gyro+MWD 0ft to 16485ft MD	**Total Gravity Field Strength:**	999.3086mgn (9.80665 Based)
Survey Date:	May 23, 2014	**Gravity Model:**	GARM
Tort / AHD / DDI / ERD Ratio:	263.748 ° / 11041.344 ft / 6.881 / 1.750	**Total Magnetic Field Strength:**	52221.845 nT
Coordinate Reference System:	NAD27 West Virginia State Plane, Northern Zone, US Feet	**Magnetic Dip Angle:**	66.832 °
Location Lat / Long:	N 39° 20' 11.48000", W 81° 0' 45.76000"	**Declination Date:**	May 23, 2014
Location Grid N/E Y/X:	N 308280.481 ftUS, E 1572150.255 ftUS	**Magnetic Declination Model:**	HDGM 2013
CRS Grid Convergence Angle:	-0.9648 °	**North Reference:**	Grid North
Grid Scale Factor:	0.99995343	**Grid Convergence Used:**	-0.9648 °
Version / Patch:	2.7.1043.0	**Total Corr Mag North->Grid North:**	-6.8993 °
		Local Coord Referenced To:	Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
SHL	0.00	0.00	0.00	0.00	-1101.19	0.00	0.00	0.00	N/A	N/A	N/A	308280.48	1572150.26	N 39 20 11.48	W 81 0 45.76	0.00
	100.00	0.24	59.08	100.00	-1001.19	0.02	0.11	0.18	0.24	0.24	0.00	308280.59	1572150.43	N 39 20 11.48	W 81 0 45.76	0.00
	200.00	0.45	79.44	200.00	-901.19	0.22	0.29	0.75	0.24	0.21	20.36	308280.77	1572151.00	N 39 20 11.48	W 81 0 45.75	0.00
	300.00	0.53	84.06	299.99	-801.20	0.63	0.41	1.59	0.09	0.08	4.62	308280.89	1572151.85	N 39 20 11.48	W 81 0 45.74	0.00
	400.00	0.57	125.87	399.99	-701.20	1.34	0.16	2.45	0.39	0.04	41.81	308280.64	1572152.71	N 39 20 11.48	W 81 0 45.73	0.40
	500.00	0.59	114.80	499.98	-601.21	2.27	-0.34	3.33	0.11	0.02	-11.07	308280.14	1572153.58	N 39 20 11.48	W 81 0 45.72	0.59
	574.00	0.82	84.83	573.98	-527.21	2.88	-0.46	4.20	0.58	0.31	-40.50	308280.03	1572154.45	N 39 20 11.48	W 81 0 45.71	0.83
	602.00	0.89	79.24	601.98	-499.21	3.08	-0.40	4.61	0.39	0.25	-19.96	308280.08	1572154.87	N 39 20 11.48	W 81 0 45.70	0.90
	665.00	1.28	84.32	664.96	-436.23	3.66	-0.24	5.79	0.64	0.62	8.06	308280.24	1572156.05	N 39 20 11.48	W 81 0 45.69	1.09
	760.00	0.74	132.71	759.95	-341.24	4.81	-0.55	7.30	1.01	-0.57	50.94	308279.93	1572157.55	N 39 20 11.48	W 81 0 45.67	1.36
	855.00	1.86	164.87	854.93	-246.26	6.84	-2.45	8.15	1.36	1.18	33.85	308278.03	1572158.41	N 39 20 11.46	W 81 0 45.66	1.62
	952.00	3.36	163.22	951.82	-149.37	10.98	-6.69	9.38	1.55	1.55	-1.70	308273.79	1572159.64	N 39 20 11.42	W 81 0 45.64	1.91
	1002.00	4.17	167.47	1001.71	-99.48	14.01	-9.87	10.20	1.71	1.62	8.50	308270.61	1572160.46	N 39 20 11.38	W 81 0 45.63	2.06
	1097.00	4.92	170.35	1096.42	-4.77	20.79	-17.26	11.63	0.82	0.79	3.03	308263.22	1572161.89	N 39 20 11.31	W 81 0 45.61	2.27
	1193.00	5.15	164.25	1192.05	90.86	28.48	-25.46	13.49	0.61	0.24	-6.35	308255.02	1572163.75	N 39 20 11.23	W 81 0 45.58	2.43
	1289.00	4.53	154.19	1287.70	186.51	36.22	-33.02	16.31	1.09	-0.65	-10.48	308247.46	1572166.57	N 39 20 11.16	W 81 0 45.55	2.57
	1384.00	3.89	152.38	1382.45	281.26	43.09	-39.26	19.44	0.69	-0.67	-1.91	308241.23	1572169.69	N 39 20 11.10	W 81 0 45.50	2.67
	1479.00	2.91	158.06	1477.28	376.09	48.60	-44.35	21.84	1.09	-1.03	5.98	308236.13	1572172.09	N 39 20 11.05	W 81 0 45.47	2.76
	1575.00	1.91	171.69	1573.19	472.00	52.36	-48.19	22.98	1.19	-1.04	14.20	308232.29	1572173.23	N 39 20 11.01	W 81 0 45.46	2.84
	1670.00	1.49	177.52	1668.15	566.96	54.78	-50.99	23.26	0.48	-0.44	6.14	308229.49	1572173.51	N 39 20 10.98	W 81 0 45.45	2.88
	1766.00	0.74	178.35	1764.13	662.94	56.31	-52.86	23.33	0.78	-0.78	0.86	308227.62	1572173.59	N 39 20 10.96	W 81 0 45.45	2.92
	1861.00	0.40	35.98	1859.13	757.94	56.72	-53.20	23.54	1.14	-0.36	-149.86	308227.28	1572173.80	N 39 20 10.96	W 81 0 45.45	2.95
	1956.00	0.86	50.87	1954.13	852.94	56.59	-52.49	24.29	0.51	0.48	15.67	308228.00	1572174.55	N 39 20 10.97	W 81 0 45.44	2.98
	2052.00	1.22	58.98	2050.11	948.92	56.66	-51.51	25.73	0.40	0.38	8.45	308228.98	1572175.98	N 39 20 10.98	W 81 0 45.42	3.00
	2147.00	1.01	68.45	2145.09	1043.90	56.98	-50.68	27.37	0.29	-0.22	9.97	308229.81	1572177.63	N 39 20 10.98	W 81 0 45.40	3.02
	2243.00	0.38	107.12	2241.08	1139.89	57.46	-50.46	28.46	0.78	-0.66	40.28	308230.02	1572178.72	N 39 20 10.99	W 81 0 45.39	3.05
	2339.00	0.56	171.79	2337.08	1235.89	58.13	-51.02	28.83	0.55	0.19	67.36	308229.47	1572179.09	N 39 20 10.98	W 81 0 45.38	3.06
	2433.00	0.80	183.58	2431.08	1329.89	59.03	-52.13	28.86	0.29	0.26	12.54	308228.36	1572179.11	N 39 20 10.97	W 81 0 45.38	3.08
	2528.00	1.08	199.97	2526.06	1424.87	60.03	-53.63	28.51	0.41	0.29	17.25	308226.85	1572178.77	N 39 20 10.95	W 81 0 45.39	3.10
	2624.00	0.88	209.19	2622.05	1520.86	60.83	-55.12	27.84	0.26	-0.21	9.60	308225.36	1572178.10	N 39 20 10.94	W 81 0 45.39	3.11
	2718.00	0.29	256.48	2716.04	1614.85	61.03	-55.81	27.26	0.76	-0.63	50.31	308224.67	1572177.51	N 39 20 10.93	W 81 0 45.40	3.14
	2814.00	0.57	345.90	2812.04	1710.85	60.49	-55.40	26.91	0.66	0.29	93.15	308225.08	1572177.16	N 39 20 10.94	W 81 0 45.41	3.15
	2910.00	0.90	343.11	2908.03	1806.84	59.34	-54.22	26.57	0.35	0.34	-2.91	308226.26	1572176.83	N 39 20 10.95	W 81 0 45.41	3.17
	3005.00	1.29	343.14	3003.02	1901.83	57.63	-52.48	26.05	0.41	0.41	0.03	308228.00	1572176.30	N 39 20 10.97	W 81 0 45.42	3.19
	3101.00	1.40	345.84	3098.99	1997.80	55.54	-50.31	25.44	0.13	0.11	2.81	308230.17	1572175.70	N 39 20 10.99	W 81 0 45.43	3.20
	3196.00	0.96	356.49	3193.97	2092.78	53.80	-48.39	25.11	0.52	-0.46	11.21	308232.09	1572175.37	N 39 20 11.01	W 81 0 45.43	3.22
	3292.00	0.79	2.28	3289.96	2188.77	52.61	-46.93	25.09	0.20	-0.18	6.03	308233.56	1572175.34	N 39 20 11.02	W 81 0 45.43	3.24
	3387.00	0.97	1.15	3384.95	2283.76	51.47	-45.47	25.13	0.19	0.19	-1.19	308235.01	1572175.39	N 39 20 11.03	W 81 0 45.43	3.25
	3482.00	1.09	0.81	3479.93	2378.74	50.12	-43.76	25.16	0.13	0.13	-0.36	308236.72	1572175.41	N 39 20 11.05	W 81 0 45.43	3.26
	3578.00	1.31	1.78	3575.91	2474.72	48.54	-41.75	25.21	0.23	0.23	1.01	308238.73	1572175.46	N 39 20 11.07	W 81 0 45.43	3.27
	3671.00	0.48	35.66	3668.90	2567.71	47.59	-40.37	25.47	1.02	-0.89	38.43	308240.11	1572175.72	N 39 20 11.09	W 81 0 45.43	3.30
	3767.00	0.86	131.15	3764.89	2663.70	48.17	-40.52	26.24	1.07	0.40	99.47	308239.96	1572176.50	N 39 20 11.08	W 81 0 45.42	3.32
	3863.00	1.32	136.90	3860.88	2759.69	49.97	-41.80	27.54	0.49	0.48	5.99	308238.68	1572177.80	N 39 20 11.07	W 81 0 45.40	3.34
	3958.00	1.14	132.65	3955.85	2854.66	51.99	-43.24	28.99	0.21	-0.19	-4.47	308237.24	1572179.24	N 39 20 11.06	W 81 0 45.38	3.35
	4005.00	1.39	188.44	4002.84	2901.65	52.85	-44.12	29.25	2.56	0.53	118.70	308236.36	1572179.50	N 39 20 11.05	W 81 0 45.38	3.38
	4053.00	2.27	213.35	4050.82	2949.63	53.58	-45.49	28.64	2.43	1.83	51.90	308234.99	1572178.89	N 39 20 11.04	W 81 0 45.39	3.41
	4100.00	3.41	233.42	4097.76	2996.57	53.90	-47.10	27.00	3.18	2.43	42.70	308233.38	1572177.26	N 39 20 11.02	W 81 0 45.41	3.44
	4149.00	4.84	249.40	4146.64	3045.45	53.32	-48.70	23.90	3.72	2.92	32.61	308231.79	1572174.15	N 39 20 11.00	W 81 0 45.45	3.48
	4196.00	6.38	259.73	4193.41	3092.22	51.60	-49.86	19.47	3.91	3.28	21.98	308230.62	1572169.73	N 39 20 10.99	W 81 0 45.50	3.53
	4244.00	7.86	267.09	4241.04	3139.85	48.58	-50.50	13.57	3.62	3.08	15.33	308229.98	1572163.82	N 39 20 10.98	W 81 0 45.58	3.58
	4291.00	9.19	274.03	4287.52	3186.33	44.34	-50.40	6.62	3.57	2.83	14.77	308230.08	1572156.87	N 39 20 10.98	W 81 0 45.67	3.62
	4339.00	10.46	276.17	4334.82	3233.63	38.87	-49.66	-1.54	2.75	2.65	4.46	308230.82	1572148.71	N 39 20 10.99	W 81 0 45.77	3.67
	4386.00	11.31	272.46	4380.97	3279.78	33.05	-49.01	-10.39	2.34	1.81	-7.89	308231.48	1572139.87	N 39 20 10.99	W 81 0 45.88	3.71
	4435.00	12.69	270.88	4428.90	3327.71	26.73	-48.72	-20.57	2.89	2.82	-3.22	308231.76	1572129.69	N 39 20 11.00	W 81 0 46.01	3.76
	4482.00	14.19	273.29	4474.61	3373.42	19.87	-48.31	-31.48	3.41	3.19	5.13	308232.17	1572118.77	N 39 20 11.00	W 81 0 46.15	3.81
	4530.00	15.09	275.96	4521.05	3419.86	11.85	-47.32	-43.57	2.34	1.88	5.56	308233.16	1572106.69	N 39 20 11.01	W 81 0 46.30	3.85
	4577.00	16.37	274.85	4566.29	3465.10	3.30	-46.13	-56.26	2.80	2.72	-2.36	308234.36	1572094.00	N 39 20 11.01	W 81 0 46.47	3.89
	4626.00	18.10	274.54	4613.09	3511.90	-6.31	-44.94	-70.73	3.54	3.53	-0.63	308235.54	1572079.53	N 39 20 11.02	W 81 0 46.65	3.94
	4673.00	19.95	276.59	4657.52	3556.33	-16.63	-43.44	-85.97	4.18	3.94	4.36	308237.04	1572064.29	N 39 20 11.04	W 81 0 46.84	4.00
	4721.00	20.97	277.45	4702.49	3601.30	-28.24	-41.39	-102.62	2.22	2.13	1.79	308239.09	1572047.64	N 39 20 11.05	W 81 0 47.06	4.04
	4768.00	21.79	276.46	4746.26	3645.07	-40.08	-39.32	-119.63	1.91	1.74	-2.11	308241.17	1572030.63	N 39 20 11.07	W 81 0 47.27	4.08
	4816.00	21.53	274.57	4790.87	3689.68	-51.99	-37.61	-137.26	1.55	-0.54	-3.94	308242.87	1572013.00	N 39 20 11.09	W 81 0 47.50	4.12
	4912.00	22.60	274.59	4879.84	3778.65	-75.81	-34.73	-173.21	1.11	1.11	0.02	308245.75	1571977.05	N 39 20 11.11	W 81 0 47.96	4.18
	5008.00	23.90	275.84	4968.04	3866.85	-101.15	-31.28	-210.94	1.45	1.35	1.30	308249.20	1571939.32	N 39 20 11.14	W 81 0 48.44	4.24
	5103.00	22.64	276.63	5055.31	3954.12	-126.74	-27.21	-248.25	1.37	-1.33	0.83	308253.27	1571902.01	N 39 20 11.17	W 81 0 48.91	4.30
	5199.00	23.71	278.35	5143.56	4042.37	-153.10	-22.27	-285.70	1.32	1.11	1.79	308258.21	1571864.57	N 39 20 11.21	W 81 0 49.39	4.35
	5295.00	22.83	277.60	5231.75	4130.56	-179.79	-17.01	-323.26	0.97	-0.92	-0.78	308263.48	1571827.01	N 39 20 11.26	W 81 0 49.87	4.40
	5390.00	24.06	276.51	5318.91	4217.72	-205.95	-12.37	-360.77	1.37	1.29	-1.15	308268.11	1571789.50	N 39 20 11.30	W 81 0 50.35	4.45
	5475.00	23.64	276.70	5396.65	4295.46	-229.54	-8.42	-394.91	0.50	-0.49	0.22	308272.06	1571755.36	N 39 20 11.33	W 81 0 50.78	4.48
	5606.00	20.99	273.23	5517.83	4416.64	-262.69	-4.03	-444.43	2.26	-2.02	-2.65	308276.45	1571705.84	N 39 20 11.37	W 81 0 51.41	4.54
	5653.00	20.30	270.59	5561.82	4460.63	-273.04	-3.47	-460.99	2.46	-1.47	-5.62	308277.01	1571689.29	N 39 20 11.37	W 81 0 51.63	4.56
	5702.00	19.62	254.65	5607.91	4506.72	-281.21	-5.57	-477.44	11.16	-1.39	-32.53	308274.91	1571672.84	N 39 20 11.35	W 81 0 51.83	4.61
	5749.00	20.53	238.98	5652.08	4550.89	-284.91	-11.91	-492.12	11.57	1.94	-33.34	308268.57	1571658.16	N 39 20 11.28	W 81 0 52.02	4.66
	5797.00	20.67	225.06	5697.04	4595.85	-284.55	-22.24	-505.34	10.19	0.29	-29.00	308258.25	1571644.94	N 39 20 11.18	W 81 0 52.19	4.70
	5844.00	19.95	211.40	5741.14	4639.95	-280.38	-34.95	-515.39	10.18	-1.53	-29.06	308245.54	1571634.89	N 39 20 11.05	W 81 0 52.31	4.73
	5893.00	20.67	196.71	5787.13	4685.94	-272.11	-50.37	-522.24	10.48	1.47	-29.98	308230.11	1571628.04	N 39 20 10.90	W 81 0 52.39	4.77
	5940.00	21.68	183.64	5830.98	4729.79	-260.56	-66.99	-525.18	10.25	2.15	-27.81	308213.49	1571625.10	N 39 20 10.73	W 81 0 52.43	4.81
	5988.00	23.97	175.48	5875.23	4774.04	-245.55	-85.57	-524.97	8.13	4.77	-17.00	308194.92	1571625.31	N 39 20 10.55	W 81 0 52.42	4.84
	6035.00	26.14	169.80	5917.81	4816.62	-228.21	-105.28	-522.39	6.89	4.62	-12.09	308175.21	1571627.89	N 39 20 10.36	W 81 0 52.38	4.86
	6084.00	30.23	164.90	5961.00	4859.81	-207.08	-127.83	-517.26	9.58	8.35	-10.00	308152.66	1571633.02	N 39 20 10.13	W 81 0 52.31	4.90
	6131.00	34.80	161.97	6000.62	4899.43	-183.36	-152.02	-510.02	10.28	9.72	-6.23	308128.46	1571640.26	N 39 20 9.89	W 81 0 52.21	4.93
	6179.00	38.92	159.64	6039.02	4937.83	-155.91	-179.19	-500.53	9.06	8.58	-4.85	308101.30	1571649.75	N 39 20 9.62	W 81 0 52.08	4.97
	6226.00	43.60	157.67	6074.34	4973.15	-126.04	-208.04	-489.23	10.33	9.96	-4.19	308072.45	1571661.05	N 39 20 9.34	W 81 0 51.94	5.00
	6274.00	48.21	155.32	6107.74	5006.55	-92.49	-239.63	-475.46	10.23	9.60	-4.90	308040.87	1571674.82	N 39 20 9.03	W 81 0 51.76	5.04
	6321.00	52.45	153.27	6137.73	5036.54	-56.99	-272.21	-459.76	9.62	9.02	-4.36	308008.29	1571690.52	N 39 20 8.71	W 81 0 51.55	5.07
	6369.00	55.93	152.16	6165.82	5064.63	-18.60	-306.79	-441.91	7.49	7.25	-2.31	307973.71	1571708.37	N 39 20 8.37	W 81 0 51.32	5.10
	6416.00	60.55	150.74	6190.55	5089.36	20.95	-341.88	-422.80	10.16	9.83	-3.02	307938.62	1571727.47	N 39 20 8.03	W 81 0 51.07	5.14
	6465.00	65.90	148.80	6212.62	5111.43	64.39	-379.65	-400.77	11.48	10.92	-3.96	307900.85	1571749.50	N 39 20 7.66	W 81 0 50.78	5.18
	6512.00	70.50	146.47	6230.07	5128.88	107.89	-416.49	-377.41	10.81	9.79	-4.96	307864.01	1571772.86	N 39 20 7.30	W 81 0 50.47	5.21
	6560.00	73.64	143.16	6244.85	5143.66	153.53	-453.80	-351.09	9.26	6.54	-6.90	307826.71	1571799.18	N 39 20 6.94	W 81 0 50.13	5.25
	6607.00	76.95	140.93	6256.78	5155.59	198.97	-489.63	-323.13	8.41	7.04	-4.74	307790.92	1571827.15	N 39 20 6.59	W 81 0 49.77	5.28
	6656.00	80.63	140.94	6266.30	5165.11	246.99	-526.94	-292.85	7.51	7.51	0.02	307753.57	1571857.42	N 39 20 6.22	W 81 0 49.37	5.31

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WV Department of
Environmental Protection

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
	6703.00	84.92	140.18	6272.21	5171.02	293.55	-562.94	-263.23	9.27	9.13	-1.62	307717.57	1571887.04	N 39 20 5.87 W	81 0 48.99	5.34
	6751.00	89.81	140.17	6274.42	5173.23	341.42	-599.76	-232.53	10.19	10.19	-0.02	307680.75	1571917.73	N 39 20 5.51 W	81 0 48.59	5.37
	6789.00	90.91	139.50	6274.18	5172.99	379.35	-628.79	-208.02	3.39	2.89	-1.76	307651.72	1571942.24	N 39 20 5.23 W	81 0 48.27	5.39
	6883.00	91.62	140.50	6272.55	5171.36	453.21	-685.47	-160.47	1.66	0.96	1.35	307595.05	1571989.79	N 39 20 4.68 W	81 0 47.66	5.42
	6959.00	90.14	141.30	6271.07	5169.88	549.11	-750.96	-99.94	1.75	-1.54	0.83	307530.56	1572050.32	N 39 20 3.95 W	81 0 46.87	5.46
	7054.00	89.31	140.67	6271.53	5170.34	644.04	-833.77	-40.13	1.10	-0.87	-0.66	307446.76	1572110.12	N 39 20 3.23 W	81 0 46.09	5.49
	7150.00	89.07	140.93	6272.88	5171.69	739.94	-908.15	20.54	0.37	-0.25	0.27	307372.37	1572170.79	N 39 20 2.51 W	81 0 45.30	5.53
	7245.00	88.52	141.01	6274.88	5173.69	834.84	-981.93	80.35	0.59	-0.58	0.08	307298.59	1572230.60	N 39 20 1.79 W	81 0 44.53	5.56
	7340.00	88.45	142.03	6277.39	5176.20	929.77	-1056.28	139.44	1.08	-0.07	1.07	307224.26	1572289.69	N 39 20 1.06 W	81 0 43.76	5.59
	7436.00	88.52	140.75	6279.93	5178.74	1025.68	-1131.26	199.32	1.33	0.07	-1.33	307149.27	1572349.57	N 39 20 0.33 W	81 0 42.98	5.62
	7531.00	88.42	139.04	6282.47	5181.28	1120.48	-1203.90	260.50	1.80	-0.11	-1.80	307076.64	1572410.74	N 39 19 59.63 W	81 0 42.19	5.65
	7627.00	89.24	139.22	6284.43	5183.24	1216.21	-1276.48	323.30	0.87	0.85	0.19	307004.07	1572473.54	N 39 19 58.92 W	81 0 41.37	5.67
	7722.00	90.07	139.28	6285.00	5183.81	1310.98	-1348.44	385.31	0.88	0.87	0.06	306932.10	1572535.55	N 39 19 58.22 W	81 0 40.57	5.70
	7818.00	89.52	138.59	6285.34	5184.15	1406.70	-1420.82	448.37	0.92	-0.57	-0.72	306859.73	1572598.61	N 39 19 57.51 W	81 0 39.75	5.72
	7913.00	90.07	138.31	6285.68	5184.49	1501.37	-1491.92	511.38	0.65	0.58	-0.29	306788.64	1572661.61	N 39 19 56.82 W	81 0 38.93	5.75
	8009.00	89.86	137.83	6285.74	5184.55	1596.98	-1563.34	575.53	0.55	-0.22	-0.50	306717.22	1572725.76	N 39 19 56.13 W	81 0 38.10	5.77
	8105.00	89.90	140.16	6285.94	5184.75	1692.71	-1635.78	638.52	2.43	0.04	2.43	306644.78	1572788.74	N 39 19 55.42 W	81 0 37.28	5.80
	8200.00	90.07	137.47	6285.97	5184.78	1787.41	-1707.27	701.07	2.84	0.18	-2.83	306573.30	1572851.29	N 39 19 54.72 W	81 0 36.47	5.82
	8296.00	90.34	137.81	6285.63	5184.44	1882.95	-1778.20	765.75	0.45	0.28	0.35	306502.36	1572915.97	N 39 19 54.03 W	81 0 35.64	5.85
	8392.00	90.17	141.22	6285.20	5184.01	1978.73	-1851.21	828.07	3.56	-0.18	3.55	306429.36	1572978.28	N 39 19 53.32 W	81 0 34.83	5.87
	8487.00	90.41	140.81	6284.72	5183.53	2073.66	-1925.05	887.83	0.50	0.25	-0.43	306355.52	1573038.04	N 39 19 52.60 W	81 0 34.05	5.89
	8583.00	90.48	140.96	6283.97	5182.78	2169.57	-1999.53	948.40	0.17	0.07	0.16	306281.04	1573098.60	N 39 19 51.88 W	81 0 33.26	5.91
	8679.00	90.27	140.60	6283.34	5182.15	2265.48	-2073.91	1009.09	0.43	-0.22	-0.38	306206.68	1573159.30	N 39 19 51.15 W	81 0 32.48	5.93
	8774.00	90.52	140.30	6282.69	5181.50	2360.37	-2147.16	1069.58	0.41	0.26	-0.32	306133.43	1573219.79	N 39 19 50.44 W	81 0 31.69	5.95
	8870.00	89.93	141.57	6282.31	5181.12	2456.29	-2221.69	1130.08	1.46	-0.61	1.32	306058.90	1573280.28	N 39 19 49.71 W	81 0 30.90	5.97
	8966.00	89.48	140.62	6282.81	5181.62	2552.22	-2296.39	1190.37	1.09	-0.47	-0.99	305984.20	1573340.57	N 39 19 48.98 W	81 0 30.12	5.99
	9061.00	89.31	141.46	6283.81	5182.62	2647.14	-2370.26	1250.10	0.90	-0.18	0.88	305910.34	1573400.30	N 39 19 48.26 W	81 0 29.35	6.01
	9157.00	88.35	140.57	6285.77	5184.58	2743.04	-2444.87	1310.48	1.36	-1.00	-0.93	305835.73	1573460.67	N 39 19 47.54 W	81 0 28.56	6.02
	9253.00	88.45	142.94	6288.45	5187.26	2838.97	-2520.23	1369.88	2.47	0.10	2.47	305760.38	1573520.07	N 39 19 46.80 W	81 0 27.79	6.05
	9348.00	88.83	142.61	6290.70	5189.51	2933.94	-2595.65	1427.33	0.53	0.40	-0.35	305684.76	1573577.52	N 39 19 46.06 W	81 0 27.04	6.06
	9443.00	89.07	141.55	6292.45	5191.26	3028.90	-2670.78	1485.71	1.14	0.25	-1.12	305609.63	1573635.89	N 39 19 45.33 W	81 0 26.28	6.08
	9539.00	89.45	138.09	6293.69	5192.50	3124.71	-2744.11	1547.63	3.63	0.40	-3.60	305536.51	1573697.81	N 39 19 44.62 W	81 0 25.48	6.10
	9633.00	89.69	139.37	6294.39	5193.20	3218.41	-2814.75	1609.63	1.39	0.26	1.36	305465.86	1573759.81	N 39 19 43.93 W	81 0 24.68	6.12
	9729.00	89.66	138.53	6294.94	5193.75	3314.14	-2887.15	1672.67	0.88	-0.03	-0.88	305393.47	1573822.85	N 39 19 43.23 W	81 0 23.86	6.13
	9824.00	89.21	140.68	6295.87	5194.68	3408.93	-2959.49	1734.23	2.31	-0.47	2.26	305321.13	1573884.40	N 39 19 42.52 W	81 0 23.06	6.15
	9920.00	89.55	138.00	6296.91	5195.72	3504.70	-3032.31	1796.77	2.81	0.35	-2.79	305248.32	1573946.94	N 39 19 41.81 W	81 0 22.25	6.17
	10014.00	90.38	139.34	6296.97	5195.78	3598.39	-3102.89	1858.65	1.68	0.88	1.43	305177.74	1574009.01	N 39 19 41.13 W	81 0 21.44	6.19
	10109.00	90.93	139.15	6295.88	5194.69	3693.15	-3174.85	1920.86	0.61	0.58	-0.20	305105.79	1574071.03	N 39 19 40.42 W	81 0 20.64	6.20
	10204.00	91.34	139.15	6294.00	5192.81	3787.89	-3246.70	1982.99	0.43	0.43	0.00	305033.94	1574133.15	N 39 19 39.72 W	81 0 19.83	6.22
	10299.00	90.31	139.56	6292.63	5191.44	3882.66	-3318.77	2044.86	1.17	-1.08	0.43	304961.87	1574195.02	N 39 19 39.02 W	81 0 19.03	6.23
	10395.00	90.86	139.96	6291.65	5190.46	3978.48	-3392.05	2106.87	0.71	0.57	0.42	304888.60	1574257.03	N 39 19 38.31 W	81 0 18.23	6.24
	10490.00	90.00	139.75	6290.94	5189.75	4073.31	-3464.66	2168.12	0.93	-0.91	-0.22	304815.99	1574318.27	N 39 19 37.60 W	81 0 17.43	6.26
	10584.00	89.04	141.35	6291.73	5190.54	4167.20	-3537.24	2227.84	1.98	-1.02	1.70	304743.41	1574377.99	N 39 19 36.89 W	81 0 16.66	6.27
	10679.00	89.42	139.82	6293.00	5191.81	4262.08	-3610.63	2288.15	1.66	0.40	-1.61	304670.03	1574438.30	N 39 19 36.18 W	81 0 15.87	6.29
	10774.00	89.93	141.00	6293.54	5192.35	4356.96	-3683.83	2348.69	1.35	0.54	1.24	304596.83	1574498.84	N 39 19 35.47 W	81 0 15.09	6.30
	10869.00	90.27	140.39	6293.38	5192.19	4451.87	-3757.34	2408.87	0.74	0.36	-0.64	304523.32	1574559.01	N 39 19 34.75 W	81 0 14.31	6.32
	10963.00	91.00	140.71	6292.34	5191.15	4545.76	-3829.92	2468.60	0.85	0.78	0.34	304450.75	1574618.73	N 39 19 34.04 W	81 0 13.53	6.33
	11058.00	90.52	140.77	6291.08	5189.89	4640.66	-3903.47	2528.71	0.51	-0.51	0.06	304377.20	1574678.84	N 39 19 33.32 W	81 0 12.75	6.34
	11153.00	88.97	142.01	6291.50	5190.31	4735.60	-3977.70	2587.99	2.09	-1.63	1.31	304302.97	1574738.12	N 39 19 32.60 W	81 0 11.98	6.36
	11249.00	89.11	141.42	6293.11	5191.92	4831.55	-4053.05	2647.46	0.63	0.15	-0.61	304227.63	1574797.58	N 39 19 31.87 W	81 0 11.21	6.37
	11344.00	86.11	141.26	6297.07	5195.88	4926.41	-4127.15	2706.75	3.16	-3.16	-0.17	304153.53	1574856.87	N 39 19 31.14 W	81 0 10.44	6.38
	11440.00	86.77	140.95	6303.03	5201.84	5022.15	-4201.73	2766.91	0.76	0.69	-0.32	304078.96	1574917.03	N 39 19 30.42 W	81 0 9.66	6.40
	11534.00	87.90	141.82	6307.40	5206.21	5116.00	-4275.09	2825.51	1.52	1.20	0.93	304005.60	1574975.62	N 39 19 29.70 W	81 0 8.89	6.41
	11629.00	90.14	141.65	6309.02	5207.83	5210.95	-4349.67	2884.33	2.36	2.36	-0.18	303931.03	1575034.44	N 39 19 28.97 W	81 0 8.13	6.42
	11725.00	91.86	139.65	6307.35	5206.16	5306.82	-4423.88	2945.18	2.75	1.79	-2.08	303856.81	1575095.29	N 39 19 28.25 W	81 0 7.34	6.44
	11820.00	91.41	139.54	6304.64	5203.45	5401.59	-4496.20	3006.73	0.49	-0.47	-0.12	303784.50	1575156.84	N 39 19 27.55 W	81 0 6.54	6.45
	11915.00	91.03	139.45	6302.62	5201.43	5496.37	-4568.41	3068.42	0.41	-0.40	-0.09	303712.29	1575218.53	N 39 19 26.84 W	81 0 5.74	6.46
	12010.00	90.69	138.54	6301.19	5200.00	5591.09	-4640.10	3130.75	1.02	-0.36	-0.96	303640.61	1575280.85	N 39 19 26.14 W	81 0 4.93	6.47
	12105.00	90.96	139.29	6299.81	5198.62	5686.81	-4712.45	3193.83	0.83	0.28	0.78	303568.26	1575343.93	N 39 19 25.44 W	81 0 4.12	6.48
	12200.00	90.86	138.87	6298.31	5197.12	5780.55	-4783.47	3255.39	0.46	-0.11	-0.45	303497.25	1575405.49	N 39 19 24.75 W	81 0 3.32	6.49
	12294.00	91.24	139.98	6296.59	5195.40	5874.32	-4854.85	3316.52	1.25	0.40	1.18	303425.87	1575466.62	N 39 19 24.05 W	81 0 2.52	6.50
	12389.00	91.03	139.01	6294.71	5193.52	5969.10	-4927.07	3378.21	1.04	-0.22	-1.02	303353.65	1575528.30	N 39 19 23.35 W	81 0 1.72	6.51
	12484.00	90.62	138.35	6293.34	5192.15	6063.78	-4998.41	3440.93	0.82	-0.43	-0.69	303282.32	1575591.02	N 39 19 22.65 W	81 0 0.91	6.53
	12579.00	90.34	137.70	6292.55	5191.36	6158.39	-5069.03	3504.47	0.74	-0.29	-0.68	303211.69	1575654.55	N 39 19 21.97 W	81 0 0.09	6.54
	12674.00	90.14	138.78	6292.15	5190.96	6253.02	-5139.90	3567.74	1.16	-0.21	1.14	303140.84	1575717.82	N 39 19 21.28 W	80 59 59.27	6.55
	12769.00	89.76	138.59	6292.23	5191.04	6347.72	-5211.25	3630.45	0.45	-0.40	-0.20	303069.49	1575780.53	N 39 19 20.58 W	80 59 58.45	6.56
	12865.00	89.73	138.35	6292.66	5191.47	6443.38	-5283.11	3694.10	0.25	-0.03	-0.25	302997.62	1575844.18	N 39 19 19.88 W	80 59 57.63	6.57
	12960.00	90.79	138.86	6292.23	5191.04	6538.07	-5354.38	3756.92	1.24	1.12	0.54	302926.36	1575906.99	N 39 19 19.19 W	80 59 56.82	6.58
	13055.00	90.72	140.73	6290.98	5189.79	6632.89	-5426.92	3818.24	1.97	-0.07	1.97	302853.82	1575968.31	N 39 19 18.48 W	80 59 56.02	6.59
	13151.00	90.65	138.84	6289.83	5188.64	6728.70	-5500.22	3880.21	1.97	-0.07	-1.97	302780.52	1576030.28	N 39 19 17.77 W	80 59 55.22	6.60
	13246.00	91.00	139.40	6288.46	5187.27	6823.44	-5572.04	3942.38	0.70	0.37	0.59	302708.71	1576092.44	N 39 19 17.07 W	80 59 54.41	6.61
	13342.00	91.00	139.13	6286.78	5185.59	6919.19	-5644.78	4005.02	0.28	0.00	-0.28	302635.98	1576155.08	N 39 19 16.36 W	80 59 53.60	6.62
	13438.00	90.21	139.42	6285.77	5184.58	7014.96	-5717.52	4067.65	0.88	-0.82	0.30	302563.23	1576217.70	N 39 19 15.65 W	80 59 52.79	6.63
	13533.00	90.52	138.96	6285.17	5183.98	7109.72	-5789.43	4129.73	0.58	0.33	-0.48	302491.34	1576279.79	N 39 19 14.95 W	80 59 51.98	6.64
	13628.00	90.34	139.54	6284.45	5183.26	7204.48	-5861.39	4191.74	0.64	-0.19	0.61	302419.37	1576341.79	N 39 19 14.25 W	80 59 51.18	6.65
	13724.00	90.45	139.76	6283.79	5182.60	7300.29	-5934.55	4253.90	0.26	0.11	0.23	302346.22	1576403.94	N 39 19 13.54 W	80 59 50.37	6.66
	13819.00	90.45	139.17	6283.04	5181.85	7395.08	-6006.75	4315.64	0.62	0.00	-0.62	302274.02	1576465.68	N 39 19 12.83 W	80 59 49.57	6.66
	13915.00	90.34	139.33	6282.38	5181.19	7490.84	-6079.48	4378.30	0.20	-0.11	0.17	302201.30	1576528.34	N 39 19 12.13 W	80 59 48.76	6.67
	14010.00	90.17	139.56	6281.96	5180.77	7585.63	-6151.65	4440.07	0.29	-0.18	0.23	302129.13	1576590.11	N 39 19 11.42 W	80 59 47.95	6.68
	14104.00	90.31	139.26	6281.57	5180.38	7679.42	-6223.02	4501.24	0.34	0.15	-0.31	302057.76	1576651.27	N 39 19 10.73 W	80 59 47.16	6.69
	14200.00	90.21	139.81	6281.13	5179.94	7775.22	-6296.06	4563.54	0.58	-0.10	0.57	301984.73	1576713.57	N 39 19 10.02 W	80 59 46.35	6.70
	14295.00	90.38	141.46	6280.64	5179.45	7870.12	-6369.50	4623.79	1.75	0.18	1.74	301911.29	1576773.82	N 39 19 9.30 W	80 59 45.57	6.71
	14391.00	90.24	141.40	6280.12	5178.93	7966.07	-6444.56	4683.64	0.16	-0.15	-0.06	301836.23	1576833.67	N 39 19 8.57 W	80 59 44.79	6.72
	14486.00	90.45	141.67	6279.55	5178.36	8061.02	-6518.94	4742.74	0.36	0.22	0.28	301761.86	1576892.76	N 39 19 7.84 W	80 59 44.03	6.72
	14581.00	90.55	141.58	6278.72	5177.53	8155.98	-6593.42	4801.71	0.14	0.11	-0.09	301687.39	1576951.73	N 39 19 7.12 W	80 59 43.26	6.73
	14678.00	90.10	141.50	6278.18	5176.99	8250.94	-6667.80	4860.80	0.48	-0.47	-0.08	301613.00	1577010.81	N 39 19 6.39 W	80 59 42.49	6.74
	14771.00	89.73	141.30	6278.32	5177.13	8345.89	-6742.05	4920.06	0.44	-0.39	-0.21	301538.76	1577070.08	N 39 19 5.67 W	80 59 41.72	6.75
	14866.00	89.28	141.82	6279.14	5177.95	8440.84	-6816.45	4979.12	0.72	-0.47	0.55	301464.36	1577129.14	N 39 19 4.94 W	80 59 40.96	6.76
	14960.00	89.42	141.84	6280.21	5179.02	8534.80	-6890.35	5037.21	0.15	0.15	0.02	301390.47	1577187.22	N 39 19 4.22 W	80 59 40.20	6.76
	15054.00	89.42	141.66	6281.16	5179.97	8628.77	-6964.17	5095.40	0.19	0.00	-0.19	301316.65	1577245.41	N 39 19 3.50 W	80 59 39.45	6.77
	15150.00	89.38	141.43	6282.17	5180.98	8724.72	-7039.34	5155.10	0.24	-0.04	-0.24	301241.48	1577305.11	N 39 19 2.77 W	80 59 38.67	6.78
	15245.00	89.79	141.98	6282.86	5181.67	8819.68	-7113.90	5213.97	0.72	0.43	0.58	301166.93	1577363.97	N 39 19 2.04 W	80 59 37.91	6.79
	15340.00	90.00	141.40	6283.03	5181.84	8914.65	-7188.44	5272.86	0.65	0.22	-0.61	301092.39	1577422.86	N 39 19 1.31 W	80 59 37.14	6.79
	15436.00	89.90	141.19	6283.11	5181.92	9010.59	-7263.36	5332.89	0.24	-0.10	-0.22	301017.48	1577482.89	N 39 19 0.58 W	80 59 36.36	6.80
	15532.00	89.97	141.41	6283.22	5182.03	9106.54	-7338.28	5392.92	0.24	0.07	0.23	300942.56	1577542.91	N 39 18 59.85 W	80 59 35.58	6.81
	15628.00	90.14	140.32	6283.13	5181.94	9202.45	-7412.74	5453.51	1.15	0.18	-1.14	300868.10	1577603.50	N 39 18 59.13 W	80 59 34.80	6.82
	15724.00	90.03	139.29	6282.99	5181.80	9298.26	-7486.07	5515.46	1.08	-0.11	-1.07	300794.78	1577665.45	N 39 18 58.41 W	80 59 33.99	6.83
	15820.00	89.35	139.26	6283.51	5182.32	9394.04	-7558.82	5578.09	0.71	-0.71	-0.03	300722.03	1577728.08	N 39 18 57.70 W	80 59 33.18	6.83
	15916.00	89.55	139.38	6284.43	5183.24	9489.81	-7631.62	5640.67	0.24	0.21	0.13	300649.23	1577790.65	N 39 18 56.99 W	80 59 32.37	6.84
	16012.00	89.59	139.23	6285.15	5183.96	9585.58	-7704.40	5703.26	0.16	0.04	-0.16	300576.45	1577853.24	N 39 18 56.29 W	80 59 31.56	6.85
	16107.00	89.55	139.38	6285.86	5184.67	9680.36	-7776.43	5765.20	0.16	-0.04	0.16	300504.43	1577915.18	N 39 18 55.58 W	80 59 30.75	6.85
	16203.00	89.52	139.58	6286.64	5185.45	9776.14	-7849.40	5827.57	0.21	-0.03	0.21	300431.46	1577977.54	N 39 18 54.87 W	80 59 29.94	6.86
	16298.00	89.62	139.63	6287.35	5186.16	9870.95	-7921.75	5889.14	0.12	0.11	0.05	300359.11	1578039.11	N 39 18 54.17 W	80 59 29.15	6.87
	16393.00	90.03	139.21	6287.64	5186.45	9965.74	-7993.91	5950.93	0.62	0.43	-0.44	300286.96	1578100.90	N 39 18 53.47 W	80 59 28.34	6.88
Final Survey 13Jun14	16458.00	89.97	139.15	6287.64	5186.45	10030.57	-8043.09	5993.42	0.13	-0.09	-0.09	300237.78	1578143.39	N 39 18 52.99 W	80 59 27.79	6.88
PTB	16485.00	89.97	139.15	6287.66	5186.47	10057.50	-8063.52	6011.08	0.00	0.00	0.00	300217.35	1578161.05	N 39 18 52.79 W	80 59 27.56	6.88

Survey Type: Def Survey

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma

Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey

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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
		1	0.000	26.000	Act Stns	30.000	30.000	SLB_NSG+MSHOT-Depth Only		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to 16485ft MD						
		1	26.000	952.000	Act Stns	30.000	30.000	SLB_NSG+MSHOT		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	952.000	1097.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	1097.000	1193.000	Act Stns	30.000	30.000	SLB_INC_ONLY<10		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	1193.000	5475.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	5475.000	6863.000	Act Stns	30.000	30.000	SLB_MWD-INC_ONLY>10		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	6863.000	6959.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	6959.000	7054.000	Act Stns	30.000	30.000	SLB_MWD-INC_ONLY>10		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	7054.000	8009.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	8009.000	8105.000	Act Stns	30.000	30.000	SLB_MWD-INC_ONLY>10		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	8105.000	8870.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	8870.000	9061.000	Act Stns	30.000	30.000	SLB_MWD-INC_ONLY>10		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	9061.000	9157.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	9157.000	9253.000	Act Stns	30.000	30.000	SLB_MWD-INC_ONLY>10		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	9253.000	9539.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	9539.000	9633.000	Act Stns	30.000	30.000	SLB_MWD-INC_ONLY>10		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	9633.000	10490.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	10490.000	11029.000	Act Stns	30.000	30.000	SLB_MWD-INC_ONLY>10		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	11029.000	16458.000	Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						
		1	16458.000	16485.000	Act Stns	30.000	30.000	SLB_BLIND+TREND		Original Borehole / Noble Energy PEN2CHS Gyro+MWD 0ft to						

PATHFINDER
A Schlumberger Company

Noble Energy

noble energy

Borehole:	Well:	Field:	Structure:
Original Borehole	PEN2CHS	WV Ritchie County (NAD27)	Nomac 78

Gravity & Magnetic Parameters

Model:	HDGM 2013	Dip:	66.832°	Date:	23-May-2014
MagDec:	-7.864°	FS:	52221.845nT	Gravity FS:	999.309mgn (9.80665 Based)

Surface Location NAD27 West Virginia State Plane, Northern Zone, US Feet

Lat:	N 39 20 11.48	Northing:	308280.481ftUS	Grid Conv:	-0.9648°
Lon:	W 81 0 45.76	Easting:	1572150.255ftUS	Scale Fact:	0.99995343

Miscellaneous

Slot:	PEN2CHS	TVD Ref:	KB(1101.19ft above MSL)
Plan:	Noble Energy PEN2CHS Gyro+MWD 0ft to 16485ft MD		

Surface Location

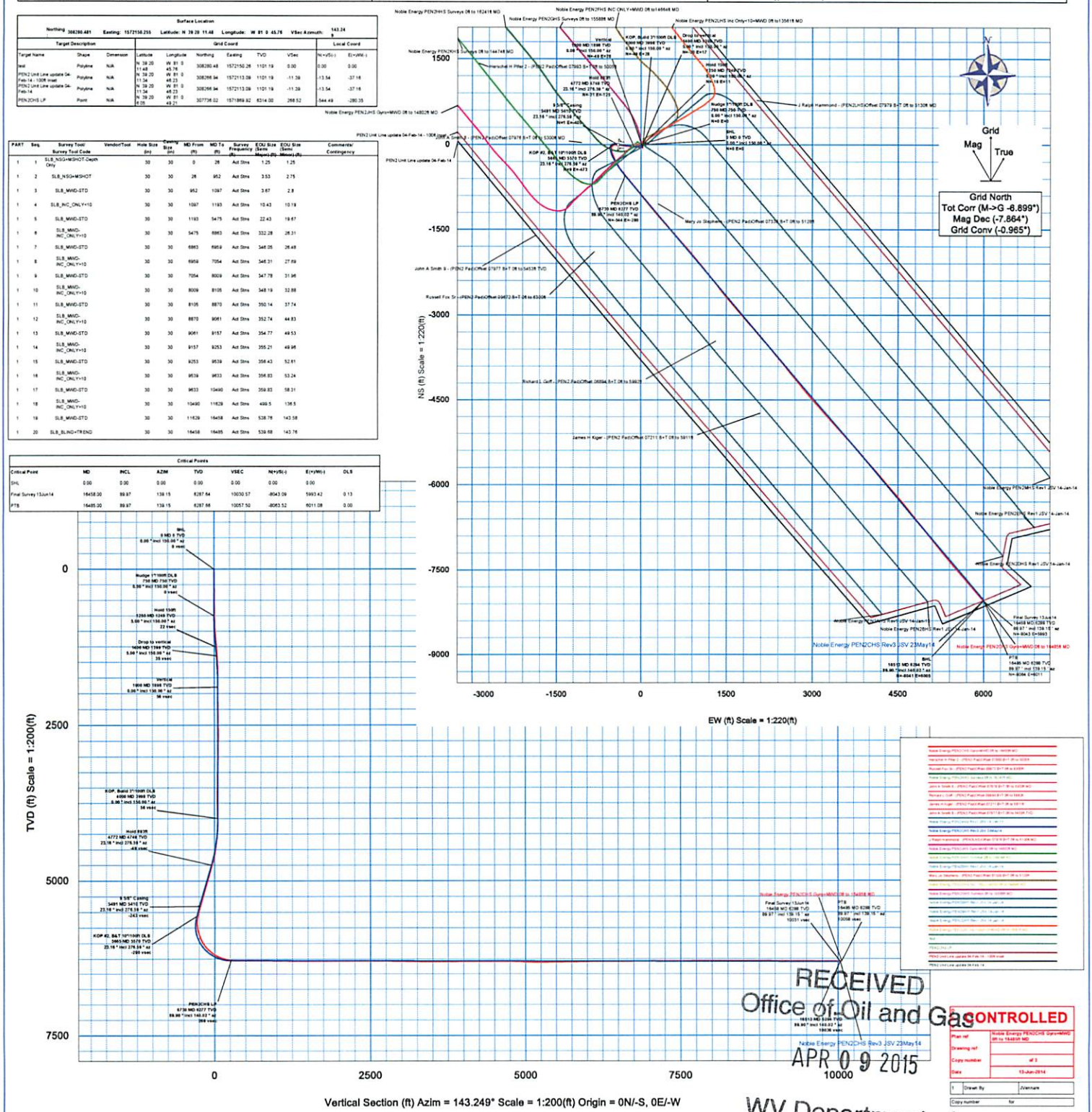
Northing: 308280.481 Easting: 1572150.255 Latitude: N 39 20 11.48 Longitude: W 81 0 45.76 VSec Azimuth: 143.24 °

Target Description			Grid Coord				Local Coord	
Target Name	Shape	Dimension	Latitude	Longitude	Northing	Easting	TVD	VSec	N(+)/S(-)	E(+)/W(-)
test	Polyline	N/A	N 39 20 11.48	W 81 0 45.76	308280.48	1572150.26	1101.19	0.00	0.00	0.00
PEN2 Unit Line update 04-Feb-14 - 100ft inset	Polyline	N/A	N 39 20 11.34	W 81 0 46.23	308266.94	1572113.09	1101.19	-11.39	-13.54	-37.16
PEN2 Unit Line update 04-Feb-14	Polyline	N/A	N 39 20 11.34	W 81 0 46.23	308266.94	1572113.09	1101.19	-11.39	-13.54	-37.16
PEN2CHS LP	Point	N/A	N 39 20 8.05	W 81 0 49.21	307736.02	1571869.82	6314.00	268.52	544.49	-280.35

PART	Seq.	Survey Tool/ Survey Tool Code	Vendor/Tool	Hole Size (in)	Casing Size (in)	MD From (ft)	MD To (ft)	Survey Frequency (ft)	EOU Size (Semi Major)(ft)	EOU Size (Semi Minor) (ft)	Comments/ Contingency
1	1	SLB_NSG+MSHOT-Depth Only		30	30	0	28	Act Stns	1.25	1.25	
1	2	SLB_NSG+MSHOT		30	30	28	952	Act Stns	3.53	2.75	
1	3	SLB_MWD-STD		30	30	952	1097	Act Stns	3.67	2.8	
1	4	SLB_INC_ONLY+10		30	30	1097	1193	Act Stns	10.43	10.19	
1	5	SLB_MWD-STD		30	30	1193	5475	Act Stns	22.43	19.67	
1	6	SLB_MWD-INC_ONLY+10		30	30	5475	6863	Act Stns	332.28	26.31	
1	7	SLB_MWD-STD		30	30	6863	6959	Act Stns	346.05	26.48	
1	8	SLB_MWD-INC_ONLY+10		30	30	6959	7054	Act Stns	346.31	27.69	
1	9	SLB_MWD-STD		30	30	7054	8009	Act Stns	347.78	31.96	
1	10	SLB_MWD-INC_ONLY+10		30	30	8009	8105	Act Stns	348.19	32.88	
1	11	SLB_MWD-STD		30	30	8105	8870	Act Stns	350.14	37.74	
1	12	SLB_MWD-INC_ONLY+10		30	30	8870	9061	Act Stns	352.74	44.83	
1	13	SLB_MWD-STD		30	30	9061	9157	Act Stns	354.77	49.53	
1	14	SLB_MWD-INC_ONLY+10		30	30	9157	9253	Act Stns	355.21	49.96	
1	15	SLB_MWD-STD		30	30	9253	9539	Act Stns	356.43	52.61	
1	16	SLB_MWD-INC_ONLY+10		30	30	9539	9633	Act Stns	356.83	53.24	
1	17	SLB_MWD-STD		30	30	9633	10490	Act Stns	359.83	58.31	
1	18	SLB_MWD-INC_ONLY+10		30	30	10490	11629	Act Stns	499.5	136.5	
1	19	SLB_MWD-STD		30	30	11629	16458	Act Stns	538.78	143.58	
1	20	SLB_BLIND+TREND		30	30	16458	16485	Act Stns	539.68	143.76	

Critical Points

Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Final Survey 13Jun14	16458.00	89.97	139.15	6287.64	10030.57	-8043.09	5993.42	0.13
PTB	16485.00	89.97	139.15	6287.66	10057.50	-8063.52	6011.08	0.00



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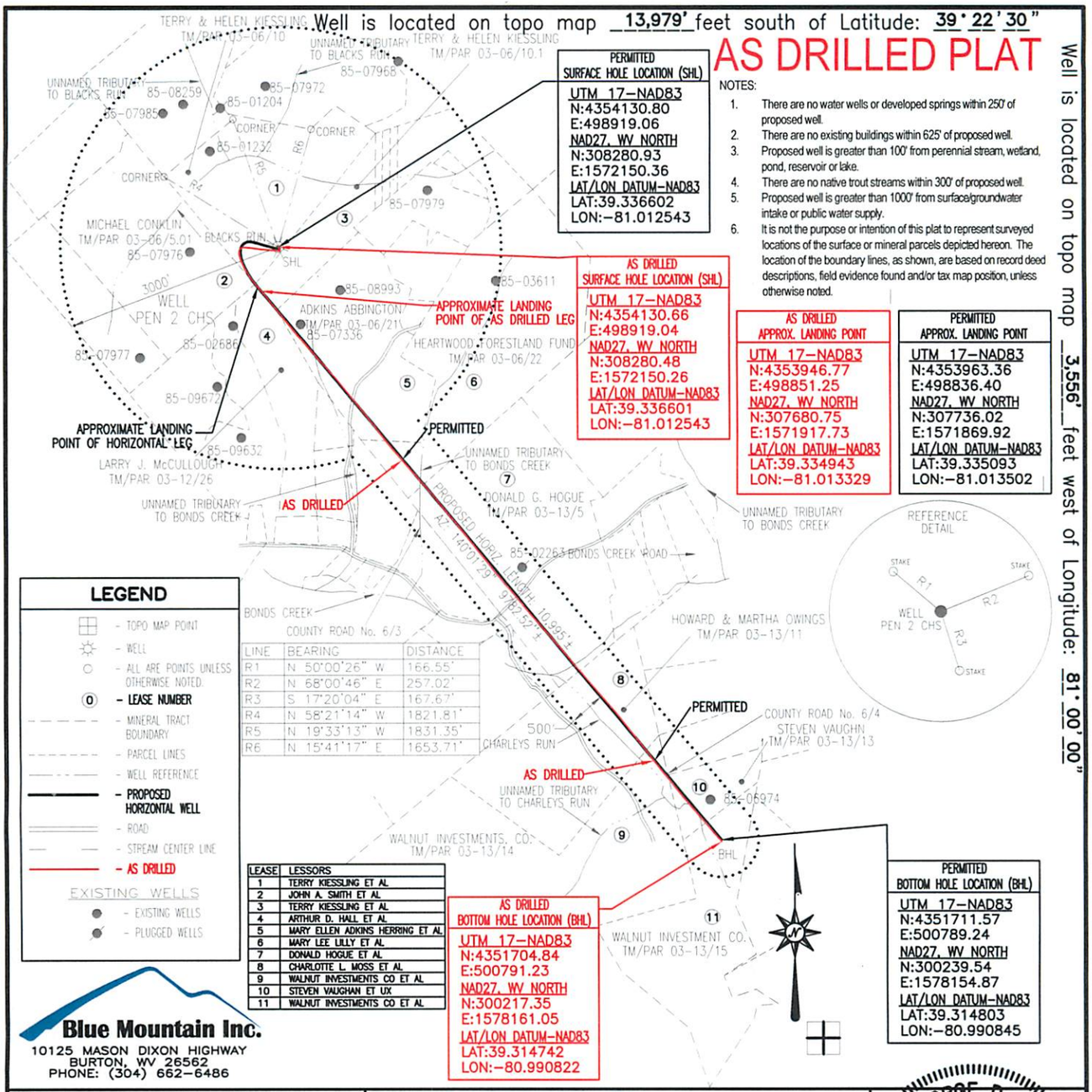
Plan ref	Noble Energy PEN2CHS Gyro+MWD 0ft to 16485ft MD
Drawing ref	
Copy number	of 3
Date	13-Jun-2014
1	Drawn By: JVenture
Copy number	for

AS DRILLED PLAT

Well is located on topo map 13,979' feet south of Latitude: 39°22'30"

Well is located on topo map 3,556' feet west of Longitude: 81°00'00"



LINE	BEARING	DISTANCE
R1	N 50°00'26" W	166.55'
R2	N 68°00'46" E	257.02'
R3	S 17°20'04" E	167.67'
R4	N 58°21'14" W	1821.81'
R5	N 19°33'13" W	1831.35'
R6	N 15°41'17" E	1653.71'

LEGEND

- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED
- (0) – LEASE NUMBER
- MINERAL TRACT BOUNDARY
- PARCEL LINES
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE
- AS DRILLED

EXISTING WELLS

- EXISTING WELLS
- PLUGGED WELLS

LEASE	LESSORS
1	TERRY KIESSLING ET AL
2	JOHN A. SMITH ET AL
3	TERRY KIESSLING ET AL
4	ARTHUR D. HALL ET AL
5	MARY ELLEN ADKINS HERRING ET AL
6	MARY LEE LILLY ET AL
7	DONALD HOGUE ET AL
8	CHARLOTTE L. MOSS ET AL
9	WALNUT INVESTMENTS CO ET AL
10	STEVEN VAUGHAN ET UX
11	WALNUT INVESTMENTS CO ET AL

PERMITTED SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4354130.80
E:498919.06
NAD27, WV NORTH
N:308280.93
E:1572150.36
LAT/LON DATUM-NAD83
LAT:39.336602
LON:-81.012543

AS DRILLED SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4354130.66
E:498919.04
NAD27, WV NORTH
N:308280.48
E:1572150.26
LAT/LON DATUM-NAD83
LAT:39.336601
LON:-81.012543

AS DRILLED APPROX. LANDING POINT
UTM 17-NAD83
N:4353946.77
E:498851.25
NAD27, WV NORTH
N:307680.75
E:1571917.73
LAT/LON DATUM-NAD83
LAT:39.334943
LON:-81.013329

PERMITTED APPROX. LANDING POINT
UTM 17-NAD83
N:4353963.36
E:498836.40
NAD27, WV NORTH
N:307736.02
E:1571869.92
LAT/LON DATUM-NAD83
LAT:39.335093
LON:-81.013502

AS DRILLED BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4351704.84
E:500791.23
NAD27, WV NORTH
N:300217.35
E:1578161.05
LAT/LON DATUM-NAD83
LAT:39.314742
LON:-80.990822

PERMITTED BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4351711.57
E:500789.24
NAD27, WV NORTH
N:300239.54
E:1578154.87
LAT/LON DATUM-NAD83
LAT:39.314803
LON:-80.990845

NOTES:

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

Blue Mountain Inc.
10125 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

FILE #: PEN 2 CHS-AS DRILLED

DRAWING #: PEN 2 CHS-AS DRILLED

SCALE: 1" = 2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

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

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

Signed: George W. Six

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

GEORGE D. SIX LICENSED No. 2000 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

PLACE SEAL HERE

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

DATE: FEBRUARY 11, 2015

OPERATOR'S WELL #: PEN 2 CHS-AS DRILLED

API WELL #: 47 (STATE) 85 (COUNTY) 10055 (PERMIT)

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: NORTH FORK HUGHES RIVER ELEVATION: 1084'±

COUNTY/DISTRICT: RITCHIE / CLAY QUADRANGLE: ELLENBORO, WV 7.5'

SURFACE OWNER: TERRY & HELEN KIESSLING ACREAGE: 79.242±

OIL & GAS ROYALTY OWNER: TERRY KIESSLING ET AL ACREAGE: 992.959±

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☐

PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐

CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,423'± TMD: 16,598'±

WELL OPERATOR NOBLE ENERGY, INC. DESIGNATED AGENT STEVEN M. GREEN

Address 333 TECHNOLOGY DRIVE, SUITE 116 Address 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590

City CANONSBURG State PA Zip Code 15317 City CHARLESTON State WV Zip Code 25301

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

API 47 - 085 - 10066 County Ritche District Clay
Quad Pennsboro Pad Name PEN 2 Field/Pool Name NA
Farm name Terry & Helen Kiessling Well Number PEN 2 MHS
Operator (as registered with the OOG) Noble Energy, Inc.
Address 1000 Noble Energy Drive City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4354137.44 Easting 498936.03
Landing Point of Curve Northing 4354324.56 Easting 499448.58
Bottom Hole Northing 4352176.30 Easting 501314.35

Elevation (ft) 1084 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

Drilling 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 10/30/2013 Date drilling commenced 01/20/2014 Date drilling ceased 09/24/2014
Date completion activities began 10/25/2014 Date completion activities ceased 1/24/2015
Verbal plugging (Y/N) N Date permission granted _____ Granted by _____

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

Freshwater depth(s) ft 454 Open mine(s) (Y/N) depths none
Salt water depth(s) ft 1244 Void(s) encountered (Y/N) depths none
Coal depth(s) ft no coal Cavern(s) encountered (Y/N) depths none
Is coal being mined in area (Y/N) N

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Reviewed by:
AL 5/19/2015
W.S. 6/01/15

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API 47- 085 - 10066 Farm name Terry & Helen Kiessling Well number PEN 2 MHS

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	36	30	40	N			
Surface	17 1/2	13 3/8	605.0	N	J-55 54.5#		Y
Coal							
Intermediate 1	12 3/8	9 5/8	5,630.6	N	K-55 36#		Y
Intermediate 2							
Intermediate 3							
Production	8 3/4	5 1/2	16,640.7	N	P-110 20#		Y
Tubing							
Packer type and depth set							

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor							
Surface	TYPE 1	532	15.6	1.20	638	0	8
Coal							
Intermediate 1							
Intermediate 2	Class A	Lead 963 Tail 302	Lead 2.0 Tail 15.6	Lead 1.62 Tail 1.37	Lead 1560 Tail 414	0	8
Intermediate 3							
Production	Class A	Lead 425 Tail 2266	Lead 14.2 Tail 14.8	Lead 1.62 Tail 1.37	Lead 688 Tail 3104	5510	8
Tubing							

Drillers TD (ft) 16,612 Loggers TD (ft) 16,518

Deepest formation penetrated Marcellus Plug back to (ft) Not a Pilot Hole

Plug back procedure Not a Pilot Hole

Kick off depth (ft) 7369

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction
☐ neutron ☐ resistivity ■ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ☐ No ☐ Conventional ☐ Sidewall Were cuttings collected ■ Yes ☐ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING Conductor - No centralizers used. Fresh Water/Surface- Surface - 5 centralizers used, one every third joint Intermediate - 68 centralizers - bow spring centralizers on every joint to KOP, on every third joint from KOP to 100' from surface. Production - 292 centralizers - rigid bow spring every third joint from KOP to TOC, rigid bow spring every joint to KOP.

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10066 Farm name Terry & Helen Kiessling Well number PEN 2 MHS

PERFORATION RECORD

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

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	SEE ATTACHED STIMULATION							
	INFORMATION PER STAGE							
	RECORD							

Please insert additional pages as applicable.

Perforation Record

API: 47-085-10066 Farm name: Kiessling, Terry & Helen Well Name: PEN-2-M-HS

Stage No.	Stim Date	Top Perf	Bottom Perf	# of Perfs	Formation
1	10/25/2014	16,291	16,495	36	Marcellus
2	10/26/2014	15,987	16,191	36	Marcellus
3	10/28/2014	15,684	15,888	36	Marcellus
4	10/29/2014	15,381	15,585	36	Marcellus
5	10/30/2014	15,077	15,282	36	Marcellus
6	10/31/2014	14,774	14,978	36	Marcellus
7	11/2/2014	14,471	14,675	36	Marcellus
8	11/3/2014	14,167	14,372	36	Marcellus
9	11/4/2014	13,864	14,068	36	Marcellus
10	11/5/2014	13,561	13,765	36	Marcellus
11	11/6/2014	13,258	13,462	36	Marcellus
12	11/8/2014	12,954	13,158	36	Marcellus
13	11/9/2014	12,651	12,855	36	Marcellus
14	11/10/2014	12,348	12,552	36	Marcellus
15	11/10/2014	12,044	12,249	36	Marcellus
16	11/10/2014	11,741	11,945	36	Marcellus
17	11/11/2014	11,438	11,642	36	Marcellus
18A	11/11/2014	11,134	11,339	36	Marcellus
18B	11/11/2014	11,119	11,204	36	Marcellus
19	11/12/2014	10,831	11,035	36	Marcellus
20	11/13/2014	10,528	10,732	36	Marcellus
21	11/13/2014	10,225	10,429	36	Marcellus
22	11/14/2014	9,921	10,125	36	Marcellus
23	11/14/2014	9,618	9,822	36	Marcellus
23B Inj Test	11/24/2014	-	-	-	Marcellus
23B	11/25/2014	9,580	9,607	36	Marcellus
24	11/26/2014	9,315	9,519	36	Marcellus
25	11/26/2014	9,011	9,216	36	Marcellus
26	11/26/2014	8,708	8,912	36	Marcellus
27	11/27/2014	8,405	8,609	36	Marcellus
28	11/27/2014	8,101	8,306	36	Marcellus
29	11/27/2014	7,798	8,002	36	Marcellus
30	11/28/2014	7,495	7,699	36	Marcellus
31	11/28/2014	7,192	7,396	36	Marcellus
32	11/28/2014	6,888	7,092	36	Marcellus

STIMULATION INFORMATION PER STAGE

API: 47-085-10066 Farm name: Kiessling, Terry & Helen Well Name: PEN-2 -M-HS

Stage No.	Stim Date	Avg Rate (bpm)	ATP (psi)	Max BD Pressure	ISIP (psi)	Proppant (lbs)	Water (BBLS)	Amount of N^2/ other (units)
Trigger Toes	10/25/2014	0.0	-	9,560	6,180	-	527	
1	10/25/2014	79.4	7,692	5,822	3,254	595,650	12,477	
2	10/26/2014	81.2	7,583	6,092	3,609	596,500	14,651	
3	10/28/2014	82.0	7,950	5,532	4,705	600,500	14,533	
4	10/29/2014	84.2	7,728	5,293	3,440	604,800	12,518	
5	10/30/2014	83.0	7,800	5,486	3,365	599,900	12,853	
6	10/31/2014	83.5	7,912	6,022	2,336	600,550	14,273	
7	11/2/2014	78.0	8,051	5,833	3,458	603,000	12,381	
8	11/3/2014	73.2	8,127	5,772	4,224	600,800	17,925	
9	11/4/2014	83.4	7,806	6,326	3,383	601,900	12,146	
10	11/5/2014	82.5	7,909	5,704	3,580	603,450	12,811	
11	11/6/2014	71.0	7,704	6,444	3,483	600,850	20,252	
12	11/8/2014	80.2	7,980	6,262	3,562	601,400	14,295	
13	11/9/2014	75.0	8,458	5,987	3,330	600,450	16,628	
14	11/10/2014	78.3	8,418	6,709	3,054	600,750	13,130	
15	11/10/2014	84.1	8,229	5,540	3,211	601,650	12,653	
16	11/10/2014	88.0	7,609	5,014	3,086	601,900	12,775	
17	11/11/2014	87.3	7,581	5,068	3,022	600,420	12,540	
18A	11/11/2014	84.4	8,276	6,073	5,068	236,940	9,521	
18B	11/11/2014	68.0	8,122	6,351	5,168	269,450	11,662	
19	11/12/2014	66.1	7,924	5,926	3,040	695,000	17,354	
20	11/13/2014	71.0	7,739	5,261	3,294	603,100	19,638	
21	11/13/2014	71.9	8,118	5,507	3,244	601,600	14,966	
22	11/14/2014	90.0	8,374	5,304	3,093	607,850	12,473	
23	11/14/2014	82.0	8,407	5,676	4,967	129,450	8,981	
23B Inj Test	11/24/2014	10.1	6,422	6,548	4,978	-	401	
23B	11/25/2014	74.6	8,040	6,598	3,651	472,000	12,417	
24	11/26/2014	84.9	7,894	7,482	3,465	599,940	12,576	
25	11/26/2014	86.6	7,802	5,779	3,819	601,482	14,419	
26	11/26/2014	85.1	7,686	7,313	3,240	603,250	13,722	
27	11/27/2014	87.4	7,608	4,549	3,676	599,740	12,529	
28	11/27/2014	87.1	7,529	5,193	3,519	599,810	12,628	
29	11/27/2014	88.3	7,579	6,373	3,333	603,500	12,263	
30	11/28/2014	89.0	7,200	5,515	3,172	599,400	12,197	
31	11/28/2014	89.0	7,053	5,479	3,279	600,400	12,932	
32	11/28/2014	90.2	6,565	6,823	3,051	600,750	12,172	

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Page ___ of ___

API 47- 085 - 10066 Farm name Terry & Helen Kiessling Well number PEN 2 MHS

PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6,323 TVD	16,612 MD	

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ☐ Open Flow OIL TEST ☐ Flow ☐ Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	3,832 mcfpd	134 bpd	390 bpd	1023 bpd	☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
	SEE ATTACHED FORMATION SHEET				

Please insert additional pages as applicable.

Drilling Contractor NOMAC
Address 171 Locust Avenue Ext. City Mt. Morris State PA Zip 15349

Logging Company _____
Address _____ City _____ State _____ Zip _____

Cementing Company Baker Hughes
Address 4600 J Barry Court, Suite 200 City Canonsburg State PA Zip 15317

Stimulating Company U. S Well Service
Address 533 Industrial Park Drive City Jane Lew State WV Zip 26378
Please insert additional pages as applicable.

Completed by Regina A. Logue Telephone 724-820-3559
Signature Regina A. Logue Title Regulatory Analyst Date 2/18/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

PEN 2 MHS 47-085-10066

Formations	Top TVD	Base TVD	Top MD	Base MD	Fluid
Shale and Sandstone	0	1309	0	1309	
Sandstone	1309	1433	1309	1423	
Shale and Sandstone	1423	1593	1423	1593	
Sandstone	1593	1635	1593	1635	
Shale and Sandstone	1635	1737	1635	1737	
Maxton Sand	1737	1820	1737	1820	
Shale and Sandstone	1820	1943	1820	1943	
Big Lime	1943	1998	1943	1998	
Big Injun	1998	2133	1998	2133	
Price	2133	2405	2133	2405	
Weir	2405	2444	2405	2444	
Shale	2444	2724	2444	2724	
Gordon	2724	2741	2724	6301	
Shale and Sandstone	2741	2921	2741	6302	
5th Sand	2921	2933	2921	6371	
Shale	2933	3076	2933	not encountered	
Sandstone	3076	3090	3076	not encountered	
Shale	3090	3498	3090	not encountered	
Warren	3498	3560	3500	6300	
Shale	3560	3894	3562	6301	
Sandstone	3894	3931	3900	6302	
Shale and Sandstone	3931	4925	3937	6371	
Benson	4925	4987	4941	not encountered	
Shale	4987	5147	5004	not encountered	
Alexander	5147	5215	5166	not encountered	
Shale	5215	5725	5234	not encountered	
Rheinstreet	5725	6051	5750	not encountered	
Cashaqua	6051	6143	6080	not encountered	
Middlesex	6143	6172	6176	not encountered	
West River	6172	6216	6206	not encountered	
Burkett	6216	6259	6253	not encountered	
Tully Limestone	6259	6260	6300	not encountered	
Hamilton	6260	6261	6301	6302	Gas
Marcellus	6261	6320	6302	6371	
Onondaga	6320		6371	not encountered	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	10/25/2014
Job End Date:	11/28/2014
State:	West Virginia
County:	Ritchie
API Number:	47-085-10066-00-00
Operator Name:	Noble Energy, Inc.
Well Name and Number:	Pen 2 M
Longitude:	-81.01251400
Latitude:	39.33658300
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,323
Total Base Water Volume (gal):	19,413,198
Total Base Non Water Volume:	965,974

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

INTERSTATE Oil & Gas COMPACT COMMISSION

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	Noble Energy	Base Fluid					
			Water	7732-18-5	100.00000	89.02343	
40/70 Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	7.34466	
70/140 Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	3.23335	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.18039	
			Hydrogen Chloride	7647-01-0	18.00000	0.04309	
WFRA-405e	U.S. Well Services	Friction Reducer					
			Anionic Polyacrylamide	Proprietary	40.00000	0.02641	
			Water	7732-18-5	40.00000	0.02641	
			Sodium Chloride	7647-14-5	20.00000	0.01321	
			Petroleum Distillates	64742-47-8	20.00000	0.01063	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00330	
LGC-15	U.S. Well Services, LLC	Gelling Agents					
			Guar Gum	9000-30-0	50.00000	0.01384	

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			Petroleum Distillates	64742-47-8	60.00000	0.01310	
			Suspending agent (solid)	14808-60-7	3.00000	0.00212	
			Surfactant	68439-51-0	3.00000	0.00083	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			Anionic Polyacrylamide	Proprietary	40.00000	0.00902	
			Water	7732-18-5	40.00000	0.00902	
			Petroleum Distillates	64742-47-8	40.00000	0.00726	
			Crystalline Salt	12125-02-9	5.00000	0.00113	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00113	
SI-1100	U.S. Well Services	Scale Inhibitor					
			Di Water	7732-18-5	80.00000	0.01094	
			Ethylene Glycol	107-21-1	40.00000	0.00618	
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00185	
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00176	
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00171	
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00161	
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00157	
			Acrylic polymer	52255-49-9	5.00000	0.00068	
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00607	
			Deionized Water	7732-18-5	28.00000	0.00347	
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Diethylene Glycol	111-46-6	30.00000	0.00028	
			Methenamine	100-97-0	20.00000	0.00022	
			Hydrogen Chloride	7647-01-0	10.00000	0.00010	
			Polyethylene polyamine	68603-67-8	10.00000	0.00008	
			Coco amine	61791-14-8	5.00000	0.00004	
AP One	U.S. Well Services, LLC	Gel Breakers					
			Ammonium Persulfate	7727-54-0	100.00000	0.00070	
ICA-800	U.S. Well Services	Iron Control Additive					
			Erythorbic Acid	89-65-6	100.00000	0.00024	
pH-15L	U.S. Well Services	pH Buffer					
			Sodium Hydroxide	1310-73-2	25.00000	0.00017	

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.

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* 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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Actual Wellpath Report

PEN-2M-HS AWP Proj: 16635'

REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot M
Area	Ritchie County, WV	Well	PEN-2M-HS
Field	Ritchie	Wellbore	PEN-2M-HS 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	Gotfbral
Scale	0.999953	Report Generated	9/23/2014 at 3:00:51 PM
Convergence at slot	0.96° West	Database/Source file	WANorthEast/PEN-2M-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	34.86	93.32	1572206.41	308301.80	39°20'11.700"N	81°00'45.050"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 (RKB) to Facility Vertical Datum	1101.01ft
Horizontal Reference Pt	Slot	Nomac 78 (RKB) to Mean Sea Level	1101.01ft
Vertical Reference Pt	Nomac 78 (RKB)	Nomac 78 (RKB) to Mud Line at Slot (Slot M)	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	140.03°

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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot M
Area	Ritchie County, WV	Well	PEN-2M-HS
Field	Ritchie	Wellbore	PEN-2M-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (181 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	190.590	0.00	0.00	0.00	0.00	1572206.41	308301.80	39°20'11.700"N	81°00'45.050"W	0.00	0.000	0.00
26.00	0.000	190.590	26.00	0.00	0.00	0.00	1572206.41	308301.80	39°20'11.700"N	81°00'45.050"W	0.00	0.000	0.00
49.88	0.160	190.590	49.88	0.02	-0.03	-0.01	1572206.40	308301.76	39°20'11.700"N	81°00'45.050"W	0.03	190.590	0.67
149.88	0.230	217.640	149.88	0.15	-0.33	-0.15	1572206.25	308301.47	39°20'11.697"N	81°00'45.052"W	0.36	205.138	0.11
249.88	0.350	197.690	249.88	0.36	-0.78	-0.37	1572206.04	308301.02	39°20'11.692"N	81°00'45.055"W	0.86	205.394	0.16
349.88	0.330	240.550	349.88	0.47	-1.21	-0.71	1572205.69	308300.59	39°20'11.688"N	81°00'45.059"W	1.41	210.490	0.25
449.88	0.340	235.430	449.87	0.39	-1.52	-1.21	1572205.20	308300.28	39°20'11.685"N	81°00'45.065"W	1.94	218.459	0.03
500.09	0.230	231.050	500.08	0.37	-1.67	-1.41	1572205.00	308300.13	39°20'11.683"N	81°00'45.068"W	2.18	220.176	0.22
600.00	0.180	258.180	599.99	0.30	-1.83	-1.72	1572204.69	308299.97	39°20'11.682"N	81°00'45.071"W	2.51	223.248	0.11
654.00	0.280	257.700	653.99	0.19	-1.87	-1.93	1572204.48	308299.92	39°20'11.681"N	81°00'45.074"W	2.69	225.873	0.19
682.00	0.110	258.500	681.99	0.15	-1.89	-2.02	1572204.38	308299.90	39°20'11.681"N	81°00'45.075"W	2.77	226.919	0.61
749.00	0.600	71.320	748.99	0.25	-1.79	-1.75	1572204.65	308300.00	39°20'11.682"N	81°00'45.072"W	2.51	224.378	1.06
800.00	3.530	86.220	799.95	1.27	-1.60	0.07	1572206.47	308300.19	39°20'11.684"N	81°00'45.049"W	1.61	177.674	5.79
842.00	6.170	89.510	841.80	3.47	-1.50	3.61	1572210.02	308300.30	39°20'11.686"N	81°00'45.004"W	3.91	112.543	6.32
896.00	9.130	89.580	895.31	8.04	-1.44	10.80	1572217.21	308300.35	39°20'11.688"N	81°00'44.912"W	10.90	97.613	5.48
991.00	9.210	92.560	989.10	17.98	-1.73	25.93	1572232.34	308300.07	39°20'11.687"N	81°00'44.720"W	25.99	93.812	0.51
1086.00	5.250	92.240	1083.33	26.05	-2.24	37.88	1572244.28	308299.56	39°20'11.684"N	81°00'44.568"W	37.94	93.381	4.17
1182.00	3.690	90.280	1179.03	30.99	-2.42	45.35	1572251.76	308299.37	39°20'11.684"N	81°00'44.472"W	45.42	93.060	1.63
1278.00	3.460	99.420	1274.84	35.19	-2.91	51.30	1572257.70	308298.88	39°20'11.680"N	81°00'44.397"W	51.38	93.250	0.64
1373.00	0.790	101.500	1369.77	37.88	-3.51	54.77	1572261.17	308298.28	39°20'11.674"N	81°00'44.352"W	54.88	93.670	2.81
1469.00	0.830	112.430	1465.76	39.01	-3.91	56.06	1572262.47	308297.89	39°20'11.671"N	81°00'44.336"W	56.20	93.990	0.17
1565.00	1.180	133.960	1561.75	40.61	-4.86	57.42	1572263.82	308296.94	39°20'11.662"N	81°00'44.318"W	57.62	94.840	0.53
1660.00	0.250	303.540	1656.74	41.38	-5.43	57.95	1572264.35	308296.37	39°20'11.656"N	81°00'44.311"W	58.20	95.350	1.50
1755.00	0.380	254.390	1751.74	41.06	-5.40	57.47	1572263.87	308296.40	39°20'11.656"N	81°00'44.318"W	57.72	95.365	0.30
1851.00	0.180	263.690	1847.74	40.84	-5.50	57.02	1572263.42	308296.30	39°20'11.655"N	81°00'44.323"W	57.28	95.509	0.21
1946.00	0.120	180.120	1942.74	40.83	-5.61	56.87	1572263.27	308296.18	39°20'11.654"N	81°00'44.325"W	57.14	95.639	0.22
2042.00	0.100	263.170	2038.74	40.86	-5.73	56.78	1572263.19	308296.07	39°20'11.653"N	81°00'44.326"W	57.07	95.758	0.15
2137.00	0.040	146.380	2133.74	40.85	-5.76	56.72	1572263.12	308296.03	39°20'11.652"N	81°00'44.327"W	57.01	95.802	0.13
2232.00	0.180	289.220	2228.74	40.76	-5.74	56.60	1572263.00	308296.06	39°20'11.653"N	81°00'44.329"W	56.89	95.793	0.22
2328.00	0.040	173.460	2324.74	40.66	-5.73	56.46	1572262.86	308296.07	39°20'11.653"N	81°00'44.330"W	56.75	95.790	0.21

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noble energy

Actual Wellpath Report

PEN-2M-HS AWP Proj: 16635'

BAKER HUGHES

REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot M
Area	Ritchie County, WV	Well	PEN-2M-HS
Field	Ritchie	Wellbore	PEN-2M-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (181 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]
2423.00	0.300	10.210	2419.74	40.52	-5.51	56.51	1572262.91	308296.28	39°20'11.655"N	81°00'44.330"W	56.77	95.573	0.36
2519.00	0.140	60.120	2515.74	40.38	-5.21	56.65	1572263.06	308296.59	39°20'11.658"N	81°00'44.328"W	56.89	95.252	0.25
2615.00	0.330	342.910	2611.74	40.15	-4.88	56.67	1572263.08	308296.91	39°20'11.661"N	81°00'44.328"W	56.88	94.926	0.34
2710.00	0.290	303.670	2706.73	39.67	-4.49	56.39	1572262.80	308297.31	39°20'11.665"N	81°00'44.331"W	56.57	94.552	0.22
2805.00	0.130	244.630	2801.73	39.41	-4.40	56.09	1572262.50	308297.39	39°20'11.666"N	81°00'44.335"W	56.27	94.488	0.26
2900.00	0.500	300.470	2896.73	38.99	-4.24	55.64	1572262.04	308297.56	39°20'11.667"N	81°00'44.341"W	55.80	94.357	0.46
2995.00	0.460	316.220	2991.73	38.22	-3.75	55.02	1572261.42	308298.04	39°20'11.672"N	81°00'44.349"W	55.15	93.903	0.14
3090.00	0.260	287.970	3086.73	37.66	-3.41	54.55	1572260.95	308298.39	39°20'11.675"N	81°00'44.355"W	54.66	93.579	0.28
3186.00	0.410	278.470	3182.73	37.22	-3.29	54.00	1572260.41	308298.50	39°20'11.676"N	81°00'44.362"W	54.10	93.490	0.17
3281.00	0.430	237.750	3277.72	36.91	-3.43	53.37	1572259.77	308298.36	39°20'11.675"N	81°00'44.370"W	53.48	93.682	0.31
3377.00	0.490	269.880	3373.72	36.60	-3.63	52.65	1572259.05	308298.17	39°20'11.673"N	81°00'44.379"W	52.78	93.941	0.27
3473.00	0.130	278.950	3469.72	36.26	-3.61	52.13	1572258.54	308298.19	39°20'11.673"N	81°00'44.386"W	52.26	93.962	0.38
3568.00	0.310	297.120	3564.72	35.94	-3.48	51.80	1572258.20	308298.32	39°20'11.674"N	81°00'44.390"W	51.91	93.840	0.20
3663.00	0.200	236.100	3659.72	35.68	-3.45	51.43	1572257.83	308298.34	39°20'11.674"N	81°00'44.395"W	51.55	93.840	0.29
3758.00	0.230	253.590	3754.72	35.59	-3.60	51.11	1572257.51	308298.20	39°20'11.673"N	81°00'44.399"W	51.24	94.028	0.08
3854.00	2.330	30.560	3850.69	34.86	-1.97	51.92	1572258.32	308299.82	39°20'11.689"N	81°00'44.389"W	51.96	92.176	2.61
3949.00	3.700	29.510	3945.56	33.14	2.36	54.41	1572260.81	308304.16	39°20'11.732"N	81°00'44.358"W	54.46	87.518	1.44
4045.00	6.860	37.800	4041.14	30.84	9.59	59.45	1572265.85	308311.38	39°20'11.805"N	81°00'44.296"W	60.22	80.840	3.38
4139.00	6.410	44.060	4134.51	29.11	17.79	66.54	1572272.94	308319.59	39°20'11.887"N	81°00'44.207"W	68.88	75.030	0.91
4234.00	9.020	47.420	4228.64	28.22	26.64	75.71	1572282.12	308328.44	39°20'11.976"N	81°00'44.092"W	80.26	70.613	2.79
4329.00	12.830	42.480	4321.91	26.49	39.47	88.33	1572294.73	308341.26	39°20'12.105"N	81°00'43.935"W	96.74	65.923	4.13
4424.00	16.980	37.620	4413.69	22.12	58.24	103.92	1572310.32	308360.04	39°20'12.293"N	81°00'43.740"W	119.13	60.732	4.56
4520.00	21.370	33.170	4504.35	14.03	84.00	122.06	1572328.46	308385.79	39°20'12.550"N	81°00'43.515"W	148.17	55.465	4.82
4615.00	22.190	38.940	4592.58	5.56	112.45	142.81	1572349.21	308414.24	39°20'12.835"N	81°00'43.257"W	181.76	51.783	2.41
4711.00	22.570	42.700	4681.35	-0.28	140.09	166.70	1572373.09	308441.88	39°20'13.112"N	81°00'42.959"W	217.74	49.957	1.54
4806.00	25.400	44.090	4768.14	-4.71	168.13	193.24	1572399.64	308469.91	39°20'13.394"N	81°00'42.627"W	256.14	48.976	3.04
4901.00	27.400	51.460	4853.25	-6.28	196.39	224.53	1572430.92	308498.18	39°20'13.678"N	81°00'42.235"W	298.30	48.825	4.04
4997.00	31.130	52.780	4936.99	-4.53	225.17	261.58	1572467.97	308526.96	39°20'13.969"N	81°00'41.770"W	345.15	49.277	3.94
5092.00	36.170	50.020	5016.05	-3.36	258.06	302.65	1572509.04	308559.85	39°20'14.301"N	81°00'41.254"W	397.73	49.546	5.54
5188.00	41.230	47.860	5090.95	-4.56	297.52	347.84	1572554.23	308599.30	39°20'14.698"N	81°00'40.687"W	457.72	49.459	5.45

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Field	Ritchie	Wellbore	PEN-2M-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (181 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]
5283.00	46.530	46.990	5159.40	-7.58	342.07	396.30	1572602.69	308643.85	39°20'15.146"N	81°00'40.080"W	523.51	49.201	5.61
5379.00	45.100	45.190	5226.31	-12.29	389.80	445.90	1572652.28	308691.58	39°20'15.626"N	81°00'39.459"W	592.26	48.840	2.01
5474.00	42.840	42.960	5294.68	-19.11	437.16	491.79	1572698.17	308738.93	39°20'16.102"N	81°00'38.885"W	658.00	48.366	2.88
5570.00	41.750	43.230	5365.69	-26.91	484.33	535.92	1572742.30	308786.10	39°20'16.575"N	81°00'38.334"W	722.35	47.895	1.15
5655.00	40.720	42.180	5429.61	-34.05	525.50	573.92	1572780.30	308827.27	39°20'16.989"N	81°00'37.859"W	778.16	47.522	1.46
5750.00	42.410	45.690	5500.70	-40.71	570.85	617.66	1572824.04	308872.62	39°20'17.444"N	81°00'37.312"W	841.06	47.256	3.03
5846.00	41.210	49.260	5572.26	-43.58	614.11	664.80	1572871.17	308915.87	39°20'17.879"N	81°00'36.722"W	905.03	47.270	2.78
5941.00	41.210	51.510	5643.73	-43.20	654.01	713.01	1572919.38	308955.77	39°20'18.282"N	81°00'36.117"W	967.53	47.471	1.56
6036.00	42.250	51.610	5714.63	-41.51	693.32	762.53	1572968.90	308995.08	39°20'18.678"N	81°00'35.495"W	1030.61	47.722	1.10
6132.00	42.210	53.210	5785.72	-38.83	732.68	813.66	1573020.02	309034.44	39°20'19.076"N	81°00'34.853"W	1094.92	47.998	1.12
6227.00	42.260	52.860	5856.05	-35.48	771.08	864.68	1573071.04	309072.84	39°20'19.464"N	81°00'34.212"W	1158.55	48.275	0.25
6322.00	49.930	60.390	5921.93	-27.35	808.41	921.87	1573128.23	309110.16	39°20'19.842"N	81°00'33.492"W	1226.12	48.752	9.88
6415.00	55.750	73.570	5978.24	-5.52	836.96	989.93	1573196.28	309138.72	39°20'20.136"N	81°00'32.632"W	1296.33	49.786	12.89
6510.00	56.770	78.210	6031.03	28.94	856.20	1066.51	1573272.87	309157.95	39°20'20.338"N	81°00'31.661"W	1367.67	51.243	4.20
6606.00	59.290	89.240	6081.96	74.10	864.97	1147.27	1573353.62	309166.72	39°20'20.438"N	81°00'30.636"W	1436.80	52.986	10.09
6701.00	58.780	104.400	6131.05	133.19	855.37	1227.80	1573434.15	309157.12	39°20'20.357"N	81°00'29.609"W	1496.38	55.136	13.68
6797.00	61.730	111.670	6178.73	203.84	829.52	1306.94	1573513.29	309131.27	39°20'20.115"N	81°00'28.596"W	1547.96	57.597	7.26
6892.00	70.720	114.840	6216.99	281.40	795.15	1386.69	1573593.03	309096.91	39°20'19.788"N	81°00'27.574"W	1598.49	60.169	9.94
6987.00	74.710	118.630	6245.22	364.69	754.34	1467.65	1573673.99	309056.10	39°20'19.398"N	81°00'26.535"W	1650.16	62.798	5.67
7083.00	76.930	123.420	6268.75	452.67	706.37	1547.37	1573753.70	309008.13	39°20'18.937"N	81°00'25.510"W	1700.97	65.464	5.36
7178.00	81.970	129.700	6286.16	543.42	650.75	1622.30	1573828.63	308952.51	39°20'18.400"N	81°00'24.545"W	1747.95	68.143	8.39
7274.00	85.840	135.870	6296.36	638.06	585.94	1692.30	1573898.62	308887.71	39°20'17.771"N	81°00'23.640"W	1790.86	70.902	7.55
7369.00	89.750	140.760	6300.02	732.90	515.08	1755.39	1573961.71	308816.85	39°20'17.082"N	81°00'22.822"W	1829.40	73.647	6.59
7464.00	89.480	141.370	6300.65	827.88	441.18	1815.09	1574021.41	308742.96	39°20'16.361"N	81°00'22.047"W	1867.94	76.338	0.70
7560.00	89.110	139.310	6301.84	923.86	367.29	1876.35	1574082.67	308669.07	39°20'15.641"N	81°00'21.251"W	1911.96	78.925	2.18
7655.00	89.110	138.700	6303.31	1018.84	295.59	1938.67	1574144.98	308597.38	39°20'14.943"N	81°00'20.443"W	1961.07	81.331	0.64
7751.00	88.830	139.920	6305.04	1114.81	222.81	2001.24	1574207.55	308524.60	39°20'14.234"N	81°00'19.631"W	2013.61	83.647	1.30
7846.00	88.800	139.720	6307.00	1209.79	150.25	2062.52	1574268.83	308452.04	39°20'13.527"N	81°00'18.836"W	2067.99	85.834	0.21
7942.00	88.520	140.130	6309.25	1305.76	76.81	2124.31	1574330.61	308378.60	39°20'12.812"N	81°00'18.034"W	2125.70	87.929	0.52
8038.00	88.460	139.560	6311.78	1401.73	3.46	2186.20	1574392.49	308305.26	39°20'12.097"N	81°00'17.231"W	2186.20	89.909	0.60

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Field	Ritchie	Wellbore	PEN-2M-HS AWB
Facility	PEN-2 Pad		

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8133.00	89.170	139.690	6313.74	1496.71	-68.90	2247.72	1574454.02	308232.90	39°20'11.392"N	81°00'16.433"W	2248.78	91.756	0.76
8229.00	89.690	138.200	6314.70	1592.68	-141.28	2310.77	1574517.06	308160.52	39°20'10.687"N	81°00'15.615"W	2315.08	93.499	1.64
8325.00	89.570	135.370	6315.32	1688.52	-211.24	2376.49	1574582.78	308090.57	39°20'10.007"N	81°00'14.764"W	2385.86	95.079	2.95
8420.00	89.480	139.260	6316.10	1783.39	-281.05	2440.89	1574647.17	308020.76	39°20'09.328"N	81°00'13.929"W	2457.01	96.568	4.10
8516.00	89.200	143.760	6317.21	1879.32	-356.17	2500.62	1574706.90	307945.64	39°20'08.595"N	81°00'13.153"W	2525.85	98.106	4.70
8611.00	89.450	142.830	6318.33	1974.16	-432.33	2557.39	1574763.67	307869.49	39°20'07.852"N	81°00'12.415"W	2593.68	99.595	1.01
8707.00	89.910	140.790	6318.87	2070.11	-507.78	2616.74	1574823.02	307794.05	39°20'07.116"N	81°00'11.643"W	2665.55	100.982	2.18
8803.00	89.850	142.610	6319.07	2166.06	-583.11	2676.24	1574882.51	307718.71	39°20'06.381"N	81°00'10.870"W	2739.03	102.292	1.90
8899.00	90.280	138.440	6318.96	2262.04	-657.20	2737.26	1574943.53	307644.63	39°20'05.659"N	81°00'10.078"W	2815.04	103.501	4.37
8995.00	90.580	140.140	6318.24	2358.02	-729.96	2799.87	1575006.14	307571.87	39°20'04.951"N	81°00'09.266"W	2893.46	104.612	1.80
9090.00	89.660	140.440	6318.04	2453.02	-803.04	2860.56	1575066.83	307498.79	39°20'04.239"N	81°00'08.478"W	2971.14	105.681	1.02
9185.00	89.660	143.280	6318.60	2547.96	-877.75	2919.22	1575125.49	307424.09	39°20'03.510"N	81°00'07.715"W	3048.33	106.735	2.99
9281.00	89.720	143.110	6319.12	2643.81	-954.62	2976.74	1575183.00	307347.23	39°20'02.760"N	81°00'06.967"W	3126.06	107.781	0.19
9377.00	89.690	142.170	6319.62	2739.71	-1030.92	3034.99	1575241.25	307270.93	39°20'02.015"N	81°00'06.210"W	3205.30	108.761	0.98
9472.00	89.850	136.720	6320.00	2834.67	-1103.07	3096.73	1575302.99	307198.78	39°20'01.313"N	81°00'05.409"W	3287.33	109.606	5.74
9567.00	90.280	132.640	6319.89	2929.24	-1169.85	3164.27	1575370.52	307132.00	39°20'00.664"N	81°00'04.535"W	3373.60	110.290	4.32
9662.00	90.150	132.750	6319.53	3023.46	-1234.27	3234.09	1575440.34	307067.58	39°20'00.039"N	81°00'03.633"W	3461.61	110.889	0.18
9758.00	90.090	133.540	6319.33	3118.77	-1299.92	3304.13	1575510.38	307001.94	39°19'59.401"N	81°00'02.728"W	3550.65	111.476	0.83
9853.00	89.450	140.080	6319.71	3213.56	-1369.15	3369.12	1575575.36	306932.72	39°19'58.728"N	81°00'01.886"W	3636.69	112.116	6.92
9949.00	89.600	142.690	6320.51	3309.52	-1444.15	3429.02	1575635.26	306857.72	39°19'57.997"N	81°00'01.108"W	3720.72	112.839	2.72
10043.00	89.690	140.750	6321.09	3403.48	-1517.93	3487.25	1575693.49	306783.94	39°19'57.277"N	81°00'00.351"W	3803.29	113.523	2.07
10138.00	89.140	145.040	6322.06	3498.33	-1593.68	3544.55	1575750.78	306708.20	39°19'56.538"N	80°59'59.606"W	3886.34	114.209	4.55
10232.00	89.570	148.340	6323.12	3591.68	-1672.22	3596.16	1575802.39	306629.66	39°19'55.771"N	80°59'58.933"W	3965.94	114.938	3.54
10328.00	89.750	150.050	6323.69	3686.45	-1754.67	3645.32	1575851.55	306547.21	39°19'54.964"N	80°59'58.290"W	4045.64	115.704	1.79
10423.00	90.830	146.110	6323.21	3780.49	-1835.28	3695.54	1575901.76	306466.60	39°19'54.175"N	80°59'57.634"W	4126.17	116.410	4.30
10518.00	90.890	142.560	6321.78	3875.20	-1912.45	3750.91	1575957.13	306389.44	39°19'53.422"N	80°59'56.913"W	4210.32	117.015	3.74
10613.00	90.030	142.190	6321.02	3970.11	-1987.68	3808.90	1576015.13	306314.21	39°19'52.688"N	80°59'56.159"W	4296.35	117.558	0.99
10707.00	90.980	138.870	6320.19	4064.09	-2060.23	3868.65	1576074.86	306241.66	39°19'51.981"N	80°59'55.383"W	4383.03	118.037	3.67
10803.00	90.920	132.510	6318.60	4159.75	-2128.88	3935.66	1576141.88	306173.02	39°19'51.314"N	80°59'54.516"W	4474.55	118.410	6.62
10897.00	89.850	127.290	6317.97	4252.25	-2189.16	4007.75	1576213.96	306112.75	39°19'50.730"N	80°59'53.586"W	4566.67	118.645	5.67

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10992.00	89.510	126.480	6318.50	4344.76	-2246.18	4083.73	1576289.94	306055.73	39°19'50.179"N	80°59'52.607"W	4660.70	118.812	0.92
11086.00	89.600	129.810	6319.23	4436.73	-2304.23	4157.65	1576363.85	305997.68	39°19'49.617"N	80°59'51.654"W	4753.47	118.996	3.54
11182.00	90.000	133.140	6319.56	4531.65	-2367.80	4229.56	1576435.76	305934.12	39°19'49.001"N	80°59'50.726"W	4847.23	119.241	3.49
11277.00	90.460	145.340	6319.18	4626.46	-2439.62	4291.47	1576497.67	305862.30	39°19'48.302"N	80°59'49.923"W	4936.44	119.617	12.85
11373.00	90.000	145.970	6318.79	4721.99	-2518.88	4345.63	1576551.82	305783.04	39°19'47.527"N	80°59'49.217"W	5022.87	120.098	0.81
11468.00	90.340	141.470	6318.51	4816.77	-2595.44	4401.83	1576608.02	305706.48	39°19'46.780"N	80°59'48.485"W	5110.03	120.525	4.75
11564.00	90.310	141.000	6317.97	4912.75	-2670.29	4461.94	1576668.12	305631.63	39°19'46.050"N	80°59'47.705"W	5199.94	120.899	0.49
11659.00	90.180	139.690	6317.56	5007.74	-2743.43	4522.56	1576728.75	305558.50	39°19'45.337"N	80°59'46.918"W	5289.61	121.241	1.39
11754.00	90.340	140.080	6317.13	5102.74	-2816.08	4583.77	1576789.95	305485.85	39°19'44.629"N	80°59'46.124"W	5379.71	121.565	0.44
11850.00	90.280	136.210	6316.61	5198.67	-2887.57	4647.81	1576853.99	305414.36	39°19'43.933"N	80°59'45.294"W	5471.77	121.852	4.03
11945.00	90.150	136.280	6316.25	5293.46	-2956.19	4713.51	1576919.69	305345.75	39°19'43.266"N	80°59'44.443"W	5563.83	122.095	0.16
12040.00	89.570	138.760	6316.49	5388.36	-3026.25	4777.66	1576983.84	305275.70	39°19'42.584"N	80°59'43.612"W	5655.46	122.351	2.68
12136.00	89.850	144.080	6316.97	5484.30	-3101.27	4837.51	1577043.68	305200.68	39°19'41.853"N	80°59'42.835"W	5746.24	122.663	5.55
12230.00	89.910	147.110	6317.17	5577.85	-3178.81	4890.61	1577096.78	305123.14	39°19'41.095"N	80°59'42.143"W	5832.92	123.023	3.22
12324.00	90.180	146.380	6317.10	5671.20	-3257.42	4942.16	1577148.33	305044.54	39°19'40.327"N	80°59'41.470"W	5919.10	123.389	0.83
12419.00	90.490	146.040	6316.54	5765.65	-3336.37	4994.99	1577201.16	304965.59	39°19'39.555"N	80°59'40.781"W	6006.77	123.741	0.48
12514.00	90.310	142.940	6315.88	5860.35	-3413.69	5050.17	1577256.33	304888.27	39°19'38.800"N	80°59'40.063"W	6095.69	124.057	3.27
12609.00	90.250	140.150	6315.41	5955.30	-3488.08	5109.24	1577315.40	304813.89	39°19'38.075"N	80°59'39.295"W	6186.36	124.321	2.94
12704.00	90.490	140.220	6314.80	6050.30	-3561.05	5170.07	1577376.22	304740.92	39°19'37.364"N	80°59'38.506"W	6277.79	124.558	0.26
12799.00	90.400	141.170	6314.06	6145.29	-3634.55	5230.24	1577436.39	304667.42	39°19'36.647"N	80°59'37.725"W	6369.10	124.796	1.00
12895.00	90.460	142.090	6313.34	6241.25	-3709.82	5289.83	1577495.98	304592.16	39°19'35.913"N	80°59'36.951"W	6461.04	125.042	0.96
12990.00	90.400	141.270	6312.63	6336.20	-3784.35	5348.73	1577554.88	304517.63	39°19'35.186"N	80°59'36.185"W	6552.12	125.280	0.87
13085.00	90.430	140.230	6311.94	6431.19	-3857.91	5408.84	1577614.98	304444.07	39°19'34.469"N	80°59'35.405"W	6643.72	125.499	1.10
13181.00	90.770	138.190	6310.93	6527.17	-3930.59	5471.55	1577677.69	304371.40	39°19'33.761"N	80°59'34.592"W	6737.01	125.692	2.15
13276.00	90.120	136.590	6310.20	6622.07	-4000.50	5535.86	1577742.00	304301.49	39°19'33.081"N	80°59'33.759"W	6830.06	125.854	1.82
13372.00	90.090	134.600	6310.02	6717.77	-4069.08	5603.03	1577809.16	304232.92	39°19'32.414"N	80°59'32.890"W	6924.69	125.988	2.07
13468.00	89.690	138.450	6310.21	6813.58	-4138.73	5669.07	1577875.20	304163.27	39°19'31.737"N	80°59'32.035"W	7019.07	126.131	4.03
13563.00	90.090	143.650	6310.39	6908.53	-4212.59	5728.77	1577934.90	304089.42	39°19'31.017"N	80°59'31.260"W	7110.88	126.328	5.49
13658.00	89.510	142.100	6310.72	7003.41	-4288.33	5786.10	1577992.23	304013.68	39°19'30.278"N	80°59'30.514"W	7202.00	126.544	1.74
13754.00	90.000	141.960	6311.13	7099.35	-4364.01	5845.17	1578051.29	303938.00	39°19'29.540"N	80°59'29.747"W	7294.55	126.745	0.53

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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot M
Area	Ritchie County, WV	Well	PEN-2M-HS
Field	Ritchie	Wellbore	PEN-2M-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (181 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]
13849.00	90.000	143.080	6311.13	7194.26	-4439.39	5902.97	1578109.09	303862.62	39°19'28.804"N	80°59'28.995"W	7386.02	126.945	1.18
13945.00	89.940	142.610	6311.18	7290.14	-4515.91	5960.95	1578167.07	303786.11	39°19'28.057"N	80°59'28.241"W	7478.39	127.147	0.49
14040.00	89.970	141.430	6311.25	7385.08	-4590.79	6019.41	1578225.53	303711.23	39°19'27.327"N	80°59'27.482"W	7570.25	127.331	1.24
14134.00	90.060	140.740	6311.23	7479.06	-4663.93	6078.46	1578284.57	303638.10	39°19'26.614"N	80°59'26.715"W	7661.58	127.499	0.74
14230.00	89.510	139.170	6311.59	7575.06	-4737.41	6140.22	1578346.33	303564.61	39°19'25.898"N	80°59'25.914"W	7755.35	127.652	1.73
14325.00	90.150	140.620	6311.87	7670.06	-4810.07	6201.42	1578407.52	303491.96	39°19'25.190"N	80°59'25.120"W	7848.21	127.799	1.67
14421.00	90.180	141.720	6311.60	7766.04	-4884.86	6261.61	1578467.71	303417.18	39°19'24.461"N	80°59'24.338"W	7941.64	127.959	1.15
14515.00	90.090	141.030	6311.37	7860.01	-4958.29	6320.29	1578526.39	303343.74	39°19'23.745"N	80°59'23.576"W	8033.10	128.114	0.74
14611.00	90.150	139.560	6311.17	7956.00	-5032.15	6381.61	1578587.71	303269.89	39°19'23.025"N	80°59'22.780"W	8126.96	128.257	1.53
14706.00	90.520	137.190	6310.62	8050.96	-5103.16	6444.71	1578650.80	303198.89	39°19'22.333"N	80°59'21.963"W	8220.49	128.373	2.52
14801.00	90.000	133.470	6310.19	8145.62	-5170.70	6511.49	1578717.58	303131.34	39°19'21.677"N	80°59'21.099"W	8314.78	128.453	3.95
14896.00	89.480	134.290	6310.62	8240.07	-5236.55	6579.96	1578786.05	303065.50	39°19'21.037"N	80°59'20.214"W	8409.36	128.514	1.02
14990.00	89.380	137.580	6311.55	8333.81	-5304.08	6645.32	1578851.41	302997.97	39°19'20.381"N	80°59'19.368"W	8502.56	128.596	3.50
15084.00	89.480	139.910	6312.49	8427.78	-5374.74	6707.30	1578913.38	302927.32	39°19'19.693"N	80°59'18.565"W	8595.10	128.706	2.48
15180.00	89.350	139.310	6313.47	8523.77	-5447.86	6769.50	1578975.58	302854.21	39°19'18.980"N	80°59'17.758"W	8689.38	128.826	0.64
15275.00	89.510	141.820	6314.41	8618.75	-5521.22	6829.84	1579035.91	302780.85	39°19'18.265"N	80°59'16.975"W	8782.40	128.952	2.65
15370.00	89.420	141.990	6315.30	8713.70	-5595.98	6888.45	1579094.52	302706.09	39°19'17.536"N	80°59'16.213"W	8875.01	129.089	0.20
15466.00	89.480	142.450	6316.22	8809.62	-5671.85	6947.26	1579153.33	302630.22	39°19'16.796"N	80°59'15.449"W	8968.52	129.229	0.48
15562.00	89.480	142.200	6317.09	8905.54	-5747.83	7005.93	1579212.00	302554.24	39°19'16.054"N	80°59'14.687"W	9062.04	129.366	0.26
15658.00	89.480	139.370	6317.96	9001.52	-5822.20	7066.62	1579272.68	302479.88	39°19'15.329"N	80°59'13.899"W	9156.15	129.485	2.95
15754.00	89.200	143.150	6319.07	9097.47	-5897.06	7126.68	1579332.74	302405.02	39°19'14.599"N	80°59'13.119"W	9250.13	129.606	3.95
15850.00	89.910	146.900	6319.82	9193.09	-5975.71	7181.69	1579387.75	302326.38	39°19'13.831"N	80°59'12.403"W	9342.69	129.763	3.98
15947.00	89.850	138.560	6320.02	9289.90	-6052.83	7240.38	1579446.44	302249.26	39°19'13.079"N	80°59'11.640"W	9437.15	129.895	8.60
16041.00	89.820	136.780	6320.29	9383.81	-6122.32	7303.68	1579509.73	302179.78	39°19'12.402"N	80°59'10.820"W	9530.29	129.971	1.89
16136.00	89.910	136.970	6320.51	9478.67	-6191.66	7368.62	1579574.67	302110.44	39°19'11.728"N	80°59'09.979"W	9624.61	130.039	0.22
16231.00	89.910	138.290	6320.66	9573.58	-6261.84	7432.64	1579638.68	302040.26	39°19'11.045"N	80°59'09.150"W	9718.79	130.113	1.39
16326.00	89.820	141.430	6320.89	9668.57	-6334.46	7493.87	1579699.92	301967.65	39°19'10.337"N	80°59'08.355"W	9812.42	130.207	3.31
16422.00	90.250	141.670	6320.83	9764.54	-6409.64	7553.57	1579759.61	301892.47	39°19'09.604"N	80°59'07.580"W	9906.56	130.317	0.51
16518.00	91.080	138.070	6319.71	9860.51	-6483.02	7615.43	1579821.47	301819.09	39°19'08.889"N	80°59'06.778"W	10001.22	130.408	3.85
16612.00	89.540	133.690	6319.21	9954.24	-6550.48	7680.85	1579886.88	301751.63	39°19'08.233"N	80°59'05.931"W	10094.76	130.459	4.94

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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot M
Area	Ritchie County, WV	Well	PEN-2M-HS
Field	Ritchie	Wellbore	PEN-2M-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (181 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]
16635.00	89.540	133.690	6319.39	9977.10	-6566.37	7697.48	1579903.51	301735.75	39°19'08.078"N	80°59'05.716"W	10117.73	130.466	0.00

TARGETS

Name	MD [ft]	TVD [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Shape
PEN-2M-HS BHL Rev-		6298.00	-6774.48	7862.37	1580068.39	301527.65	39°19'06.049"N	80°59'03.575"W	point
PEN-2M-HS BHL Rev-2		6298.00	-6570.64	7691.47	1579897.50	301731.48	39°19'08.035"N	80°59'05.792"W	point
PEN-2M-HS LP Rev-2		6298.00	613.85	1668.31	1573874.64	308915.62	39°20'18.043"N	81°00'23.951"W	point
PEN-2 Pad LL		6999.55	-34.86	-93.32	1572113.09	308266.94	39°20'11.340"N	81°00'46.230"W	polygon

WELLPATH COMPOSITION - Ref Wellbore: PEN-2M-HS AWB Ref Wellpath: PEN-2M-HS AWP Proj: 16635'

Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore
26.00	500.09	Generic gyro - northseeking (Standard)	01 Gyrodata MS Gyro <17-1/2"> (49.88'-500.09')	PEN-2M-HS AWB
500.09	5570.00	NaviTrak (MagCorr)	02 BHI MWD <12-1/4"> (500.09')(600'-5570') Proj: 5648'	PEN-2M-HS AWB
5570.00	16612.00	NaviTrak (AT Curve Short Spaced)	03 BHI AT Curve <8-3/4"> (5570')(5655'-16612')	PEN-2M-HS AWB
16612.00	16635.00	Blind Drilling (std)	Projection to bit	PEN-2M-HS AWB

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REFERENCE WELLPATH IDENTIFICATION			
Operator	**NOBLE ENERGY**	Slot	**Slot M**
Area	**Ritchie County, WV**	Well	**PEN-2M-HS**
Field	**Ritchie**	Wellbore	**PEN-2M-HS AWB**
Facility	**PEN-2 Pad**		

COMMENTS

Wellpath general comments
API: 47-085-10066-0000
BHI Job #: 6651408
Rig: Nomac 78
Duration: 09/11/2014 – 09/21/2014
Gyrodata MS Gyro <17-1/2"> (49.88'-500.09')
BHI MWD <12-1/4"> (500.09')(600'-5570')
BHI AT Curve <8-3/4"> (5570')(5655'-16612')
Projected MD at TD: 16635'

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NOBLE ENERGY

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

Slot: Slot M
Well: PEN-2M-HS
Wellbore: PEN-2M-HS PWB

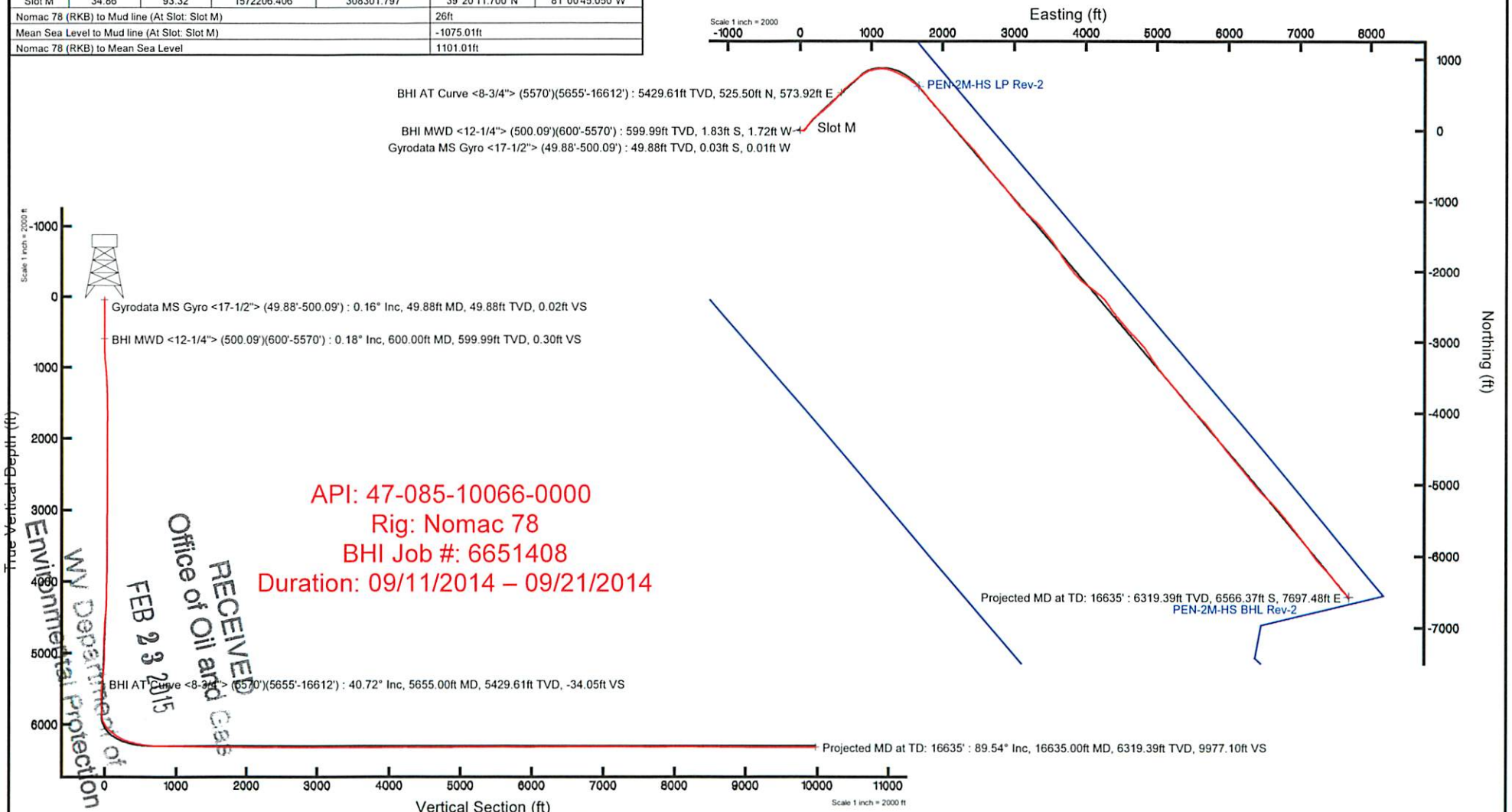
Plot reference wellpath is PEN-2M-HS PWP Rev-B.0	
True vertical depths are referenced to Nomac 78 (RKB)	Grid System: NAD27 / Lambert West Virginia SP, Northern Zone (4701), US feet
Measured depths are referenced to Nomac 78 (RKB)	North Reference: Grid north
Nomac 78 (RKB) to Mean Sea Level: 1101.01 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot M): -1075.01 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: gotfbral on 9/23/2014

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 N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot M	34.86	93.32	1572206.406	308301.797	39°20'11.700"N	81°00'45.050"W

Nomac 78 (RKB) to Mud line (At Slot: Slot M)	26ft
Mean Sea Level to Mud line (At Slot: Slot M)	-1075.01ft
Nomac 78 (RKB) to Mean Sea Level	1101.01ft

User specified (HDGM) Dip: 66.80° Field: 52223 nT
Magnetic North is 7.84 degrees West of True North (at 8/28/2014)
Grid North is 0.96 degrees West of True North
To correct azimuth from True to Grid add 0.96 degrees
To correct azimuth from Magnetic to Grid subtract 6.88 degrees



API: 47-085-10066-0000
Rig: Nomac 78
BHI Job #: 6651408
Duration: 09/11/2014 – 09/21/2014

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Well is located on topo map 13,957' feet south of Latitude: 39 ° 22 ' 30 "

AS DRILLED PLAT

Well is located on topo map 3,500' feet west of Longitude: 81 ° 00 ' 00 "

PERMITTED SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4354137.33
E:498936.14
NAD27, WV NORTH
N:308301.45
E:1572206.74
LAT/LON DATUM-NAD83
LAT:39.336661
LON:-81.012345

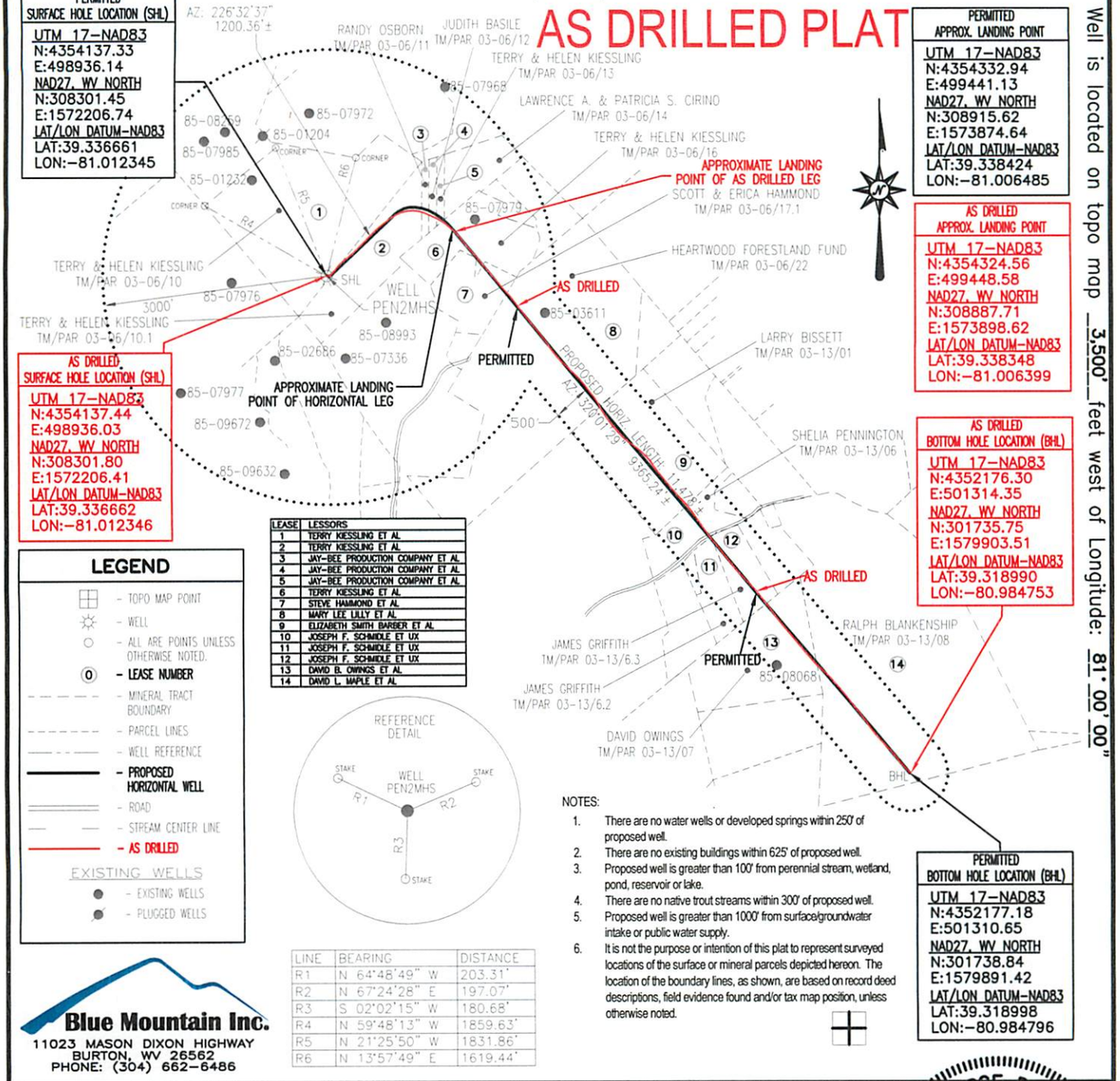
PERMITTED APPROX. LANDING POINT
UTM 17-NAD83
N:4354332.94
E:499441.13
NAD27, WV NORTH
N:308915.62
E:1573874.64
LAT/LON DATUM-NAD83
LAT:39.338424
LON:-81.006485

AS DRILLED APPROX. LANDING POINT
UTM 17-NAD83
N:4354324.56
E:499448.58
NAD27, WV NORTH
N:308887.71
E:1573898.62
LAT/LON DATUM-NAD83
LAT:39.338348
LON:-81.006399

AS DRILLED BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4352176.30
E:501314.35
NAD27, WV NORTH
N:301735.75
E:1579903.51
LAT/LON DATUM-NAD83
LAT:39.318990
LON:-80.984753

AS DRILLED SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4354137.44
E:498936.03
NAD27, WV NORTH
N:308301.80
E:1572206.41
LAT/LON DATUM-NAD83
LAT:39.336662
LON:-81.012346

PERMITTED BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4352177.18
E:501310.65
NAD27, WV NORTH
N:301738.84
E:1579891.42
LAT/LON DATUM-NAD83
LAT:39.318998
LON:-80.984796



LEASE	LESSORS
1	TERRY KIESSLING ET AL
2	TERRY KIESSLING ET AL
3	JAY-BEE PRODUCTION COMPANY ET AL
4	JAY-BEE PRODUCTION COMPANY ET AL
5	JAY-BEE PRODUCTION COMPANY ET AL
6	TERRY KIESSLING ET AL
7	STEVE HAMMOND ET AL
8	MARY LEE LILLY ET AL
9	ELIZABETH SMITH BARBER ET AL
10	JOSEPH F. SCHMIDLE ET UX
11	JOSEPH F. SCHMIDLE ET UX
12	JOSEPH F. SCHMIDLE ET UX
13	DAVID B. OWINGS ET AL
14	DAVID L. MAPLE ET AL

LEGEND

- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED.
- 0 - LEASE NUMBER
- MINERAL TRACT BOUNDARY
- PARCEL LINES
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE
- AS DRILLED

EXISTING WELLS
- EXISTING WELLS
- PLUGGED WELLS

LINE	BEARING	DISTANCE
R1	N 64°48'49" W	203.31'
R2	N 67°24'28" E	197.07'
R3	S 02°02'15" W	180.68'
R4	N 59°48'13" W	1859.63'
R5	N 21°25'50" W	1831.86'
R6	N 13°57'49" E	1619.44'

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

Blue Mountain Inc.
11023 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

FILE #: PEN2MHS-AS DRILLED
DRAWING #: PEN2MHS-AS DRILLED
SCALE: 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1/2500
PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

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

Signed: George D. Six
R.P.E.: L.L.S.: P.S. No. 2000

GEORGE D. SIX LICENSED No. 2000 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

PLACE SEAL HERE

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

DATE: FEBRUARY 11, 2015
OPERATOR'S WELL #: PEN2MHS-AS DRILLED
API WELL #: 47 (STATE) 85 (COUNTY) 10066 (PERMIT)

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep ☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: NORTH FORK HUGHES RIVER
ELEVATION: 1084'±
COUNTY/DISTRICT: RITCHIE / CLAY
QUADRANGLE: ELLENBORO, WV 7.5'
SURFACE OWNER: TERRY & HELEN KIESSLING
ACREAGE: 79.242±
OIL & GAS ROYALTY OWNER: TERRY KIESSLING ET AL
ACREAGE: 623.760±

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

TARGET FORMATION: MARCELLUS
ESTIMATED DEPTH: TVD: 6,314'± TMD: 16,702'±

WELL OPERATOR: NOBLE ENERGY, INC.
Address: 333 TECHNOLOGY DRIVE, SUITE 116
City: CANONSBURG State: PA Zip Code: 15317

DESIGNATED AGENT: STEVEN M. GREEN
Address: 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590
City: CHARLESTON State: WV Zip Code: 25301

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

API 47- 085 - 10069 County Ritche District Clay
Quad Pennsboro Pad Name PEN 2 Field/Pool Name NA
Farm name Terry & Helen Kiessling Well Number PEN 2 DHS
Operator (as registered with the OOG) Noble Energy, Inc.
Address 1000 Noble Energy Drive City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4354133.13 Easting 498924.78
Landing Point of Curve Northing 4354027.27 Easting 499093.34
Bottom Hole Northing 4351949.91 Easting 500890.21

Elevation (ft) 1074.85 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

Drilling 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 10/30/2013 Date drilling commenced 01/18/2014 Date drilling ceased 07/22/2014
Date completion activities began 12/4/2014 Date completion activities ceased 2/23/2015
Verbal plugging (Y/N) N Date permission granted ____ Granted by ____

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

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Freshwater depth(s) ft 454 Open mine(s) (Y/N) depths none
Salt water depth(s) ft None noted for Offsets Void(s) encountered (Y/N) depths none
Coal depth(s) ft no coal Cavern(s) encountered (Y/N) depths none
Is coal being mined in area (Y/N) N

Reviewed by:
A.L. 5/26/15
W.S. 6/01/15

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API 47- 085 - 10069 Farm name Terry & Helen Kiessling Well number PEN 2 DHS

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	36	30	40				
Surface	17 1/2	13 3/8	589.9	N	J-55 54.5#		Y
Coal							
Intermediate 1	12 3/8	9 5/8	5,414.0	N	K-55 36#		Y
Intermediate 2							
Intermediate 3							
Production	8 3/4	5 1/2	15,712.6	N	P-110 20#		Y
Tubing							
Packer type and depth set							

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor							
Surface	TYPE 1	532	15.6	1.20	115	0	8
Coal							
Intermediate 1	Class A	Lead 925 Tail 292	Lead 12.0 Tail 15.6	Lead 1.93 Tail 1.19	Lead 207 Tail 167	0	8
Intermediate 2							
Intermediate 3							
Production	Class A	Lead 398 Tail 2047	Lead 13.0 Tail 14.8	Lead 1.63 Tail 1.38	Lead 167 Tail 208	5430	8
Tubing							

Drillers TD (ft) 15,727 Loggers TD (ft) 15,703

Deepest formation penetrated Marcellus Plug back to (ft) Not a Pilot Hole

Plug back procedure Not a Pilot Hole

Kick off depth (ft) 6907

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction ☐ neutron ☐ resistivity ■ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ☐ No ☐ Conventional ☐ Sidewall Were cuttings collected ■ Yes ☐ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING Conductor - No centralizers used. Fresh Water/Surface- Surface - 5 centralizers used, one every third joint Intermediate - 66 centralizers - bow spring centralizers on every joint to KOP, on every third joint from KOP to 100' from surface. Production - 266 centralizers - rigid bow spring every third joint from KOP to TOC, rigid bow spring every joint to KOP.

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10069 Farm name Terry & Helen Kiessling Well number PEN 2 DHS

PERFORATION RECORD

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

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	SEE ATTACHED STIMULATION							
	INFORMATION PER STAGE							
	RECORD							

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Please insert additional pages as applicable.

Perforation Record

API: 47-085-10069 Farm name: KIESSLING, TERRY & HELEN Well Name: PEN-2D-HS

Stage No.	Perf Date	Top Perf	Bottom Perf	# of Perfs	Formation
Toe Prep Inj Test	12/4/2014	15580	15,586	-	Marcellus
1	12/4/2014	15329	15,568	50	Marcellus
2	12/5/2014	15032	15,271	50	Marcellus
3	12/5/2014	14735	14,974	50	Marcellus
4	12/5/2014	14438	14,677	50	Marcellus
5	12/6/2014	14141	14,380	50	Marcellus
6	12/7/2014	13844	14,083	50	Marcellus
7	12/7/2014	13547	13,786	50	Marcellus
8	12/8/2014	13250	13,489	50	Marcellus
9	12/9/2014	12953	13,192	50	Marcellus
10	12/10/2014	12656	12,895	50	Marcellus
11	12/11/2014	12359	12,598	50	Marcellus
12	12/11/2014	12062	12,301	50	Marcellus
13	12/12/2014	11765	12,004	50	Marcellus
14	12/13/2014	11468	11,707	50	Marcellus
15	1/4/2015	11171	11,410	50	Marcellus
16	1/4/2015	10874	11,113	50	Marcellus
17	1/5/2015	10577	10,816	50	Marcellus
18	1/5/2015	10280	10,519	50	Marcellus
19	1/5/2015	9983	10,222	50	Marcellus
20	1/6/2015	9686	9,925	50	Marcellus
21	1/7/2015	9389	9,628	50	Marcellus
22	1/8/2015	9092	9,331	50	Marcellus
23	1/9/2015	8795	9,034	50	Marcellus
24	1/9/2015	8498	8,737	50	Marcellus
25	1/9/2015	8201	8,440	50	Marcellus
26	1/10/2015	7904	8,143	50	Marcellus
27	1/10/2015	7607	7,846	50	Marcellus
28	1/10/2015	7310	7,549	50	Marcellus
29	1/11/2015	7013	7,252	50	Marcellus
30	1/11/2015	6716	6,955	50	Marcellus
31	1/11/2015	6419	6,658	50	Marcellus

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STIMULATION INFORMATION PER STAGE

API: 47-085-10069 Farm name: KIESSLING, TERRY & HELEN Well Name: PEN-2D-HS

Stage No.	Stim Date	Avg Rate (bpm)	ATP (psi)	Max BD Pressure	ISIP (psi)	Proppant (lbs)	Water (BBLS)	Amount of N^2/ other (units)
Toe Prep Inj Test	12/4/2014	0	-	9,905.00	4,663.00	-	354.00	
1	12/4/2014	87.2	7,828.00	5,423.00	2,998.00	602,150.00	13,696.00	
2	12/5/2014	86.3	8,145.00	6,291.00	3,301.00	599,700.00	12,898.00	
3	12/5/2014	88.5	8,291.00	7,356.00	3,369.00	598,800.00	12,898.00	
4	12/6/2014	84.9	8,226.00	6,280.00	4,081.00	489,450.00	12,117.00	
5	12/6/2014	84.5	7,937.00	5,929.00	3,515.00	640,100.00	14,762.00	
6	12/7/2014	89.1	8,093.00	5,808.00	3,358.00	602,850.00	14,043.00	
7	12/8/2014	83	8,173.00	5,736.00	3,294.00	601,000.00	12,760.00	
8	12/9/2014	87	8,131.00	5,572.00	3,701.00	601,900.00	13,171.00	
9	12/9/2014	83	8,189.00	5,533.00	3,744.00	600,220.00	16,398.00	
10	12/11/2014	85.7	8,011.00	5,833.00	3,093.00	600,750.00	12,698.00	
11	12/11/2014	84	7,805.00	5,457.00	3,365.00	600,980.00	14,506.00	
12	12/12/2014	80.9	8,128.00	5,347.00	3,444.00	601,850.00	16,885.00	
13	12/13/2014	83.2	8,051.00	5,733.00	3,576.00	602,900.00	12,745.00	
14	12/22/2014	85.6	7,647.00	5,958.00	3,812.00	599,950.00	12,586.00	
15	1/4/2015	82.1	7,776.00	6,902.00	3,909.00	599,630.00	12,418.00	
16	1/4/2015	83.9	7,814.00	6,351.00	4,581.00	601,650.00	12,293.00	
17	1/5/2015	78.8	7,940.00	6,423.00	4,219.00	600,260.00	18,737.30	
18	1/5/2015	65.5	7,911.00	5,589.00	3,630.00	596,260.00	15,407.00	
19	1/5/2015	88.6	7,653.00	6,341.00	3,980.00	600,600.00	15,305.00	
20	1/7/2015	78.9	8,128.00	6,058.00	3,812.00	600,980.00	15,355.00	
21	1/7/2015	80.2	7,905.00	6,541.00	3,619.00	601,350.00	13,184.00	
22	1/8/2015	85.4	7,932.00	5,329.00	3,841.00	599,900.00	15,172.00	
23	1/9/2015	87	7,946.00	5,422.00	3,734.00	601,620.00	12,307.00	
24	1/9/2015	84.6	7,892.00	5,354.00	3,952.00	600,820.00	12,463.00	
25	1/9/2015	82.6	7,911.00	5,171.00	3,802.00	600,400.00	14,253.00	
26	1/10/2015	88.6	7,348.00	5,657.00	5,407.00	550,780.00	11,905.00	
27	1/10/2015	86.4	7,620.00	5,203.00	3,573.00	650,160.00	14,409.00	
28	1/11/2015	82.4	7,450.00	6,651.00	4,996.00	542,300.00	14,252.00	
29	1/11/2015	88.6	7,220.00	5,761.00	4,553.00	678,780.00	14,426.00	
30	1/11/2015	88	7,541.00	5,593.00	3,219.00	601,700.00	13,527.00	
31	1/11/2015	87.3	6,599.00	6,166.00	3,319.00	603,500.00	11,959.00	

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API 47- 085 - 10069 Farm name Terry & Helen Kiessling Well number PEN 2 DHS

PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6,311 TVD	15,727 MD	

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ☐ Open Flow OIL TEST ☐ Flow ☐ Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW Gas 3569 mcfpd Oil 112 bpd NGL 411 bpd Water 992 bpd GAS MEASURED BY ☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION NAME	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 AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
	SEE ATTACHED FORMATION SHEET				

Please insert additional pages as applicable.

Drilling Contractor NOMAC
Address 171 Locust Avenue Ext. City Mt. Morris State PA Zip 15349

Logging Company _____
Address _____ City _____ State _____ Zip _____

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

Stimulating Company U. S Well Service
Address 533 Industrial Park Drive City Jane Lew State WV Zip 26378
Please insert additional pages as applicable.

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Completed by Regina A. Logue Telephone 724-820-3559
Signature Regina A. Logue Title Regulatory Analyst Date 4/6/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

PEN 2 DHS 47-085-10069

Formations	Top TVD	Base TVD	Top MD	Base MD	Fluid
Shale and Sandstone	0	1309	0	1309	
Sandstone	1309	1433	1309	1423	
Shale and Sandstone	1423	1593	1423	1593	
Sandstone	1593	1635	1593	1635	
Shale and Sandstone	1635	1737	1635	1737	
Maxton Sand	1737	1820	1737	1820	
Shale and Sandstone	1820	1943	1820	1943	
Big Lime	1943	1998	1943	1998	
Big Injun	1998	2133	1998	2133	
Price	2133	2405	2133	2405	
Weir	2405	2444	2405	2444	
Shale	2444	2724	2444	2724	
Gordon	2724	2741	2724	6301	
Shale and Sandstone	2741	2921	2741	6302	
5th Sand	2921	2933	2921	6371	
Shale	2933	3076	2933	not encountered	
Sandstone	3076	3090	3076	not encountered	
Shale	3090	3498	3090	not encountered	
Warren	3498	3560	3500	6300	
Shale	3560	3894	3562	6301	
Sandstone	3894	3931	3900	6302	
Shale and Sandstone	3931	4925	3937	6371	
Benson	4925	4987	4941	not encountered	
Shale	4987	5147	5004	not encountered	
Alexander	5147	5215	5166	not encountered	
Shale	5215	5725	5234	not encountered	
Rheinstreet	5725	6051	5750	not encountered	
Cashaqua	6051	6143	6080	not encountered	
Middlesex	6143	6172	6176	not encountered	
West River	6172	6216	6206	not encountered	
Burkett	6216	6259	6253	not encountered	
Tully Limestone	6259	6260	6300	not encountered	
Hamilton	6260	6261	6301	6302	Gas
Marcellus	6261	6320	6302	6371	
Onondaga	6320		6371	not encountered	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	12/4/2014
Job End Date:	1/11/2015
State:	West Virginia
County:	Ritchie
API Number:	47-085-10069-00-00
Operator Name:	Noble Energy, Inc.
Well Name and Number:	Pen 2 D
Longitude:	-81.01264400
Latitude:	39.33654400
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,311
Total Base Water Volume (gal):	18,055,350
Total Base Non Water Volume:	922,033

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

INTERSTATE Oil & Gas COMPACT COMMISSION

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	Noble Energy	Base Fluid					
			Water	7732-18-5	100.00000	88.72801	
40/70 Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	7.86917	
100 Mesh Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	3.07487	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.14498	
			Hydrogen Chloride	7647-01-0	18.00000	0.03463	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			Water	7732-18-5	40.00000	0.02705	
			Anionic Polyacrylamide	Proprietary	40.00000	0.02705	
			Petroleum Distillates	64742-47-8	40.00000	0.02177	
			Crystalline Salt	12125-02-9	5.00000	0.00338	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00338	
SI-1100	U.S. Well Services, LLC	Scale Inhibitor					
			Di Water	7732-18-5	80.00000	0.01363	

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			Ethylene Glycol	107-21-1	40.00000	0.00770	
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00230	
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00220	
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00213	
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00201	
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00196	
			Acrylic polymer	52255-49-9	5.00000	0.00085	
WFRA-1000	U.S. Well Services, LLC	Friction Reducer					
			Water	7732-18-5	40.00000	0.00626	
			Anionic Polyacrylamide	Proprietary	40.00000	0.00626	
			Petroleum Distillates	64742-47-8	40.00000	0.00504	
			Crystalline Salt	12125-02-9	5.00000	0.00078	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00078	
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00835	
			Deionized Water	7732-18-5	28.00000	0.00477	
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Diethylene Glycol	111-46-6	30.00000	0.00022	
			Methenamine	100-97-0	20.00000	0.00018	
			Hydrogen Chloride	7647-01-0	10.00000	0.00008	
			Polyethylene polyamine	68603-67-8	10.00000	0.00007	
			Coco amine	61791-14-8	5.00000	0.00003	
ICA-800	U.S. Well Services, LLC	Iron Control Additive					
			Erythorbic Acid	89-65-6	100.00000	0.00013	

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.

* 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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Actual Wellpath Report

PEN2DHS (AWP) Proj: 15727'

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

WELLPATH DATA (171 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	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	0.04	-0.07	-0.01	1572169.23	308288.19	39°20'11.559"N	81°00'45.520"W	0.07	191.650	0.15
200.00	0.370	205.560	200.00	0.24	-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	134.500	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	1.150	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	1.540	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
2529.00	1.630	305.950	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	1.150	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	1.280	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
3099.00	1.110	357.930	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	1.180	342.360	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
3291.00	1.360	349.570	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	1.260	343.700	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
3576.00	0.390	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
3672.00	0.290	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
3767.00	0.990	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
3863.00	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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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot D
Area	Ritchie County, WV	Well	PEN2DHS
Field	Ritchie	Wellbore	PEN2DHS (AWB)
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]
3958.00	1.030	222.700	3956.55	7.62	-9.50	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	0.550	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	19.190	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	270.040	5495.52	9.60	-13.96	-1.69	1572167.55	308274.30	39°20'11.422"N	81°00'45.539"W	14.06	186.911	0.29
5557.00	0.060	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	88.560	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	88.930	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	90.000	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	89.850	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
7273.00	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
7369.00	89.230	138.300	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
7464.00	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
7560.00	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
7655.00	88.950	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
7751.00	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
7846.00	88.490	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
7945.00	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
8038.00	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
8133.00	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	NOBLE ENERGY	Slot	Slot D
Area	Ritchie County, WV	Well	PEN2DHS
Field	Ritchie	Wellbore	PEN2DHS (AWB)
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°19'55.317"N	81°00'24.182"W	2347.76	135.389	1.38
8516.00	89.780	140.430	6307.42	2436.15	-1745.89	1709.30	1573878.46	306542.45	39°19'54.591"N	81°00'23.396"W	2443.33	135.607	1.05
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	1574001.47	306396.38	39°19'53.167"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	1574063.12	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	89.880	139.940	6309.93	3200.47	-2317.82	2216.77	1574385.91	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	89.600	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
10992.00	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	92.1	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
11182.00	90.0	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
11277.00	90.0	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
11373.00	90.220	138.590	6307.50	5290.01	-3922.18	3555.51	1575724.58	304366.26	39°19'33.389"N	80°59'59.442"W	5293.88	137.807	0.31
11468.00	90.120	139.820	6307.21	5384.99	-3994.10	3617.58	1575786.65	304294.35	39°19'32.689"N	80°59'58.637"W	5388.85	137.832	1.30
11564.00	90.150	141.340	6306.99	5480.99	-4068.26	3678.54	1575847.60	304220.19	39°19'31.966"N	80°59'57.846"W	5484.74	137.880	1.58
11660.00	90.400	141.470	6306.53	5576.96	-4143.29	3738.42	1575907.49	304145.17	39°19'31.234"N	80°59'57.068"W	5580.56	137.941	0.29
11754.00	89.880	141.140	6306.30	5670.93	-4216.66	3797.19	1575966.25	304071.81	39°19'30.519"N	80°59'56.305"W	5674.40	137.996	0.66
11849.00	89.940	139.640	6306.45	5765.93	-4289.84	3857.75	1576026.81	303998.62	39°19'29.806"N	80°59'55.518"W	5769.32	138.036	1.58
11945.00	89.750	139.850	6306.71	5861.92	-4363.11	3919.79	1576088.84	303925.36	39°19'29.092"N	80°59'54.714"W	5865.27	138.064	0.29
12040.00	89.9	140.060	6306.99	5956.92	-4435.83	3980.91	1576149.96	303852.64	39°19'28.383"N	80°59'53.921"W	5960.22	138.094	0.28
12136.00	89.940	140.130	6307.11	6052.92	-4509.47	4042.50	1576211.54	303779.00	39°19'27.666"N	80°59'53.121"W	6056.16	138.126	0.08
12230.00	89.880	143.040	6307.26	6146.88	-4583.12	4100.90	1576269.94	303705.36	39°19'26.948"N	80°59'52.363"W	6149.99	138.178	3.10
12324.00	90.150	141.950	6307.24	6240.79	-4657.69	4158.13	1576327.17	303630.79	39°19'26.220"N	80°59'51.619"W	6243.72	138.243	1.19
12419.00	90.220	138.160	6306.93	6335.77	-4730.51	4219.11	1576388.15	303557.98	39°19'25.510"N	80°59'50.827"W	6338.66	138.270	3.99

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Actual Wellpath Report

PEN2DHS (AWP) Proj: 15727'

REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot D
Area	Ritchie County, WV	Well	PEN2DHS
Field	Ritchie	Wellbore	PEN2DHS (AWB)
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]
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	4399.71	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
15466.00	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
15561.00	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
15658.00	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
15673.00	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
15727.00	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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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)	01_Gyro Surveys (100'-1038')	PEN2DHS (AWB)
1038.00	5373.00	ISCWSA MWD, Rev. 2 (Standard)	02_Schlumberger MWD Surveys 12 1/4" (1193'-5373')Proj:5430'	PEN2DHS (AWB)
5373.00	15703.00	NaviTrak (AT Curve Short Spaced)	03_BHIATcurve Surveys 8 3/4" (5373')(5497'-15703')	PEN2DHS (AWB)
15703.00	15727.00	Blind Drilling (std)	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: Nomac 78
BHI Job #: 6519078
Duration: 07/15/2014-07/19/2014
Gyro Surveys (100'-1038')
Schlumberger MWD Surveys (1193'-5373')
BHIATcurve Surveys (5373')(5497'-15703')
TD Projected to MD: 15727'

NOBLE ENERGY

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

Slot: Slot D
Well: PEN2DHS
Wellbore: PEN2DHS PWB

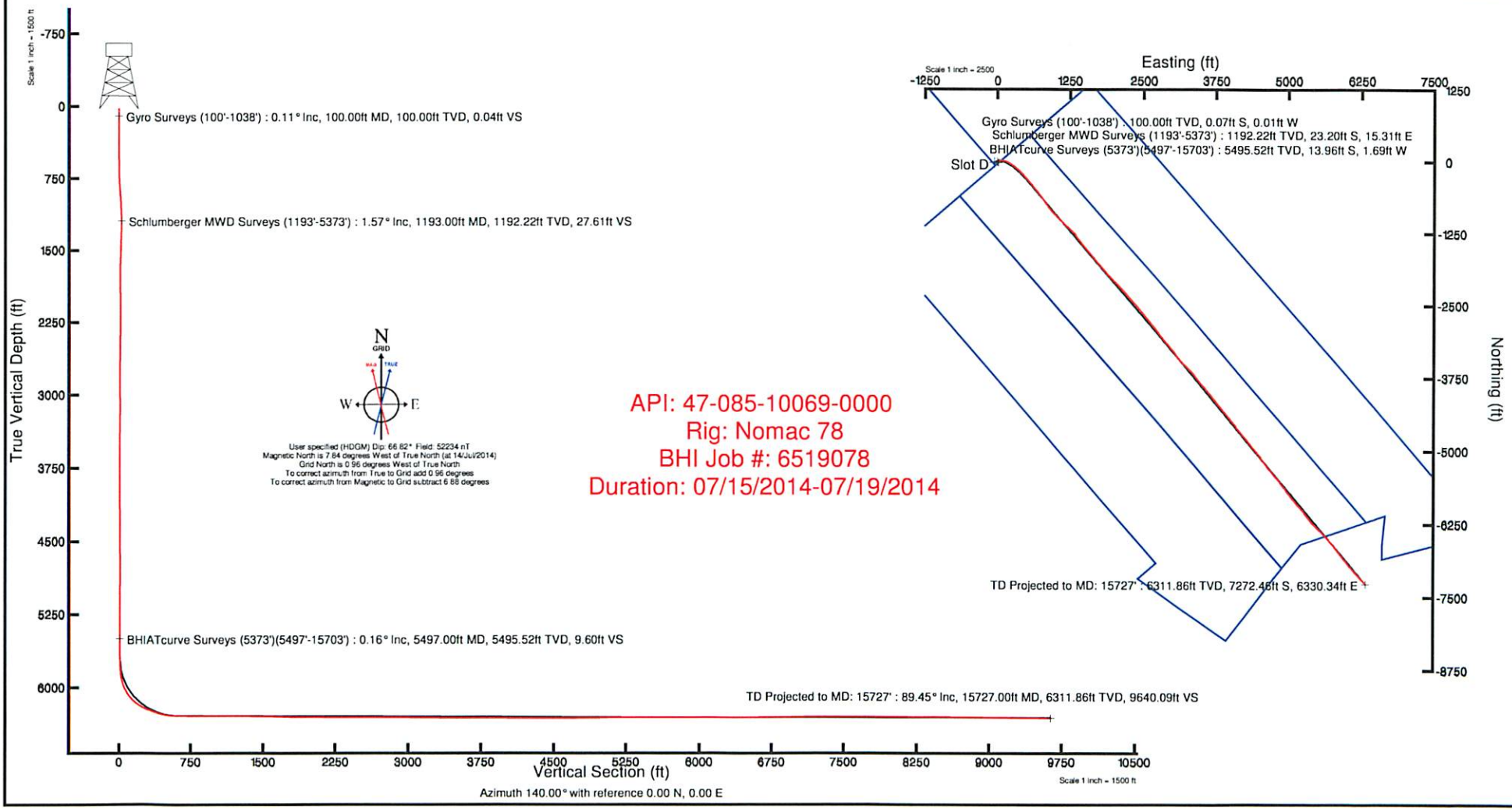
Location Information

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 N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot D	21.32	56.16	1572169.245	308288.256	39°20'11.560"N	81°00'45.520"W
Nomac 78 (RT) to Mud line (At Slot: Slot D)					26ft	
Mean Sea Level to Mud line (At Slot: Slot D)					-1074.46ft	
Nomac 78 (RT) to Mean Sea Level					1100.46ft	

Plot reference wellpath is PEN2DHS (PWP) Rev-A.0	
True vertical depths are referenced to Nomac 78 (RT)	Grid System: NAD27 / Lambert West Virginia SP, Northern Zone (4701), US feet
Measured depths are referenced to Nomac 78 (RT)	North Reference: Grid north
Nomac 78 (RT) to Mean Sea Level: 1100.46 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot D): -1074.46 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: kroschr on 24/Jul/2014

Well Data

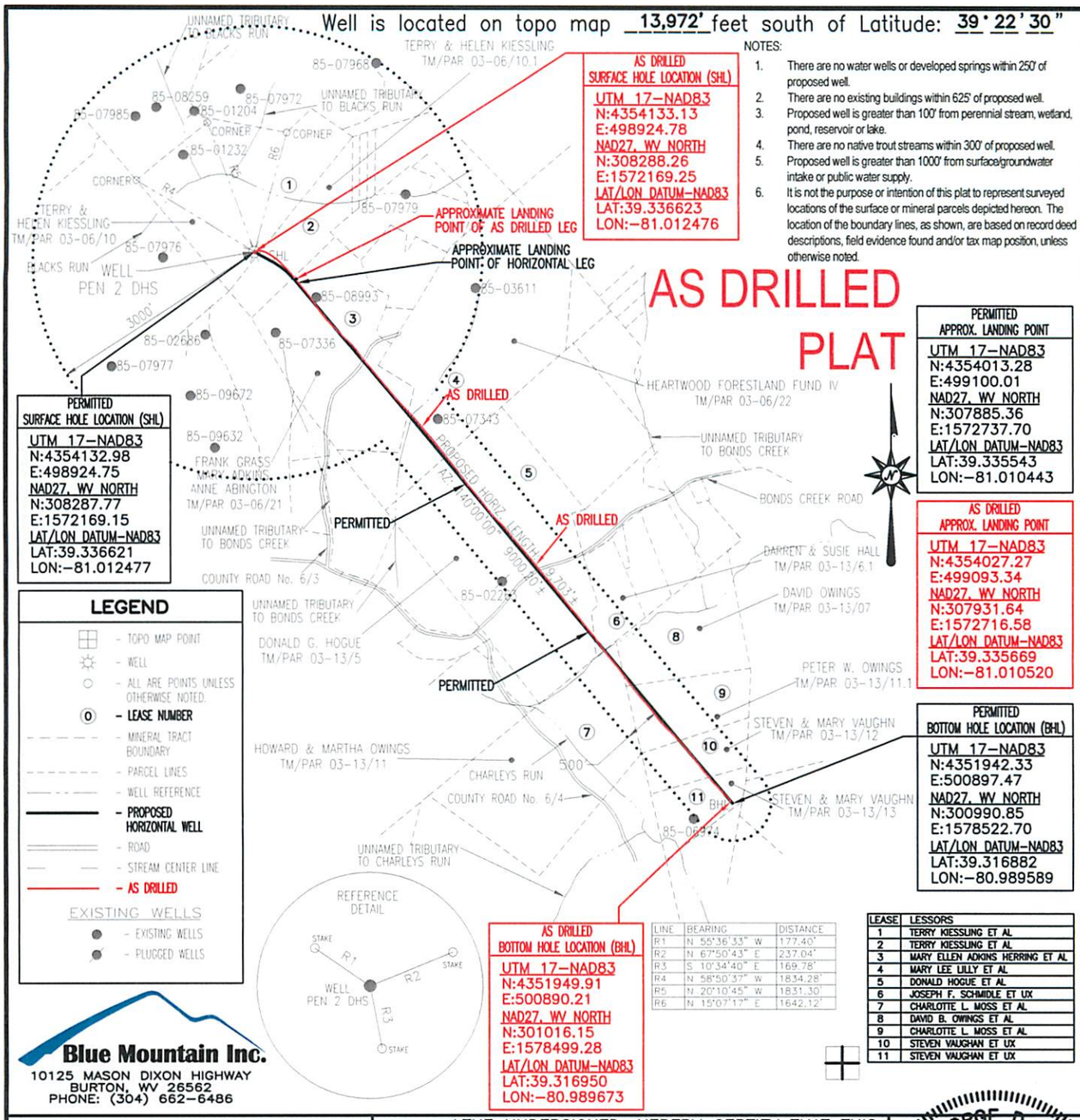
Slot	Well	Wellbore	Wellpath
Slot D	PEN2DHS	PEN2DHS (AWB)	PEN2DHS (AWP) Proj: 15727'
Slot D	PEN2DHS	PEN2DHS PWB	PEN2DHS (PWP) Rev-A.0



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

Well is located on topo map 13,972' feet south of Latitude: 39°22'30"

Well is located on topo map 3,538' feet west of Longitude: 81°00'00"



NOTES:

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

LINE	BEARING	DISTANCE
R1	N 55°36'33" W	177.40'
R2	N 67°50'43" E	237.04'
R3	S 10°34'40" E	169.78'
R4	N 58°50'37" W	1834.28'
R5	N 20°10'45" W	1831.30'
R6	N 15°07'17" E	1642.12'

LEASE	LESSORS
1	TERRY KIESSLING ET AL
2	TERRY KIESSLING ET AL
3	MARY ELLEN ADKINS HERRING ET AL
4	MARY LEE LILLY ET AL
5	DONALD HOGUE ET AL
6	JOSEPH F. SCHMIDLE ET UX
7	CHARLOTTE L. MOSS ET AL
8	DAVID B. OWINGS ET AL
9	CHARLOTTE L. MOSS ET AL
10	STEVEN VAUGHAN ET UX
11	STEVEN VAUGHAN ET UX

Blue Mountain Inc.
10125 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

FILE #: PEN 2 DHS-AS DRILLED

DRAWING #: PEN 2 DHS-AS DRILLED

SCALE: 1" = 2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

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

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

Signed: George W. Six

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

GEORGE D. SIX LICENSED No. 2000 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

PLACE SEAL HERE

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(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: FEBRUARY 9, 2015

OPERATOR'S WELL #: PEN 2 DHS-AS DRILLED

API WELL #: 47 085 10069
STATE COUNTY PERMIT
47 085 10069

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: NORTH FORK HUGHES RIVER ELEVATION: 1084'±

COUNTY/DISTRICT: RITCHIE / CLAY QUADRANGLE: ELLENBORO, WV 7.5'

SURFACE OWNER: TERRY & HELEN KIESSLING ACREAGE: 79.242±

OIL & GAS ROYALTY OWNER: TERRY KIESSLING ET AL ACREAGE: 675.359±

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☐

PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐

CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,324'± TMD: 15,700'±

WELL OPERATOR NOBLE ENERGY, INC. DESIGNATED AGENT STEVEN M. GREEN

Address 333 TECHNOLOGY DRIVE, SUITE 116 Address 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590

City CANONSBURG State PA Zip Code 15317 City CHARLESTON State WV Zip Code 25301

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

API 47 - 085 - 10070 County Ritche District Clay
Quad Pennsboro Pad Name PEN 2 Field/Pool Name NA
Farm name Terry & Helen Kiessling Well Number PEN 2 EHS
Operator (as registered with the OOG) Noble Energy, Inc.
Address 1000 Noble Energy Drive City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4344135.28 Easting 498930.29
Landing Point of Curve Northing 4354162.12 Easting 499276.60
Bottom Hole Northing 4352101.16 Easting 501063.45

Elevation (ft) 1074.85 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

Drilling 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 10/30/2013 Date drilling commenced 01/19/2014 Date drilling ceased 09/02/2014
Date completion activities began 12/2/2014 Date completion activities ceased 2/11/2015
Verbal plugging (Y/N) N Date permission granted _____ Granted by _____

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

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Freshwater depth(s) ft 454 Open mine(s) (Y/N) depths None
Salt water depth(s) ft None noted for Offsets Void(s) encountered (Y/N) depths none
Coal depth(s) ft no coal Cavern(s) encountered (Y/N) depths none
Is coal being mined in area (Y/N) N

Reviewed by:
A.L. 5/26/15
W.S. 06/01/15

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API 47- 085 - 10070 Farm name Terry & Helen Kiessling Well number PEN 2 EHS

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	36	30	40				
Surface	17 1/2	13 3/8	595.3	N	J-55 54.5#		Y
Coal							
Intermediate 1	12 3/8	9 5/8	5,514.0	N	K-55 36#		Y
Intermediate 2							
Intermediate 3							
Production	8 3/4	5 1/2	15,936.0	N	P-110 20#		Y
Tubing							
Packer type and depth set							

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft^3/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor							
Surface	TYPE 1	532	15.6	1.20	114.5	0	8
Coal							
Intermediate 1	Class A	Lead 945 Tail 300	Lead 12.0 Tail 15.6	Lead 1.93 Tail 1.19	Lead 201 Tail 167	0	8
Intermediate 2							
Intermediate 3							
Production	Class A	Lead 415 Tail 2105	Lead 12.3 Tail 14.8	Lead 1.62 Tail 1.37	Lead 167 Tail 208	5530	8
Tubing							

Drillers TD (ft) 15,593 Loggers TD (ft) 15,927

Deepest formation penetrated Marcellus Plug back to (ft) Not a Pilot Hole

Plug back procedure Not a Pilot Hole

Kick off depth (ft) 6986

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction ☐ neutron ☐ resistivity ■ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ☐ No ☐ Conventional ☐ Sidewall Were cuttings collected ■ Yes ☐ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING Conductor - No centralizers used. Fresh Water/Surface- Surface - 5 centralizers used, one every third joint Intermediate - 67 centralizers - bow spring centralizers on every joint to KOP, on every third joint from KOP to 100' from surface. Production - 272 centralizers - rigid bow spring every third joint from KOP to TOC, rigid bow spring every joint to KOP.

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10070 Farm name Terry & Helen Kiessling Well number PEN 2 EHS

PERFORATION RECORD

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

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	SEE ATTACHED STIMULATION							
	INFORMATION PER STAGE							
	RECORD							

Please insert additional pages as applicable.

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Perforation Record

API: 47-085-10070 Farm name: TERRY & HELEN KIESSLING Well Name: PEN-2-E-HS

Stage No.	Stim Date	Top Perf	Bottom Perf	# of Perfs	Formation
Trigger Toe	12/2/2014	15809	15,814	-	Marcellus
1	12/2/2014	15630	15,791	50	Marcellus
2	12/3/2014	15431	15,592	50	Marcellus
3	12/3/2014	15232	15,393	50	Marcellus
4	12/3/2014	15033	15,194	50	Marcellus
4 Inj Test I	12/5/2014	-	-	-	Marcellus
4 Inj Test II	12/5/2014	-	-	-	Marcellus
5	12/6/2014	14834	14,995	50	Marcellus
6	12/6/2014	14635	14,796	50	Marcellus
7	12/7/2014	14436	14,597	50	Marcellus
8	12/8/2014	14237	14,398	50	Marcellus
9	12/12/2014	14038	14,199	50	Marcellus
10	12/13/2014	13839	14,000	50	Marcellus
11	12/13/2014	13640	13,801	50	Marcellus
12	12/14/2014	13441	13,602	50	Marcellus
13	12/14/2014	13242	13,403	50	Marcellus
14	12/15/2014	13043	13,204	50	Marcellus
15	12/15/2014	12844	13,005	50	Marcellus
16	12/16/2014	12645	12,806	50	Marcellus
17	12/16/2014	12446	12,607	50	Marcellus
18	12/17/2014	12247	12,408	50	Marcellus
19	12/17/2014	12048	12,209	50	Marcellus
20	12/17/2014	11849	12,010	50	Marcellus
21	12/18/2014	11650	11,811	50	Marcellus
22	12/18/2014	11448	11,612	50	Marcellus
23	12/19/2014	11252	11,413	50	Marcellus
24	12/19/2014	11053	11,214	50	Marcellus
25	12/19/2014	10854	11,015	50	Marcellus
26	12/20/2014	10655	10,816	50	Marcellus
26 Inj Test	12/20/2014	0	-	-	Marcellus
26B (Reperf)	12/21/2014	10649	10,688	36	Marcellus
27	12/21/2014	10456	10,617	50	Marcellus
27B	12/21/2014	10436	10,452	24	Marcellus
28	12/22/2014	10257	10,402	50	Marcellus
29	12/29/2014	10058	10,219	50	Marcellus
29 Inj Test	12/23/2014	0	-	-	Marcellus
29B (Reperf)	12/23/2014	10052	10,122	48	Marcellus
29C (Commingle)	12/23/2014	9859	10,020	50	Marcellus
31	12/24/2014	9660	9,821	60	Marcellus
32	12/24/2014	9461	9,622	50	Marcellus
33	12/26/2014	9262	9,423	50	Marcellus

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Perforation Record

API: 47-085-10070 Farm name: TERRY & HELEN KIESSLING Well Name: PEN-2-E-HS

Stage No.	Stim Date	Top Perf	Bottom Perf	# of Perfs	Formation
34	12/26/2014	9063	9,224	50	Marcellus
35	12/27/2014	8864	9,025	50	Marcellus
36	12/27/2014	8665	8,826	50	Marcellus
36B (Reperf)	12/27/2014	8650	8,694	36	Marcellus
36C (Commingle)	12/27/2014	8466	8,627	50	Marcellus
38	12/27/2014	8267	8,428	50	Marcellus
39	12/28/2014	8068	8,229	50	Marcellus
40	12/29/2014	7869	8,030	50	Marcellus
41	12/29/2014	7670	7,831	50	Marcellus
42	12/29/2014	7471	7,632	50	Marcellus

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STIMULATION INFORMATION PER STAGE

API: 47-085-10070 Farm name: TERRY & HELEN KIESSLING Well Name: PEN-2 -E-HS

Stage No.	Stim Date	Avg Rate (bpm)	ATP (psi)	Max BD Pressure	ISIP (psi)	Proppant (lbs)	Water (BBLS)	Amount of N^2/ other (units)
Trigger Toe	12/2/2014	6.0	7,470	9,724	4,106	-	347	
1	12/2/2014	81.8	8,062	6,459	3,533	329,750	8,416	
2	12/3/2014	78.9	8,251	6,183	4,041	315,700	9,323	
3	12/3/2014	79.6	8,456	5,822	3,547	345,850	8,874	
4	12/3/2014	87.0	8,537	5,701	5,010	268,500	6,431	
4 Inj Test I	12/5/2014	4.1	5,900	7,489	-	-	1,143	
4 Inj Test II	12/5/2014	7.1	6,676	9,040	4,957	-	1,353	
5	12/6/2014	81.7	8,192	5,747	3,916	381,150	11,254	
6	12/6/2014	80.7	8,143	6,223	3,762	331,150	7,273	
7	12/7/2014	82.2	8,174	5,676	3,508	330,750	9,333	
8	12/8/2014	80.5	8,214	5,454	4,528	333,650	10,501	
9	12/12/2014	71.0	8,402	5,529	3,726	331,260	11,029	
10	12/13/2014	77.8	8,319	5,600	3,494	330,500	9,338	
11	12/13/2014	76.0	8,121	5,250	3,659	331,580	8,560	
12	12/14/2014	77.5	8,225	5,393	3,787	330,750	7,130	
13	12/14/2014	76.1	8,312	5,797	3,351	331,450	9,347	
14	12/15/2014	77.0	8,439	5,518	4,020	331,260	10,001	
15	12/15/2014	83.4	8,120	5,189	3,920	330,800	7,571	
16	12/16/2014	82.0	8,011	4,996	4,159	330,660	8,279	
17	12/16/2014	79.0	8,083	5,357	3,777	330,900	8,775	
18	12/17/2014	83.0	7,978	6,008	3,952	331,340	8,199	
19	12/17/2014	85.2	8,074	5,468	3,787	329,500	8,166	
20	12/17/2014	84.0	8,237	5,643	4,717	327,420	8,096	
21	12/18/2014	87.1	8,062	5,786	3,809	330,250	8,217	
22	12/18/2014	86.2	8,130	5,887	3,541	329,500	8,155	
23	12/19/2014	86.0	7,979	5,772	3,963	330,360	8,018	
24	12/19/2014	87.2	7,618	3,316	3,655	330,050	8,057	
25	12/19/2014	86.0	7,930	6,226	3,905	331,040	7,934	
26	12/20/2014	71.4	8,430	6,022	-	5,500	1,755	
26 Inj Test	12/20/2014	8.0	7,890	5,500	-	-	1,578	
26B (Reperf)	12/21/2014	56.0	7,755	7,292	3,619	331,000	12,318	
27	12/21/2014	57.0	8,703	6,673	4,560	9,500	4,416	
27B	12/21/2014	69.0	7,673	7,678	4,156	331,990	11,365	
28	12/22/2014	85.0	7,826	5,901	3,855	330,250	8,417	
29	12/29/2014	75.3	8,154	5,475	7,077	4,000	2,345	
29 Inj Test	12/23/2014	20.0	6,116	5,271	4,638	1,000	3,360	
29B (Reperf)	12/23/2014	46.0	8,216	6,927	5,397	184,250	11,885	
29C (Commingle)	12/23/2014	83.0	7,238	6,319	4,402	478,891	10,860	
31	12/24/2014	86.0	7,491	5,897	4,520	338,056	8,809	
32	12/24/2014	87.0	7,705	6,469	5,075	328,768	7,923	
33	12/26/2014	86.0	7,546	5,901	4,088	330,500	10,969	

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STIMULATION INFORMATION PER STAGE

API: 47-085-10070 Farm name: TERRY & HELEN KIESSLING Well Name: PEN-2 -E-HS

Stage No.	Stim Date	Avg Rate (bpm)	ATP (psi)	Max BD Pressure	ISIP (psi)	Proppant (lbs)	Water (BBLS)	Amount of N^2/ other (units)
34	12/26/2014	86.0	7,426	6,537	4,395	327,250	7,955	
35	12/27/2014	88.0	7,267	6,165	4,467	330,600	8,037	
36	12/27/2014	80.0	8,522	5,790	4,696	14,200	4,019	
36B (Reperf)	12/27/2014	47.0	8,770	6,491	4,470	4,500	3,381	
36C (Commingle)	12/27/2014	87.0	7,052	5,436	3,948	705,700	14,291	
38	12/27/2014	88.0	7,373	5,396	3,880	331,350	8,014	
39	12/28/2014	81.0	7,921	5,865	4,081	313,278	10,933	
40	12/29/2014	76.9	7,440	6,219	4,835	340,000	10,783	
41	12/29/2014	82.0	7,585	6,595	3,415	327,100	8,939	
42	12/29/2014	-	-	7,081	4,780	-	468	

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API 47- 085 - 10070 Farm name Terry & Helen Kiessling Well number PEN 2 DHS

PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6,313 TVD	15,727 MD	

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ☐ Open Flow OIL TEST ☐ Flow ☐ Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	3868 mcfpd	117 bpd	429 bpd	883 bpd	☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
	SEE ATTACHED FORMATION SHEET				

Please insert additional pages as applicable.

Drilling Contractor NOMAC
Address 171 Locust Avenue Ext. City Mt. Morris State PA Zip 15349

Logging Company _____
Address _____ City _____ State _____ Zip _____

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

Stimulating Company U. S Well Service
Address 533 Industrial Park Drive City Jane Lew State WV Zip 26378
Please insert additional pages as applicable.

Completed by Regina A. Logue Telephone 724-820-3559
Signature Regina A. Logue Title Regulatory Analyst Date 4/6/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

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PEN 2 EHS 47-085-10070

Formations	Top TVD	Base TVD	Top MD	Base MD	Fluid
Shale and Sandstone	0	1309	0	1309	
Sandstone	1309	1433	1309	1423	
Shale and Sandstone	1423	1593	1423	1593	
Sandstone	1593	1635	1593	1635	
Shale and Sandstone	1635	1737	1635	1737	
Maxton Sand	1737	1820	1737	1820	
Shale and Sandstone	1820	1943	1820	1943	
Big Lime	1943	1998	1943	1998	
Big Injun	1998	2133	1998	2133	
Price	2133	2405	2133	2405	
Weir	2405	2444	2405	2444	
Shale	2444	2724	2444	2724	
Gordon	2724	2741	2724	6301	
Shale and Sandstone	2741	2921	2741	6302	
5th Sand	2921	2933	2921	6371	
Shale	2933	3076	2933	not encountered	
Sandstone	3076	3090	3076	not encountered	
Shale	3090	3498	3090	not encountered	
Warren	3498	3560	3500	6300	
Shale	3560	3894	3562	6301	
Sandstone	3894	3931	3900	6302	
Shale and Sandstone	3931	4925	3937	6371	
Benson	4925	4987	4941	not encountered	
Shale	4987	5147	5004	not encountered	
Alexander	5147	5215	5166	not encountered	
Shale	5215	5725	5234	not encountered	
Rheinstreet	5725	6051	5750	not encountered	
Cashaqua	6051	6143	6080	not encountered	
Middlesex	6143	6172	6176	not encountered	
West River	6172	6216	6206	not encountered	
Burkett	6216	6259	6253	not encountered	
Tully Limestone	6259	6260	6300	not encountered	
Hamilton	6260	6261	6301	6302	Gas
Marcellus	6261	6320	6302	6371	
Onondaga	6320		6371	not encountered	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	12/2/2014
Job End Date:	12/29/2014
State:	West Virginia
County:	Ritchie
API Number:	47-085-10070-00-00
Operator Name:	Noble Energy, Inc.
Well Name and Number:	Pen 2 E
Longitude:	-81.01258100
Latitude:	39.33656400
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,313
Total Base Water Volume (gal):	16,464,000
Total Base Non Water Volume:	720,266

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

Interstate Oil & Gas Compact Commission

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	Noble Engery	Base Fluid					
			Water	7732-18-5	100.00000	90.50441	
40/70 Sand	U.S. Well Services	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	6.41537	
100 Mesh Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	2.56436	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.28831	
			Hydrogen Chloride	7647-01-0	18.00000	0.06887	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			Anionic Polyacrylamide	Proprietary	40.00000	0.03500	
			Water	7732-18-5	40.00000	0.03500	
			Petroleum Distillates	64742-47-8	40.00000	0.02818	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00438	
			Crystalline Salt	12125-02-9	5.00000	0.00438	
SI-1100	U.S. Well Services	Scale Inhibitor					
			Di Water	7732-18-5	80.00000	0.01360	
			Ethylene Glycol	107-21-1	40.00000	0.00769	

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			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00230	
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00219	
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00213	
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00201	
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00196	
			Acrylic polymer	52255-49-9	5.00000	0.00085	
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00832	
			Deionized Water	7732-18-5	28.00000	0.00475	
LGC-15	U.S. Well Services, LLC	Gelling Agents					
			Guar Gum	9000-30-0	50.00000	0.00202	
			Petroleum Distillates	64742-47-8	60.00000	0.00192	
			Suspending agent (solid)	14808-60-7	3.00000	0.00031	
			Surfactant	68439-51-0	3.00000	0.00012	
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Diethylene Glycol	111-46-6	30.00000	0.00044	
			Methenamine	100-97-0	20.00000	0.00035	
			Hydrogen Chloride	7647-01-0	10.00000	0.00015	
			Polyethylene polyamine	68603-67-8	10.00000	0.00013	
			Coco amine	61791-14-8	5.00000	0.00006	
ICA-800	U.S. Well Services	Iron Control Additive					
			Erythorbic Acid	89-65-6	100.00000	0.00038	
AP One	U.S. Well Services, LLC	Gel Breakers					
			Ammonium Persulfate	7727-54-0	100.00000	0.00006	

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.

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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Actual Wellpath Report

PEN-2E-HS AWP Proj: 15953'

REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot E
Area	Ritchie County, WV	Well	PEN-2E-HS
Field	Ritchie	Wellbore	PEN-2E-HS 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	Gotfbral
Scale	0.999953	Report Generated	9/2/2014 at 10:28:40 AM
Convergence at slot	0.96° West	Database/Source file	WANorthEast/PEN-2E-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	28.09	74.35	1572187.43	308295.03	39°20'11.630"N	81°00'45.290"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	1101.07ft
Horizontal Reference Pt	Slot	Nomac 78 (RT) to Mean Sea Level	1101.07ft
Vertical Reference Pt	Nomac 78 (RT)	Nomac 78 (RT) to Mud Line at Slot (Slot E)	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	140.03°

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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot E
Area	Ritchie County, WV	Well	PEN-2E-HS
Field	Ritchie	Wellbore	PEN-2E-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (172 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	9.550	0.00	0.00	0.00	0.00	1572187.43	308295.03	39°20'11.630"N	81°00'45.290"W	0.00	0.000	0.00
26.00	0.000	9.550	26.00	0.00	0.00	0.00	1572187.43	308295.03	39°20'11.630"N	81°00'45.290"W	0.00	0.000	0.00
100.00	0.150	9.550	100.00	-0.06	0.10	0.02	1572187.45	308295.13	39°20'11.631"N	81°00'45.290"W	0.10	9.550	0.20
200.00	0.250	99.080	200.00	0.02	0.19	0.25	1572187.69	308295.22	39°20'11.632"N	81°00'45.287"W	0.32	53.092	0.29
300.00	0.510	108.140	300.00	0.56	0.02	0.89	1572188.32	308295.05	39°20'11.630"N	81°00'45.279"W	0.89	88.896	0.27
400.00	0.510	104.530	399.99	1.30	-0.23	1.75	1572189.18	308294.80	39°20'11.628"N	81°00'45.268"W	1.76	97.605	0.03
500.00	0.760	108.310	499.99	2.23	-0.55	2.81	1572190.24	308294.48	39°20'11.625"N	81°00'45.254"W	2.86	101.151	0.25
559.00	1.000	87.620	558.98	2.87	-0.65	3.69	1572191.12	308294.38	39°20'11.624"N	81°00'45.243"W	3.75	100.055	0.67
681.00	0.510	100.010	680.97	3.94	-0.70	5.29	1572192.72	308294.33	39°20'11.624"N	81°00'45.223"W	5.34	97.588	0.42
712.00	0.620	127.180	711.97	4.21	-0.83	5.56	1572192.99	308294.20	39°20'11.623"N	81°00'45.219"W	5.62	98.492	0.92
745.00	1.060	132.580	744.96	4.68	-1.14	5.93	1572193.36	308293.89	39°20'11.620"N	81°00'45.214"W	6.04	100.930	1.35
809.00	2.750	139.780	808.93	6.81	-2.72	7.35	1572194.79	308292.32	39°20'11.604"N	81°00'45.196"W	7.84	110.281	2.66
903.00	5.930	135.370	902.65	13.90	-7.90	12.22	1572199.65	308287.14	39°20'11.554"N	81°00'45.133"W	14.55	122.864	3.40
998.00	6.540	135.370	997.08	24.19	-15.24	19.47	1572206.90	308279.80	39°20'11.483"N	81°00'45.039"W	24.73	128.048	0.64
1092.00	6.540	134.020	1090.47	34.85	-22.77	27.08	1572214.51	308272.27	39°20'11.410"N	81°00'44.941"W	35.38	130.055	0.16
1188.00	5.000	134.980	1185.98	44.45	-29.53	33.97	1572221.40	308265.51	39°20'11.344"N	81°00'44.851"W	45.01	130.994	1.61
1284.00	3.490	140.270	1281.72	51.54	-34.73	38.80	1572226.23	308260.31	39°20'11.293"N	81°00'44.789"W	52.07	131.832	1.62
1380.00	2.520	155.080	1377.58	56.50	-38.89	41.56	1572228.99	308256.14	39°20'11.253"N	81°00'44.753"W	56.92	133.103	1.29
1475.00	1.890	168.210	1472.51	59.90	-42.32	42.76	1572230.19	308252.72	39°20'11.219"N	81°00'44.737"W	60.16	134.705	0.85
1571.00	0.830	188.190	1568.49	61.76	-44.56	42.98	1572230.41	308250.48	39°20'11.197"N	81°00'44.734"W	61.91	136.031	1.19
1667.00	0.810	200.610	1664.48	62.55	-45.88	42.64	1572230.07	308249.16	39°20'11.184"N	81°00'44.738"W	62.64	137.094	0.19
1762.00	1.200	220.620	1759.46	63.05	-47.26	41.76	1572229.19	308247.77	39°20'11.170"N	81°00'44.748"W	63.07	138.538	0.55
1857.00	0.960	206.800	1854.45	63.52	-48.73	40.75	1572228.18	308246.31	39°20'11.155"N	81°00'44.761"W	63.52	140.094	0.37
1953.00	0.280	73.800	1950.44	63.94	-49.38	40.61	1572228.05	308245.65	39°20'11.149"N	81°00'44.763"W	63.94	140.564	1.22
2048.00	0.920	50.350	2045.44	64.03	-48.83	41.43	1572228.86	308246.21	39°20'11.154"N	81°00'44.752"W	64.03	139.690	0.71
2144.00	0.740	82.270	2141.43	64.37	-48.25	42.63	1572230.06	308246.78	39°20'11.160"N	81°00'44.737"W	64.39	138.540	0.51
2239.00	0.580	224.420	2236.42	64.74	-48.52	42.90	1572230.34	308246.52	39°20'11.158"N	81°00'44.734"W	64.77	138.513	1.32
2334.00	1.140	225.180	2331.41	64.87	-49.53	41.90	1572229.33	308245.51	39°20'11.148"N	81°00'44.746"W	64.87	139.770	0.59
2430.00	1.150	266.670	2427.39	64.38	-50.25	40.26	1572227.69	308244.78	39°20'11.140"N	81°00'44.767"W	64.39	141.302	0.84
2525.00	1.050	325.120	2522.38	62.94	-49.60	38.81	1572226.24	308245.44	39°20'11.146"N	81°00'44.786"W	62.97	141.957	1.13

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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot E
Area	Ritchie County, WV	Well	PEN-2E-HS
Field	Ritchie	Wellbore	PEN-2E-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (172 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]
2621.00	0.550	41.290	2618.37	61.99	-48.53	38.61	1572226.04	308246.51	39°20'11.157"N	81°00'44.788"W	62.01	141.494	1.11
2717.00	0.700	74.260	2714.37	62.16	-48.02	39.48	1572226.91	308247.01	39°20'11.162"N	81°00'44.777"W	62.17	140.577	0.40
2811.00	0.610	104.990	2808.36	62.81	-48.00	40.51	1572227.95	308247.04	39°20'11.162"N	81°00'44.764"W	62.81	139.832	0.38
2906.00	0.420	200.230	2903.36	63.40	-48.45	40.88	1572228.31	308246.58	39°20'11.158"N	81°00'44.759"W	63.40	139.844	0.81
3001.00	0.720	263.510	2998.35	63.24	-48.85	40.17	1572227.60	308246.19	39°20'11.154"N	81°00'44.768"W	63.24	140.569	0.68
3096.00	0.810	261.650	3093.35	62.56	-49.01	38.91	1572226.34	308246.02	39°20'11.152"N	81°00'44.784"W	62.58	141.554	0.10
3192.00	1.360	261.880	3189.33	61.60	-49.27	37.11	1572224.54	308245.76	39°20'11.149"N	81°00'44.807"W	61.69	143.013	0.57
3288.00	0.850	264.100	3285.31	60.60	-49.51	35.28	1572222.71	308245.53	39°20'11.147"N	81°00'44.830"W	60.79	144.528	0.53
3383.00	0.310	306.840	3380.31	59.96	-49.42	34.37	1572221.80	308245.61	39°20'11.147"N	81°00'44.842"W	60.20	145.186	0.69
3479.00	0.280	60.680	3476.30	59.75	-49.15	34.37	1572221.80	308245.88	39°20'11.150"N	81°00'44.842"W	59.98	145.041	0.52
3575.00	0.550	47.930	3572.30	59.77	-48.73	34.91	1572222.34	308246.30	39°20'11.154"N	81°00'44.835"W	59.95	144.381	0.30
3669.00	0.660	85.500	3666.30	60.07	-48.39	35.79	1572223.22	308246.65	39°20'11.158"N	81°00'44.824"W	60.18	143.513	0.43
3764.00	0.980	125.690	3761.29	61.18	-48.82	36.99	1572224.42	308246.22	39°20'11.154"N	81°00'44.809"W	61.25	142.846	0.67
3860.00	0.810	148.190	3857.28	62.64	-49.87	38.02	1572225.45	308245.16	39°20'11.143"N	81°00'44.796"W	62.71	142.682	0.40
3956.00	0.740	165.020	3953.27	63.88	-51.05	38.53	1572225.97	308243.99	39°20'11.132"N	81°00'44.789"W	63.96	142.952	0.25
4051.00	0.970	181.220	4048.26	65.04	-52.44	38.68	1572226.11	308242.59	39°20'11.118"N	81°00'44.787"W	65.16	143.592	0.35
4147.00	0.980	188.240	4144.24	66.20	-54.07	38.54	1572225.97	308240.97	39°20'11.102"N	81°00'44.788"W	66.40	144.518	0.12
4243.00	1.280	178.970	4240.23	67.58	-55.95	38.44	1572225.87	308239.08	39°20'11.083"N	81°00'44.789"W	67.89	145.509	0.36
4334.00	1.460	28.880	4331.22	67.95	-55.96	39.02	1572226.45	308239.08	39°20'11.084"N	81°00'44.781"W	68.22	145.109	2.91
4430.00	4.500	31.710	4427.07	66.32	-51.68	41.59	1572229.02	308243.36	39°20'11.126"N	81°00'44.750"W	66.34	141.173	3.17
4525.00	4.590	30.420	4521.78	63.88	-45.23	45.48	1572232.91	308249.80	39°20'11.191"N	81°00'44.702"W	64.14	134.845	0.14
4621.00	5.310	29.150	4617.42	61.00	-38.04	49.58	1572237.01	308257.00	39°20'11.262"N	81°00'44.651"W	62.49	127.494	0.76
4716.00	7.790	27.820	4711.79	57.00	-28.50	54.73	1572242.16	308266.53	39°20'11.357"N	81°00'44.587"W	61.71	117.511	2.62
4811.00	12.700	31.660	4805.25	51.28	-13.91	63.22	1572250.65	308281.12	39°20'11.503"N	81°00'44.483"W	64.73	102.411	5.22
4907.00	16.290	37.580	4898.18	45.04	5.75	76.98	1572264.41	308300.78	39°20'11.700"N	81°00'44.312"W	77.19	85.730	4.04
5002.00	18.310	36.170	4988.88	38.60	28.36	93.91	1572281.34	308323.39	39°20'11.926"N	81°00'44.101"W	98.10	73.199	2.17
5098.00	20.980	33.030	5079.29	29.96	54.94	112.18	1572299.61	308349.97	39°20'12.192"N	81°00'43.874"W	124.92	63.906	2.99
5193.00	23.780	33.120	5167.12	19.41	85.25	131.92	1572319.35	308380.28	39°20'12.494"N	81°00'43.630"W	157.07	57.129	2.95
5289.00	28.410	31.750	5253.31	6.61	120.90	154.53	1572341.95	308415.93	39°20'12.850"N	81°00'43.349"W	196.20	51.961	4.86
5384.00	33.630	35.520	5334.71	-7.08	161.56	181.73	1572369.15	308456.58	39°20'13.257"N	81°00'43.012"W	243.16	48.362	5.86

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Field	Ritchie	Wellbore	PEN-2E-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (172 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]
5480.00	34.390	36.460	5414.28	-20.10	205.00	213.28	1572400.70	308500.03	39°20'13.691"N	81°00'42.620"W	295.83	46.134	0.96
5555.00	32.730	28.560	5476.81	-32.50	239.86	235.57	1572423.00	308534.89	39°20'14.040"N	81°00'42.344"W	336.20	44.483	6.22
5650.00	36.080	34.070	5555.20	-49.60	285.62	263.54	1572450.96	308580.64	39°20'14.496"N	81°00'41.998"W	388.63	42.698	4.81
5746.00	35.780	54.060	5633.21	-55.42	325.65	302.23	1572489.65	308620.66	39°20'14.898"N	81°00'41.514"W	444.28	42.864	12.18
5841.00	36.020	60.510	5710.19	-48.38	355.71	349.05	1572536.46	308650.72	39°20'15.203"N	81°00'40.924"W	498.36	44.459	3.99
5937.00	35.470	66.640	5788.13	-35.28	380.66	399.20	1572586.62	308675.67	39°20'15.458"N	81°00'40.292"W	551.60	46.363	3.77
6032.00	41.190	80.440	5862.76	-11.51	396.82	455.51	1572642.92	308691.84	39°20'15.627"N	81°00'39.579"W	604.11	48.939	10.81
6127.00	44.930	79.580	5932.16	20.88	408.09	519.37	1572706.78	308703.10	39°20'15.749"N	81°00'38.768"W	660.52	51.842	3.98
6223.00	45.470	82.180	5999.81	55.82	418.88	586.62	1572774.02	308713.89	39°20'15.867"N	81°00'37.915"W	720.82	54.471	2.00
6317.00	45.380	95.110	6065.92	97.42	420.46	653.27	1572840.68	308715.47	39°20'15.894"N	81°00'37.067"W	776.89	57.234	9.79
6416.00	53.120	110.570	6130.72	157.14	403.32	725.80	1572913.20	308698.34	39°20'15.736"N	81°00'36.140"W	830.33	60.939	14.14
6509.00	60.880	121.020	6181.43	228.18	369.20	795.68	1572983.07	308664.22	39°20'15.411"N	81°00'35.244"W	877.16	65.108	12.57
6604.00	65.130	126.180	6224.57	309.34	322.33	866.10	1573053.49	308617.35	39°20'14.959"N	81°00'34.338"W	924.13	69.586	6.59
6700.00	73.120	129.790	6258.76	396.99	267.12	936.67	1573124.06	308562.14	39°20'14.425"N	81°00'33.428"W	974.02	74.083	9.03
6795.00	80.290	132.900	6280.60	488.32	206.07	1006.00	1573193.39	308501.09	39°20'13.834"N	81°00'32.532"W	1026.89	78.424	8.19
6890.00	87.010	136.270	6291.10	582.24	139.83	1073.19	1573260.57	308434.85	39°20'13.190"N	81°00'31.663"W	1082.26	82.577	7.90
6986.00	89.170	138.750	6294.30	678.08	69.08	1137.99	1573325.36	308364.11	39°20'12.502"N	81°00'30.824"W	1140.08	86.526	3.42
7081.00	89.630	137.210	6295.29	773.01	-1.49	1201.57	1573388.95	308293.55	39°20'11.815"N	81°00'29.999"W	1201.57	90.071	1.69
7177.00	89.480	140.420	6296.04	868.98	-73.72	1264.78	1573452.15	308221.31	39°20'11.112"N	81°00'29.180"W	1266.93	93.336	3.35
7272.00	89.420	143.330	6296.95	963.91	-148.44	1323.42	1573510.79	308146.60	39°20'10.383"N	81°00'28.417"W	1331.72	96.400	3.06
7367.00	89.320	144.250	6298.00	1058.70	-225.09	1379.54	1573566.90	308069.95	39°20'09.635"N	81°00'27.687"W	1397.78	99.267	0.97
7463.00	89.510	140.340	6298.98	1154.60	-301.02	1438.24	1573625.60	307994.02	39°20'08.894"N	81°00'26.924"W	1469.40	101.821	4.08
7558.00	89.570	137.920	6299.74	1249.58	-372.85	1500.39	1573687.75	307922.20	39°20'08.195"N	81°00'26.118"W	1546.03	103.956	2.55
7654.00	89.510	136.040	6300.51	1345.44	-443.04	1565.88	1573753.24	307852.02	39°20'07.512"N	81°00'25.269"W	1627.35	105.798	1.96
7749.00	89.540	138.120	6301.30	1440.30	-512.60	1630.57	1573817.92	307782.46	39°20'06.835"N	81°00'24.431"W	1709.25	107.451	2.19
7845.00	89.380	141.320	6302.20	1536.28	-585.82	1692.63	1573879.98	307709.24	39°20'06.122"N	81°00'23.626"W	1791.14	109.091	3.34
7940.00	89.450	145.100	6303.17	1631.12	-661.89	1749.51	1573936.85	307633.18	39°20'05.380"N	81°00'22.886"W	1870.53	110.723	3.98
8036.00	89.570	143.940	6304.00	1726.82	-740.06	1805.22	1573992.57	307555.01	39°20'04.616"N	81°00'22.160"W	1951.03	112.291	1.21
8132.00	89.570	144.530	6304.72	1822.55	-817.95	1861.33	1574048.67	307477.12	39°20'03.856"N	81°00'21.430"W	2033.12	113.723	0.61
8227.00	89.600	142.040	6305.40	1917.39	-894.10	1918.12	1574105.46	307400.98	39°20'03.113"N	81°00'20.691"W	2116.27	114.992	2.62

REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot E
Area	Ritchie County, WV	Well	PEN-2E-HS
Field	Ritchie	Wellbore	PEN-2E-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (172 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]
8323.00	89.540	138.450	6306.12	2013.37	-967.88	1979.50	1574166.84	307327.20	39°20'02.394"N	81°00'19.894"W	2203.46	116.057	3.74
8419.00	89.540	135.660	6306.90	2109.23	-1038.15	2044.90	1574232.23	307256.94	39°20'01.710"N	81°00'19.047"W	2293.33	116.916	2.91
8514.00	89.420	136.360	6307.76	2203.99	-1106.49	2110.87	1574298.20	307188.59	39°20'01.046"N	81°00'18.193"W	2383.30	117.663	0.75
8610.00	89.540	137.900	6308.63	2299.86	-1176.85	2176.18	1574363.51	307118.24	39°20'00.361"N	81°00'17.347"W	2474.01	118.404	1.61
8705.00	89.630	138.950	6309.32	2394.82	-1247.91	2239.22	1574426.54	307047.18	39°19'59.669"N	81°00'16.529"W	2563.47	119.131	1.11
8801.00	89.660	138.020	6309.91	2490.78	-1319.79	2302.85	1574490.17	306975.30	39°19'58.970"N	81°00'15.705"W	2654.24	119.818	0.97
8899.00	90.090	145.820	6310.13	2588.65	-1396.87	2363.24	1574550.56	306898.23	39°19'58.218"N	81°00'14.920"W	2745.21	120.587	7.97
8993.00	89.750	141.530	6310.26	2682.44	-1472.59	2418.91	1574606.23	306822.52	39°19'57.479"N	81°00'14.195"W	2831.90	121.332	4.58
9088.00	89.750	139.430	6310.67	2777.43	-1545.87	2479.36	1574666.67	306749.24	39°19'56.765"N	81°00'13.410"W	2921.81	121.943	2.21
9184.00	89.630	138.510	6311.19	2873.41	-1618.29	2542.38	1574729.69	306676.83	39°19'56.059"N	81°00'12.593"W	3013.73	122.478	0.97
9280.00	89.690	137.560	6311.76	2969.35	-1689.66	2606.57	1574793.88	306605.45	39°19'55.365"N	81°00'11.761"W	3106.31	122.953	0.99
9375.00	89.970	138.600	6312.04	3064.30	-1760.35	2670.04	1574857.34	306534.77	39°19'54.677"N	81°00'10.938"W	3198.12	123.397	1.13
9470.00	89.780	141.440	6312.25	3159.29	-1833.14	2731.07	1574918.37	306461.98	39°19'53.967"N	81°00'10.146"W	3289.25	123.870	3.00
9566.00	89.660	142.380	6312.72	3255.23	-1908.69	2790.29	1574977.59	306386.43	39°19'53.231"N	81°00'09.377"W	3380.66	124.374	0.99
9661.00	90.000	138.780	6313.00	3350.21	-1982.07	2850.61	1575037.90	306313.06	39°19'52.515"N	81°00'08.594"W	3471.97	124.811	3.81
9756.00	89.600	137.090	6313.33	3445.14	-2052.59	2914.25	1575101.54	306242.54	39°19'51.829"N	81°00'07.769"W	3564.55	125.158	1.83
9851.00	89.720	136.710	6313.90	3540.00	-2121.96	2979.16	1575166.45	306173.18	39°19'51.154"N	81°00'06.928"W	3657.61	125.461	0.42
9947.00	89.720	135.770	6314.37	3635.79	-2191.29	3045.56	1575232.84	306103.85	39°19'50.480"N	81°00'06.068"W	3751.96	125.735	0.98
10041.00	89.630	136.440	6314.90	3729.57	-2259.03	3110.73	1575298.01	306036.12	39°19'49.821"N	81°00'05.225"W	3844.46	125.987	0.72
10137.00	89.540	138.520	6315.59	3825.46	-2329.78	3175.61	1575362.89	305965.37	39°19'49.133"N	81°00'04.384"W	3938.57	126.266	2.17
10231.00	89.660	138.600	6316.25	3919.43	-2400.24	3237.82	1575425.09	305894.91	39°19'48.447"N	81°00'03.578"W	4030.46	126.550	0.15
10326.00	89.820	139.610	6316.68	4014.41	-2472.05	3300.01	1575487.28	305823.10	39°19'47.748"N	81°00'02.771"W	4123.24	126.837	1.08
10422.00	90.090	142.090	6316.76	4110.40	-2546.49	3360.62	1575547.88	305748.66	39°19'47.022"N	81°00'01.984"W	4216.44	127.153	2.60
10517.00	90.310	144.250	6316.43	4205.25	-2622.53	3417.56	1575604.83	305672.63	39°19'46.280"N	81°00'01.243"W	4307.83	127.502	2.29
10612.00	90.090	144.420	6316.09	4299.98	-2699.71	3472.95	1575660.21	305595.46	39°19'45.526"N	81°00'00.522"W	4398.84	127.860	0.29
10706.00	90.400	145.620	6315.69	4393.62	-2776.73	3526.84	1575714.10	305518.44	39°19'44.774"N	80°59'59.820"W	4488.74	128.214	1.32
10801.00	91.230	143.090	6314.34	4488.33	-2853.91	3582.19	1575769.45	305441.26	39°19'44.020"N	80°59'59.100"W	4580.05	128.544	2.80
10897.00	90.460	137.560	6312.92	4584.28	-2927.76	3643.45	1575830.70	305367.41	39°19'43.301"N	80°59'58.304"W	4674.02	128.784	5.82
10990.00	90.250	135.400	6312.35	4677.10	-2995.20	3707.48	1575894.73	305299.98	39°19'42.645"N	80°59'57.475"W	4766.20	128.934	2.33
11085.00	90.090	131.310	6312.07	4771.43	-3060.40	3776.54	1575963.79	305234.78	39°19'42.012"N	80°59'56.583"W	4860.90	129.020	4.31

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REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot E
Area	Ritchie County, WV	Well	PEN-2E-HS
Field	Ritchie	Wellbore	PEN-2E-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (172 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]
11180.00	89.880	129.770	6312.09	4865.13	-3122.15	3848.74	1576035.98	305173.04	39°19'41.414"N	80°59'55.651"W	4955.86	129.049	1.64
11276.00	89.540	131.740	6312.58	4959.87	-3184.81	3921.45	1576108.69	305110.37	39°19'40.806"N	80°59'54.713"W	5051.81	129.082	2.08
11371.00	90.340	138.830	6312.68	5054.48	-3252.28	3988.25	1576175.49	305042.91	39°19'40.151"N	80°59'53.848"W	5146.21	129.196	7.51
11467.00	90.460	142.860	6312.01	5150.45	-3326.70	4048.85	1576236.09	304968.49	39°19'39.425"N	80°59'53.061"W	5240.24	129.408	4.20
11562.00	90.310	144.690	6311.37	5245.24	-3403.34	4104.99	1576292.22	304891.86	39°19'38.677"N	80°59'52.331"W	5332.32	129.661	1.93
11658.00	90.430	146.120	6310.75	5340.81	-3482.36	4159.49	1576346.72	304812.84	39°19'37.905"N	80°59'51.621"W	5424.78	129.936	1.49
11753.00	89.660	143.720	6310.67	5435.46	-3560.10	4214.09	1576401.31	304735.11	39°19'37.146"N	80°59'50.910"W	5516.59	130.191	2.65
11848.00	89.630	143.750	6311.26	5530.26	-3636.69	4270.28	1576457.50	304658.52	39°19'36.398"N	80°59'50.178"W	5608.99	130.419	0.04
11943.00	90.090	143.650	6311.49	5625.06	-3713.25	4326.52	1576513.74	304581.96	39°19'35.651"N	80°59'49.447"W	5701.49	130.638	0.50
12039.00	90.310	142.130	6311.16	5720.94	-3789.81	4384.44	1576571.66	304505.41	39°19'34.904"N	80°59'48.693"W	5795.34	130.839	1.60
12134.00	90.180	142.520	6310.75	5815.86	-3865.00	4442.50	1576629.72	304430.22	39°19'34.170"N	80°59'47.939"W	5888.47	131.023	0.43
12229.00	90.090	143.590	6310.53	5910.73	-3940.92	4499.60	1576686.81	304354.30	39°19'33.430"N	80°59'47.196"W	5981.41	131.213	1.13
12322.00	90.280	141.980	6310.23	6003.62	-4014.98	4555.84	1576743.06	304280.24	39°19'32.707"N	80°59'46.465"W	6072.55	131.389	1.74
12418.00	90.680	140.760	6309.42	6099.59	-4089.97	4615.77	1576802.98	304205.26	39°19'31.976"N	80°59'45.686"W	6167.11	131.544	1.34
12512.00	90.120	137.200	6308.77	6193.55	-4160.88	4677.46	1576864.66	304134.35	39°19'31.285"N	80°59'44.887"W	6260.31	131.655	3.83
12607.00	89.940	138.990	6308.72	6288.50	-4231.58	4740.90	1576928.11	304063.66	39°19'30.597"N	80°59'44.064"W	6354.72	131.751	1.89
12702.00	90.000	138.540	6308.77	6383.47	-4303.02	4803.52	1576990.72	303992.22	39°19'29.901"N	80°59'43.253"W	6449.02	131.854	0.48
12797.00	90.430	138.860	6308.41	6478.45	-4374.39	4866.22	1577053.42	303920.85	39°19'29.206"N	80°59'42.440"W	6543.35	131.953	0.56
12893.00	90.340	141.090	6307.76	6574.44	-4447.90	4927.96	1577115.15	303847.35	39°19'28.490"N	80°59'41.639"W	6638.42	132.069	2.32
12989.00	90.280	139.480	6307.25	6670.43	-4521.74	4989.29	1577176.48	303773.51	39°19'27.770"N	80°59'40.843"W	6733.44	132.186	1.68
13084.00	90.000	140.470	6307.01	6765.43	-4594.49	5050.39	1577237.58	303700.77	39°19'27.061"N	80°59'40.050"W	6827.57	132.294	1.08
13179.00	90.370	139.900	6306.71	6860.43	-4667.46	5111.22	1577298.40	303627.80	39°19'26.350"N	80°59'39.261"W	6921.69	132.402	0.72
13275.00	90.090	139.480	6306.32	6956.43	-4740.66	5173.32	1577360.50	303554.60	39°19'25.637"N	80°59'38.455"W	7016.92	132.501	0.53
13370.00	90.180	139.110	6306.10	7051.42	-4812.68	5235.28	1577422.46	303482.59	39°19'24.936"N	80°59'37.651"W	7111.26	132.592	0.40
13466.00	90.090	140.290	6305.87	7147.41	-4885.90	5297.37	1577484.54	303409.37	39°19'24.222"N	80°59'36.846"W	7206.53	132.686	1.23
13562.00	90.030	141.620	6305.77	7243.40	-4960.45	5357.84	1577545.01	303334.82	39°19'23.495"N	80°59'36.061"W	7301.54	132.794	1.39
13657.00	89.940	141.380	6305.80	7338.37	-5034.80	5416.98	1577604.15	303260.48	39°19'22.770"N	80°59'35.293"W	7395.46	132.906	0.27
13752.00	90.060	140.280	6305.80	7433.36	-5108.45	5476.98	1577664.15	303186.83	39°19'22.052"N	80°59'34.514"W	7489.57	133.006	1.16
13848.00	90.060	140.370	6305.70	7529.36	-5182.34	5538.27	1577725.44	303112.95	39°19'21.332"N	80°59'33.718"W	7584.79	133.098	0.09
13943.00	89.690	140.920	6305.90	7624.35	-5255.80	5598.51	1577785.67	303039.49	39°19'20.616"N	80°59'32.936"W	7678.98	133.192	0.70

REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot E
Area	Ritchie County, WV	Well	PEN-2E-HS
Field	Ritchie	Wellbore	PEN-2E-HS AWB
Facility	PEN-2 Pad		

WELLPATH DATA (172 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]
14038.00	90.060	138.220	6306.11	7719.34	-5328.10	5660.12	1577847.27	302967.19	39°19'19.912"N	80°59'32.137"W	7773.39	133.269	2.87
14133.00	89.630	135.420	6306.37	7814.18	-5397.37	5725.12	1577912.27	302897.93	39°19'19.238"N	80°59'31.296"W	7868.20	133.312	2.98
14228.00	89.630	137.290	6306.98	7908.98	-5466.11	5790.68	1577977.83	302829.19	39°19'18.569"N	80°59'30.447"W	7963.06	133.348	1.97
14324.00	89.660	138.700	6307.58	8004.91	-5537.44	5854.92	1578042.07	302757.86	39°19'17.875"N	80°59'29.615"W	8058.75	133.404	1.47
14419.00	89.540	143.080	6308.24	8099.88	-5611.14	5914.83	1578101.98	302684.17	39°19'17.157"N	80°59'28.837"W	8152.92	133.491	4.61
14514.00	89.420	145.540	6309.10	8194.60	-5688.29	5970.25	1578157.39	302607.02	39°19'16.403"N	80°59'28.116"W	8246.24	133.615	2.59
14610.00	89.510	147.650	6310.00	8289.96	-5768.42	6023.10	1578210.24	302526.89	39°19'15.620"N	80°59'27.426"W	8339.80	133.763	2.20
14704.00	89.850	146.530	6310.52	8383.25	-5847.33	6074.17	1578261.30	302447.99	39°19'14.849"N	80°59'26.760"W	8431.30	133.910	1.25
14800.00	89.480	142.190	6311.08	8478.95	-5925.33	6130.09	1578317.23	302369.99	39°19'14.087"N	80°59'26.032"W	8525.70	134.027	4.54
14895.00	89.380	142.930	6312.03	8573.85	-6000.76	6187.84	1578374.97	302294.57	39°19'13.351"N	80°59'25.281"W	8619.65	134.121	0.79
14989.00	89.170	141.090	6313.22	8667.78	-6074.83	6245.69	1578432.82	302220.50	39°19'12.628"N	80°59'24.530"W	8712.76	134.205	1.97
15083.00	90.310	140.340	6313.65	8761.77	-6147.58	6305.21	1578492.34	302147.75	39°19'11.919"N	80°59'23.757"W	8806.16	134.275	1.45
15178.00	90.150	136.030	6313.26	8856.70	-6218.37	6368.53	1578555.66	302076.97	39°19'11.230"N	80°59'22.937"W	8900.92	134.316	4.54
15273.00	90.150	137.050	6313.01	8951.52	-6287.32	6433.88	1578621.00	302008.01	39°19'10.559"N	80°59'22.091"W	8995.84	134.340	1.07
15369.00	90.090	137.020	6312.81	9047.39	-6357.57	6499.31	1578686.42	301937.77	39°19'09.876"N	80°59'21.243"W	9091.74	134.368	0.07
15464.00	90.150	137.820	6312.61	9142.29	-6427.53	6563.58	1578750.70	301867.82	39°19'09.195"N	80°59'20.411"W	9186.61	134.400	0.84
15560.00	89.940	138.020	6312.54	9238.22	-6498.78	6627.92	1578815.03	301796.57	39°19'08.502"N	80°59'19.577"W	9282.43	134.436	0.30
15656.00	89.850	136.980	6312.72	9334.13	-6569.55	6692.78	1578879.88	301725.80	39°19'07.813"N	80°59'18.737"W	9378.29	134.468	1.09
15752.00	89.910	137.260	6312.92	9430.01	-6639.90	6758.10	1578945.20	301655.45	39°19'07.128"N	80°59'17.892"W	9474.19	134.495	0.30
15848.00	90.000	139.750	6312.99	9525.96	-6711.80	6821.70	1579008.80	301583.56	39°19'06.428"N	80°59'17.067"W	9569.95	134.535	2.60
15927.00	89.780	140.390	6313.14	9604.96	-6772.38	6872.41	1579059.51	301522.98	39°19'05.838"N	80°59'16.409"W	9648.58	134.580	0.86
15953.00	89.780	140.390	6313.24	9630.96	-6792.41	6888.98	1579076.08	301502.95	39°19'05.643"N	80°59'16.194"W	9674.45	134.596	0.00

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Operator	NOBLE ENERGY	Slot	Slot E
Area	Ritchie County, WV	Well	PEN-2E-HS
Field	Ritchie	Wellbore	PEN-2E-HS 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
PEN-2E-HS BHL Rev-2		6292.00	-6778.50	6877.51	1579064.61	301516.86	39°19'05.778"N	80°59'16.343"W	point
PEN-2E-HS BHL SLB		6292.00	-7436.05	7428.68	1579615.75	300859.34	39°18'59.370"N	80°59'09.193"W	point
PEN-2E-HS LP Rev-2		6292.00	118.93	1096.03	1573283.41	308413.96	39°20'12.987"N	81°00'31.368"W	point
PEN-2 Pad LL		6999.61	-28.09	-74.35	1572113.09	308266.94	39°20'11.340"N	81°00'46.230"W	polygon
PEN2 LL 1		7007.07	-27.78	-74.67	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon
PEN2 LL 2		7007.07	-27.78	-74.67	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon
PEN2 LL 3		7007.07	-27.78	-74.67	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon
PEN2 LL 4		7007.07	-27.78	-74.67	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon
PEN2 LL 5		7007.07	-27.78	-74.67	1572112.77	308267.25	39°20'11.343"N	81°00'46.234"W	polygon

WELLPATH COMPOSITION - Ref Wellbore: PEN-2E-HS AWB Ref Wellpath: PEN-2E-HS AWP Proj: 15953'

Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore
26.00	500.00	Generic gyro - northseeking (Standard)	01_Gyro <17-1/2"> (100'-500')	PEN-2E-HS AWB
500.00	5480.00	NaviTrak (MagCorr)	02_BHI MWD <12-1/4"> (500')(559'-5480')	PEN-2E-HS AWB
5480.00	15927.00	NaviTrak (AT Curve Short Spaced)	03_BHI AT Curve <8-3/4"> (5480')(5555'-15927')	PEN-2E-HS AWB
15927.00	15953.00	Blind Drilling (std)	Projection to bit	PEN-2E-HS AWB

REFERENCE WELLPATH IDENTIFICATION			
Operator	NOBLE ENERGY	Slot	Slot E
Area	Ritchie County, WV	Well	PEN-2E-HS
Field	Ritchie	Wellbore	PEN-2E-HS AWB
Facility	PEN-2 Pad		

COMMENTS

Wellpath general comments
API: 47-085-10070-0000
BHI Job #: 6599787
Rig: Nomac 78
Duration: 08/14/2014 - 08/29/2014
Gyro <17-1/2"> (100'-500')
BHI MWD <12-1/4"> (500')(559'-5480')
BHI AT Curve <8-3/4"> (5480')(5555'-15927')
Projected MD at TD: 15953'

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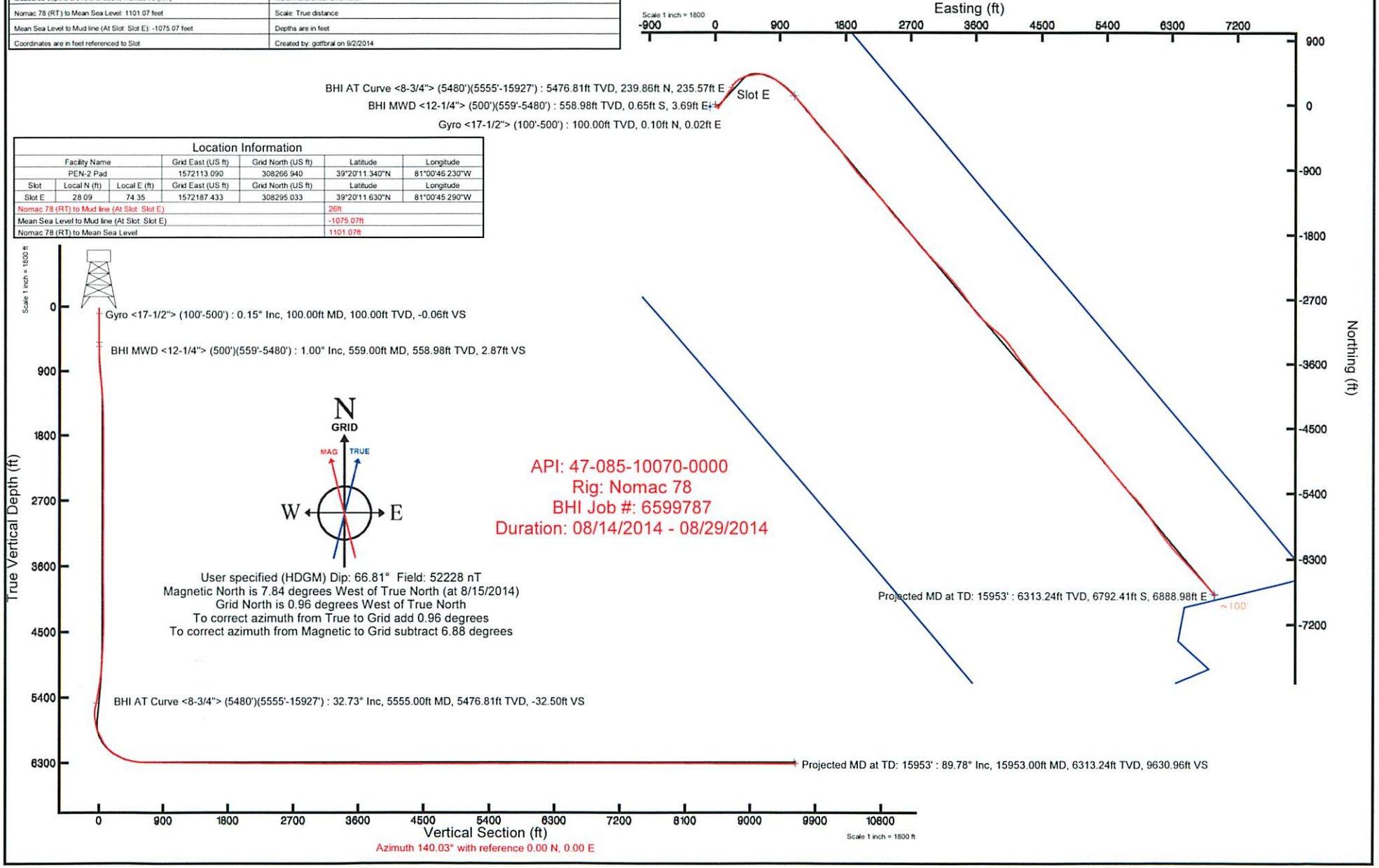
NOBLE ENERGY

Location: Ritchie County, WV
Field: Ritchie
Facility: PEN-2 Pad
Slot: Slot E
Well: PEN-2E-HS
Wellbore: PEN-2E-HS PWB

Plot reference wellpath is PEN-2E-HS PWP Rev-A.0	
True vertical depths are referenced to Nomac 78 (RT)	Grid System: NAD27 / Lambert West Virginia SP, Northern Zone (4701), US feet
Measured depths are referenced to Nomac 78 (RT)	North Reference: Grid north
Nomac 78 (RT) to Mean Sea Level: 1101.07 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot E): -1075.07 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: gottbral on 9/2/2014

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 N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot E	28.09	74.35	1572187.433	308295.033	39°20'11.630"N	81°00'45.290"W
Nomac 78 (RT) to Mud line (At Slot: Slot E)					26ft	
Mean Sea Level to Mud line (At Slot: Slot E)					-1075.07ft	
Nomac 78 (RT) to Mean Sea Level					1101.07ft	



AS DRILLED PLAT

Well is located on topo map 13,964' feet south of Latitude: 39 ° 22 ' 30 "

Well is located on topo map 3,519' feet west of Longitude: 81 ° 00 ' 00 "

AS DRILLED SURFACE HOLE LOCATION (SHL)
UTM 17–NAD83
N:4354135.28
E:498930.29
NAD27, WV NORTH
N:308295.03
E:1572187.43
LAT/LON DATUM–NAD83
LAT:39.336642
LON:–81.012413

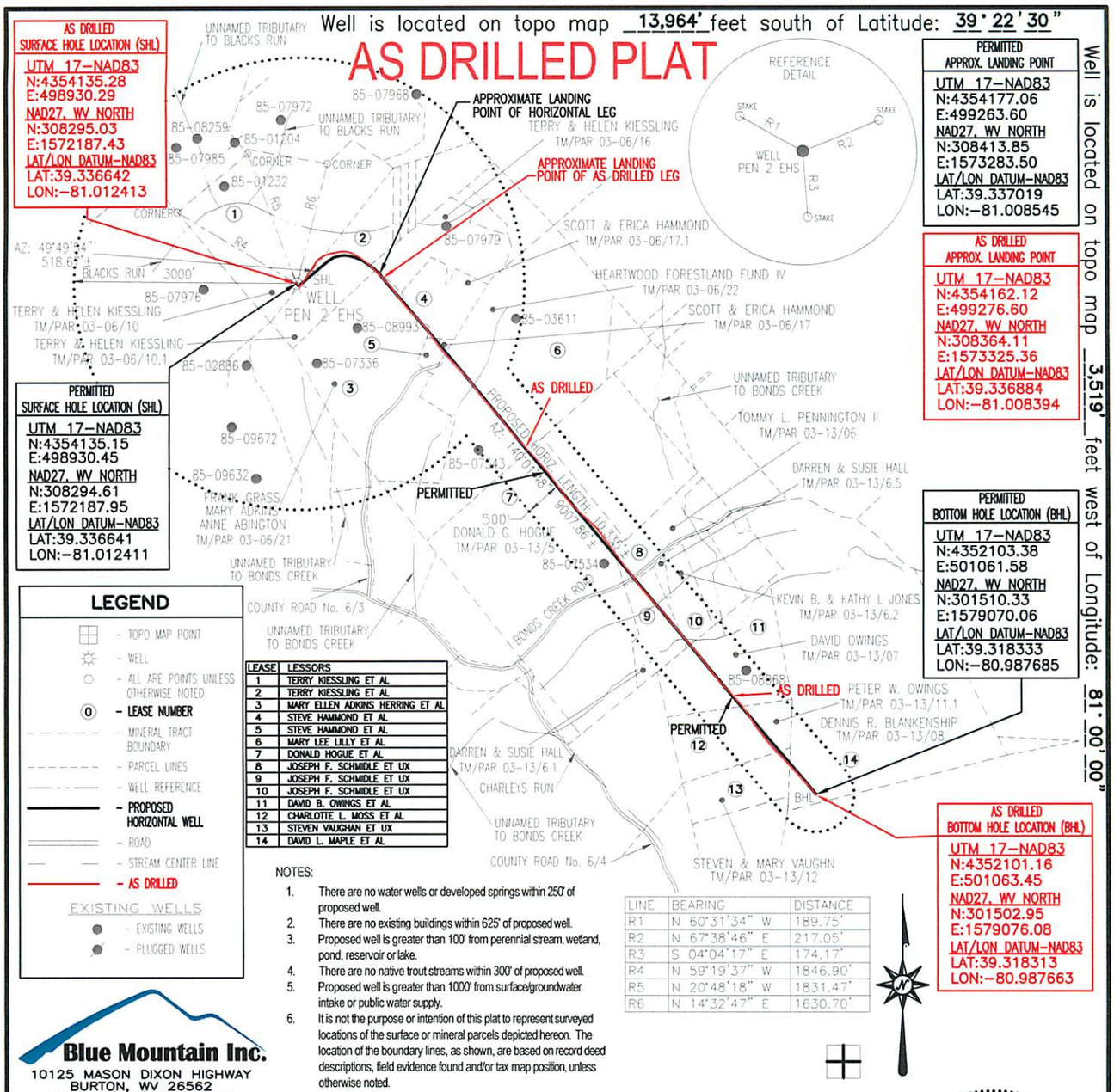
PERMITTED SURFACE HOLE LOCATION (SHL)
UTM 17–NAD83
N:4354135.15
E:498930.45
NAD27, WV NORTH
N:308294.61
E:1572187.95
LAT/LON DATUM–NAD83
LAT:39.336641
LON:–81.012411

PERMITTED APPROX. LANDING POINT
UTM 17–NAD83
N:4354177.06
E:499263.60
NAD27, WV NORTH
N:308413.85
E:1573283.50
LAT/LON DATUM–NAD83
LAT:39.337019
LON:–81.008545

AS DRILLED APPROX. LANDING POINT
UTM 17–NAD83
N:4354162.12
E:499276.60
NAD27, WV NORTH
N:308364.11
E:1573325.36
LAT/LON DATUM–NAD83
LAT:39.336884
LON:–81.008394

PERMITTED BOTTOM HOLE LOCATION (BHL)
UTM 17–NAD83
N:4352103.38
E:501061.58
NAD27, WV NORTH
N:301510.33
E:1579070.06
LAT/LON DATUM–NAD83
LAT:39.318333
LON:–80.987685

AS DRILLED BOTTOM HOLE LOCATION (BHL)
UTM 17–NAD83
N:4352101.16
E:501063.45
NAD27, WV NORTH
N:301502.95
E:1579076.08
LAT/LON DATUM–NAD83
LAT:39.318313
LON:–80.987663



LEGEND

- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED.
- (0) – LEASE NUMBER
- MINERAL TRACT BOUNDARY
- PARCEL LINES
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE
- AS DRILLED

EXISTING WELLS
- EXISTING WELLS
- PLUGGED WELLS

LEASE	LESSORS
1	TERRY KIESSLING ET AL
2	TERRY KIESSLING ET AL
3	MARY ELLEN ADKINS HERRING ET AL
4	STEVE HAMMOND ET AL
5	STEVE HAMMOND ET AL
6	MARY LEE LILLY ET AL
7	DONALD HOGUE ET AL
8	JOSEPH F. SCHMIDLE ET UX
9	JOSEPH F. SCHMIDLE ET UX
10	JOSEPH F. SCHMIDLE ET UX
11	DAVID B. OWINGS ET AL
12	CHARLOTTE L. MOSS ET AL
13	STEVEN VAUGHAN ET UX
14	DAVID L. MAPLE ET AL

LINE	BEARING	DISTANCE
R1	N 60°31'34" W	189.75'
R2	N 67°38'46" E	217.05'
R3	S 04°04'17" E	174.17'
R4	N 59°19'37" W	1846.90'
R5	N 20°48'18" W	1831.47'
R6	N 14°32'47" E	1630.70'

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

Blue Mountain Inc.
10125 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662–6486

FILE #: PEN 2 EHS–AS DRILLED
DRAWING #: PEN 2 EHS–AS DRILLED
SCALE: 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1/2500
PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

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

Signed: George D. Six
R.P.E.: L.L.S.: P.S. No. 2000

GEORGE D. SIX LICENSED No. 2000 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

PLACE SEAL HERE

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

STATE OF WEST VIRGINIA

DATE: FEBRUARY 11, 2015
OPERATOR'S WELL #: PEN 2 EHS–AS DRILLED
WV Department of Environmental Protection
API WELL #: 47 (STATE) 85 (COUNTY) 10070 (PERMIT)

Well Type: [ ] Oil [ ] Waste Disposal [X] Production [ ] Deep
[X] Gas [ ] Liquid Injection [ ] Storage [X] Shallow

WATERSHED: NORTH FORK HUGHES RIVER ELEVATION: 1084'±
COUNTY/DISTRICT: RITCHIE / CLAY QUADRANGLE: ELLENBORO, WV 7.5'
SURFACE OWNER: TERRY & HELEN KIESSLING ACREAGE: 79.242±
OIL & GAS ROYALTY OWNER: TERRY KIESSLING ET AL ACREAGE: 823.051±

DRILL [X] CONVERT [ ] DRILL DEEPER [ ] REDRILL [ ] FRACTURE OR STIMULATE [ ]
PLUG OFF OLD FORMATION [ ] PERFORATE NEW FORMATION [ ] PLUG & ABANDON [ ]
CLEAN OUT & REPLUG [ ] OTHER CHANGE [ ] (SPECIFY):

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,324'± TMD: 16,001'±

WELL OPERATOR NOBLE ENERGY, INC. DESIGNATED AGENT STEVEN M. GREEN
Address 333 TECHNOLOGY DRIVE, SUITE 116 Address 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590
City CANONSBURG State PA Zip Code 15317 City CHARLESTON State WV Zip Code 25301

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

API 47 - 085 - 10071 County Ritche District Clay
Quad Pennsboro Pad Name PEN 2 Field/Pool Name NA
Farm name Terry & Helen Kiessling Well Number PEN 2 FHS
Operator (as registered with the OOG) Noble Energy, Inc.
Address 1000 Noble Energy Drive City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4354140.83 Easting 498928.13
Landing Point of Curve Northing 4354437.43 Easting 499049.93
Bottom Hole Northing 4356234.66 Easting 497473.95

Elevation (ft) 1074.85 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

Drilling 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 10/30/2013 Date drilling commenced 01/08/2014 Date drilling ceased 03/16/2014
Date completion activities began 10/26/2014 Date completion activities ceased 2/24/2015
Verbal plugging (Y/N) N Date permission granted _____ Granted by _____

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

Freshwater depth(s) ft 454 Open mine(s) (Y/N) depths none
Salt water depth(s) ft None noted for Offsets Void(s) encountered (Y/N) depths none
Coal depth(s) ft no coal Cavern(s) encountered (Y/N) depths none
Is coal being mined in area (Y/N) N

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Reviewed by:
A.L. 5/26/15 ✓
W.S. 06/01/15 –

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API 47- 085 - 10071 Farm name Terry & Helen Kiessling Well number PEN 2 FHS

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	36	30	40				
Surface	17 1/2	13 3/8	594.5	N	J-55 54.5#		Y
Coal							
Intermediate 1	12 3/8	9 5/8	5,481.6	N	K-55 36#		Y
Intermediate 2							
Intermediate 3							
Production	8 3/4	5 1/2	14,649.0	N	P-110 20#		Y
Tubing							
Packer type and depth set							

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor							
Surface	TYPE 1	532	15.6	1.20	113	0	8
Coal							
Intermediate 1	Class A	Lead 982.4 Tail 293.5	Lead 12.0 Tail 15.6	Lead 1.85 Tail 1.19	Lead 201 Tail 208	0	8
Intermediate 2							
Intermediate 3							
Production	Class A	Lead 410 Tail 1692	Lead 13.0 Tail 14.8	Lead 1.61 Tail 1.41	Lead 118 Tail 207	5506	8
Tubing							

Drillers TD (ft) 14,664 Loggers TD (ft) 14,566

Deepest formation penetrated Marcellus Plug back to (ft) Not a Pilot Hole

Plug back procedure Not a Pilot Hole

Kick off depth (ft) 6,954

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction ☐ neutron ☐ resistivity ■ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ☐ No ☐ Conventional ☐ Sidewall Were cuttings collected ■ Yes ☐ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING Conductor - No centralizers used. Fresh Water/Surface- Surface - 5 centralizers used, one every third joint Intermediate - 69 centralizers - bow spring centralizers on every joint to KOP, on every third joint from KOP to 100' from surface. Production - 282 centralizers - rigid bow spring every third joint from KOP to TOC, rigid bow spring every joint to KOP.

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10071 Farm name Terry & Helen Kiessling Well number PEN 2 FHS

PERFORATION RECORD

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

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	SEE ATTACHED STIMULATION							
	INFORMATION PER STAGE							
	RECORD							

Please insert additional pages as applicable.

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Perforation Record

API: 47-085-10071 Farm name: TERRY & HELEN KIESSLING Well Name: PEN-2-F-HS

Stage No.	Stim Date	Top Perf	Bottom Perf	# of Perfs	Formation
Trigger Toe	10/25/2014	14519	14,522	-	Marcellus
1	10/26/2014	14269	14,506	50	Marcellus
2	10/26/2014	13974	14,212	50	Marcellus
3	10/27/2014	13680	13,917	50	Marcellus
4	10/27/2014	13385	13,622	50	Marcellus
4 Inj Test	10/29/2014	0	-	-	Marcellus
4B (Reperf)	10/29/2014	13365	13,377	24	Marcellus
5	10/30/2014	13091	13,328	50	Marcellus
6	10/30/2014	12796	13,034	50	Marcellus
7	10/31/2014	12502	12,739	50	Marcellus
8	11/1/2014	12207	12,445	50	Marcellus
9	11/2/2014	11913	12,150	50	Marcellus
10	11/2/2014	11618	11,856	50	Marcellus
11	11/3/2014	11324	11,561	50	Marcellus
11 Inj test 1	11/4/2014	-	-	-	Marcellus
11 Inj Test 2	11/5/2014	-	-	-	Marcellus
11B (Reperf)	11/5/2014	11314	11,332	24	Marcellus
12	11/5/2014	11029	11,267	50	Marcellus
13	11/6/2014	10735	10,972	50	Marcellus
14	11/7/2014	10440	10,678	50	Marcellus
15	11/7/2014	10146	10,383	50	Marcellus
16	11/8/2014	9851	10,089	50	Marcellus
17	11/14/2014	9557	9,794	50	Marcellus
18	11/15/2014	9262	9,500	50	Marcellus
19	11/15/2014	8968	9,205	50	Marcellus
20	11/15/2014	8673	8,911	50	Marcellus
21	11/15/2014	8379	8,616	50	Marcellus
22	11/16/2014	8084	8,322	50	Marcellus
23	11/16/2014	7790	8,027	50	Marcellus
24	11/16/2014	7495	7,733	50	Marcellus
25	11/17/2014	7201	7,438	50	Marcellus
26	11/17/2014	6906	7,144	50	Marcellus
27	11/17/2014	6612	6,849	50	Marcellus

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STIMULATION INFORMATION PER STAGE

API: 47-085-10071 Farm name: TERRY & HELEN KIESSLING Well Name: PEN-2 -F-HS

Stage No.	Stim Date	Avg Rate (bpm)	ATP (psi)	Max BD Pressure	ISIP (psi)	Proppant (lbs)	Water (BBLS)	Amount of N^2/ other (units)
Trigger Toe	10/25/2014	-	-	9,470	6,175	-	201	
1	10/26/2014	87.9	7,219	5,555	4,865	598,500	12,387	
2	10/26/2014	88.5	7,331	5,301	4,297	600,300	12,873	
3	10/27/2014	90.0	7,430	5,169	3,532	599,500	12,221	
4	10/27/2014	80.8	7,789	5,894	8,766	334,300	10,587	
4 Inj Test	10/29/2014	9.9	5,519	-	5,765	-	721	
4B (Reperf)	10/29/2014	67.0	7,947	6,430	4,438	264,150	9,642	
5	10/30/2014	87.7	7,604	5,665	3,390	601,800	12,202	
6	10/30/2014	85.9	7,839	5,540	3,190	600,400	12,666	
7	10/31/2014	87.0	7,671	6,098	2,854	600,000	13,844	
8	11/1/2014	70.0	7,587	5,863	4,148	601,400	19,269	
9	11/2/2014	89.3	7,490	5,751	3,122	601,500	11,796	
10	11/2/2014	83.5	7,712	5,722	2,918	600,300	13,319	
11	11/3/2014	88.7	8,131	5,429	-	382,250	9,647	
11 Inj test 1	11/4/2014	4.7	5,145	-	5,068	-	538	
11 Inj Test 2	11/5/2014	9.1	7,091	-	5,196	-	1,881	
11B (Reperf)	11/5/2014	68.0	8,364	6,877	4,989	141,000	7,421	
12	11/5/2014	87.1	8,016	4,982	3,068	679,650	13,500	
13	11/6/2014	86.7	7,520	5,118	3,076	602,150	12,587	
14	11/7/2014	87.7	8,310	5,500	2,918	602,350	12,509	
15	11/7/2014	89.4	8,062	5,636	2,661	601,450	12,454	
16	11/8/2014	84.9	8,088	5,522	3,061	600,250	12,495	
17	11/14/2014	87.3	7,885	5,118	2,707	604,650	14,182	
18	11/15/2014	90.0	7,942	4,946	2,861	601,450	13,556	
19	11/15/2014	89.7	7,628	5,525	3,076	600,350	12,431	
20	11/15/2014	88.2	7,803	4,821	2,900	600,550	13,361	
21	11/15/2014	85.0	8,120	5,136	2,772	600,800	14,530	
22	11/16/2014	85.0	7,919	5,543	2,747	602,500	14,130	
23	11/16/2014	87.1	7,829	5,314	3,072	600,350	13,424	
24	11/16/2014	85.0	7,909	5,339	4,807	570,900	13,144	
25	11/17/2014	89.0	7,529	5,136	3,076	634,950	13,112	
26	11/17/2014	89.9	7,227	5,608	2,875	599,300	12,249	
27	11/17/2014	90.2	6,713	5,114	2,725	599,800	12,093	

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API 47- 085 - 10071 Farm name Terry & Helen Kiessling Well number PEN 2 FHS

PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6,250 TVD	14,664 MD	

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ☐ Open Flow OIL TEST ☐ Flow ☐ Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	2496 mcfpd	111 bpd	406 bpd	772 bpd	☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
	SEE ATTACHED FORMATION SHEET				

Please insert additional pages as applicable.

Drilling Contractor NOMAC
Address 171 Locust Avenue Ext. City Mt. Morris State PA Zip 15349

Logging Company _____
Address _____ City _____ State _____ Zip _____

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

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

Please insert additional pages as applicable.

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Completed by Regina A. Logue Telephone 724-820-3559
Signature Regina A. Logue Title Regulatory Analyst Date 4/6/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

PEN 2 FHS 47-085-10071

Formations	Top TVD	Base TVD	Top MD	Base MD	Fluid
Shale and Sandstone	0	1309	0	1309	
Sandstone	1309	1433	1309	1423	
Shale and Sandstone	1423	1593	1423	1593	
Sandstone	1593	1635	1593	1635	
Shale and Sandstone	1635	1737	1635	1737	
Maxton Sand	1737	1820	1737	1820	
Shale and Sandstone	1820	1943	1820	1943	
Big Lime	1943	1998	1943	1998	
Big Injun	1998	2133	1998	2133	
Price	2133	2405	2133	2405	
Weir	2405	2444	2405	2444	
Shale	2444	2724	2444	2724	
Gordon	2724	2741	2724	6301	
Shale and Sandstone	2741	2921	2741	6302	
5th Sand	2921	2933	2921	6371	
Shale	2933	3076	2933	not encountered	
Sandstone	3076	3090	3076	not encountered	
Shale	3090	3498	3090	not encountered	
Warren	3498	3560	3500	6300	
Shale	3560	3894	3562	6301	
Sandstone	3894	3931	3900	6302	
Shale and Sandstone	3931	4925	3937	6371	
Benson	4925	4987	4941	not encountered	
Shale	4987	5147	5004	not encountered	
Alexander	5147	5215	5166	not encountered	
Shale	5215	5725	5234	not encountered	
Rheinstreet	5725	6051	5750	not encountered	
Cashaqua	6051	6143	6080	not encountered	
Middlesex	6143	6172	6176	not encountered	
West River	6172	6216	6206	not encountered	
Burkett	6216	6259	6253	not encountered	
Tully Limestone	6259	6260	6300	not encountered	
Hamilton	6260	6261	6301	6302	Gas
Marcellus	6261	6320	6302	6371	
Onondaga	6320		6371	not encountered	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	10/26/2014
Job End Date:	11/17/2014
State:	West Virginia
County:	Ritchie
API Number:	47-085-10071-00-00
Operator Name:	Noble Energy, Inc.
Well Name and Number:	Pen 2 F
Longitude:	-81.01260600
Latitude:	39.33661400
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,250
Total Base Water Volume (gal):	15,580,824
Total Base Non Water Volume:	807,235

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

INTERSTATE Oil & Gas COMPACT COMMISSION

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	Noble Engery	Base Fluid					
			Water	7732-18-5	100.00000	88.59607	
40/70 Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	7.68097	
100 Mesh Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	3.38252	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.15657	
			Hydrogen Chloride	7647-01-0	18.00000	0.03740	
WFRA-405e	U.S. Well Services	Friction Reducer					
			Water	7732-18-5	40.00000	0.01787	
			Anionic Polyacrylamide	Proprietary	40.00000	0.01787	
			Sodium Chloride	7647-14-5	20.00000	0.00894	
			Petroleum Distillates	64742-47-8	20.00000	0.00719	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00223	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			Water	7732-18-5	40.00000	0.01662	

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			Anionic Polyacrylamide	Proprietary	40.00000	0.01662	
			Petroleum Distillates	64742-47-8	40.00000	0.01338	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00208	
			Crystalline Salt	12125-02-9	5.00000	0.00208	
SI-1100	U.S. Well Services	Scale Inhibitor					
			Di Water	7732-18-5	80.00000	0.01070	
			Ethylene Glycol	107-21-1	40.00000	0.00605	
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00181	
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00173	
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00167	
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00158	
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00154	
			Acrylic polymer	52255-49-9	5.00000	0.00067	
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00562	
			Deionized Water	7732-18-5	28.00000	0.00321	
LGC-15	U.S. Well Services, LLC	Gelling Agents					
			Guar Gum	9000-30-0	50.00000	0.00280	
			Petroleum Distillates	64742-47-8	60.00000	0.00265	
			Suspending agent (solid)	14808-60-7	3.00000	0.00043	
			Surfactant	68439-51-0	3.00000	0.00017	
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Diethylene Glycol	111-46-6	30.00000	0.00024	
			Methenamine	100-97-0	20.00000	0.00019	
			Hydrogen Chloride	7647-01-0	10.00000	0.00008	
			Polyethylene polyamine	68603-67-8	10.00000	0.00007	
			Coco amine	61791-14-8	5.00000	0.00003	
ICA-800	U.S. Well Services	Iron Control Additive					
			Erythorbic Acid	89-65-6	100.00000	0.00021	
AP One	U.S. Well Services, LLC	Gel Breakers					
			Ammonium Persulfate	7727-54-0	100.00000	0.00013	

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.

* 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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PATHFINDER
A Schlumberger Company

noble energy

Noble Energy PEN2FHS INC ONLY+MWD 0ft to14664ft MD Survey Report

(Def Survey)

Report Date:	March 14, 2014 - 08:58 AM	**Survey / DLS Computation:**	Minimum Curvature / Lubinski
Client:	Noble Energy	**Vertical Section Azimuth:**	326.368 ° (Grid North)
Field:	WV Ritchie County (NAD27)	**Vertical Section Origin:**	0.000 ft, 0.000 ft
Structure / Slot:	Noble Energy PEN2 Pad / PEN2FHS	**TVD Reference Datum:**	KB
Well:	PEN2FHS	**TVD Reference Elevation:**	1099.100 ft above MSL
Borehole:	Original Borehole	**Seabed / Ground Elevation:**	1073.100 ft above MSL
UWI / API#:	Unknown / Unknown	**Magnetic Declination:**	-7.855 °
Survey Name:	Noble Energy PEN2FHS INC ONLY+MWD 0ft to14664ft MD	**Total Gravity Field Strength:**	999.3088mgn (9.80665 Based)
Survey Date:	February 22, 2014	**Gravity Model:**	GARM
Tort / AHD / DDI / ERD Ratio:	303.218 ° / 9255.503 ft / 6.816 / 1.471	**Total Magnetic Field Strength:**	52254.660 nT
Coordinate Reference System:	NAD27 West Virginia State Plane, Northern Zone, US Feet	**Magnetic Dip Angle:**	66.856 °
Location Lat / Long:	N 39° 20' 11.81000", W 81° 0' 45.38000"	**Declination Date:**	February 22, 2014
Location Grid N/E Y/X:	N 308313.361 ftUS, E 1572180.669 ftUS	**Magnetic Declination Model:**	HDGM 2013
CRS Grid Convergence Angle:	-0.9647 °	**North Reference:**	Grid North
Grid Scale Factor:	0.99995343	**Grid Convergence Used:**	-0.9647 °
Version / Patch:	2.7.1043.0	**Total Corr Mag North->Grid North:**	-6.8904 °
		Local Coord Referenced To:	Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
SHL	0.00	0.00	0.00	0.00	-1099.10	0.00	0.00	0.00	N/A	N/A	N/A	308313.36	1572180.67	N 39 20 11.81	W 81 0 45.38	0.00
	715.00	0.30	278.39	715.00	-384.10	1.25	0.27	-1.85	0.04	0.04	0.00	308313.63	1572178.82	N 39 20 11.81	W 81 0 45.40	0.00
	809.00	2.83	14.57	808.96	-290.14	2.96	2.56	-1.51	3.06	2.69	102.32	308315.92	1572179.16	N 39 20 11.84	W 81 0 45.40	1.13
	905.00	3.99	18.48	904.79	-194.31	6.60	8.02	0.14	1.23	1.21	4.07	308321.38	1572180.81	N 39 20 11.89	W 81 0 45.38	1.64
	1001.00	4.22	20.48	1000.54	-98.56	10.72	14.49	2.44	0.28	0.24	2.08	308327.85	1572183.11	N 39 20 11.95	W 81 0 45.35	1.89
	1097.00	4.53	11.53	1096.26	-2.84	15.46	21.52	4.43	0.78	0.32	-9.32	308334.88	1572185.10	N 39 20 12.02	W 81 0 45.33	2.11
	1192.00	5.19	10.81	1190.92	91.82	21.17	29.41	5.99	0.70	0.69	-0.76	308342.77	1572186.66	N 39 20 12.10	W 81 0 45.31	2.29
	1288.00	4.17	22.25	1286.60	187.50	26.23	36.91	8.12	1.44	-1.06	11.92	308350.27	1572188.79	N 39 20 12.18	W 81 0 45.28	2.47
	1384.00	3.95	11.74	1382.36	283.26	30.51	43.38	10.12	0.81	-0.23	-10.95	308356.74	1572190.79	N 39 20 12.24	W 81 0 45.26	2.58
	1479.00	3.76	6.19	1477.15	378.05	35.20	49.68	11.12	0.44	-0.20	-5.84	308363.04	1572191.79	N 39 20 12.30	W 81 0 45.25	2.66
	1574.00	3.40	5.86	1571.96	472.86	39.77	55.58	11.74	0.38	-0.38	-0.35	308368.94	1572192.41	N 39 20 12.36	W 81 0 45.24	2.72
	1670.00	1.82	2.21	1667.86	568.76	43.20	59.93	12.09	1.65	-1.65	-3.80	308373.29	1572192.76	N 39 20 12.40	W 81 0 45.24	2.83
	1765.00	0.76	323.09	1762.83	663.73	45.05	61.94	11.77	1.39	-1.12	-41.18	308375.30	1572192.44	N 39 20 12.42	W 81 0 45.24	2.89
	1861.00	1.11	315.15	1858.82	759.72	46.60	63.11	10.73	0.39	0.36	-8.27	308376.47	1572191.40	N 39 20 12.44	W 81 0 45.26	2.92
	1957.00	1.65	335.60	1954.79	855.69	48.88	65.03	9.51	0.75	0.56	21.30	308378.39	1572190.18	N 39 20 12.45	W 81 0 45.27	2.95
	2052.00	1.18	354.60	2049.77	950.67	51.09	67.25	8.85	0.69	-0.49	20.00	308380.61	1572189.52	N 39 20 12.48	W 81 0 45.28	2.99
	2147.00	1.03	21.08	2144.75	1045.65	52.45	69.02	9.07	0.55	-0.16	27.87	308382.38	1572189.73	N 39 20 12.49	W 81 0 45.28	3.02
	2243.00	0.39	53.10	2240.74	1141.64	52.96	70.02	9.64	0.76	-0.67	33.35	308383.38	1572190.31	N 39 20 12.50	W 81 0 45.27	3.05
	2338.00	0.41	81.07	2335.74	1236.64	52.84	70.27	10.23	0.20	0.02	29.44	308383.63	1572190.90	N 39 20 12.51	W 81 0 45.26	3.06
	2434.00	0.20	30.46	2431.74	1332.64	52.77	70.47	10.66	0.34	-0.22	-52.72	308383.82	1572191.32	N 39 20 12.51	W 81 0 45.26	3.07
	2528.00	0.14	162.77	2525.74	1426.64	52.73	70.50	10.77	0.33	-0.06	140.76	308383.85	1572191.44	N 39 20 12.51	W 81 0 45.26	3.08
	2623.00	0.17	173.13	2620.74	1521.64	52.49	70.25	10.82	0.04	0.03	10.91	308383.60	1572191.49	N 39 20 12.51	W 81 0 45.26	3.08
	2718.00	0.26	263.20	2715.74	1616.64	52.46	70.08	10.63	0.33	0.09	94.81	308383.44	1572191.30	N 39 20 12.50	W 81 0 45.26	3.09
	2813.00	0.30	285.77	2810.73	1711.63	52.75	70.12	10.17	0.12	0.04	23.76	308383.48	1572190.84	N 39 20 12.50	W 81 0 45.27	3.10
	2909.00	0.10	263.53	2906.73	1807.63	52.98	70.18	9.85	0.22	-0.21	-23.17	308383.54	1572190.52	N 39 20 12.51	W 81 0 45.27	3.10
	3005.00	0.27	283.01	3002.73	1903.63	53.18	70.22	9.54	0.19	0.18	20.29	308383.58	1572190.21	N 39 20 12.51	W 81 0 45.27	3.11
	3100.00	0.51	253.62	3097.73	1998.63	53.47	70.15	8.92	0.32	0.25	-30.94	308383.51	1572189.59	N 39 20 12.50	W 81 0 45.28	3.12
	3196.00	0.36	260.31	3193.73	2094.63	53.72	69.98	8.21	0.16	-0.16	6.97	308383.34	1572188.88	N 39 20 12.50	W 81 0 45.29	3.13
	3292.00	0.14	279.06	3289.73	2190.63	53.92	69.95	7.80	0.24	-0.23	19.53	308383.31	1572188.47	N 39 20 12.50	W 81 0 45.30	3.14
	3387.00	0.35	224.71	3384.73	2285.63	53.94	69.76	7.48	0.31	0.22	-57.21	308383.12	1572188.15	N 39 20 12.50	W 81 0 45.30	3.15
	3481.00	0.87	159.78	3478.72	2379.62	53.19	68.89	7.53	0.84	0.55	-69.07	308382.25	1572188.20	N 39 20 12.49	W 81 0 45.30	3.17
	3577.00	0.96	163.36	3574.71	2475.61	51.71	67.44	8.01	0.11	0.09	3.73	308380.79	1572188.68	N 39 20 12.48	W 81 0 45.29	3.18
	3673.00	0.98	172.14	3670.70	2571.60	50.20	65.85	8.35	0.16	0.02	9.15	308379.21	1572189.02	N 39 20 12.46	W 81 0 45.29	3.19
	3768.00	0.61	193.08	3765.69	2666.59	49.13	64.55	8.35	0.49	-0.39	22.04	308377.91	1572189.02	N 39 20 12.45	W 81 0 45.29	3.21
	3864.00	0.72	222.31	3861.68	2762.58	48.63	63.61	7.83	0.37	0.11	30.45	308376.97	1572188.50	N 39 20 12.44	W 81 0 45.29	3.22
	3960.00	0.43	121.17	3957.68	2858.58	48.16	62.98	7.73	0.94	-0.30	-105.35	308376.34	1572188.40	N 39 20 12.43	W 81 0 45.30	3.25
	4055.00	2.72	63.20	4052.64	2953.54	47.56	63.81	10.05	2.65	2.41	-61.02	308377.17	1572190.71	N 39 20 12.44	W 81 0 45.27	3.31
	4103.00	3.84	58.42	4100.56	3001.46	47.37	65.17	12.43	2.40	2.33	-9.96	308378.52	1572193.10	N 39 20 12.46	W 81 0 45.24	3.35
	4149.00	5.24	58.63	4146.41	3047.31	47.23	67.07	15.54	3.04	3.04	0.46	308380.42	1572196.21	N 39 20 12.48	W 81 0 45.20	3.39
	4196.00	6.23	61.58	4193.18	3094.08	46.92	69.40	19.61	2.20	2.11	6.28	308382.75	1572200.28	N 39 20 12.50	W 81 0 45.15	3.42
	4245.00	7.39	60.19	4241.83	3142.73	46.47	72.23	24.69	2.39	2.37	-2.84	308385.59	1572205.35	N 39 20 12.53	W 81 0 45.08	3.47
	4292.00	8.15	58.53	4288.40	3189.30	46.14	75.47	30.15	1.69	1.62	-3.53	308388.83	1572210.82	N 39 20 12.56	W 81 0 45.01	3.51
	4340.00	8.96	57.30	4335.86	3236.76	45.95	79.27	36.20	1.73	1.69	-2.56	308392.62	1572216.87	N 39 20 12.60	W 81 0 44.94	3.54
	4387.00	9.39	63.26	4382.26	3283.16	45.43	82.97	42.70	2.22	0.91	12.68	308396.33	1572223.37	N 39 20 12.64	W 81 0 44.85	3.59
	4436.00	9.97	67.92	4430.57	3331.47	44.10	86.36	50.20	1.99	1.18	9.51	308399.72	1572230.87	N 39 20 12.67	W 81 0 44.76	3.63
	4483.00	10.70	66.52	4476.80	3377.70	42.52	89.63	57.97	1.64	1.55	-2.98	308402.99	1572238.64	N 39 20 12.71	W 81 0 44.66	3.66
	4531.00	11.22	65.44	4523.93	3424.83	41.00	93.35	66.31	1.16	1.08	-2.25	308406.70	1572246.98	N 39 20 12.74	W 81 0 44.56	3.70
	4578.00	12.30	65.03	4569.94	3470.84	39.52	97.36	75.01	2.30	2.30	-0.87	308410.72	1572255.67	N 39 20 12.78	W 81 0 44.45	3.74
	4626.00	13.46	64.21	4616.73	3517.63	37.99	101.95	84.67	2.45	2.42	-1.71	308415.30	1572265.34	N 39 20 12.83	W 81 0 44.32	3.78
	4673.00	13.90	63.76	4662.40	3563.30	36.52	106.82	94.66	0.96	0.94	-0.96	308420.18	1572275.33	N 39 20 12.88	W 81 0 44.20	3.81
	4722.00	14.75	63.21	4709.88	3610.78	35.01	112.24	105.51	1.76	1.73	-1.12	308425.59	1572286.17	N 39 20 12.94	W 81 0 44.06	3.85
	4769.00	15.90	63.07	4755.20	3656.10	33.55	117.85	116.59	2.45	2.45	-0.30	308431.21	1572297.25	N 39 20 12.99	W 81 0 43.92	3.89
	4817.00	16.61	62.77	4801.28	3702.18	32.02	123.97	128.55	1.49	1.48	-0.63	308437.32	1572309.21	N 39 20 13.06	W 81 0 43.77	3.93
	4864.00	17.67	62.97	4846.20	3747.10	30.45	130.28	140.88	2.26	2.26	0.43	308443.64	1572321.54	N 39 20 13.12	W 81 0 43.62	3.97
	4913.00	18.44	63.17	4892.78	3793.68	28.68	137.16	154.42	1.58	1.57	0.41	308450.52	1572335.08	N 39 20 13.19	W 81 0 43.44	4.00
	4960.00	19.50	64.30	4937.23	3838.13	26.71	143.92	168.12	2.39	2.26	2.40	308457.27	1572348.78	N 39 20 13.26	W 81 0 43.27	4.04
	5008.00	21.28	63.64	4982.22	3883.12	24.50	151.26	183.15	3.74	3.71	-1.38	308464.61	1572363.81	N 39 20 13.34	W 81 0 43.08	4.09
	5055.00	23.27	62.22	5025.71	3926.61	22.48	159.38	199.00	4.39	4.23	-3.02	308472.73	1572379.66	N 39 20 13.42	W 81 0 42.88	4.13
	5104.00	24.04	63.12	5070.59	3971.49	20.32	168.40	216.47	1.74	1.57	1.84	308481.75	1572397.13	N 39 20 13.51	W 81 0 42.66	4.17
	5151.00	24.40	62.39	5113.46	4014.36	18.17	177.23	233.61	1.00	0.77	-1.55	308490.58	1572414.27	N 39 20 13.60	W 81 0 42.45	4.20
	5200.00	25.39	63.47	5157.90	4058.80	15.81	186.61	251.98	2.22	2.02	2.20	308499.96	1572432.64	N 39 20 13.70	W 81 0 42.21	4.24
	5247.00	27.11	64.80	5200.06	4100.96	13.00	195.67	270.69	3.87	3.66	2.83	308509.02	1572451.34	N 39 20 13.79	W 81 0 41.98	4.28
	5295.00	27.58	64.73	5242.69	4143.59	9.78	205.07	290.63	0.98	0.98	-0.15	308518.42	1572471.28	N 39 20 13.88	W 81 0 41.73	4.31
	5342.00	28.03	64.29	5284.27	4185.17	6.67	214.51	310.42	1.05	0.96	-0.94	308527.86	1572491.07	N 39 20 13.98	W 81 0 41.48	4.33
	5391.00	29.07	63.67	5327.31	4228.21	3.57	224.78	331.46	2.21	2.12	-1.27	308538.13	1572512.12	N 39 20 14.09	W 81 0 41.21	4.37
	5443.00	29.77	62.91	5372.60	4273.50	0.50	236.26	354.28	1.53	1.35	-1.46	308549.61	1572534.93	N 39 20 14.20	W 81 0 40.92	4.40
	5511.00	28.61	61.50	5431.97	4332.87	-2.88	251.72	383.62	1.98	-1.71	-2.07	308565.07	1572564.27	N 39 20 14.36	W 81 0 40.55	4.44
	5606.00	32.44	62.11	5513.78	4414.68	-7.47	274.50	426.14	4.04	4.03	0.64	308587.85	1572606.79	N 39 20 14.59	W 81 0 40.02	4.51
	5701.00	32.27	63.76	5594.04	4494.94	-13.28	297.63	471.41	0.95	-0.18	1.74	308610.98	1572652.06	N 39 20 14.83	W 81 0 39.44	4.55
	5797.00	31.55	62.33	5675.53	4576.43	-19.19	320.63	516.64	1.09	-0.75	-1.49	308633.97	1572697.29	N 39 20 15.06	W 81 0 38.87	4.60
	5844.00	30.82	58.02	5715.74	4616.64	-20.81	332.72	537.75	4.99	-1.55	-9.17	308646.06	1572718.40	N 39 20 15.19	W 81 0 38.61	4.63
	5892.00	29.42	46.32	5757.30	4658.20	-19.11	347.38	556.72	12.56	-2.92	-24.38	308660.72	1572737.37	N 39 20 15.34	W 81 0 38.37	4.69
	5939.00	30.00	35.14	5798.15	4699.05	-12.83	364.98	571.84	11.84	1.23	-23.79	308678.32	1572752.49	N 39 20 15.51	W 81 0 38.18	4.74
	5987.00	32.34	25.98	5839.24	4740.14	-1.99	386.35	584.38	11.00	4.88	-19.29	308699.69	1572765.04	N 39 20 15.73	W 81 0 38.03	4.78
	6034.00	34.91	19.99	5878.38	4779.28	12.36	410.30	594.49	8.92	5.47	-12.74	308723.64	1572775.16	N 39 20 15.96	W 81 0 37.90	4.82
	6083.00	36.92	14.99	5918.08	4818.98	30.41	437.70	603.10	7.25	4.10	-10.20	308751.04	1572783.74	N 39 20 16.24	W 81 0 37.80	4.85
	6130.00	39.10	10.07	5955.11	4856.01	50.46	465.94	609.34	7.94	4.64	-10.47	308779.28	1572789.98	N 39 20 16.52	W 81 0 37.73	4.89
	6178.00	41.28	6.52	5991.78	4892.68	73.51	496.58	613.79	6.59	4.54	-7.40	308809.92	1572794.43	N 39 20 16.82	W 81 0 37.68	4.92
	6225.00	42.96	1.22	6026.66	4927.56	98.51	528.01	615.89	8.36	3.57	-11.28	308841.37	1572796.53	N 39 20 17.13	W 81 0 37.66	4.95
	6274.00	44.76	355.99	6062.00	4962.90	127.22	561.92	615.04	8.26	3.67	-10.67	308875.28	1572795.68	N 39 20 17.47	W 81 0 37.67	4.99
	6321.00	46.15	350.02	6094.98	4995.88	157.15	595.14	610.94	9.52	2.96	-12.70	308908.47	1572791.58	N 39 20 17.79	W 81 0 37.73	5.02
	6369.00	48.91	343.83	6127.40	5028.30	190.28	629.58	602.90	11.11	5.75	-12.90	308942.91	1572783.54	N 39 20 18.13	W 81 0 37.84	5.06
	6416.00	51.70	339.50	6157.43	5058.33	225.15	663.88	591.50	9.24	5.94	-9.21	308977.21	1572772.14	N 39 20 18.47	W 81 0 38.00	5.10
	6464.00	54.98	334.86	6186.09	5086.99	262.95	699.34	576.55	10.33	6.83	-9.67	309012.67	1572757.19	N 39 20 18.82	W 81 0 38.19	5.13
	6511.00	59.65	332.88	6211.47	5112.37	302.16	734.83	559.11	10.55	9.94	-4.21	309048.16	1572739.76	N 39 20 19.16	W 81 0 38.42	5.17
	6559.00	65.34	332.10	6233.63	5134.53	344.48	772.58	539.45	11.94	11.85	-1.63	309085.91	1572720.10	N 39 20 19.53	W 81 0 38.68	5.20
	6606.00	69.03	330.24	6251.85	5152.75	387.64	810.51	518.56	8.66	7.85	-3.96	309123.84	1572699.20	N 39 20 19.91	W 81 0 38.95	5.23
	6655.00	72.98	327.91	6267.80	5168.70	433.91	850.24	494.74	9.23	8.06	-4.76	309163.56	1572675.39	N 39 20 20.29	W 81 0 39.27	5.27
	6702.00	77.99	326.14	6279.58	5180.48	479.39	888.40	469.98	11.27	10.66	-3.77	309201.71	1572650.63	N 39 20 20.67	W 81 0 39.59	5.30
	6751.00	82.87	325.60	6287.72	5188.62	527.69	928.38	442.88	10.02	9.96	-1.10	309241.69	1572623.53	N 39 20 21.06	W 81 0 39.94	5.33
	6798.00	87.15	324.21	6291.81	5192.71	574.48	966.68	415.96	9.57	9.11	-2.96	309279.99	1572596.61	N 39 20 21.43	W 81 0 40.29	5.36
	6846.00	90.65	320.72	6292.73	5193.63	622.35	1004.72	386.73	10.30	7.29	-7.27	309318.03	1572567.38	N 39 20 21.80	W 81 0 40.67	5.40

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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Directional Difficulty Index
	6893.00	91.86	318.81	6291.70	5192.60	669.02	1040.59	356.38	4.81	2.57	-4.06	309353.90	1572537.04	N 39 20 22.15 W	81 0 41.07	5.42
	6941.00	91.85	319.28	6290.15	5191.05	716.60	1076.82	324.94	0.96	-0.02	0.98	309390.13	1572505.59	N 39 20 22.51 W	81 0 41.48	5.44
	7037.00	90.41	317.18	6288.25	5189.15	811.61	1148.40	261.01	2.65	-1.50	-2.19	309461.71	1572441.66	N 39 20 23.20 W	81 0 42.30	5.48
	7132.00	89.79	315.13	6288.09	5188.99	905.10	1218.91	195.20	2.25	-0.65	-2.16	309530.21	1572375.86	N 39 20 23.87 W	81 0 43.16	5.51
	7228.00	89.93	311.93	6288.32	5189.22	998.69	1283.02	125.61	3.34	0.15	-3.33	309596.32	1572306.27	N 39 20 24.51 W	81 0 44.06	5.55
	7323.00	89.66	310.80	6288.66	5189.56	1090.45	1345.80	54.31	1.22	-0.28	-1.19	309659.10	1572234.98	N 39 20 25.12 W	81 0 44.98	5.58
	7418.00	89.28	314.45	6289.54	5190.44	1182.71	1410.12	-15.57	3.86	-0.40	3.84	309723.41	1572165.10	N 39 20 25.74 W	81 0 45.88	5.62
	7514.00	89.24	318.42	6290.78	5191.68	1277.24	1479.66	-81.71	4.14	-0.04	4.14	309792.95	1572098.96	N 39 20 26.42 W	81 0 46.74	5.65
	7609.00	91.20	323.45	6290.42	5191.32	1371.78	1553.40	-141.56	5.68	2.06	5.29	309866.68	1572039.11	N 39 20 27.14 W	81 0 47.51	5.69
	7705.00	91.13	322.45	6288.46	5189.36	1467.59	1630.00	-199.39	1.04	-0.07	-1.04	309943.26	1571981.29	N 39 20 27.88 W	81 0 48.27	5.72
	7800.00	89.78	320.21	6287.73	5188.63	1562.21	1704.16	-256.74	2.76	-1.44	-2.36	310017.44	1571921.94	N 39 20 28.61 W	81 0 49.04	5.74
	7896.00	89.55	322.32	6288.30	5189.20	1657.82	1779.04	-318.81	2.21	0.22	2.20	310092.31	1571861.88	N 39 20 29.34 W	81 0 49.82	5.77
	7992.00	89.86	324.81	6288.80	5189.70	1753.70	1856.27	-375.82	2.61	0.32	2.59	310169.54	1571804.87	N 39 20 30.09 W	81 0 50.56	5.80
	8087.00	89.45	327.22	6289.37	5190.27	1848.69	1935.03	-428.91	2.57	-0.43	2.54	310248.30	1571751.78	N 39 20 30.86 W	81 0 51.25	5.83
	8183.00	89.59	328.00	6290.17	5191.07	1944.66	2016.09	-480.34	0.83	0.15	0.81	310329.36	1571700.35	N 39 20 31.65 W	81 0 51.92	5.85
	8278.00	90.10	328.12	6290.43	5191.33	2039.62	2096.71	-530.60	0.55	0.54	0.13	310409.97	1571650.10	N 39 20 32.44 W	81 0 52.58	5.87
	8374.00	90.17	327.88	6290.21	5191.11	2135.58	2178.12	-581.47	0.26	0.07	-0.25	310491.38	1571599.23	N 39 20 33.24 W	81 0 53.25	5.89
	8470.00	90.34	326.09	6289.78	5190.68	2231.57	2258.62	-633.77	1.87	0.18	-1.86	310571.87	1571548.93	N 39 20 34.02 W	81 0 53.93	5.91
	8565.00	91.00	321.98	6288.67	5189.57	2326.46	2335.49	-689.55	4.38	0.69	-4.33	310648.73	1571491.16	N 39 20 34.77 W	81 0 54.66	5.94
	8661.00	91.13	319.09	6286.88	5187.78	2421.94	2409.58	-750.55	3.01	0.14	-3.01	310722.82	1571430.16	N 39 20 35.50 W	81 0 55.45	5.96
	8757.00	90.31	318.27	6285.68	5186.58	2517.07	2481.67	-813.93	1.21	-0.85	-0.85	310794.91	1571366.78	N 39 20 36.20 W	81 0 56.27	5.98
	8853.00	90.27	320.26	6285.19	5186.09	2612.33	2554.41	-876.57	2.07	-0.04	2.07	310867.64	1571304.14	N 39 20 36.91 W	81 0 57.08	6.00
	8948.00	89.69	319.79	6285.22	5186.12	2706.74	2627.21	-937.60	0.79	-0.61	-0.49	310940.44	1571243.11	N 39 20 37.62 W	81 0 57.88	6.02
	9044.00	90.31	320.62	6285.22	5186.12	2802.19	2700.97	-999.05	1.08	0.65	0.86	311014.20	1571181.67	N 39 20 38.34 W	81 0 58.67	6.04
	9139.00	89.76	319.84	6285.16	5186.06	2896.64	2773.99	-1059.82	1.00	-0.58	-0.82	311087.21	1571120.90	N 39 20 39.05 W	81 0 59.46	6.06
	9235.00	90.14	320.66	6285.25	5186.15	2992.09	2847.79	-1121.20	0.94	0.40	0.85	311161.02	1571059.52	N 39 20 39.77 W	81 1 0.26	6.08
	9331.00	90.48	318.89	6284.73	5185.63	3087.45	2921.09	-1183.20	1.88	0.35	-1.84	311234.31	1570997.53	N 39 20 40.48 W	81 1 1.06	6.09
	9426.00	90.21	315.78	6284.16	5185.06	3181.26	2990.93	-1247.57	3.29	-0.28	-3.27	311304.15	1570933.16	N 39 20 41.18 W	81 1 1.90	6.12
	9521.00	90.03	316.93	6283.96	5184.86	3274.81	3059.68	-1313.14	1.23	-0.19	1.21	311372.89	1570867.60	N 39 20 41.83 W	81 1 2.75	6.13
	9617.00	90.48	317.98	6283.53	5184.43	3369.65	3130.40	-1378.05	1.19	0.47	1.09	311443.61	1570802.69	N 39 20 42.52 W	81 1 3.59	6.15
	9711.00	90.62	320.80	6282.63	5183.53	3462.94	3201.75	-1439.22	3.00	0.15	3.00	311514.96	1570741.52	N 39 20 43.21 W	81 1 4.38	6.17
	9807.00	90.86	323.52	6281.39	5182.29	3558.67	3277.55	-1498.10	2.84	0.25	2.83	311590.76	1570682.64	N 39 20 43.95 W	81 1 5.15	6.19
	9903.00	90.45	325.60	6280.29	5181.19	3654.61	3355.76	-1553.76	2.21	-0.43	2.17	311668.96	1570626.98	N 39 20 44.71 W	81 1 5.87	6.20
	9998.00	90.79	326.37	6279.26	5180.16	3749.60	3434.50	-1606.90	0.89	0.36	0.81	311747.69	1570573.84	N 39 20 45.48 W	81 1 6.57	6.22
	10093.00	90.65	322.40	6278.07	5178.97	3844.51	3511.71	-1662.21	4.18	-0.15	-4.18	311824.90	1570518.54	N 39 20 46.24 W	81 1 7.29	6.24
	10188.00	90.58	317.90	6277.05	5177.95	3938.93	3584.62	-1723.06	4.74	-0.07	-4.74	311897.80	1570457.69	N 39 20 46.95 W	81 1 8.08	6.26
	10282.00	90.69	316.17	6276.01	5176.91	4031.67	3653.40	-1787.12	1.84	0.12	-1.84	311966.58	1570393.63	N 39 20 47.62 W	81 1 8.91	6.28
	10378.00	90.31	314.41	6275.17	5176.07	4125.88	3721.62	-1854.66	1.88	-0.40	-1.83	312034.80	1570326.10	N 39 20 48.28 W	81 1 9.78	6.29
	10473.00	90.00	312.54	6274.91	5175.81	4218.48	3786.98	-1923.59	2.00	-0.33	-1.97	312100.15	1570257.17	N 39 20 48.91 W	81 1 10.67	6.31
	10568.00	89.69	309.71	6275.17	5176.07	4310.12	3849.45	-1995.15	3.00	-0.33	-2.98	312162.62	1570185.62	N 39 20 49.52 W	81 1 11.60	6.33
	10663.00	89.38	308.90	6275.94	5176.84	4400.94	3909.63	-2068.65	0.91	-0.33	-0.85	312222.80	1570112.12	N 39 20 50.10 W	81 1 12.55	6.34
	10758.00	89.62	311.88	6276.77	5177.67	4492.25	3971.18	-2141.00	3.15	0.25	3.14	312284.34	1570039.78	N 39 20 50.70 W	81 1 13.48	6.36
	10853.00	88.83	315.18	6278.05	5178.95	4584.86	4036.59	-2209.86	3.57	-0.83	3.47	312349.75	1569970.92	N 39 20 51.33 W	81 1 14.37	6.37
	10947.00	91.07	320.06	6278.14	5179.04	4677.73	4106.00	-2273.19	5.71	2.38	5.19	312419.16	1569907.59	N 39 20 52.01 W	81 1 15.19	6.39
	11042.00	91.10	320.42	6278.34	5177.24	4772.17	4179.02	-2333.94	0.38	0.03	0.38	312492.17	1569846.84	N 39 20 52.72 W	81 1 15.98	6.41
	11136.00	91.13	319.93	6274.51	5175.41	4865.60	4251.20	-2394.13	0.52	0.03	-0.52	312564.35	1569786.65	N 39 20 53.42 W	81 1 16.76	6.42
	11232.00	90.65	318.54	6273.02	5173.92	4960.85	4323.89	-2456.81	1.53	-0.50	-1.45	312637.05	1569723.98	N 39 20 54.13 W	81 1 17.58	6.43
	11327.00	90.52	316.76	6272.05	5172.95	5054.74	4394.10	-2520.80	1.88	-0.14	-1.87	312707.24	1569659.99	N 39 20 54.81 W	81 1 18.40	6.44
	11423.00	90.14	315.87	6271.49	5172.39	5149.26	4463.52	-2587.10	1.01	-0.40	-0.93	312776.66	1569593.69	N 39 20 55.49 W	81 1 19.26	6.46
	11518.00	90.72	316.95	6270.78	5171.68	5242.83	4532.32	-2652.60	1.29	0.61	1.14	312845.46	1569528.20	N 39 20 56.16 W	81 1 20.11	6.47
	11614.00	89.42	317.12	6270.66	5171.56	5337.55	4602.57	-2718.03	1.37	-1.35	0.18	312915.71	1569462.77	N 39 20 56.84 W	81 1 20.96	6.48
	11709.00	89.97	320.36	6271.17	5172.07	5431.70	4673.97	-2780.67	3.46	0.58	3.41	312987.11	1569400.13	N 39 20 57.54 W	81 1 21.77	6.50
	11804.00	91.48	324.00	6269.97	5170.87	5526.42	4749.00	-2838.91	4.15	1.59	3.83	313062.13	1569341.90	N 39 20 58.27 W	81 1 22.53	6.51
	11900.00	91.75	325.53	6267.26	5168.16	5622.34	4827.38	-2894.27	1.62	0.28	1.59	313140.50	1569286.54	N 39 20 59.03 W	81 1 23.25	6.53
	11995.00	90.52	323.90	6265.38	5166.28	5717.28	4904.90	-2949.13	2.15	-1.29	-1.72	313218.03	1569231.68	N 39 20 59.79 W	81 1 23.97	6.54
	12090.00	90.24	322.75	6264.75	5165.65	5812.14	4981.09	-3005.87	1.25	-0.29	-1.21	313294.21	1569174.94	N 39 21 0.53 W	81 1 24.71	6.55
	12185.00	90.24	321.41	6264.35	5165.25	5906.87	5056.03	-3064.25	1.41	0.00	-1.41	313369.15	1569116.57	N 39 21 1.26 W	81 1 25.46	6.56
	12279.00	90.24	320.20	6263.96	5164.86	6000.43	5128.88	-3123.66	1.29	0.00	-1.29	313441.99	1569057.17	N 39 21 1.97 W	81 1 26.24	6.57
	12374.00	90.14	319.35	6263.64	5164.54	6094.80	5201.41	-3185.00	0.90	-0.11	-0.89	313514.52	1568995.82	N 39 21 2.68 W	81 1 27.03	6.58
	12469.00	90.48	318.70	6263.13	5164.03	6189.02	5273.14	-3247.30	0.77	0.36	-0.68	313586.24	1568933.53	N 39 21 3.38 W	81 1 27.84	6.59
	12564.00	90.17	318.36	6262.59	5163.49	6283.13	5344.32	-3310.21	0.48	-0.33	-0.36	313657.42	1568870.62	N 39 21 4.07 W	81 1 28.66	6.60
	12659.00	90.24	318.51	6262.25	5163.15	6377.22	5415.40	-3373.24	0.17	0.07	0.16	313726.50	1568807.60	N 39 21 4.76 W	81 1 29.47	6.61
	12754.00	90.21	318.80	6261.88	5162.78	6471.36	5486.72	-3435.99	0.31	-0.03	0.31	313799.81	1568744.84	N 39 21 5.46 W	81 1 30.29	6.62
	12849.00	90.45	319.98	6261.33	5162.23	6565.65	5558.84	-3497.83	1.27	0.25	1.24	313871.93	1568683.01	N 39 21 6.16 W	81 1 31.09	6.63
	12945.00	90.27	321.29	6260.73	5161.63	6661.16	5633.05	-3558.71	1.38	-0.19	1.36	313946.14	1568622.13	N 39 21 6.89 W	81 1 31.88	6.64
	13041.00	90.41	322.12	6260.16	5161.06	6756.84	5708.39	-3618.20	0.88	0.15	0.86	314021.48	1568562.64	N 39 21 7.62 W	81 1 32.66	6.65
	13135.00	90.24	322.31	6259.62	5160.52	6850.60	5782.68	-3675.80	0.27	-0.18	0.20	314095.76	1568505.05	N 39 21 8.34 W	81 1 33.41	6.66
	13231.00	90.96	323.96	6258.62	5159.52	6946.43	5859.48	-3733.38	1.68	0.75	1.72	314172.56	1568447.47	N 39 21 9.09 W	81 1 34.15	6.67
	13327.00	90.52	324.34	6257.38	5158.28	7042.35	5937.29	-3789.60	0.61	-0.46	0.40	314250.36	1568391.25	N 39 21 9.85 W	81 1 34.89	6.68
	13422.00	90.72	324.40	6256.35	5157.25	7137.29	6014.50	-3844.94	0.22	0.21	0.06	314327.57	1568335.91	N 39 21 10.60 W	81 1 35.61	6.69
	13518.00	90.58	323.91	6255.26	5156.16	7233.21	6092.31	-3901.16	0.53	-0.15	-0.51	314405.38	1568279.70	N 39 21 11.36 W	81 1 36.34	6.70
	13613.00	90.21	322.48	6254.61	5155.51	7328.06	6168.37	-3956.07	1.55	-0.39	-1.51	314481.43	1568222.79	N 39 21 12.11 W	81 1 37.08	6.71
	13708.00	90.28	322.94	6254.20	5155.10	7422.87	6243.95	-4015.62	0.49	0.07	0.48	314557.01	1568165.24	N 39 21 12.84 W	81 1 37.83	6.72
	13804.00	90.48	323.15	6253.56	5154.46	7518.70	6320.66	-4073.33	0.30	0.21	0.22	314633.72	1568107.53	N 39 21 13.59 W	81 1 38.58	6.73
	13899.00	90.93	320.61	6252.39	5153.29	7613.40	6395.39	-4131.97	2.72	0.47	-2.67	314708.44	1568048.90	N 39 21 14.32 W	81 1 39.34	6.74
	13995.00	90.65	317.12	6251.07	5151.97	7708.55	6467.87	-4195.11	3.65	-0.29	-3.64	314780.72	1567985.77	N 39 21 15.02 W	81 1 40.16	6.75
	14090.00	90.31	314.92	6250.27	5151.17	7802.00	6536.03	-4261.07	2.34	-0.36	-2.32	314849.07	1567919.81	N 39 21 15.69 W	81 1 41.02	6.76
	14184.00	90.45	316.20	6249.65	5150.55	7894.33	6603.14	-4326.88	1.37	0.15	1.36	314916.18	1567854.00	N 39 21 16.34 W	81 1 41.87	6.77
	14280.00	89.76	315.58	6249.47	5150.37	7988.72	6672.07	-4393.70	0.97	-0.72	-0.65	314985.10	1567787.18	N 39 21 17.01 W	81 1 42.74	6.78
	14375.00	90.62	316.08	6249.16	5150.06	8082.12	6740.21	-4459.89	1.05	0.91	0.53	315053.24	1567720.99	N 39 21 17.67 W	81 1 43.59	6.79
	14471.00	90.82	316.68	6247.95	5148.85	8176.66	6809.70	-4526.12	0.66	0.21	0.63	315122.73	1567654.77	N 39 21 18.35 W	81 1 44.45	6.80
Final Survey 13-Mar-14 PTB	14506.00	90.41	317.24	6246.93	5147.83	8210.37	6879.13	-4560.95	0.73	-0.43	0.59	315192.15	1567589.94	N 39 21 19.02 W	81 1 45.29	6.81
	14664.00	90.41	317.24	6246.23	5147.13	8367.13	6951.08	-4657.48	0.00	0.00	0.00	315264.10	1567523.41	N 39 21 19.72 W	81 1 46.15	6.82

Survey Type: Def Survey

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma

Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	1	0.000	26.000	Act Stns	30.000	30.000	SLB_INC_ONLY<10-Depth Only	Original Borehole / Noble Energy PEN2FHS INC ONLY+MWD 0ft to14664ft MD
	1	26.000	715.000	1/98.425	30.000	30.000	SLB_INC_ONLY<10	Original Borehole / Noble Energy PEN2FHS INC ONLY+MWD 0ft
	1	715.000	809.000	Act Stns	30.000	30.000	SLB_INC_ONLY<10	Original Borehole / Noble Energy PEN2FHS INC ONLY+MWD 0ft
	1	809.000	14506.000	Act Stns	30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy PEN2FHS INC ONLY+MWD 0ft
	1	14506.000	14664.000	Act Stns	30.000	30.000	SLB_BLIND+TREND	Original Borehole / Noble Energy PEN2FHS INC ONLY+MWD 0ft

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PATHFINDER
A Schlumberger Company

Noble Energy

noble energy

Borehole:	Well:	Field:	Structure:
Original Borehole	PEN2FHS	WV Ritchie County (NAD27)	Nomac 78

Gravity & Magnetic Parameters					Surface Location	NAD27 West Virginia State Plane, Northern Zone, US Feet				Miscellaneous			
Model:	HDGM 2013	Dip:	66.856°	Date:	22-Feb-2014	Lat:	N 39 20 11.81	Northing:	308313.361ftUS	Grid Conv:	-0.9647°	Slot:	PEN2FHS	TVD Ref:	KB(1099.1ft above MSL)
MagDec:	-7.855°	FS:	52254.66nT	Gravity FS:	999.309mgn (9.80665 Based)	Lon:	W 81 0 45.38	Easting:	1572180.669ftUS	Scale Fact:	0.99995343	Plan:	Noble Energy PEN2FHS INC ONLY+MWD 0ft to14664ft MD		

Critical Points

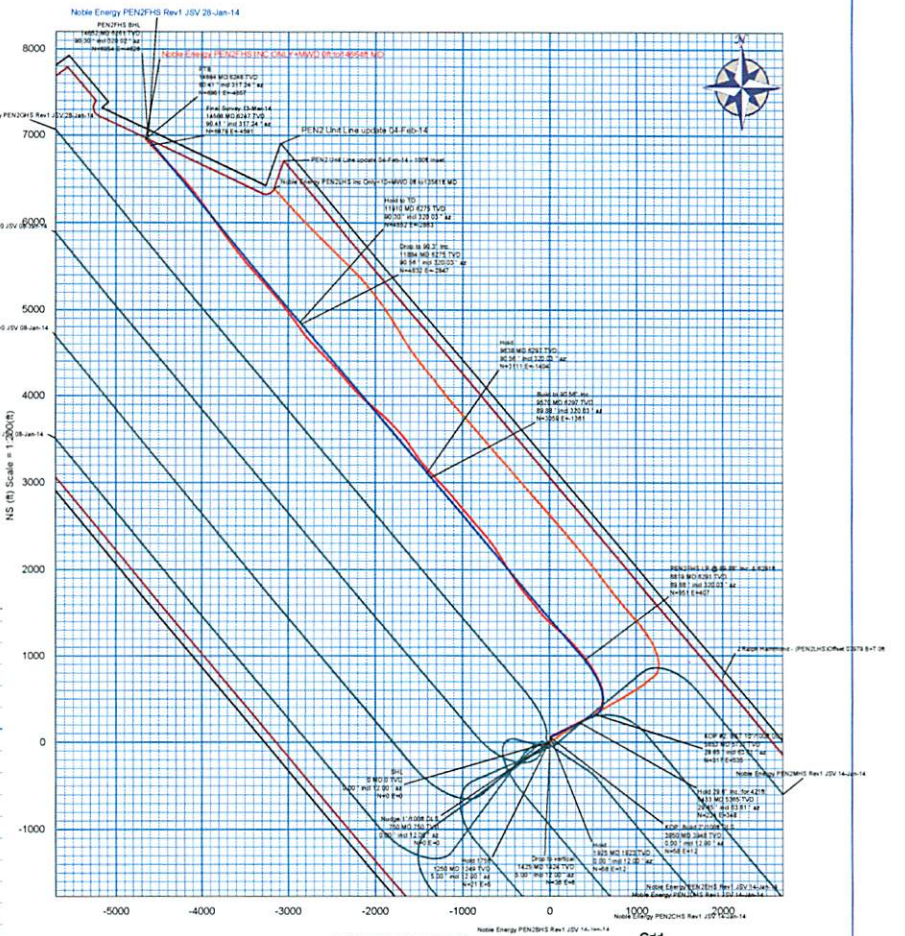
Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Final Survey 13-Mar-14	14566.00	90.41	317.24	8246.93	8270.37	6879.13	-4590.95	0.73
PTB	14664.00	90.41	317.24	8246.23	8367.13	6951.08	-4657.48	0.00

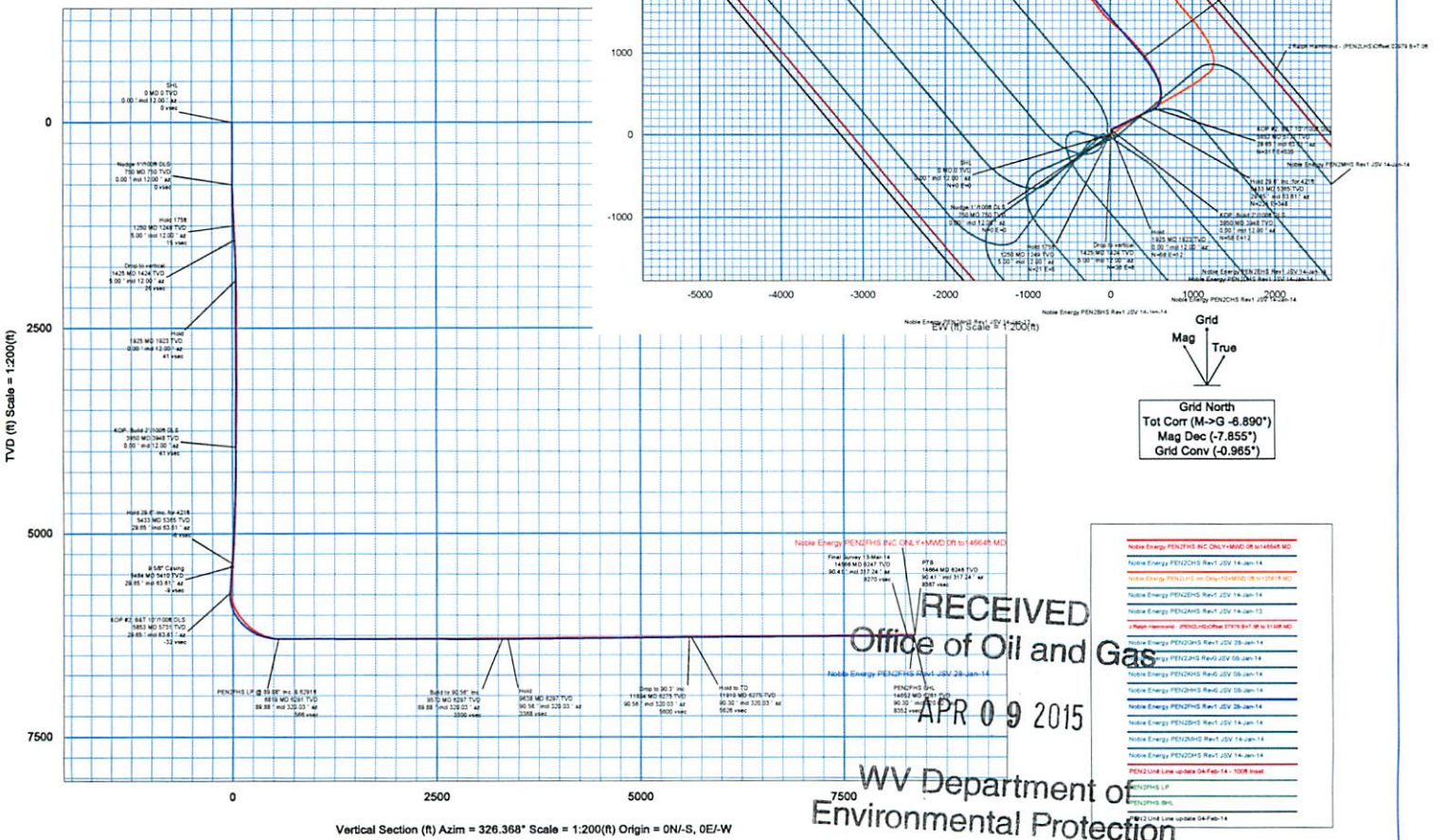
PART	Seq.	Survey Tool/ Survey Tool Code	Vendor/Tool	Hole Size (in)	Casing Size (in)	MD From (ft)	MD To (ft)	Survey Frequency (ft)	ECU Size (Semi Major) (ft)	ECU Size (Semi Minor) (ft)	Comments/ Contingency
1	1	SLB_INC_ONLY+10-Depth Only		30	30	0	26	Act Stns	1.25	1.25	
1	2	SLB_INC_ONLY+10		30	30	26	715	168.425	8.22	8.22	
1	3	SLB_INC_ONLY+10		30	30	715	809	Act Stns	9.96	9.96	
1	4	SLB_MWD-STD		30	30	809	14566	Act Stns	235.27	23.7	
1	5	SLB_BLIND+TREND		30	30	14566	14664	Act Stns	260.36	27.61	

Surface Location

Northing: 308313.361 Easting: 1572180.669 Latitude: N 39 20 11.81 Longitude: W 81 0 45.38 VSec Azimuth: 326.368

Target Description			Grid Coord						Local Coord	
Target Name	Shape	Dimension	Latitude	Longitude	Northing	Easting	TVD	VSec	N(+)/S(-)	E(+)/W(-)
PEN2 Unit Line update 04-Feb-14 - 100ft Inset	Polyline	N/A	N 39 20 11.34	W 81 0 46.23	308268.94	1572113.09	1099.10	-1.22	-46.42	-67.58
PEN2 Unit Line update 04-Feb-14	Polyline	N/A	N 39 20 11.34	W 81 0 46.23	308268.94	1572113.09	1099.10	-1.22	-46.42	-67.58
PEN2FHS LP	Point	N/A	N 39 20 21.27	W 81 0 40.41	309263.99	1572587.40	8314.00	566.26	950.68	406.75
PEN2FHS BHL	Point	N/A	N 39 21 19.75	W 81 1 45.75	315266.63	1567555.28	8314.00	8351.58	6953.61	-4625.61





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Well is located on topo map 13,946' feet south of Latitude: 39°22'30"

AS DRILLED PLAT

Well is located on topo map 3,526' feet west of Longitude: 81°00'00"

LEGEND

- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED
- (0) – LEASE NUMBER
- MINERAL TRACT BOUNDARY
- PARCEL LINES
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE
- AS DRILLED

EXISTING WELLS

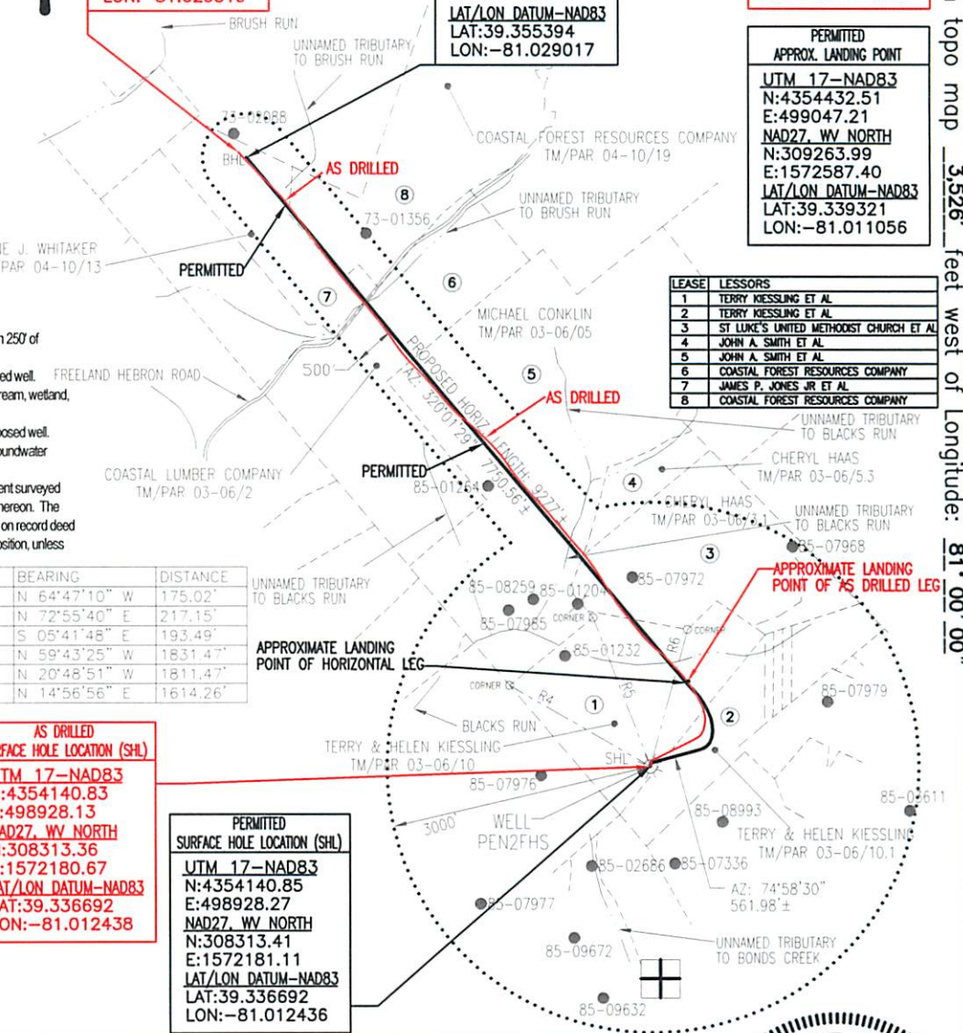
- EXISTING WELLS
- PLUGGED WELLS

AS DRILLED BOTTOM HOLE LOCATION (BHL)
UTM 17–NAD83
N:4356234.66
E:497473.95
NAD27, WV NORTH
N:315264.10
E:1567523.41
LAT/LON DATUM–NAD83
LAT:39.355556
LON:–81.029319

PERMITTED BOTTOM HOLE LOCATION (BHL)
UTM 17–NAD83
N:4356216.61
E:497500.02
NAD27, WV NORTH
N:315203.41
E:1567608.00
LAT/LON DATUM–NAD83
LAT:39.355394
LON:–81.029017

AS DRILLED APPROX. LANDING POINT
UTM 17–NAD83
N:4354437.43
E:499049.93
NAD27, WV NORTH
N:309279.99
E:1572596.61
LAT/LON DATUM–NAD83
LAT:39.339365
LON:–81.011025

PERMITTED APPROX. LANDING POINT
UTM 17–NAD83
N:4354432.51
E:499047.21
NAD27, WV NORTH
N:309263.99
E:1572587.40
LAT/LON DATUM–NAD83
LAT:39.339321
LON:–81.011056

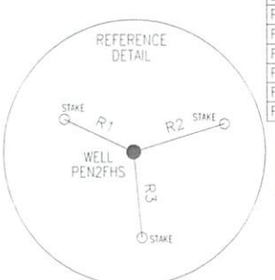


LEASE	LESSORS
1	TERRY KIESSLING ET AL
2	TERRY KIESSLING ET AL
3	ST LUKE'S UNITED METHODIST CHURCH ET AL
4	JOHN A. SMITH ET AL
5	JOHN A. SMITH ET AL
6	COASTAL FOREST RESOURCES COMPANY
7	JAMES P. JONES JR ET AL
8	COASTAL FOREST RESOURCES COMPANY

NOTES:

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

LINE	BEARING	DISTANCE
R1	N 64°47'10" W	175.02'
R2	N 72°55'40" E	217.15'
R3	S 05°41'48" E	193.49'
R4	N 59°43'25" W	1831.47'
R5	N 20°48'51" W	1811.47'
R6	N 14°56'56" E	1614.26'



AS DRILLED SURFACE HOLE LOCATION (SHL)
UTM 17–NAD83
N:4354140.83
E:498928.13
NAD27, WV NORTH
N:308313.36
E:1572180.67
LAT/LON DATUM–NAD83
LAT:39.336692
LON:–81.012438

PERMITTED SURFACE HOLE LOCATION (SHL)
UTM 17–NAD83
N:4354140.85
E:498928.27
NAD27, WV NORTH
N:308313.41
E:1572181.11
LAT/LON DATUM–NAD83
LAT:39.336692
LON:–81.012436

Blue Mountain Inc.
10125 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662–6486

FILE #: PEN2FHS–AS DRILLED

DRAWING #: PEN2FHS–AS DRILLED

SCALE: 1" = 2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

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

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

Signed: George D. Six

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

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GEORGE D. SIX LICENSED No. 2000 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

PLACE SEAL HERE

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

WV Department of Environmental Protection

DATE: FEBRUARY 16, 2015

OPERATOR'S WELL #: PEN2FHS–AS DRILLED

API WELL #: 47 (STATE) 85 (COUNTY) 10071 (PERMIT)

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep ☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: NORTH FORK HUGHES RIVER ELEVATION: 1084'±

COUNTY/DISTRICT: RITCHIE / CLAY QUADRANGLE: ELLENBORO, WV 7.5'

SURFACE OWNER: TERRY & HELEN KIESSLING ACREAGE: 79.242±

OIL & GAS ROYALTY OWNER: TERRY KIESSLING ET AL ACREAGE: 694.583±

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☐

PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐

CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,314'± TMD: 14,783'±

WELL OPERATOR NOBLE ENERGY, INC. DESIGNATED AGENT STEVEN M. GREEN

Address 333 TECHNOLOGY DRIVE, SUITE 116 Address 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590

City CANONSBURG State PA Zip Code 15317 City CHARLESTON State WV Zip Code 25301

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

API 47 - 085 - 10072 County Ritche District Clay
Quad Pennsboro Pad Name PEN 2 Field/Pool Name NA
Farm name Terry & Helen Kiessling Well Number PEN 2 GHS
Operator (as registered with the OOG) Noble Energy, Inc.
Address 1000 Noble Energy Drive City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4354138.67 Easting 498922.63
Landing Point of Curve Northing 4354335.13 Easting 498831.00
Bottom Hole Northing 4356384.60 Easting 497041.55

Elevation (ft) 1074.85 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

Drilling 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 10/30/2013 Date drilling commenced 01/09/2014 Date drilling ceased 03/31/2014
Date completion activities began 10/25/2014 Date completion activities ceased 2/20/2015
Verbal plugging (Y/N) N Date permission granted ____ Granted by ____

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

Freshwater depth(s) ft 454 Open mine(s) (Y/N) depths none
Salt water depth(s) ft None noted for Offsets Void(s) encountered (Y/N) depths none
Coal depth(s) ft no coal Cavern(s) encountered (Y/N) depths none
Is coal being mined in area (Y/N) N

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Reviewed by:
W.A.S 04/01/15
A.L. 5/26/15

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API 47- 085 - 10072 Farm name Terry & Helen Kiessling Well number PEN 2 GHS

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	36	30	40				
Surface	17 1/2	13 3/8	599.2	N	J-55 54.5#		Y
Coal							
Intermediate 1	12 3/8	9 5/8	5,410.0	N	K-55 36#		Y
Intermediate 2							
Intermediate 3							
Production	8 3/4	5 1/2	15,573.3	N	P-110 20#		Y
Tubing							
Packer type and depth set							

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor							
Surface	TYPE 1	532	15.6	1.20	115	0	8
Coal							
Intermediate 1	Class A	Lead 925 Tail 292	Lead 12.0 Tail 15.6	Lead 1.93 Tail 1.19	Lead 201 Tail 207	0	8
Intermediate 2							
Intermediate 3							
Production	Class A	Lead 400 Tail 1891	Lead 12.3 Tail 14.8	Lead 1.61 Tail 1.37	Lead 167 Tail 208	5324	8
Tubing							

Drillers TD (ft) 15,588 Loggers TD (ft) 15,504

Deepest formation penetrated Marcellus Plug back to (ft) Not a Pilot Hole

Plug back procedure Not a Pilot Hole

Kick off depth (ft) 6,940

Check all wireline logs run ☐ caliper ☐ density ☐ deviated/directional ☐ induction ☐ neutron ☐ resistivity ■ gamma ray ☐ temperature ☐ sonic

Well cored ☐ Yes ☐ No ☐ Conventional ☐ Sidewall Were cuttings collected ■ Yes ☐ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING Conductor - No centralizers used. Fresh Water/Surface- Surface - 5 centralizers used, one every third joint Intermediate - 66 centralizers - bow spring centralizers on every joint to KOP, on every third joint from KOP to 100' from surface. Production - 266 centralizers - rigid bow spring every third joint from KOP to TOC, rigid bow spring every joint to KOP.

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 085 - 10072 Farm name Terry & Helen Kiessling Well number PEN 2 GHS

PERFORATION RECORD

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

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	SEE ATTACHED STIMULATION							
	INFORMATION PER STAGE							
	RECORD							

Please insert additional pages as applicable.

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Perforation Record

API: 47-085-10072 Farm name: TERRY & HELEN KIESSLING Well Name: PEN-2-G-HS

Stage No.	Stim Date	Top Perf	Bottom Perf	# of Perfs	Formation
Trigger Toe	10/25/2014	15,443	15,446	-	Marcellus
1	10/26/2014	15,193	15,431	60	Marcellus
2	10/27/2014	14,900	15,138	60	Marcellus
3	10/28/2014	14,607	14,845	60	Marcellus
4	10/29/2014	14,314	14,552	60	Marcellus
5	10/31/2014	14,021	14,259	60	Marcellus
6	11/1/2014	13,728	13,966	60	Marcellus
7	11/2/2014	13,435	13,673	60	Marcellus
8	11/4/2014	13,142	13,380	60	Marcellus
9	11/5/2014	12,849	13,087	60	Marcellus
10	11/6/2014	12,556	12,794	60	Marcellus
11	11/7/2014	12,263	12,501	60	Marcellus
11 Inj Test	11/8/2014	-	-	-	Marcellus
11B (Reperf)	11/12/2014	12,292	12,396	36	Marcellus
12	11/18/2014	11,970	12,208	60	Marcellus
13	11/18/2014	11,677	11,915	60	Marcellus
14	11/18/2014	11,384	11,622	60	Marcellus
15	11/19/2014	11,091	11,329	60	Marcellus
16	11/19/2014	10,798	11,036	60	Marcellus
17	11/19/2014	10,505	10,743	60	Marcellus
18	11/20/2014	10,212	10,450	60	Marcellus
19	11/20/2014	9,919	10,157	60	Marcellus
20	11/20/2014	9,626	9,864	60	Marcellus
21	11/21/2014	9,333	9,571	60	Marcellus
22	11/21/2014	9,040	9,278	60	Marcellus
23	11/22/2014	8,747	8,985	60	Marcellus
24	11/22/2014	8,454	8,692	60	Marcellus
25	11/22/2014	8,161	8,399	60	Marcellus
26	11/22/2014	7,868	8,106	60	Marcellus
27	11/23/2014	7,575	7,813	60	Marcellus
28	11/23/2014	7,282	7,520	60	Marcellus
29	11/23/2014	6,989	7,227	60	Marcellus
30	11/24/2014	6,696	6,934	60	Marcellus
31	11/25/2014	6,403	6,641	60	Marcellus

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STIMULATION INFORMATION PER STAGE

API: 47-085-10072 Farm name: TERRY & HELEN KIESSLING Well Name: PEN-2 -G-HS

Stage No.	Stim Date	Avg Rate (bpm)	ATP (psi)	Max BD Pressure	ISIP (psi)	Proppant (lbs)	Water (BBLS)	Amount of N^2/ other (units)
Trigger Toe	10/25/2014	-	-	9,527	-	-	201	
1	10/26/2014	88.0	7,357	-	5,317	607,000	14,542	
2	10/27/2014	85.6	7,605	5,827	4,930	602,400	14,128	
3	10/28/2014	85.0	7,734	5,447	5,214	601,900	14,410	
4	10/29/2014	84.7	7,311	6,151	2,707	596,800	12,791	
5	10/31/2014	85.0	7,648	5,929	2,829	598,500	12,634	
6	11/1/2014	86.9	7,798	5,865	2,886	600,800	14,289	
7	11/2/2014	86.9	7,673	5,851	3,440	600,050	12,599	
8	11/4/2014	83.9	7,706	5,862	3,033	603,250	14,364	
9	11/5/2014	85.5	7,830	6,080	3,330	598,250	11,826	
10	11/6/2014	89.5	7,892	5,268	3,211	601,950	12,711	
11	11/7/2014	50.0	8,017	5,744	6,065	432,550	11,430	
11 Inj Test	11/8/2014	13.8	7,552	-	5,307	-	1,254	
11B (Reperf)	11/12/2014	39.6	8,667	6,677	4,452	158,000	14,615	
12	11/18/2014	85.0	7,981	5,347	3,430	600,500	12,599	
13	11/18/2014	86.8	7,846	7,138	3,644	600,550	12,575	
14	11/18/2014	83.3	7,372	6,702	3,555	599,700	12,562	
15	11/19/2014	88.9	7,701	6,298	3,269	600,750	12,544	
16	11/19/2014	90.7	7,742	5,422	3,887	601,450	12,539	
17	11/19/2014	80.0	6,771	6,187	3,405	602,100	12,549	
18	11/20/2014	89.9	7,098	6,266	4,942	599,700	12,541	
19	11/20/2014	90.5	7,440	5,783	3,237	601,050	12,468	
20	11/20/2014	91.0	7,248	5,626	4,656	602,400	12,593	
21	11/21/2014	90.3	7,647	5,296	4,424	573,150	12,284	
22	11/21/2014	80.3	7,040	5,211	3,476	629,430	13,794	
23	11/22/2014	90.6	7,430	5,397	3,462	601,925	12,510	
24	11/22/2014	90.0	7,408	6,166	3,644	599,000	12,298	
25	11/22/2014	89.0	7,102	5,046	3,569	601,126	12,275	
26	11/22/2014	90.5	7,317	6,262	3,859	597,000	12,355	
27	11/23/2014	90.8	7,025	6,416	3,970	602,350	12,342	
28	11/23/2014	91.0	6,971	6,373	3,848	601,160	12,190	
29	11/23/2014	89.7	7,146	5,733	3,573	600,159	12,253	
30	11/24/2014	84.6	6,888	7,060	3,204	603,084	12,127	
31	11/25/2014	88.4	6,823	5,847	3,022	601,264	12,352	

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API 47- 085 - 10072 Farm name Terry & Helen Kiessling Well number PEN 2 FHS

PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6,217 TVD	15,588 MD	

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ☐ Open Flow OIL TEST ☐ Flow ☐ Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW Gas 3358 mcfpd Oil 86 bpd NGL 460 bpd Water 902 bpd GAS MEASURED BY ☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		
	SEE ATTACHED FORMATION SHEET				

Please insert additional pages as applicable.

Drilling Contractor NOMAC
Address 171 Locust Avenue Ext. City Mt. Morris State PA Zip 15349

Logging Company _____
Address _____ City _____ State _____ Zip _____

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

Stimulating Company U. S Well Service
Address 533 Industrial Park Drive City Jane Lew State WV Zip 26378
Please insert additional pages as applicable.

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Completed by Regina A. Logue Telephone 724-820-3559
Signature Regina A. Logue Title Regulatory Analyst Date 4/6/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

PEN 2 GHS 47-085-10072

Formations	Top TVD	Base TVD	Top MD	Base MD	Fluid
Shale and Sandstone	0	1309	0	1309	
Sandstone	1309	1433	1309	1423	
Shale and Sandstone	1423	1593	1423	1593	
Sandstone	1593	1635	1593	1635	
Shale and Sandstone	1635	1737	1635	1737	
Maxton Sand	1737	1820	1737	1820	
Shale and Sandstone	1820	1943	1820	1943	
Big Lime	1943	1998	1943	1998	
Big Injun	1998	2133	1998	2133	
Price	2133	2405	2133	2405	
Weir	2405	2444	2405	2444	
Shale	2444	2724	2444	2724	
Gordon	2724	2741	2724	6301	
Shale and Sandstone	2741	2921	2741	6302	
5th Sand	2921	2933	2921	6371	
Shale	2933	3076	2933	not encountered	
Sandstone	3076	3090	3076	not encountered	
Shale	3090	3498	3090	not encountered	
Warren	3498	3560	3500	6300	
Shale	3560	3894	3562	6301	
Sandstone	3894	3931	3900	6302	
Shale and Sandstone	3931	4925	3937	6371	
Benson	4925	4987	4941	not encountered	
Shale	4987	5147	5004	not encountered	
Alexander	5147	5215	5166	not encountered	
Shale	5215	5725	5234	not encountered	
Rheinstreet	5725	6051	5750	not encountered	
Cashaqua	6051	6143	6080	not encountered	
Middlesex	6143	6172	6176	not encountered	
West River	6172	6216	6206	not encountered	
Burkett	6216	6259	6253	not encountered	
Tully Limestone	6259	6260	6300	not encountered	
Hamilton	6260	6261	6301	6302	Gas
Marcellus	6261	6320	6302	6371	
Onondaga	6320		6371	not encountered	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	10/25/2014
Job End Date:	11/25/2014
State:	West Virginia
County:	Ritchie
API Number:	47-085-10072-00-00
Operator Name:	Noble Energy, Inc.
Well Name and Number:	Pen 2 G
Longitude:	-81.01266900
Latitude:	39.33659400
Datum:	NAD27
Federal/Tribal Well:	NO
True Vertical Depth:	6,217
Total Base Water Volume (gal):	17,284,848
Total Base Non Water Volume:	922,848

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

INTERSTATE Oil & Gas COMPACT COMMISSION

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	Noble Energy	Base Fluid					
			Water	7732-18-5	100.00000	88.26722	
40/70 Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	7.94806	
100 Mesh Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	3.45263	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.15623	
			Hydrogen Chloride	7647-01-0	18.00000	0.03732	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			Water	7732-18-5	40.00000	0.01912	
			Anionic Polyacrylamide	Proprietary	40.00000	0.01912	
			Petroleum Distillates	64742-47-8	40.00000	0.01539	
			Crystalline Salt	12125-02-9	5.00000	0.00239	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00239	
WFRA-405e	U.S. Well Services, LLC	Friction Reducer					
			Anionic Polyacrylamide	Proprietary	40.00000	0.01221	

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			Water	7732-18-5	40.00000	0.01221	
			Sodium Chloride	7647-14-5	20.00000	0.00611	
			Petroleum Distillates	64742-47-8	20.00000	0.00491	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00153	
SI-1100	U.S. Well Services, LLC	Scale Inhibitor					
			Di Water	7732-18-5	80.00000	0.01061	
			Ethylene Glycol	107-21-1	40.00000	0.00600	
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00179	
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00171	
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00166	
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00157	
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00153	
			Acrylic polymer	52255-49-9	5.00000	0.00066	
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00583	
			Deionized Water	7732-18-5	28.00000	0.00333	
LGC-15	U.S. Well Services, LLC	Gelling Agents					
			Guar Gum	9000-30-0	50.00000	0.00292	
			Petroleum Distillates	64742-47-8	60.00000	0.00277	
			Suspending agent (solid)	14808-60-7	3.00000	0.00045	
			Surfactant	68439-51-0	3.00000	0.00018	
WFRA-2100	U.S. Well Services, LLC	Friction Reducer					
			Di Water	7732-18-5	60.00000	0.00078	
			Hydrotreated light distillate (petroleum)	64742-47-8	30.00000	0.00032	
			2-Propenoic acid, polymer with 2-propenamide	9003-06-9	30.00000	0.00005	
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Diethylene Glycol	111-46-6	30.00000	0.00024	
			Methenamine	100-97-0	20.00000	0.00019	
			Hydrogen Chloride	7647-01-0	10.00000	0.00008	
			Polyethylene polyamine	68603-67-8	10.00000	0.00007	
			Coco amine	61791-14-8	5.00000	0.00003	
ICA-800	U.S. Well Services, LLC	Iron Control Additive					
			Erythorbic Acid	89-65-6	100.00000	0.00021	
pH-15L	U.S. Well Services, LLC	pH Buffer					
			Sodium Hydroxide	1310-73-2	25.00000	0.00011	

AP One	U.S. Well Services, LLC	Gel Breakers					
			Ammonium Persulfate	7727-54-0	100.00000	0.00007	

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.

* 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)

PATHFINDER
A Schlumberger Company

noble energy

Noble Energy PEN2GHS Surveys 0ft to 15588ft MD Survey Geodetic Report

(Def Survey)

Report Date:	March 31, 2014 - 08:58 AM	**Survey / DLS Computation:**	Minimum Curvature / Lubinski
Client:	Noble Energy	**Vertical Section Azimuth:**	321.116 ° (Grid North)
Field:	WV Ritchie County (NAD27)	**Vertical Section Origin:**	0.000 ft, 0.000 ft
Structure / Slot:	Noble Energy PEN2 Pad / PEN2GHS	**TVD Reference Datum:**	KB
Well:	PEN2GHS	**TVD Reference Elevation:**	1101.830 ft above MSL
Borehole:	Original Borehole	**Seabed / Ground Elevation:**	1075.830 ft above MSL
UWI / API#:	Unknown / Unknown	**Magnetic Declination:**	-7.857 °
Survey Name:	Noble Energy PEN2GHS Surveys 0ft to 15588ft MD	**Total Gravity Field Strength:**	999.3085mgn (9.80665 Based)
Survey Date:	March 14, 2014	**Gravity Model:**	GARM
Tort / AHD / DDI / ERD Ratio:	218.671 ° / 9708.159 ft / 6.722 / 1.545	**Total Magnetic Field Strength:**	52247.335 nT
Coordinate Reference System:	NAD27 West Virginia State Plane, Northern Zone, US Feet	**Magnetic Dip Angle:**	66.850 °
Location Lat / Long:	N 39° 20' 11.74000", W 81° 0' 45.61000"	**Declination Date:**	March 14, 2014
Location Grid N/E Y/X:	N 308306.584 ftUS, E 1572162.482 ftUS	**Magnetic Declination Model:**	HDGM 2013
CRS Grid Convergence Angle:	-0.9647 °	**North Reference:**	Grid North
Grid Scale Factor:	0.99995343	**Grid Convergence Used:**	-0.9647 °
Version / Patch:	2.7.1043.0	**Total Corr Mag North->Grid North:**	-6.8925 °
		Local Coord Referenced To:	Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
SHL	0.00	0.00	0.00	0.00	-1101.83	0.00	0.00	0.00	N/A	N/A	N/A	308306.58	1572162.48	N 39 20 11.74	W 81 0 45.61
	693.00	1.55	168.38	692.92	-408.91	-8.33	-9.18	1.89	0.22	0.22	0.00	308297.40	1572164.37	N 39 20 11.65	W 81 0 45.58
	783.00	0.11	175.30	782.90	-318.93	-9.49	-10.46	2.14	1.60	-1.60	7.69	308296.12	1572164.62	N 39 20 11.64	W 81 0 45.58
	879.00	2.42	347.88	878.88	-222.95	-7.75	-8.57	1.72	2.63	2.41	179.77	308298.01	1572164.20	N 39 20 11.66	W 81 0 45.59
	974.00	4.30	344.73	973.71	-128.12	-2.70	-3.17	0.36	1.99	1.98	-3.32	308303.41	1572162.84	N 39 20 11.71	W 81 0 45.60
	1068.00	5.60	344.23	1067.36	-34.47	4.75	4.64	-1.81	1.38	1.38	-0.53	308311.23	1572160.67	N 39 20 11.79	W 81 0 45.63
	1163.00	5.95	342.22	1161.87	60.04	13.61	13.79	-4.58	0.43	0.37	-2.12	308320.37	1572157.91	N 39 20 11.88	W 81 0 45.67
	1258.00	6.21	336.95	1256.34	154.51	23.14	23.21	-8.09	0.65	0.27	-5.55	308329.79	1572154.39	N 39 20 11.97	W 81 0 45.72
	1354.00	5.74	329.41	1351.82	249.99	32.89	32.12	-12.57	0.95	-0.49	-7.85	308338.70	1572149.92	N 39 20 12.06	W 81 0 45.78
	1450.00	3.93	329.86	1447.47	345.64	40.89	39.10	-16.66	1.89	-1.89	0.47	308345.68	1572145.82	N 39 20 12.12	W 81 0 45.83
	1546.00	2.55	321.41	1543.32	441.49	46.28	43.61	-19.65	1.52	-1.44	-8.80	308350.19	1572142.84	N 39 20 12.17	W 81 0 45.87
	1642.00	1.30	304.94	1639.26	537.43	49.46	45.90	-21.87	1.41	-1.30	-17.16	308352.49	1572140.61	N 39 20 12.19	W 81 0 45.90
	1737.00	0.75	295.78	1734.25	632.42	51.06	46.79	-23.31	0.60	-0.58	-9.64	308353.37	1572139.17	N 39 20 12.20	W 81 0 45.92
	1832.00	0.58	318.07	1829.24	727.41	52.10	47.42	-24.20	0.32	-0.18	23.46	308354.00	1572138.29	N 39 20 12.20	W 81 0 45.93
	1928.00	0.19	96.45	1925.24	823.41	52.47	47.76	-24.36	0.76	-0.41	144.15	308354.34	1572138.12	N 39 20 12.21	W 81 0 45.93
	2023.00	0.42	93.77	2020.24	918.41	52.12	47.72	-23.86	0.24	0.24	-2.82	308354.30	1572138.63	N 39 20 12.21	W 81 0 45.92
	2119.00	0.91	96.81	2116.23	1014.40	51.34	47.61	-22.75	0.51	0.51	3.17	308354.19	1572139.73	N 39 20 12.21	W 81 0 45.91
	2214.00	0.45	129.71	2211.23	1109.40	50.44	47.28	-21.71	0.62	-0.48	34.63	308353.86	1572140.77	N 39 20 12.20	W 81 0 45.90
	2310.00	0.46	211.57	2307.22	1205.39	49.94	46.71	-21.63	0.62	0.01	85.27	308353.29	1572140.86	N 39 20 12.20	W 81 0 45.90
	2405.00	0.92	225.99	2402.22	1300.39	49.74	45.86	-22.37	0.51	0.48	15.18	308352.44	1572140.11	N 39 20 12.19	W 81 0 45.90
	2500.00	0.45	257.60	2497.21	1395.38	49.84	45.25	-23.29	0.62	-0.49	33.27	308351.83	1572139.20	N 39 20 12.18	W 81 0 45.92
	2596.00	0.36	297.22	2593.21	1491.38	50.28	45.30	-23.92	0.30	-0.09	41.27	308351.89	1572138.56	N 39 20 12.18	W 81 0 45.92
	2692.00	0.74	321.80	2689.20	1587.37	51.18	45.93	-24.57	0.46	0.40	25.60	308352.51	1572137.91	N 39 20 12.19	W 81 0 45.93
	2787.00	0.55	352.92	2784.20	1682.37	52.18	46.86	-25.01	0.41	-0.20	32.76	308353.45	1572137.47	N 39 20 12.20	W 81 0 45.94
	2881.00	0.63	18.83	2878.19	1776.36	52.84	47.80	-24.90	0.29	0.09	27.56	308354.38	1572137.58	N 39 20 12.21	W 81 0 45.94
	2976.00	0.79	14.32	2973.19	1871.36	53.51	48.93	-24.57	0.18	0.17	-4.75	308355.51	1572137.91	N 39 20 12.22	W 81 0 45.93
	3071.00	0.94	10.81	3068.17	1966.34	54.41	50.33	-24.26	0.17	0.16	-3.69	308356.91	1572138.22	N 39 20 12.23	W 81 0 45.93
	3167.00	0.42	54.73	3164.17	2062.34	54.89	51.31	-23.83	0.73	-0.54	45.75	308357.89	1572138.66	N 39 20 12.24	W 81 0 45.92
	3262.00	0.51	109.59	3259.17	2157.34	54.51	51.37	-23.14	0.46	0.09	57.75	308357.95	1572139.34	N 39 20 12.24	W 81 0 45.92
	3358.00	0.77	126.67	3355.16	2253.33	53.52	50.84	-22.22	0.33	0.27	17.79	308357.42	1572140.26	N 39 20 12.24	W 81 0 45.90
	3454.00	0.52	182.10	3451.15	2349.32	52.57	50.02	-21.72	0.67	-0.26	57.74	308356.60	1572140.76	N 39 20 12.23	W 81 0 45.90
	3549.00	0.84	230.46	3546.15	2444.32	52.24	49.14	-22.27	0.66	0.34	50.91	308355.72	1572140.21	N 39 20 12.22	W 81 0 45.90
	3645.00	0.24	154.45	3642.14	2540.31	52.03	48.51	-22.73	0.85	-0.63	-79.18	308355.09	1572139.75	N 39 20 12.22	W 81 0 45.91
	3740.00	0.44	116.97	3737.14	2635.31	51.51	48.17	-22.32	0.30	0.21	-39.45	308354.75	1572140.16	N 39 20 12.21	W 81 0 45.90
	3835.00	0.68	123.01	3832.14	2730.31	50.64	47.70	-21.52	0.26	0.25	6.36	308354.28	1572140.96	N 39 20 12.21	W 81 0 45.89
	3930.00	0.22	138.06	3927.13	2825.30	49.92	47.25	-20.93	0.50	-0.48	15.84	308353.83	1572141.56	N 39 20 12.20	W 81 0 45.89
	4026.00	0.22	175.76	4023.13	2921.30	49.58	46.93	-20.79	0.15	0.00	39.27	308353.51	1572141.69	N 39 20 12.20	W 81 0 45.88
	4122.00	0.33	203.93	4119.13	3017.30	49.31	46.50	-20.89	0.18	0.11	29.34	308353.08	1572141.59	N 39 20 12.20	W 81 0 45.89
	4218.00	0.56	296.46	4215.13	3113.30	49.61	46.45	-21.42	0.69	0.24	96.39	308353.03	1572141.06	N 39 20 12.20	W 81 0 45.89
	4313.00	1.07	303.09	4310.12	3208.29	50.87	47.14	-22.58	0.55	0.54	6.98	308353.72	1572139.90	N 39 20 12.20	W 81 0 45.91
	4408.00	0.45	285.78	4405.11	3303.28	52.02	47.73	-23.68	0.69	-0.65	-18.22	308354.31	1572138.80	N 39 20 12.21	W 81 0 45.92
	4503.00	0.34	200.01	4500.11	3398.28	52.18	47.57	-24.14	0.57	-0.12	-90.28	308354.15	1572138.35	N 39 20 12.21	W 81 0 45.93
	4599.00	0.84	168.35	4596.11	3494.28	51.40	46.61	-24.09	0.60	0.52	-32.98	308353.19	1572138.39	N 39 20 12.20	W 81 0 45.93
	4694.00	0.58	166.56	4691.10	3589.27	50.35	45.46	-23.84	0.27	-0.27	-1.88	308352.04	1572138.64	N 39 20 12.19	W 81 0 45.92
	4789.00	0.40	291.85	4786.10	3684.27	50.21	45.11	-24.04	0.92	-0.19	131.88	308351.70	1572138.45	N 39 20 12.18	W 81 0 45.93
	4885.00	1.05	310.99	4882.09	3780.26	51.36	45.82	-25.01	0.71	0.68	19.94	308352.40	1572137.47	N 39 20 12.19	W 81 0 45.94
	4980.00	0.67	296.28	4977.08	3875.25	52.73	46.63	-26.17	0.46	-0.40	-15.48	308353.21	1572136.32	N 39 20 12.20	W 81 0 45.95
	5076.00	0.30	182.46	5073.07	3971.24	53.05	46.63	-26.68	0.87	-0.39	-118.56	308353.21	1572135.80	N 39 20 12.20	W 81 0 45.96
	5171.00	0.38	49.22	5168.07	4066.24	52.87	46.59	-26.45	0.66	0.08	-140.25	308353.17	1572136.03	N 39 20 12.20	W 81 0 45.96
	5267.00	0.79	28.16	5264.07	4162.24	53.14	47.38	-25.90	0.48	0.43	-21.94	308353.96	1572136.58	N 39 20 12.20	W 81 0 45.95
	5362.00	1.18	14.90	5359.06	4257.23	53.97	48.90	-25.34	0.47	0.41	-13.96	308355.48	1572137.14	N 39 20 12.22	W 81 0 45.94
	5471.00	1.25	347.94	5468.03	4366.20	55.70	51.15	-25.30	0.52	0.06	-24.73	308357.73	1572137.19	N 39 20 12.24	W 81 0 45.94
	5567.00	5.72	338.59	5563.83	4462.00	61.20	56.63	-27.26	4.68	4.66	-9.74	308363.21	1572135.22	N 39 20 12.30	W 81 0 45.97
	5614.00	10.98	340.22	5610.32	4508.49	67.66	63.03	-29.64	11.20	11.19	3.47	308369.61	1572132.85	N 39 20 12.36	W 81 0 46.00
	5662.00	13.14	343.22	5657.25	4555.42	77.04	72.55	-32.76	4.68	4.50	6.25	308379.13	1572129.73	N 39 20 12.45	W 81 0 46.04
	5709.00	13.26	341.53	5703.01	4601.18	87.04	82.78	-36.01	0.86	0.26	-3.60	308389.36	1572126.48	N 39 20 12.55	W 81 0 46.09
	5758.00	15.37	349.02	5750.49	4648.66	98.05	94.49	-39.03	5.72	4.31	15.29	308401.07	1572123.46	N 39 20 12.67	W 81 0 46.13
	5805.00	16.07	7.19	5795.76	4693.93	108.07	107.06	-39.40	10.54	1.49	38.66	308413.64	1572123.09	N 39 20 12.79	W 81 0 46.13
	5853.00	18.27	16.20	5841.63	4739.80	118.99	120.88	-36.47	7.18	4.58	18.77	308427.46	1572126.02	N 39 20 12.93	W 81 0 46.10
	5893.00	16.42	357.94	5879.84	4778.01	125.11	132.57	-34.92	14.31	-4.63	-45.65	308439.14	1572127.56	N 39 20 13.04	W 81 0 46.08
	5940.00	17.42	337.77	5924.84	4823.01	137.18	145.73	-37.82	12.61	2.13	-42.91	308452.30	1572124.66	N 39 20 13.17	W 81 0 46.12
	5988.00	22.63	343.67	5969.93	4868.10	152.60	161.25	-43.14	11.63	10.85	12.29	308467.83	1572119.34	N 39 20 13.33	W 81 0 46.19
	6035.00	28.91	344.92	6012.23	4910.40	171.37	180.92	-48.64	13.41	13.36	2.66	308487.50	1572113.84	N 39 20 13.52	W 81 0 46.27
	6084.00	35.64	344.04	6053.64	4951.81	195.38	206.11	-55.66	13.77	13.73	-1.80	308512.69	1572106.82	N 39 20 13.77	W 81 0 46.36
	6131.00	41.93	341.73	6090.26	4988.43	222.72	234.22	-64.36	13.73	13.38	-4.91	308540.79	1572098.13	N 39 20 14.04	W 81 0 46.48
	6179.00	48.53	340.51	6124.04	5022.21	254.73	266.44	-75.40	13.87	13.75	-2.54	308573.01	1572087.09	N 39 20 14.36	W 81 0 46.63
	6226.00	54.38	339.59	6153.32	5051.49	289.49	300.97	-87.95	12.54	12.45	-1.96	308607.54	1572074.54	N 39 20 14.70	W 81 0 46.79
	6274.00	59.18	337.68	6179.61	5077.78	327.77	338.35	-102.59	10.54	10.00	-3.98	308644.91	1572059.90	N 39 20 15.07	W 81 0 46.99
	6322.00	63.82	336.04	6202.51	5100.68	368.36	377.12	-119.17	10.12	9.67	-3.42	308683.68	1572043.32	N 39 20 15.45	W 81 0 47.21
	6369.00	67.59	333.29	6221.85	5120.02	410.00	415.82	-137.51	9.63	8.02	-5.85	308722.38	1572024.98	N 39 20 15.83	W 81 0 47.45
	6417.00	70.93	330.37	6238.84	5137.01	454.10	455.37	-158.71	8.99	6.96	-6.08	308761.93	1572003.78	N 39 20 16.21	W 81 0 47.73
	6465.00	74.21	327.89	6253.22	5151.39	499.44	494.67	-182.21	8.43	6.83	-5.17	308801.23	1571980.29	N 39 20 16.60	W 81 0 48.03
	6513.00	78.13	326.11	6264.69	5162.86	545.79	533.74	-207.59	8.92	8.17	-3.71	308840.30	1571954.90	N 39 20 16.98	W 81 0 48.37
	6560.00	83.98	325.65	6272.00	5170.17	592.04	572.16	-233.62	12.48	12.45	-0.98	308878.72	1571928.87	N 39 20 17.36	W 81 0 48.71
	6608.00	88.52	324.38	6275.14	5173.31	639.81	611.39	-261.08	9.82	9.46	-2.65	308917.95	1571901.42	N 39 20 17.74	W 81 0 49.06
	6656.00	89.24	321.74	6276.08	5174.25	687.77	649.75	-289.92	5.70	1.50	-5.50	308956.30	1571872.58	N 39 20 18.11	W 81 0 49.44
	6706.00	89.38	319.98	6276.68	5174.85	737.76	688.52	-321.47	3.53	0.28	-3.52	308995.07	1571841.02	N 39 20 18.49	W 81 0 49.85
	6750.00	89.73	320.22	6277.02	5175.19	781.75	722.28	-349.70	0.96	0.80	0.55	309028.82	1571812.80	N 39 20 18.82	W 81 0 50.21
	6845.00	89.04	319.96	6278.04	5176.21	876.73	795.14	-410.64	0.78	-0.73	-0.27	309101.69	1571751.86	N 39 20 19.53	W 81 0 51.01
	6940.00	88.90	320.02	6279.75	5177.92	971.70	867.89	-471.71	0.16	-0.15	0.06	309174.43	1571690.79	N 39 20 20.24	W 81 0 51.80
	7036.00	88.97	320.08	6281.53	5179.70	1067.67	941.47	-533.34	0.10	0.07	0.06	309248.01	1571629.16	N 39 20 20.96	W 81 0 52.60
	7131.00	89.79	320.24	6282.56	5180.73	1162.65	1014.41	-594.20	0.88	0.86	0.17	309320.95	1571568.31	N 39 20 21.67	W 81 0 53.39
	7227.00	90.14	320.64	6282.62	5180.79	1258.64	1088.43	-655.34	0.55	0.36	0.42	309394.96	1571507.17	N 39 20 22.39	W 81 0 54.18
	7322.00	89.90	320.42	6282.59	5180.76	1353.63	1161.76	-715.73	0.34	-0.25	-0.23	309468.29	1571446.79	N 39 20 23.10	W 81 0 54.97
	7417.00	90.07	319.32	6282.61	5180.78	1448.61	1234.40	-776.96	1.17	0.18	-1.16	309540.92	1571385.56	N 39 20 23.81	W 81 0 55.76

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	7513.00	89.73	318.56	6282.78	5180.95	1544.54	1306.78	-840.02	0.87	-0.35	-0.79	309613.30	1571322.51	N 39 20 24.51	W 81 0 56.58
	7608.00	90.10	318.90	6282.92	5181.09	1639.46	1378.22	-902.64	0.57	0.39	0.42	309684.73	1571258.88	N 39 20 25.21	W 81 0 57.39
	7704.00	89.79	318.88	6283.01	5181.18	1735.39	1450.58	-965.72	0.33	-0.32	-0.08	309757.09	1571196.80	N 39 20 25.91	W 81 0 58.21
	7799.00	89.63	318.90	6283.33	5181.50	1830.32	1522.16	-1028.19	0.05	0.04	0.02	309828.67	1571134.34	N 39 20 26.61	W 81 0 59.02
	7895.00	90.45	319.36	6283.09	5181.26	1926.26	1594.75	-1091.00	0.80	0.65	0.48	309901.26	1571071.53	N 39 20 27.32	W 81 0 59.84
	7991.00	90.52	319.25	6282.28	5180.45	2022.21	1667.54	-1153.80	0.14	0.07	-0.11	309974.04	1571008.94	N 39 20 28.03	W 81 1 0.65
	8086.00	90.69	319.60	6281.26	5179.45	2117.16	1739.69	-1215.38	0.41	0.18	0.37	310046.19	1570947.16	N 39 20 28.73	W 81 1 1.45
	8182.00	90.78	320.22	6280.06	5178.23	2213.13	1813.13	-1277.20	0.65	0.07	0.65	310119.62	1570885.34	N 39 20 29.44	W 81 1 2.25
	8278.00	90.00	319.43	6279.42	5177.59	2309.10	1886.47	-1339.13	1.14	-0.79	-0.82	310192.97	1570823.41	N 39 20 30.16	W 81 1 3.06
	8373.00	90.17	319.85	6279.28	5177.45	2404.07	1958.86	-1400.65	0.48	0.18	0.44	310265.35	1570761.90	N 39 20 30.86	W 81 1 3.85
	8469.00	90.00	319.89	6279.14	5177.31	2500.05	2032.26	-1462.53	0.18	-0.18	0.04	310338.75	1570700.03	N 39 20 31.58	W 81 1 4.66
	8564.00	89.48	319.22	6279.57	5177.74	2595.01	2104.56	-1524.15	0.89	-0.55	-0.71	310411.04	1570638.40	N 39 20 32.28	W 81 1 5.46
	8660.00	89.48	319.23	6280.44	5178.61	2690.95	2177.26	-1586.85	0.01	0.00	0.01	310483.73	1570575.71	N 39 20 32.99	W 81 1 6.27
	8756.00	89.59	319.35	6281.22	5179.39	2786.90	2250.02	-1649.46	0.17	0.11	0.13	310556.50	1570513.10	N 39 20 33.70	W 81 1 7.08
	8852.00	90.45	320.58	6281.19	5179.36	2882.88	2323.68	-1711.02	1.83	0.90	1.59	310630.16	1570451.55	N 39 20 34.42	W 81 1 7.88
	8947.00	90.38	319.22	6280.50	5178.67	2977.86	2396.51	-1772.02	1.75	-0.07	-1.75	310702.98	1570390.55	N 39 20 35.13	W 81 1 8.67
	9043.00	90.45	320.01	6279.81	5177.98	3073.82	2469.63	-1834.21	0.83	0.07	0.82	310776.09	1570328.36	N 39 20 35.84	W 81 1 9.48
	9138.00	90.55	319.13	6278.98	5177.15	3168.79	2541.94	-1895.82	0.93	0.11	-0.93	310848.40	1570266.75	N 39 20 36.54	W 81 1 10.28
	9234.00	91.03	319.34	6277.65	5175.82	3264.72	2614.64	-1958.50	0.55	0.50	0.22	310921.10	1570204.08	N 39 20 37.25	W 81 1 11.10
	9330.00	90.03	318.01	6276.76	5174.93	3360.63	2686.73	-2021.68	1.73	-1.04	-1.39	310993.18	1570140.70	N 39 20 37.95	W 81 1 11.92
	9425.00	90.14	318.26	6276.62	5174.79	3455.50	2757.48	-2085.29	0.29	0.12	0.26	311063.93	1570077.30	N 39 20 38.64	W 81 1 12.74
	9520.00	89.55	318.22	6276.88	5175.05	3550.38	2828.34	-2148.56	0.62	-0.62	-0.04	311134.79	1570014.03	N 39 20 39.33	W 81 1 13.56
	9615.00	90.62	319.34	6276.74	5174.91	3645.30	2899.80	-2211.15	1.63	1.13	1.18	311206.24	1569951.43	N 39 20 40.03	W 81 1 14.37
	9710.00	89.97	319.55	6276.25	5174.42	3740.26	2971.98	-2272.92	0.72	-0.68	0.22	311278.41	1569889.67	N 39 20 40.73	W 81 1 15.17
	9806.00	90.10	319.55	6276.19	5174.36	3836.22	3045.03	-2335.20	0.14	0.14	0.00	311351.46	1569827.39	N 39 20 41.44	W 81 1 15.98
	9901.00	90.82	321.04	6275.43	5173.60	3931.20	3118.11	-2395.89	1.74	0.76	1.57	311424.54	1569766.71	N 39 20 42.15	W 81 1 16.77
	9997.00	92.13	321.53	6272.96	5171.13	4027.17	3192.99	-2455.91	1.46	1.36	0.51	311499.42	1569706.69	N 39 20 42.88	W 81 1 17.55
	10091.00	91.34	320.68	6270.11	5168.28	4121.13	3266.12	-2514.90	1.23	-0.84	-0.90	311572.54	1569647.70	N 39 20 43.60	W 81 1 18.32
	10186.00	90.55	320.62	6268.55	5166.72	4216.11	3339.57	-2575.13	0.83	-0.83	-0.06	311645.99	1569587.48	N 39 20 44.31	W 81 1 19.10
	10281.00	90.52	320.96	6267.66	5165.83	4311.10	3413.17	-2635.18	0.36	-0.03	0.36	311719.59	1569527.43	N 39 20 45.03	W 81 1 19.88
	10377.00	90.03	321.01	6267.20	5165.37	4407.10	3487.76	-2695.62	0.51	-0.51	0.05	311794.18	1569467.00	N 39 20 45.76	W 81 1 20.66
	10472.00	89.93	320.54	6267.23	5165.40	4502.10	3561.36	-2755.69	0.51	-0.11	-0.49	311867.77	1569406.92	N 39 20 46.47	W 81 1 21.44
	10567.00	90.00	320.49	6267.29	5165.46	4597.09	3634.68	-2816.10	0.09	0.07	-0.05	311941.08	1569346.52	N 39 20 47.19	W 81 1 22.23
	10661.00	89.97	321.02	6267.31	5165.48	4691.09	3707.47	-2875.57	0.56	-0.03	0.56	312013.88	1569287.05	N 39 20 47.90	W 81 1 23.00
	10756.00	90.27	321.55	6267.11	5165.28	4786.09	3781.00	-2934.99	0.64	0.32	0.56	312088.00	1569227.64	N 39 20 48.62	W 81 1 23.77
	10851.00	91.51	321.09	6265.64	5163.81	4881.08	3855.75	-2994.35	1.39	1.31	-0.48	312162.15	1569168.28	N 39 20 49.34	W 81 1 24.55
	10945.00	91.20	320.93	6263.42	5161.59	4975.05	3928.79	-3053.48	0.37	-0.33	-0.17	312235.18	1569109.15	N 39 20 50.06	W 81 1 25.31
	11040.00	90.14	320.67	6262.31	5160.48	5070.04	4002.40	-3113.51	1.15	-1.12	-0.27	312308.79	1569049.12	N 39 20 50.77	W 81 1 26.09
	11135.00	89.69	320.82	6262.45	5160.62	5165.04	4075.97	-3173.63	0.50	-0.47	0.16	312382.35	1568989.01	N 39 20 51.49	W 81 1 26.87
	11231.00	89.93	321.21	6262.76	5160.93	5261.04	4150.59	-3234.02	0.48	0.25	0.41	312456.97	1568928.62	N 39 20 52.22	W 81 1 27.66
	11326.00	90.31	321.40	6262.57	5160.74	5356.04	4224.73	-3293.41	0.45	0.40	0.20	312531.11	1568869.23	N 39 20 52.94	W 81 1 28.43
	11422.00	90.31	321.10	6262.05	5160.22	5452.03	4299.60	-3353.50	0.31	0.00	-0.31	312605.98	1568809.14	N 39 20 53.67	W 81 1 29.21
	11517.00	90.34	320.68	6261.51	5159.68	5547.03	4373.31	-3413.43	0.44	0.03	-0.44	312679.68	1568749.22	N 39 20 54.39	W 81 1 29.99
	11613.00	90.34	321.14	6260.94	5159.11	5643.03	4447.82	-3473.96	0.48	0.00	0.48	312754.19	1568688.69	N 39 20 55.11	W 81 1 30.78
	11708.00	90.41	320.86	6260.32	5158.49	5738.03	4521.65	-3533.74	0.30	0.07	-0.29	312828.01	1568628.91	N 39 20 55.83	W 81 1 31.55
	11803.00	90.31	321.04	6259.72	5157.89	5833.02	4595.43	-3593.59	0.22	-0.11	0.19	312901.79	1568569.07	N 39 20 56.55	W 81 1 32.33
	11899.00	90.21	320.93	6259.28	5157.45	5929.02	4670.01	-3654.02	0.15	-0.10	-0.11	312976.37	1568508.64	N 39 20 57.28	W 81 1 33.12
	11994.00	90.48	320.92	6258.71	5156.88	6024.02	4743.76	-3713.90	0.28	0.28	-0.01	313050.12	1568448.76	N 39 20 58.00	W 81 1 33.90
	12089.00	90.31	319.55	6258.06	5156.23	6119.00	4816.76	-3774.67	1.45	-0.18	-1.44	313123.13	1568388.00	N 39 20 58.71	W 81 1 34.68
	12183.00	90.52	319.85	6257.38	5155.55	6212.97	4888.47	-3835.46	0.39	0.22	0.32	313194.82	1568327.20	N 39 20 59.41	W 81 1 35.47
	12278.00	90.14	319.16	6256.83	5155.00	6307.93	4960.72	-3897.15	0.83	-0.40	-0.73	313267.06	1568265.52	N 39 21 0.11	W 81 1 36.27
	12373.00	90.27	319.03	6256.49	5154.66	6402.87	5032.52	-3959.36	0.19	0.14	-0.14	313338.86	1568203.31	N 39 21 0.81	W 81 1 37.08
	12468.00	90.41	319.65	6255.92	5154.09	6497.83	5104.58	-4021.26	0.67	0.15	0.65	313410.92	1568141.42	N 39 21 1.51	W 81 1 37.89
	12562.00	90.76	319.15	6254.97	5153.14	6591.78	5175.95	-4082.43	0.65	0.37	-0.53	313482.28	1568080.25	N 39 21 2.21	W 81 1 38.68
	12657.00	90.62	319.91	6253.62	5151.99	6686.73	5248.21	-4144.08	0.81	-0.15	0.80	313554.54	1568018.60	N 39 21 2.91	W 81 1 39.48
	12753.00	90.69	319.64	6252.72	5150.89	6782.70	5321.50	-4206.07	0.29	0.07	-0.28	313627.83	1567956.61	N 39 21 3.62	W 81 1 40.28
	12848.00	90.62	319.69	6251.84	5149.81	6877.67	5393.92	-4267.56	0.09	-0.07	0.05	313700.24	1567895.13	N 39 21 4.33	W 81 1 41.08
	12944.00	90.69	319.54	6250.94	5148.71	6973.63	5467.04	-4329.75	0.17	0.07	-0.16	313773.35	1567832.94	N 39 21 5.04	W 81 1 41.89
	13039.00	90.21	319.36	6249.79	5147.56	7068.58	5539.22	-4391.51	0.54	-0.51	-0.19	313845.53	1567771.18	N 39 21 5.75	W 81 1 42.69
	13134.00	89.79	319.35	6249.79	5147.56	7163.54	5611.30	-4453.39	0.44	-0.44	-0.01	313917.61	1567709.30	N 39 21 6.45	W 81 1 43.50
	13230.00	90.17	319.88	6249.83	5148.00	7259.50	5684.42	-4515.59	0.68	0.40	0.55	313990.73	1567647.11	N 39 21 7.16	W 81 1 44.30
	13326.00	91.31	321.99	6248.59	5146.76	7355.49	5758.95	-4576.08	2.50	1.19	2.20	314065.25	1567586.62	N 39 21 7.89	W 81 1 45.09
	13421.00	90.41	319.22	6247.16	5145.33	7450.46	5832.35	-4636.36	3.07	-0.95	-2.92	314138.65	1567526.34	N 39 21 8.60	W 81 1 45.87
	13516.00	90.34	317.86	6246.54	5144.71	7545.36	5903.54	-4699.26	1.43	-0.07	-1.43	314209.84	1567463.45	N 39 21 9.29	W 81 1 46.69
	13611.00	90.79	317.62	6245.60	5143.77	7640.19	5973.84	-4763.14	0.54	0.47	-0.25	314280.14	1567399.57	N 39 21 9.98	W 81 1 47.52
	13707.00	90.79	317.75	6244.28	5142.45	7736.01	6044.83	-4827.78	0.14	0.00	0.14	314351.12	1567334.95	N 39 21 10.67	W 81 1 48.35
	13802.00	90.14	318.64	6243.51	5141.68	7830.88	6115.64	-4891.09	1.16	-0.68	0.94	314421.92	1567271.63	N 39 21 11.36	W 81 1 49.18
	13897.00	91.07	319.22	6242.51	5140.68	7925.81	6187.25	-4953.50	1.15	0.98	0.61	314493.54	1567209.22	N 39 21 12.05	W 81 1 49.99
	13993.00	90.86	318.75	6240.89	5139.06	8021.73	6259.68	-5016.49	0.54	-0.22	-0.49	314565.98	1567146.24	N 39 21 12.76	W 81 1 50.80
	14088.00	90.41	318.47	6239.84	5138.01	8116.63	6330.95	-5079.30	0.56	-0.47	-0.29	314637.22	1567083.43	N 39 21 13.45	W 81 1 51.62
	14183.00	90.72	319.22	6238.90	5137.07	8211.55	6402.47	-5141.81	0.85	0.33	0.79	314708.74	1567020.92	N 39 21 14.15	W 81 1 52.43
	14278.00	89.21	317.32	6238.96	5137.13	8306.43	6473.36	-5205.04	2.55	-1.59	-2.00	314779.63	1566957.69	N 39 21 14.84	W 81 1 53.25
	14374.00	89.97	318.88	6239.64	5137.81	8402.29	6544.81	-5269.15	1.81	0.79	1.63	314851.08	1566893.59	N 39 21 15.53	W 81 1 54.08
	14468.00	89.59	319.76	6240.00	5138.17	8496.24	6616.10	-5330.42	1.02	-0.40	0.94	314922.36	1566832.32	N 39 21 16.23	W 81 1 54.88
	14564.00	89.97	319.73	6240.37	5138.54	8592.21	6689.36	-5392.45	0.40	0.40	-0.03	314995.62	1566770.29	N 39 21 16.94	W 81 1 55.68
	14659.00	90.79	321.33	6239.74	5137.91	8687.20	6762.69	-5452.84	1.89	0.86	1.68	315068.95	1566709.91	N 39 21 17.66	W 81 1 56.47
	14754.00	91.37	321.41	6237.95	5136.12	8782.18	6836.89	-5512.14	0.62	0.61	0.08	315143.14	1566650.61	N 39 21 18.38	W 81 1 57.24
	14849.00	91.44	320.01	6235.62	5133.79	8877.15	6910.39	-5572.28	1.48	0.07	-1.47	315216.64	1566590.48	N 39 21 19.10	W 81 1 58.02
	14943.00	91.31	319.83	6233.37	5131.54	8971.10	6982.30	-5632.78	0.24	-0.14	-0.19	315288.54	1566529.97	N 39 21 19.80	W 81 1 58.80
	15038.00	90.89	318.96	6231.54	5129.71	9066.04	7054.41	-5694.60	1.02	-0.44	-0.92	315360.65	1566468.16	N 39 21 20.50	W 81 1 59.61
	15133.00	90.24	318.04	6230.61	5128.78	9160.94	7125.55	-5757.54	1.19	-0.68	-0.97	315431.79	1566405.22	N 39 21 21.19	W 81 2 0.42
	15228.00	91.17	318.89	6229.44	5127.61	9255.82	7196.66	-5820.53	1.33	0.98	0.89	315502.89	1566342.23	N 39 21 21.88	W 81 2 1.24
	15323.00	91.51	319.15	6227.22	5125.39	9350.73	7268.36	-5882.81	0.45	0.36	0.27	315574.59	1566279.95	N 39 21 22.58	W 81 2 2.05
	15419.00	92.13	320.62	6224.17	5122.34	9446.66	7341.73	-5944.63	1.66	0.65	1.53	315647.96	1566218.14	N 39 21 23.30	W 81 2 2.85
Final Survey	15504.00	92.44	321.61	6220.78	5118.95	9531.59	7407.85	-5997.95	1.22	0.36	1.16	315714.07	1566164.82	N 39 21 23.94	W 81 2 3.54
Projection to TD	15588.00	92.44	321.61	6217.20	5115.37	9615.51	7473.63	-6050.07	0.00	0.00	0.00	315779.85	1566112.71	N 39 21 24.58	W 81 2 4.22

Survey Type: Def Survey

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma

Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	1	0.000	26.000	Act Stns	30.000	30.000	SLB_INC_ONLY<10-Depth Only	Original Borehole / Noble Energy PEN2GHS Surveys 0ft to 15588ft MD
	1	26.000	693.000	1/96.425	30.000	30.000	SLB_INC_ONLY<10	Original Borehole / Noble Energy PEN2GHS Surveys 0ft to 15588ft
	1	693.000	783.000	Act Stns	30.000	30.000	SLB_INC_ONLY<10	Original Borehole / Noble Energy PEN2GHS Surveys 0ft to 15588ft
	1	783.000	15504.000	Act Stns	30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy PEN2GHS Surveys 0ft to 15588ft
	1	15504.000	15588.000	Act Stns	30.000	30.000	SLB_BLIND+TREND	Original Borehole / Noble Energy PEN2GHS Surveys 0ft to 15588ft

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noble energy

Noble Energy

PATHFINDER
A Schlumberger Company

Borehole:	Well:	Field:	Structure:
Original Borehole	PEN2GHS	WV Ritchie County (NAD27)	Nomac 78

Gravity & Magnetic Parameters					Surface Location	NAD27 West Virginia State Plane, Northern Zone, US Feet				Miscellaneous			
Model:	HDGM 2013	Dip:	66.85°	Date:	14-Mar-2014	Lat:	N 39 20 11.74	Northing:	308306.584ftUS	Grid Conv:	-0.9647°	Slot:	PEN2GHS	TVD Ref:	KB(1101.83ft above MSL)
MagDec:	-7.857°	FS:	52247.335nT	Gravity FS:	999.309mgn (9.80665 Based)	Lon:	W 81 0 45.61	Easting:	1572162.482ftUS	Scale Fact:	0.99995343	Plan:	Noble Energy PEN2GHS MWD 0ft to update		

Critical Points

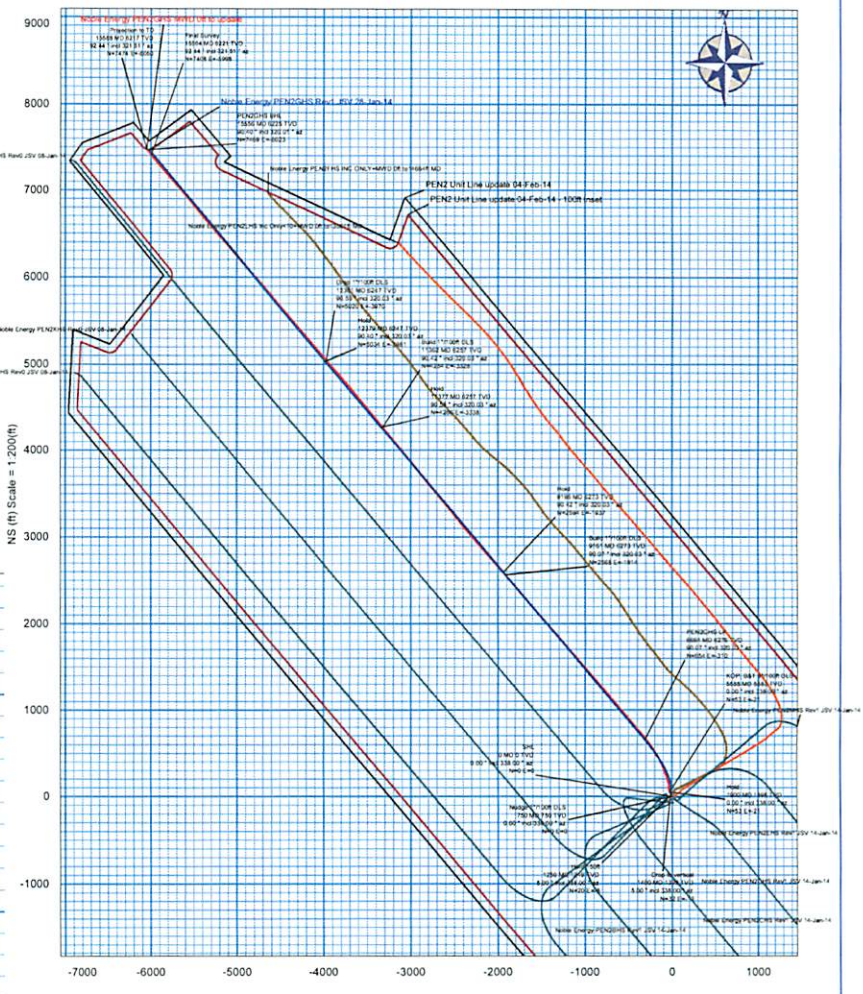
Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Final Survey	*15504.00	92.44	321.61	6220.78	9531.59	7407.85	-5997.95	1.22
Projection to TD	*15588.00	92.44	321.61	6217.20	9615.51	7473.53	-6050.07	0.00

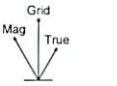
PART	Seq.	Survey Tool Survey Tool Code	VendorTool	Hole Size (in)	Casing Size (in)	MD From (ft)	MD To (ft)	Survey Frequency (ft)	EOU Size (Semi Major) (ft)	EOU Size (Semi Minor) (ft)	Comments/ Contingency
1	1	SLB_INC_ONLY+10-Depth Only		30	30	0	26	Act Stns	1.25	1.25	
1	2	SLB_INC_ONLY+10		30	30	26	993	Act Stns	1168.425	21.07	21.06
1	3	SLB_INC_ONLY+10		30	30	993	783	Act Stns	23.85	23.85	
1	4	SLB_MWD-STD		30	30	783	15504	Act Stns	272.01	24.43	
1	5	SLB_BLIND+TREND		30	30	15504	15588	Act Stns	288.71	25.12	

Surface Location

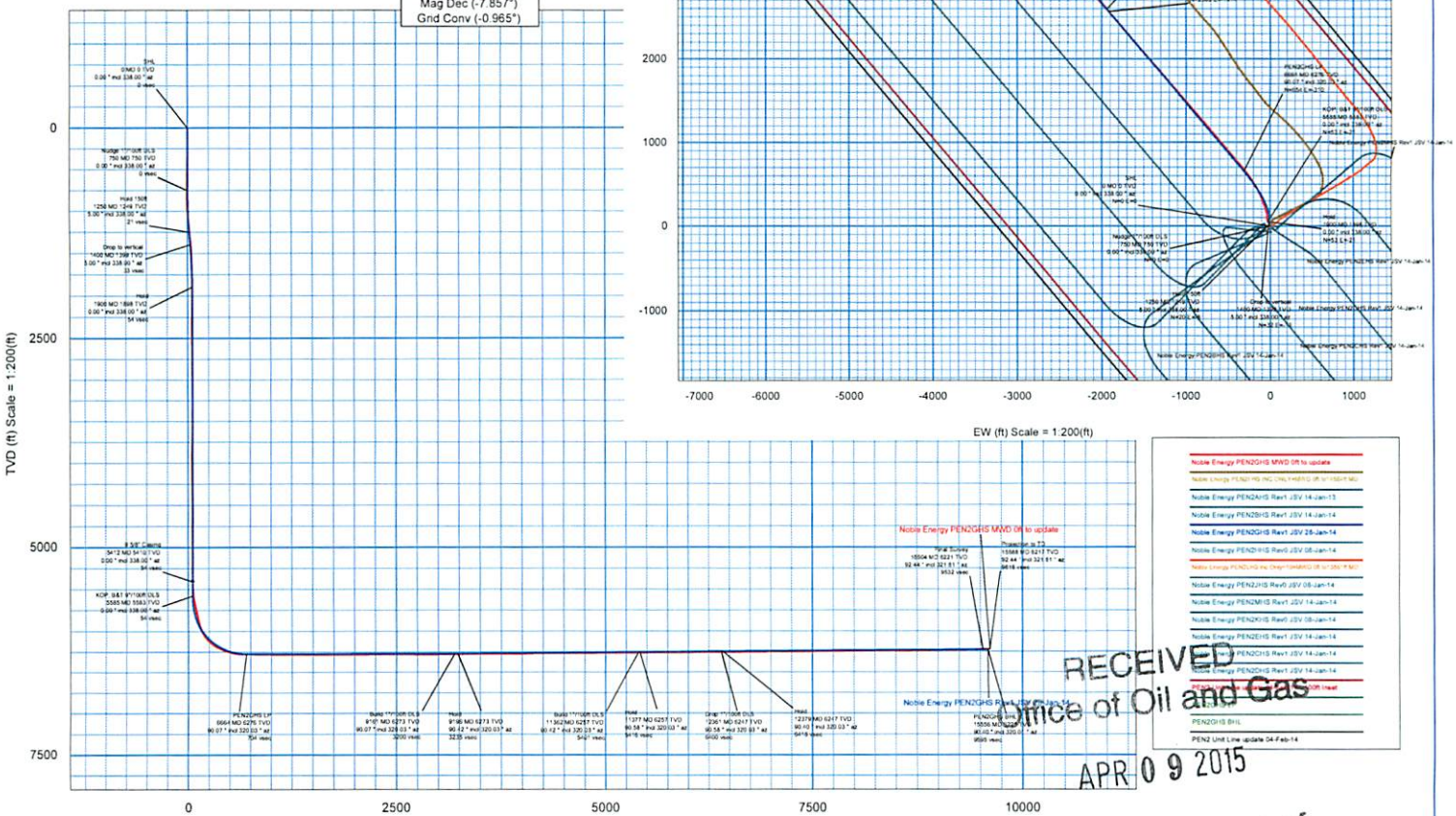
Northing: 308306.584 Easting: 1572162.482 Latitude: N 39 20 11.74 Longitude: W 81 0 45.61 VSec Azimuth: 321.116

Target Description			Grid Coord					Local Coord	
Target Name	Shape	Dimension	Latitude	Longitude	Northing	Easting	TVD	VSec	N(+)/S(-)	E(+)/W(-)
PEN2 Unit Line update 04-Feb-14 - 100ft inset	Polyline	N/A	N 39 20 11.34	W 81 0 46.23	308268.94	1572113.09	1101.83	0.14	-39.65	-49.39
PEN2 Unit Line update 04-Feb-14	Polyline	N/A	N 39 20 11.34	W 81 0 46.23	308268.94	1572113.09	1101.83	0.14	-39.65	-49.39
PEN2GHS LP	Point	N/A	N 39 20 18.86	W 81 0 50.49	309033.75	1571979.24	6314.00	786.12	727.20	-371.25
PEN2GHS BHL	Point	N/A	N 39 21 24.54	W 81 2 3.88	311774.78	1566139.80	6314.00	9594.56	7468.56	-6022.97





Grid North
Tot Corr (M->G -6.892°)
Mag Dec (-7.857°)
Grid Conv (-0.965°)



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Environmental Protection

Well is located on topo map 13,953' feet south of Latitude: 39°22'30"

AS DRILLED PLAT

Well is located on topo map 3,545' feet west of Longitude: 81°00'00"

PERMITTED BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4356371.11
E:497060.31
NAD27, WV NORTH
N:315734.55
E:1566173.53
LAT/LON DATUM-NAD83
LAT:39.356785
LON:-81.034121

AS DRILLED BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4356384.60
E:497041.55
NAD27, WV NORTH
N:315779.85
E:1566112.71
LAT/LON DATUM-NAD83
LAT:39.356906
LON:-81.034339

LINE	BEARING	DISTANCE
R1	N 59°44'40" W	161.55'
R2	N 72°40'53" E	237.13'
R3	S 11°34'02" E	189.54'
R4	N 59°14'20" W	1818.75'
R5	N 20°10'53" W	1811.29'
R6	N 15°31'37" E	1625.80'

REFERENCE DETAIL
WELL PEN2GHS
STAKE
R1
R2
20'

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

LEASE	LESSORS
1	TERRY KIESSLING ET AL
2	JOHN A. SMITH ET AL
3	COASTAL FOREST RESOURCES COMPANY
4	MARY JANE MATHESS ET AL
5	JAMES P. JONES JR ET AL

LEGEND
- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED
- (0) – LEASE NUMBER
- MINERAL TRACT BOUNDARY
- PARCEL LINES
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE
- AS DRILLED

EXISTING WELLS
- EXISTING WELLS
- PLUGGED WELLS

JANE J. WHITAKER TM/PAR 04-10/12
BRUSH RUN
BHL
PERMITTED
MARY J. MATHESS TM/PAR 14-10/31
AS DRILLED
UNNAMED TRIBUTARY TO BRUSH RUN
MICHAEL CONKLIN TM/PAR 03-06/05
UNNAMED TRIBUTARY TO BLACKS RUN
FREELAND HEBRON ROAD
PROPOSED HORIZ. AZ. 320°01'29" LENGTH: 8,441'± MD
PERMITTED
APPROXIMATE LANDING POINT OF AS DRILLED LEG
COASTAL LUMBER COMPANY TM/PAR 03-06/2
AS DRILLED
UNNAMED TRIBUTARY TO BLACKS RUN
BLACKS RUN
APPROXIMATE LANDING POINT OF HORIZONTAL LEG
TERRY & HELEN KIESSLING TM/PAR 03-06/10
SHL WELL PEN2GHS
UNNAMED TRIBUTARY TO BONDS CREEK
500'
3000'

PERMITTED SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4354138.67
E:498922.57
NAD27, WV NORTH
N:308306.57
E:1572162.31
LAT/LON DATUM-NAD83
LAT:39.336673
LON:-81.012502

PERMITTED APPROX. LANDING POINT
UTM 17-NAD83
N:4354358.31
E:498805.83
NAD27, WV NORTH
N:309033.75
E:1571791.24
LAT/LON DATUM-NAD83
LAT:39.338652
LON:-81.013857

AS DRILLED APPROX. LANDING POINT
UTM 17-NAD83
N:4354335.13
E:498831.00
NAD27, WV NORTH
N:308956.30
E:1571872.58
LAT/LON DATUM-NAD83
LAT:39.338443
LON:-81.013565

AS DRILLED SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4354138.67
E:498922.63
NAD27, WV NORTH
N:308306.58
E:1572162.48
LAT/LON DATUM-NAD83
LAT:39.336673
LON:-81.012501

Blue Mountain Inc.
10125 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

FILE #: PEN2GHS-AS DRILLED
DRAWING #: PEN2GHS-AS DRILLED
SCALE: 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1/2500
PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

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

Signed: George W. Six
R.P.E.: _____ L.L.S.: P.S. No. 2000

GEORGE W. SIX LICENSED No. 2000 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

PLACE SEAL HERE

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

DATE: FEBRUARY 11, 2015
OPERATOR'S WELL #: PEN2GHS-AS DRILLED
API WELL #: 47 (STATE) 85 (COUNTY) 10072 (PERMIT)

Well Type: [ ] Oil [ ] Waste Disposal [X] Production [ ] Deep [X] Gas [ ] Liquid Injection [ ] Storage [X] Shallow

WATERSHED: NORTH FORK HUGHES RIVER ELEVATION: 1084'±
COUNTY/DISTRICT: RITCHIE / CLAY QUADRANGLE: ELLENBORO, WV 7.5'
SURFACE OWNER: TERRY & HELEN KIESSLING ACREAGE: 79.242±
OIL & GAS ROYALTY OWNER: TERRY KIESSLING ET AL ACREAGE: 514.582±

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

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,314'± TMD: 15,563'±

WELL OPERATOR NOBLE ENERGY, INC. DESIGNATED AGENT STEVEN M. GREEN
Address 333 TECHNOLOGY DRIVE, SUITE 116 Address 500 VIRGINIA STREET, EAST, UNITED CENTER SUITE 590
City CANONSBURG State PA Zip Code 15317 City CHARLESTON State WV Zip Code 25301

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