

September 15<sup>th</sup>, 2017

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

API 47-085-10073FH6A County Ritchie District Clay  
Quad Pennsboro Pad Name PEN2HS Field/Pool Name Pennsboro  
Farm Name KIESSLING, TERRY & HELEN Well Number PEN2HHS - Fracture  
Operator (as registered with the OOG) CNX Gas Company LLC  
Address P.O. Box 1248 City Jane Lew State WV Zip 26378

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey  
Top Hole Northing 4,354,136.52 m Easting 498,916.88 m  
Landing Point of Curve Northing 4,354,166.07 m Easting 498,668.93 m  
Bottom Hole Northing 4,356,336.28 m Easting 496,785.30 m

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

Drilled Media Surface hole  Air  Mud  Fresh Water Intermediate hole  Air  Mud  Fresh Water  Brine  
Production hole  Air  Mud  Fresh Water  Brine  
Mud Type(s) and Additive(s)  
Synthetic Oil Based.

Date Permit Issued 02/08/2017 Date drilling commenced 03/05/2017 Date drilling ceased 03/18/2017  
Date completion activities began 03/05/2017 Date completion activities ceased 03/18/2017  
Verbal plugging (Y/N) N Date permission granted N/A Granted by N/A

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

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

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**APPROVED**

NAME: Michael Jeff  
DATE: 10-25-17

Reviewed by:  
Honce, Mike

01/05/2018

API 47-085-10073FH6A Farm name KIESSLING, TERRY & HELEN Well number PEN2HHS - Fracture

CASING STRINGS Conductor	Hole Size 36"	Casing Size 30"	Depth 40'	New or Used	Grade wt/ft	Basket Depth(s)	Did cement Circulate (Y/N) * Provide details to the right *
Surface	17 1/2"	13 3/8"	591.4'	New	J-55 54.5# / 591.4'		Y
Coal							
Intermediate 1	12 3/8"	9 5/8"	5412'	N	K-55 36# / 5412'		Y
Intermediate 2							
Intermediate 3							
Production	8 3/4"	5 1/2"	16227'	N	P-110 20# / 16227'		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 I	535 sks	15.60	1.20	114.5	0'	8
Coal							
Intermediate 1	Class A (Lead) / Class A (Tail)	1012 sks / 290 sks	12.0 / 15.60	1.93 / 1.19	202 / 167	0'	8
Intermediate 2							
Intermediate 3							
Production	Class A (Lead) / Class A (Tail)	400 sks / 2035 sks	12.3 / 14.8	1.61 / 1.36	167 / 207	5249'	8
Tubing							

Drillers TD (ft) 6,199'

Loggers TD (ft) 6,284'

Deepest formation penetrated: Marcellus

Plug back to (ft) Not a Pilot Hole

Plug back procedure: Not a Pilot Hole

Kick Off Depth (ft) 6,942'

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

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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 - 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 Plug And Perforation Shot Hole

WAS WELL COMPLETED OPEN HOLE  Yes  No DETAILS \_\_\_\_\_

WERE TRACERS USE  Yes  No TYPES OF TRACER(S) USED \_\_\_\_\_

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number Of Perforations	Formation(s)
Trigger Toe	1/17/2015	15852	16083	40	Marcellus
1	1/23/2015	15852	16084	40	Marcellus
2	1/23/2015	15564	15796	40	Marcellus
3	1/23/2015	15277	15509	40	Marcellus
4	1/23/2015	14989	15221	40	Marcellus
5	1/24/2015	14702	14934	40	Marcellus
6	1/24/2015	14414	14646	40	Marcellus
7	1/25/2015	14127	14359	40	Marcellus
7 Inj Test	1/27/2015			40	Marcellus
8	3/5/2017	13865	14027	40	Marcellus
9	3/6/2017	13665	13827	40	Marcellus
10	3/7/2017	13465	13627	40	Marcellus
11	3/7/2017	13265	13427	40	Marcellus
12	3/8/2017	13065	13227	40	Marcellus
13	3/8/2017	12865	13027	40	Marcellus
14	3/9/2017	12665	12827	40	Marcellus
15	3/9/2017	12465	12627	40	Marcellus
16	3/9/2017	12265	12446	40	Marcellus
17	3/10/2017	12065	12227	40	Marcellus
18	3/10/2017	11865	12027	40	Marcellus
19	3/10/2017	11665	11827	40	Marcellus
20	3/10/2017	11665	11827	40	Marcellus
21	3/11/2017	11265	11427	40	Marcellus
22	3/11/2017	11065	11227	40	Marcellus
23	3/11/2017	10865	11027	40	Marcellus
24	3/12/2017	10665	10827	40	Marcellus
25	3/12/2017	10465	10627	40	Marcellus
26	3/13/2017	10265	10427	40	Marcellus
27	3/13/2017	10065	10227	40	Marcellus
28	3/13/2017	9865	10027	40	Marcellus
29	3/14/2017	9665	9827	40	Marcellus
30	3/14/2017	9465	9627	40	Marcellus
31	3/14/2017	9265	9427	40	Marcellus
32	3/14/2017	9065	9246	40	Marcellus
33	3/15/2017	8865	9027	40	Marcellus
34	3/15/2017	9665	8827	40	Marcellus
35	3/16/2017	8627	8465	40	Marcellus
36	3/16/2017	8265	8427	40	Marcellus

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number Of Perforations	Formation(s)
37	3/16/2017	8065	8227	40	Marcellus
38	3/16/2017	7865	8027	40	Marcellus
39	3/17/2017	7665	7827	40	Marcellus
40	3/17/2017	7465	7646	40	Marcellus
41	3/17/2017	7265	7427	40	Marcellus
42	3/17/2017	7065	7246	40	Marcellus
43	3/18/2017	6865	7027	40	Marcellus
44	3/18/2017	6667	6827	40	Marcellus

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STIMULATION INFORMATION PER STAGE

Stage No.	Stimulations Date	Avg Pump Rate (BPM)	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen / other (gals)
Trigger Toe	1/17/2015	20.0	8591	9777	5665	-	377	
1	1/23/2015	85.0	8054	5414	3306	599600	13038	
2	1/23/2015	85.0	8230	5726	3430	600650	14091	
3	1/23/2015	88.0	8146	5171	3036	601010	12909	
4	1/23/2015	88.0	8049	4914	2668	605940	15887	
5	1/24/2015	86.0	8672	5516	4741	459000	15573	
6	1/24/2015	80.0	8220	6112	3409	599450	12973	
7	1/25/2015	88.2	8422	5380	4537	246000	8323	
7 Inj Test	1/27/2015	5.8	4622	1910	4467	-	924	
8	3/5/2017	79.9	8386	na	5019	402500	12200	8785
9	3/6/2017	88.7	8286	5719	4297	401996	8428	1937
10	3/7/2017	83.6	7899	5502	4599	400700	10228	8442
11	3/7/2017	89	8274	5705	3622	401059	7689	4249
12	3/8/2017	88.1	8017	5357	4129	400790	8191	4355
13	3/8/2017	86	7620	5315	3922	400435	8146	4353
14	3/9/2017	89.5	8572	6078	4677	400675	7512	4256
15	3/9/2017	82.2	8181	4987	4638	400747	8891	4378
16	3/9/2017	89.2	8629	5511	5022	401523	7394	4249
17	3/10/2017	88.3	8487	5228	4311	400993	7435	4228
18	3/10/2017	86.7	7769	5257	4318	401735	7599	4294
19	3/10/2017	90.5	8051	5281	4259	401094	7031	4272
20	3/11/2017	89.8	7852	5880	5208	400873	6795	4196
21	3/11/2017	89.4	7725	5237	4764	401825	6491	4226
22	3/11/2017	91.4	7904	5370	4894	401055	6992	4238
23	3/11/2017	90.5	7620	5257	4386	400700	6671	4197
24	3/12/2017	90	7602	5804	3922	400866	6423	4191
25	3/12/2017	89.2	7550	5808	4306	402392	6107	4200
26	3/13/2017	89.5	7329	6004	4065	401211	7219	4272
27	3/13/2017	90.1	7386	5824	3915	401522	6593	4192
28	3/13/2017	90	7232	5486	3812	400500	6944	4247
29	3/14/2017	89.5	7365	5632	3773	400278	6522	4211
30	3/14/2017	89.1	7260	5156	3952	400388	6563	3177
31	3/14/2017	89.6	7207	5052	4937	400576	6325	3182
32	3/14/2017	90.4	7559	5248	4257	400600	6308	3207
33	3/15/2017	89.6	7405	5445	4835	400580	6703	3175
34	3/15/2017	91	7389	5276	4417	400565	6280	3181
35	3/16/2017	90	7331	4957	5280	400316	6689	3166
36	3/16/2017	90.1	7126	5230	5000	400770	6856	3213

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STIMULATION INFORMATION PER STAGE

Stage No.	Stimulations Date	Avg Pump Rate (BPM)	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen / other (gals)
37	3/16/2017	91.1	7292	5521	5052	400554	6487	3189
38	3/17/2017	89.9	7573	5219	4538	400464	6880	3217
39	3/17/2017	90.6	7030	5120	5240	401519	6932	3229
40	3/17/2017	89.4	6813	4920	4782	400803	6823	3185
41	3/17/2017	89.7	6840	4944	4749	400723	6906	3277
42	3/18/2017	91.7	6772	5253	4872	400700	6710	3229
43	3/18/2017	91.7	6621	5673	4927	401268	6822	3210
44	3/18/2017	90.8	6728	5109	3990	400912	7478	3217

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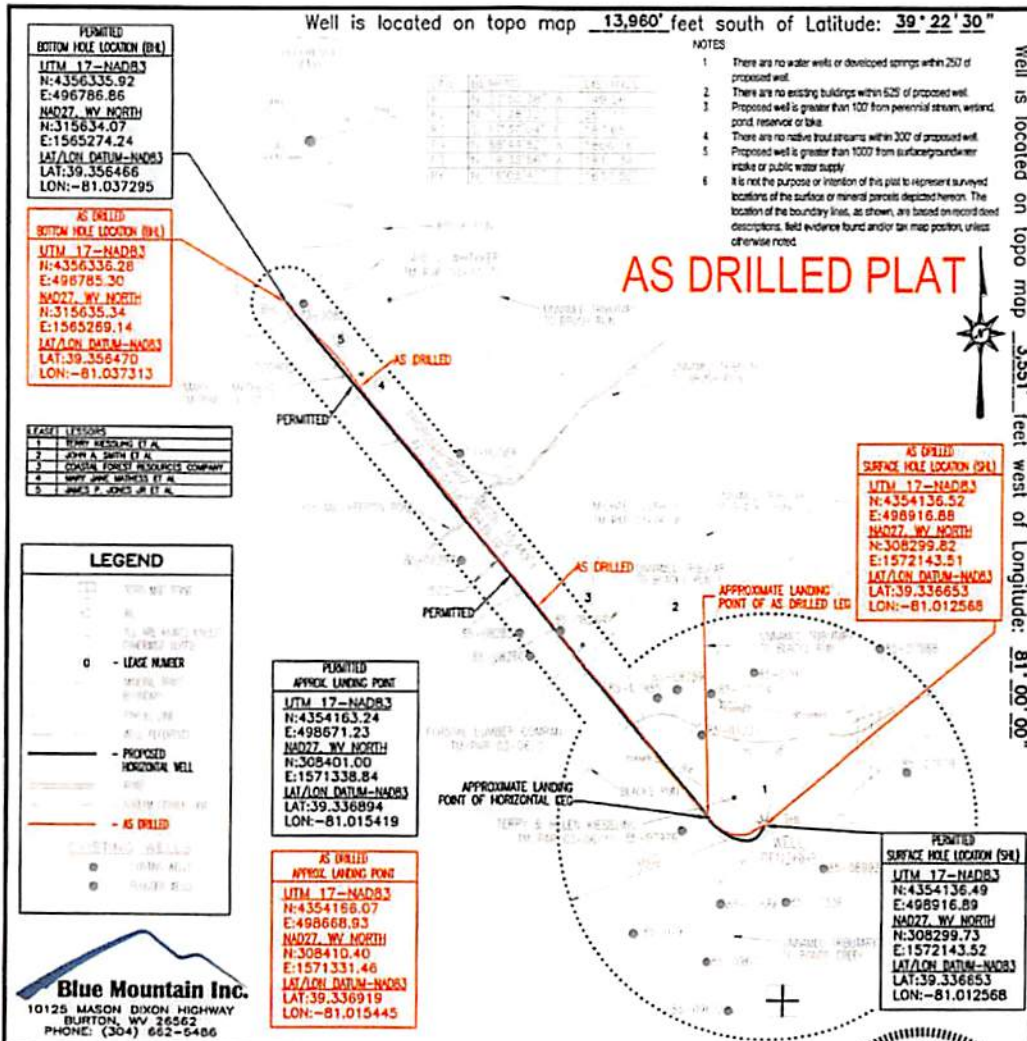


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LITHOLOGY / FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY TYPE OF FLUID (FRESHWATER,BRINE,GAS,H2S, ETC)
	DEPTH IN FT	DEPTH IN FT	DEPTH IN FT	DEPTH IN FT	
	TVD	TVD	MD	MD	
SHALE AND SANDSTONE	0	1309	0	1309	
SANDSTONE	1309	1423	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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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

FILE #: PEN2HHS-AS DRILLED  
 DRAWING #: PEN2HHS-AS DRILLED  
 SCALE: 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY: 1/2500  
 PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

DATE: FEBRUARY 11, 2015  
 OPERATOR'S WELL #: PEN2HHS-AS DRILLED  
 API WELL #: 47 85 10073  
 STATE COUNTY PERMIT

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: 514.618±

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

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: 16,331±

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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Well Name: PENS2HHS

API 4708510073	Surface Legal Location	Field PENS	Permit Number	State West Virginia	Well Configuration Type HORIZONTAL
Ground Elevation (ft) 1,084.00	Casing Flange Elevation (ft) 1,083.25	KB-Ground Distance (ft) 25.50	KB-Casing Flange Distance (ft) 26.25	Spud Date (Conductor) 1/11/2014 04:00	Rig Release Date 4/20/2014 08:30

Wellbore Name Original Hole	Parent Wellbore	Vertical Section Direction (°) 316.86
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### Kick Offs & Key Depths

Date	Point or Interval	Type	Top Depth (ftKB)	Depth Top (TVD) (ftKB)	Bottom Depth (ftKB)	Depth Bottom (TVD) (ftKB)	Length (ft)

### Deviation Surveys

Date 1/11/2014	Definitive? No	Description ORIGINAL	Proposed? No
MD Tie In (ftKB) 0.00	TVD Tie In (ftKB) 0.00	Inclination Tie In (°) 0.00	Azimuth Tie In (°) 0.00
		NS Tie In (ft) 0.00	EW Tie In (ft)

### Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Build (°/100ft)	Turn (°/100ft)	Unwrap Displace (ft)	Method	Survey Company
1/11/2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	INCL	
1/11/2014	100.00	0.43	104.08	100.00	-0.32	-0.09	0.36	0.43	0.43	104.08	0.38	GYRO MS	
1/11/2014	200.00	0.83	107.68	199.99	-1.26	-0.40	1.42	0.40	0.40	3.60	1.47	GYRO MS	
1/11/2014	300.00	1.06	127.86	299.98	-2.81	-1.19	2.84	0.40	0.23	20.18	3.10	GYRO MS	
1/11/2014	400.00	1.24	130.91	399.96	-4.80	-2.47	4.39	0.19	0.18	3.05	5.10	GYRO MS	
1/11/2014	500.00	1.39	130.37	499.93	-7.08	-3.96	6.13	0.15	0.15	-0.54	7.40	GYRO MS	
1/11/2014	600.00	1.40	130.74	599.90	-9.50	-5.54	7.98	0.01	0.01	0.37	9.83	GYRO MS	
1/11/2014	654.00	1.42	120.48	653.89	-10.80	-6.31	9.05	0.47	0.04	-19.00	11.16	GYRO MS	
1/11/2014	693.00	1.67	120.06	692.87	-11.81	-6.84	9.96	0.64	0.64	-1.08	12.21	GYRO MS	
1/11/2014	724.00	1.76	128.53	723.86	-12.71	-7.37	10.73	0.87	0.29	27.32	13.13	GYRO MS	
1/11/2014	756.00	1.46	115.22	755.85	-13.57	-7.85	11.48	1.49	-0.94	-41.59	14.03	GYRO MS	
1/11/2014	788.00	0.53	69.94	787.84	-14.01	-7.97	11.99	3.60	-2.91	-141.50	14.55	GYRO MS	
1/11/2014	820.00	0.94	322.85	819.84	-13.81	-7.71	11.97	3.77	1.28	790.34	14.81	GYRO MS	
1/11/2014	853.00	1.50	333.01	852.83	-13.12	-7.11	11.61	1.81	1.70	30.79	15.51	GYRO MS	
1/11/2014	894.00	2.12	330.06	893.81	-11.87	-5.97	10.99	1.53	1.51	-7.20	16.81	GYRO MS	
1/11/2014	948.00	3.13	321.26	947.75	-9.43	-3.96	9.56	2.01	1.87	-16.30	19.27	GYRO MS	
1/11/2014	999.00	4.03	320.62	998.65	-6.25	-1.49	7.56	1.77	1.76	-1.25	22.46	MWD	
1/11/2014	1,095.00	3.35	322.82	1,094.45	-0.10	3.36	3.72	0.72	-0.71	2.29	28.63	MWD	
1/11/2014	1,191.00	2.29	306.57	1,190.34	4.58	6.73	0.49	1.37	-1.10	-16.93	33.31	MWD	
1/11/2014	1,287.00	1.12	281.34	1,286.30	7.23	8.06	-1.97	1.42	-1.22	-26.28	36.11	MWD	
1/11/2014	1,382.00	0.85	261.91	1,381.28	8.39	8.14	-3.58	0.45	-0.28	-20.45	37.72	MWD	
1/11/2014	1,477.00	0.65	213.35	1,476.27	8.67	7.60	-4.58	0.68	-0.21	-51.12	38.85	MWD	
1/11/2014	1,573.00	1.01	235.77	1,572.26	8.68	6.66	-5.58	0.50	0.38	23.35	40.22	MWD	
1/11/2014	1,669.00	0.43	207.38	1,668.26	8.69	5.87	-6.44	0.69	-0.60	-29.57	41.39	MWD	
1/11/2014	1,764.00	0.95	201.30	1,763.25	8.23	4.82	-6.89	0.55	0.55	-6.40	42.54	MWD	
1/11/2014	1,859.00	0.74	196.95	1,858.24	7.58	3.50	-7.36	0.23	-0.22	-4.58	43.94	MWD	
1/11/2014	1,955.00	0.77	210.18	1,954.23	7.09	2.35	-7.86	0.18	0.03	13.78	45.19	MWD	
1/11/2014	2,050.00	0.57	189.04	2,049.22	6.61	1.33	-8.26	0.33	-0.21	-22.25	46.28	MWD	
1/11/2014	2,145.00	0.69	204.15	2,144.22	6.10	0.34	-8.56	0.21	0.13	15.91	47.32	MWD	
1/11/2014	2,241.00	0.82	210.05	2,240.21	5.68	-0.78	-9.14	0.16	0.14	6.15	48.58	MWD	
1/11/2014	2,337.00	0.28	59.63	2,336.21	5.43	-1.26	-9.29	1.12	-0.56	-156.69	49.08	MWD	
1/11/2014	2,432.00	0.18	8.70	2,431.21	5.47	-0.99	-9.06	0.23	-0.11	-53.61	49.43	MWD	
1/11/2014	2,526.00	0.30	0.27	2,525.21	5.74	-0.60	-9.04	0.13	0.13	-8.97	49.82	MWD	
1/11/2014	2,622.00	0.07	24.39	2,621.21	5.95	-0.30	-9.01	0.25	-0.24	25.13	50.12	MWD	

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Well Name: PENS2HHS

API 4708510073	Surface Legal Location	Field PENS	Permit Number	State West Virginia	Well Configuration Type HORIZONTAL
Ground Elevation (ft) 1,084.00	Casing Flange Elevation (ft) 1,083.25	KB-Ground Distance (ft) 25.50	KB-Casing Flange Distance (ft) 26.25	Spud Date (Conductor) 1/11/2014 04:00	Rig Release Date 4/20/2014 08:30

### Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Build (°/100ft)	Turn (°/100ft)	Unwrap Displace (ft)	Method	Survey Company
1/11/2014	2,716.00	0.46	272.51	2,715.20	6.24	-0.23	-9.37	0.52	0.41	263.96	50.48	MWD	
1/11/2014	2,812.00	0.23	272.01	2,811.20	6.65	-0.20	-9.95	0.24	-0.24	-0.52	51.06	MWD	
1/11/2014	2,908.00	0.02	335.93	2,907.20	6.80	-0.18	-10.14	0.23	-0.22	66.58	51.26	MWD	
1/11/2014	3,003.00	0.22	236.67	3,002.20	6.85	-0.27	-10.30	0.24	0.21	-104.48	51.44	MWD	
1/11/2014	3,099.00	0.30	312.14	3,098.20	7.13	-0.20	-10.64	0.34	0.08	78.61	51.79	MWD	
1/11/2014	3,195.00	0.09	227.06	3,194.20	7.38	-0.08	-10.89	0.32	-0.22	-88.63	52.06	MWD	
1/11/2014	3,290.00	0.09	314.20	3,289.20	7.46	-0.08	-10.99	0.13	0.00	91.73	52.17	MWD	
1/11/2014	3,385.00	0.19	190.74	3,384.20	7.44	-0.18	-11.08	0.26	0.11	-129.96	52.30	MWD	
1/11/2014	3,480.00	0.44	221.17	3,479.20	7.31	-0.61	-11.35	0.31	0.26	32.03	52.81	MWD	
1/11/2014	3,572.00	0.31	221.89	3,571.20	7.25	-1.06	-11.74	0.14	-0.14	0.78	53.41	MWD	
1/11/2014	3,668.00	0.85	219.43	3,667.19	7.14	-1.81	-12.37	0.56	0.56	-2.56	54.38	MWD	
1/11/2014	3,764.00	0.69	195.79	3,763.18	6.75	-2.91	-12.98	0.37	-0.17	-24.63	55.64	MWD	
1/11/2014	3,860.00	0.90	190.67	3,859.17	6.01	-4.21	-13.28	0.23	0.22	-5.33	56.97	MWD	
1/11/2014	3,956.00	0.70	216.95	3,955.17	5.46	-5.42	-13.77	0.43	-0.21	27.38	58.28	MWD	
1/11/2014	4,050.00	0.54	221.11	4,049.16	5.32	-6.21	-14.41	0.18	-0.17	4.43	59.30	MWD	
1/11/2014	4,146.00	0.12	3.14	4,145.16	5.34	-6.45	-14.70	0.67	-0.44	-227.05	59.67	MWD	
1/11/2014	4,241.00	0.22	55.78	4,240.16	5.38	-6.25	-14.54	0.18	0.11	55.41	59.93	MWD	
1/11/2014	4,337.00	0.10	292.53	4,336.16	5.43	-6.12	-14.47	0.30	-0.13	246.61	60.08	MWD	
1/11/2014	4,432.00	0.15	124.09	4,431.16	5.38	-6.15	-14.44	0.26	0.05	-177.31	60.13	MWD	
1/11/2014	4,527.00	0.29	188.02	4,526.16	5.11	-6.46	-14.37	0.28	0.15	67.29	60.45	MWD	
1/11/2014	4,623.00	0.39	341.29	4,622.16	5.26	-6.39	-14.51	0.69	0.10	159.66	60.60	MWD	
1/11/2014	4,718.00	0.59	350.87	4,717.15	5.96	-5.60	-14.69	0.23	0.21	10.08	61.41	MWD	
1/11/2014	4,814.00	0.44	333.30	4,813.15	6.72	-4.79	-14.93	0.23	-0.16	-18.30	62.26	MWD	
1/11/2014	4,909.00	0.38	297.58	4,908.15	7.37	-4.31	-15.38	0.27	-0.06	-37.60	62.91	MWD	
1/11/2014	5,005.00	0.35	319.09	5,004.15	7.96	-3.95	-15.85	0.15	-0.03	22.41	63.51	MWD	
1/11/2014	5,100.00	0.51	269.23	5,099.14	8.53	-3.73	-16.46	0.41	0.17	-52.48	64.16	MWD	
1/11/2014	5,196.00	0.42	295.96	5,195.14	9.15	-3.58	-17.21	0.24	-0.09	27.84	64.92	MWD	
1/11/2014	5,292.00	0.55	278.93	5,291.14	9.84	-3.36	-17.98	0.20	0.14	-17.74	65.72	MWD	
1/11/2014	5,368.00	0.41	295.17	5,367.13	10.38	-3.19	-18.59	0.26	-0.18	21.37	66.35	MWD	
1/11/2014	5,464.00	0.33	296.70	5,463.13	10.96	-2.92	-19.14	0.08	-0.08	1.59	66.97	MWD	
1/11/2014	5,512.00	2.04	233.19	5,511.12	11.19	-3.37	-19.95	3.99	3.56	-132.31	67.90	MWD	
1/11/2014	5,559.00	7.23	237.02	5,557.95	11.80	-5.48	-23.10	11.06	11.04	8.15	71.69	MWD	
1/11/2014	5,607.00	12.25	239.50	5,605.24	13.45	-9.71	-30.03	10.49	10.46	5.17	79.81	MWD	
1/11/2014	5,655.00	16.21	242.05	5,651.76	16.32	-15.44	-40.34	8.35	8.25	5.31	91.60	MWD	
1/11/2014	5,702.00	19.53	241.20	5,696.49	19.99	-22.30	-53.02	7.09	7.06	-1.81	106.02	MWD	
1/11/2014	5,749.00	23.45	239.77	5,740.21	24.02	-30.79	-67.99	8.41	8.34	-3.04	123.24	MWD	
1/11/2014	5,798.00	28.66	238.98	5,784.22	28.67	-41.77	-86.50	10.66	10.63	-1.61	144.75	MWD	
1/11/2014	5,846.00	33.79	238.04	5,825.25	33.68	-54.77	-107.70	10.74	10.69	-1.96	169.62	MWD	
1/11/2014	5,893.00	38.73	237.11	5,863.14	38.83	-69.68	-131.15	10.58	10.51	-1.98	197.41	MWD	
1/11/2014	5,941.00	43.80	236.49	5,899.21	44.29	-87.02	-157.63	10.60	10.56	-1.29	229.06	MWD	
1/11/2014	5,988.00	46.31	241.51	5,932.42	51.31	-104.11	-186.14	9.25	5.34	10.68	262.30	MWD	
1/11/2014	6,035.00	46.80	248.52	5,964.76	61.94	-118.50	-217.04	10.88	1.04	14.91	296.39	MWD	
1/11/2014	6,084.00	48.07	256.08	5,997.93	77.44	-129.44	-251.38	11.65	2.59	15.43	332.42	MWD	
1/11/2014	6,131.00	50.10	262.52	6,028.73	96.50	-135.99	-286.24	11.22	4.32	13.70	367.90	MWD	
1/11/2014	6,180.00	52.08	268.30	6,059.52	120.26	-139.01	-324.22	10.03	4.04	11.80	406.00	MWD	
1/11/2014	6,227.00	54.26	272.84	6,087.70	146.26	-138.62	-361.82	9.01	4.64	9.66	443.60	MWD	
1/11/2014	6,274.00	56.90	278.21	6,114.28	175.37	-134.86	-400.38	10.97	5.62	11.43	482.35	MWD	
1/11/2014	6,321.00	59.16	282.26	6,139.17	207.37	-127.76	-439.60	8.75	4.81	8.62	522.20	MWD	
1/11/2014	6,370.00	61.16	285.31	6,163.55	242.98	-117.63	-480.87	6.77	4.08	6.22	564.70	MWD	
1/11/2014	6,417.00	62.26	290.81	6,185.84	279.23	-104.79	-520.19	10.57	2.34	11.70	606.06	MWD	
1/11/2014	6,465.00	64.54	294.75	6,207.34	318.41	-88.17	-559.74	8.74	4.75	8.21	648.96	MWD	
1/11/2014	6,512.00	67.52	298.46	6,226.44	358.69	-68.93	-598.12	9.60	6.34	7.89	691.90	MWD	
1/11/2014	6,561.00	71.05	303.04	6,243.77	402.71	-45.48	-637.48	11.33	7.20	9.35	737.70	MWD	
1/11/2014	6,608.00	75.36	306.67	6,257.36	446.70	-19.77	-674.38	11.78	9.17	7.72	782.68	MWD	
1/11/2014	6,656.00	79.87	310.50	6,267.65	493.08	9.47	-711.00	12.21	9.40	7.98	829.54	MWD	
1/11/2014	6,703.00	82.76	313.04	6,274.75	539.35	40.42	-745.64	8.15	6.15	5.40	875.99	MWD	
1/11/2014	6,752.00	85.98	316.55	6,279.56	588.07	74.77	-780.23	9.69	6.57	7.16	924.74	MWD	

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Well Name: PENS2HHS

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Ground Elevation (ft) 1,084.00	Casing Flange Elevation (ft) 1,083.25	KB-Ground Distance (ft) 25.50	KB-Casing Flange Distance (ft) 26.25	Spud Date (Conductor) 1/11/2014 04:00	Rig Release Date 4/20/2014 08:30

### Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Build (°/100ft)	Turn (°/100ft)	Unwrap Displace (ft)	Method	Survey Company
1/11/2014	6,800.00	88.31	319.78	6,281.95	635.98	110.48	-812.20	8.29	4.85	6.73	972.67	MWD	
1/11/2014	6,847.00	89.17	320.29	6,282.98	682.90	146.49	-842.38	2.13	1.83	1.09	1,019.66	MWD	
1/11/2014	6,942.00	89.97	317.67	6,283.70	777.82	218.16	-904.73	2.88	0.84	-2.76	1,114.65	MWD	
1/11/2014	7,037.00	90.14	317.27	6,283.60	872.82	288.17	-968.94	0.46	0.18	-0.42	1,209.65	MWD	
1/11/2014	7,133.00	90.86	317.25	6,282.77	968.81	358.67	-	0.75	0.75	-0.02	1,305.65	MWD	
1/11/2014	7,228.00	92.06	319.25	6,280.35	1,063.75	429.52	-	2.45	1.26	2.11	1,400.61	MWD	
1/11/2014	7,324.00	90.24	318.12	6,278.42	1,159.67	501.60	-	2.23	-1.90	-1.18	1,496.58	MWD	
1/11/2014	7,419.00	89.97	317.76	6,278.24	1,254.66	572.13	-	0.47	-0.28	-0.38	1,591.58	MWD	
1/11/2014	7,514.00	90.21	318.33	6,278.10	1,349.63	642.78	-	0.65	0.25	0.60	1,686.58	MWD	
1/11/2014	7,610.00	90.14	319.08	6,277.80	1,445.58	714.91	-	0.78	-0.07	0.78	1,782.58	MWD	
1/11/2014	7,705.00	89.83	318.82	6,277.83	1,540.52	786.55	-	0.43	-0.33	-0.27	1,877.58	MWD	
1/11/2014	7,801.00	90.38	320.73	6,277.65	1,636.39	859.85	-	2.07	0.57	1.99	1,973.58	MWD	
1/11/2014	7,897.00	90.58	324.08	6,276.85	1,731.92	935.90	-	3.50	0.21	3.49	2,069.56	MWD	
1/11/2014	7,992.00	90.65	326.60	6,275.83	1,825.87	1,014.03	-	2.65	0.07	2.65	2,164.55	MWD	
1/11/2014	8,088.00	90.17	326.13	6,275.14	1,920.55	1,093.95	-	0.70	-0.50	-0.49	2,260.54	MWD	
1/11/2014	8,183.00	90.17	323.79	6,274.86	2,014.60	1,171.73	-	2.46	0.00	-2.46	2,355.54	MWD	
1/11/2014	8,279.00	90.31	323.88	6,274.46	2,109.89	1,249.23	-	0.17	0.15	0.09	2,451.54	MWD	
1/11/2014	8,375.00	90.21	323.09	6,274.02	2,205.24	1,326.38	-	0.83	-0.10	-0.82	2,547.53	MWD	
1/11/2014	8,470.00	90.65	321.25	6,273.31	2,299.83	1,401.41	-	1.99	0.46	-1.94	2,642.53	MWD	
1/11/2014	8,566.00	90.14	320.42	6,272.65	2,395.59	1,475.84	-	1.01	-0.53	-0.86	2,738.52	MWD	
1/11/2014	8,662.00	90.34	320.42	6,272.24	2,491.41	1,549.83	-	0.21	0.21	0.00	2,834.52	MWD	
1/11/2014	8,758.00	90.41	320.70	6,271.61	2,587.21	1,623.97	-	0.30	0.07	0.29	2,930.52	MWD	
1/11/2014	8,853.00	90.31	319.61	6,271.02	2,682.05	1,696.91	-	1.15	-0.11	-1.15	3,025.52	MWD	
1/11/2014	8,949.00	90.65	319.20	6,270.21	2,777.95	1,769.80	-	0.55	0.35	-0.43	3,121.51	MWD	
1/11/2014	9,045.00	90.38	319.21	6,269.35	2,873.86	1,842.47	-	0.28	-0.28	0.01	3,217.51	MWD	
1/11/2014	9,140.00	89.93	318.54	6,269.09	2,968.80	1,914.03	-	0.85	-0.47	-0.71	3,312.51	MWD	
1/11/2014	9,236.00	90.24	318.70	6,268.95	3,064.76	1,986.07	-	0.36	0.32	0.17	3,408.51	MWD	
1/11/2014	9,332.00	90.17	318.27	6,268.61	3,160.72	2,057.95	-	0.45	-0.07	-0.45	3,504.51	MWD	
1/11/2014	9,427.00	90.21	317.99	6,268.29	3,255.69	2,128.69	-	0.30	0.04	-0.29	3,599.51	MWD	
1/11/2014	9,522.00	90.03	317.51	6,268.09	3,350.68	2,199.01	-	0.54	-0.19	-0.51	3,694.51	MWD	
1/11/2014	9,617.00	90.65	316.70	6,267.53	3,445.68	2,268.61	-	1.07	0.65	-0.85	3,789.50	MWD	
1/11/2014	9,712.00	91.34	317.28	6,265.88	3,540.66	2,338.06	-	0.95	0.73	0.61	3,884.49	MWD	
							2,683.03						

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API 4708510073	Surface Legal Location	Field PENS	Permit Number	State West Virginia	Well Configuration Type HORIZONTAL
Ground Elevation (ft) 1,084.00	Casing Flange Elevation (ft) 1,083.25	KB-Ground Distance (ft) 25.50	KB-Casing Flange Distance (ft) 26.25	Spud Date (Conductor) 1/11/2014 04:00	Rig Release Date 4/20/2014 08:30

### Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Build (°/100ft)	Turn (°/100ft)	Unwrap Displace (ft)	Method	Survey Company
1/11/2014	9,808.00	91.34	319.31	6,263.64	3,636.60	2,409.71	-	2.11	0.00	2.11	3,980.46	MWD	
							2,746.88						
1/11/2014	9,904.00	90.41	321.41	6,262.17	3,732.40	2,483.62	-	2.39	-0.97	2.19	4,076.44	MWD	
							2,808.11						
1/11/2014	9,998.00	89.93	322.50	6,261.89	3,826.03	2,557.65	-	1.27	-0.51	1.16	4,170.44	MWD	
							2,866.04						
1/11/2014	10,093.00	90.17	323.04	6,261.81	3,920.53	2,633.29	-	0.62	0.25	0.57	4,265.44	MWD	
							2,923.52						
1/11/2014	10,187.00	89.90	322.96	6,261.75	4,013.99	2,708.36	-	0.30	-0.29	-0.09	4,359.44	MWD	
							2,980.09						
1/11/2014	10,282.00	89.86	321.76	6,261.95	4,108.55	2,783.59	-	1.26	-0.04	-1.26	4,454.43	MWD	
							3,038.10						
1/11/2014	10,378.00	90.03	321.12	6,262.04	4,204.24	2,858.65	-	0.69	0.18	-0.67	4,550.43	MWD	
							3,097.94						
1/11/2014	10,473.00	89.79	320.75	6,262.19	4,299.00	2,932.42	-	0.46	-0.25	-0.39	4,645.43	MWD	
							3,157.81						
1/11/2014	10,568.00	89.97	320.85	6,262.39	4,393.77	3,006.03	-	0.22	0.19	0.11	4,740.43	MWD	
							3,217.86						
1/11/2014	10,662.00	89.86	320.46	6,262.53	4,487.57	3,078.73	-	0.43	-0.12	-0.41	4,834.43	MWD	
							3,277.45						
1/11/2014	10,757.00	90.07	320.05	6,262.59	4,582.40	3,151.77	-	0.48	0.22	-0.43	4,929.43	MWD	
							3,338.19						
1/11/2014	10,853.00	90.10	319.77	6,262.44	4,678.26	3,225.22	-	0.29	0.03	-0.29	5,025.43	MWD	
							3,400.01						
1/11/2014	10,947.00	89.35	318.32	6,262.90	4,772.19	3,296.20	-	1.74	-0.80	-1.54	5,119.43	MWD	
							3,461.62						
1/11/2014	11,042.00	89.83	317.99	6,263.58	4,867.17	3,366.97	-	0.61	0.51	-0.35	5,214.42	MWD	
							3,525.00						
1/11/2014	11,136.00	90.65	318.58	6,263.18	4,961.13	3,437.14	-	1.07	0.87	0.63	5,308.42	MWD	
							3,587.55						
1/11/2014	11,232.00	90.52	318.32	6,262.20	5,057.09	3,508.98	-	0.30	-0.14	-0.27	5,404.42	MWD	
							3,651.22						
1/11/2014	11,328.00	90.58	318.35	6,261.28	5,153.06	3,580.69	-	0.07	0.06	0.03	5,500.41	MWD	
							3,715.03						
1/11/2014	11,423.00	90.28	319.77	6,260.57	5,247.98	3,652.45	-	1.53	-0.32	1.49	5,595.41	MWD	
							3,777.28						
1/11/2014	11,518.00	89.76	319.53	6,260.53	5,342.87	3,724.85	-	0.60	-0.55	-0.25	5,690.41	MWD	
							3,838.79						
1/11/2014	11,614.00	90.38	320.20	6,260.42	5,438.73	3,798.24	-	0.95	0.65	0.70	5,786.41	MWD	
							3,900.67						
1/11/2014	11,709.00	90.34	320.61	6,259.82	5,533.55	3,871.45	-	0.43	-0.04	0.43	5,881.40	MWD	
							3,961.22						
1/11/2014	11,804.00	90.72	320.90	6,258.94	5,628.33	3,945.02	-	0.50	0.40	0.31	5,976.40	MWD	
							4,021.31						
1/11/2014	11,899.00	90.45	320.75	6,257.97	5,723.09	4,018.66	-	0.33	-0.28	-0.16	6,071.40	MWD	
							4,081.32						
1/11/2014	11,995.00	90.55	320.72	6,257.13	5,818.87	4,092.98	-	0.11	0.10	-0.03	6,167.39	MWD	
							4,142.08						
1/11/2014	12,090.00	90.58	320.98	6,256.20	5,913.64	4,166.65	-	0.28	0.03	0.27	6,262.39	MWD	
							4,202.05						
1/11/2014	12,185.00	90.93	322.19	6,254.94	6,008.30	4,241.08	-	1.33	0.37	1.27	6,357.38	MWD	
							4,261.08						
1/11/2014	12,279.00	90.55	323.69	6,253.73	6,101.76	4,316.08	-	1.65	-0.40	1.60	6,451.37	MWD	
							4,317.72						
1/11/2014	12,375.00	90.79	325.64	6,252.61	6,196.86	4,394.39	-	2.05	0.25	2.03	6,547.35	MWD	
							4,373.23						
1/11/2014	12,468.00	90.55	324.57	6,251.52	6,288.89	4,470.66	-	1.18	-0.26	-1.15	6,640.35	MWD	
							4,426.43						
1/11/2014	12,563.00	90.59	321.63	6,250.57	6,383.32	4,546.62	-	3.09	0.04	-3.09	6,735.33	MWD	
							4,483.46						

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Well Name: PENS2HHS

API 4708510073	Surface Legal Location	Field PENS	Permit Number	State West Virginia	Well Configuration Type HORIZONTAL
Ground Elevation (ft) 1,084.00	Casing Flange Elevation (ft) 1,083.25	KB-Ground Distance (ft) 25.50	KB-Casing Flange Distance (ft) 26.25	Spud Date (Conductor) 1/11/2014 04:00	Rig Release Date 4/20/2014 08:30

### Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Build (°/100ft)	Turn (°/100ft)	Unwrap Displace (ft)	Method	Survey Company
1/11/2014	12,659.00	90.28	319.88	6,249.85	6,479.09	4,620.96	4,544.19	1.85	-0.32	-1.82	6,831.33	MWD	
1/11/2014	12,753.00	90.58	320.08	6,249.14	6,572.95	4,692.94	4,604.64	0.38	0.32	0.21	6,925.32	MWD	
1/11/2014	12,849.00	90.55	320.18	6,248.19	6,668.79	4,766.62	4,666.18	0.11	-0.03	0.10	7,021.32	MWD	
1/11/2014	12,945.00	89.97	318.92	6,247.76	6,764.68	4,839.67	4,728.46	1.44	-0.60	-1.31	7,117.31	MWD	
1/11/2014	13,040.00	90.17	318.81	6,247.64	6,859.62	4,911.22	4,790.95	0.24	0.21	-0.12	7,212.31	MWD	
1/11/2014	13,135.00	90.24	318.04	6,247.30	6,954.58	4,982.29	4,853.99	0.81	0.07	-0.81	7,307.31	MWD	
1/11/2014	13,231.00	90.58	319.36	6,246.62	7,050.53	5,054.41	4,917.35	1.42	0.35	1.37	7,403.31	MWD	
1/11/2014	13,327.00	90.65	319.72	6,245.58	7,146.42	5,127.44	4,979.64	0.38	0.07	0.38	7,499.30	MWD	
1/11/2014	13,422.00	90.79	319.57	6,244.39	7,241.30	5,199.83	5,041.15	0.22	0.15	-0.16	7,594.29	MWD	
1/11/2014	13,518.00	90.76	319.72	6,243.09	7,337.17	5,272.98	5,103.31	0.16	-0.03	0.16	7,690.29	MWD	
1/11/2014	13,613.00	90.79	319.32	6,241.81	7,432.06	5,345.24	5,164.97	0.42	0.03	-0.42	7,785.28	MWD	
1/11/2014	13,709.00	90.96	319.39	6,240.34	7,527.96	5,418.07	5,227.50	0.19	0.18	0.07	7,881.27	MWD	
1/11/2014	13,804.00	90.52	319.24	6,239.11	7,622.87	5,490.10	5,289.42	0.49	-0.46	-0.16	7,976.26	MWD	
1/11/2014	13,899.00	91.31	321.41	6,237.60	7,717.67	5,563.21	5,350.06	2.43	0.83	2.28	8,071.24	MWD	
1/11/2014	13,995.00	91.07	321.16	6,235.60	7,813.37	5,638.10	5,410.09	0.36	-0.25	-0.26	8,167.22	MWD	
1/11/2014	14,090.00	90.83	319.99	6,234.03	7,908.15	5,711.47	5,470.41	1.26	-0.25	-1.23	8,262.20	MWD	
1/11/2014	14,184.00	90.83	319.83	6,232.67	8,002.01	5,783.37	5,530.94	0.17	0.00	-0.17	8,356.19	MWD	
1/11/2014	14,280.00	90.89	319.99	6,231.23	8,097.86	5,856.81	5,592.76	0.18	0.06	0.17	8,452.18	MWD	
1/11/2014	14,375.00	90.93	320.09	6,229.72	8,192.70	5,929.62	5,653.77	0.11	0.04	0.11	8,547.17	MWD	
1/11/2014	14,470.00	91.00	320.83	6,228.12	8,287.50	6,002.87	5,714.24	0.78	0.07	0.78	8,642.16	MWD	
1/11/2014	14,566.00	91.00	322.90	6,226.44	8,383.12	6,078.36	5,773.50	2.16	0.00	2.16	8,738.14	MWD	
1/11/2014	14,660.00	90.79	324.19	6,224.97	8,476.46	6,153.96	5,829.35	1.39	-0.22	1.37	8,832.12	MWD	
1/11/2014	14,756.00	90.41	324.97	6,223.97	8,571.59	6,232.19	5,884.99	0.90	-0.40	0.81	8,928.12	MWD	
1/11/2014	14,851.00	90.03	324.20	6,223.60	8,665.72	6,309.61	5,940.04	0.90	-0.40	-0.81	9,023.12	MWD	
1/11/2014	14,945.00	90.96	323.26	6,222.79	8,759.04	6,385.39	5,995.64	1.41	0.99	-1.00	9,117.11	MWD	
1/11/2014	15,040.00	91.89	321.58	6,220.43	8,853.56	6,460.65	6,053.56	2.02	0.98	-1.77	9,212.08	MWD	
1/11/2014	15,135.00	92.00	320.25	6,217.20	8,948.27	6,534.35	6,113.42	1.40	0.12	-1.40	9,307.02	MWD	
1/11/2014	15,230.00	92.27	318.52	6,213.66	9,043.11	6,606.41	6,175.22	1.84	0.28	-1.82	9,401.95	MWD	
1/11/2014	15,325.00	91.51	316.41	6,210.53	9,138.04	6,676.37	6,239.40	2.36	-0.80	-2.22	9,496.89	MWD	
1/11/2014	15,420.00	90.89	315.56	6,208.54	9,233.01	6,744.67	6,305.40	1.11	-0.65	-0.89	9,591.87	MWD	

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Well Name: PENS2HHS

API 4708510073	Surface Legal Location	Field PENS	Permit Number	State West Virginia	Well Configuration Type HORIZONTAL
Ground Elevation (ft) 1,084.00	Casing Flange Elevation (ft) 1,083.25	KB-Ground Distance (ft) 25.50	KB-Casing Flange Distance (ft) 26.25	Spud Date (Conductor) 1/11/2014 04:00	Rig Release Date 4/20/2014 08:30

Survey Data													
Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Build (°/100ft)	Turn (°/100ft)	Unwrap Displace (ft)	Method	Survey Company
1/11/2014	15,516.0 0	90.83	315.22	6,207.10	9,328.97	6,813.01	- 6,372.81	0.36	-0.06	-0.35	9,687.86	MWD	
1/11/2014	15,612.0 0	90.65	315.24	6,205.86	9,424.92	6,881.15	- 6,440.41	0.19	-0.19	0.02	9,783.85	MWD	
1/11/2014	15,708.0 0	90.45	315.01	6,204.94	9,520.87	6,949.18	- 6,508.14	0.32	-0.21	-0.24	9,879.85	MWD	
1/11/2014	15,805.0 0	90.48	315.44	6,204.15	9,617.83	7,018.04	- 6,576.46	0.44	0.03	0.44	9,976.84	MWD	
1/11/2014	15,901.0 0	90.03	315.20	6,203.72	9,713.79	7,086.30	- 6,643.96	0.53	-0.47	-0.25	10,072.8 4	MWD	
1/11/2014	15,996.0 0	90.62	316.37	6,203.19	9,808.77	7,154.38	- 6,710.20	1.38	0.62	1.23	10,167.8 4	MWD	
1/11/2014	16,092.0 0	91.00	318.03	6,201.83	9,904.76	7,224.81	- 6,775.42	1.77	0.40	1.73	10,263.8 2	MWD	
1/11/2014	16,158.0 0	91.20	318.18	6,200.56	9,970.73	7,273.93	- 6,819.49	0.38	0.30	0.23	10,329.8 1	MWD	
4/15/2014	16,241.0 0	91.20	318.18	6,198.82	10,053.6 9	7,335.77	- 6,874.82	0.00	0.00	0.00	10,412.7 9	PROJ	

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# Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	3/5/2017
Job End Date:	3/18/2017
State:	West Virginia
County:	Ritchie
API Number:	47-085-10073-00-00
Operator Name:	CONSOL Energy Inc.
Well Name and Number:	PEN-2H-HS
Latitude:	39.33665300
Longitude:	-81.01256800
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,284
Total Base Water Volume (gal):	11,882,262
Total Base Non Water Volume:	



## Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Consol	Carrier/Base Fluid					
				7732-18-5		85.89514	
Scale Inhibitor E	Universal Well Services	Scale Inhibitor					
				Listed Below			

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HCL Acid (15%)	Universal Well Services	Acidizing					
				Listed Below			
HCL Acid (7.5%)	Universal Well Services	Acidizing					
				Listed Below			
Scale Hib A	universal Well Services	Scale Inhibitor					
				Listed Below			
Unislick ST50	Universal Well Services	Friction reduceer					
				Listed Below			
Unislick CST	Universal Well Services	Friction Reducer					
				Listed Below			
Aqucar 714	Universal Well Services	Biocide					
				Listed Below			
Sand	Universal Well Services	Proppant					
				Listed Below			
Unihib G	Universal Well Services	Acid Inhibitor					
				Listed Below			
Items above are Trade Names with the exception of Base Water . Items below are the individual ingredients.							
			Crystalline silica quartz	14808-60-7	99.90000	12.82477	
			Hydrochloric acid	7647-01-0	7.50000	0.06542	

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			Hydrochloric acid	7647-01-0	15.00000	0.04842	
			Water	7732-18-5	45.00000	0.01648	
			copolymer of 2-propenamamide	Proprietary	30.00000	0.01099	
			Petroleum distillate	64742-47-8	20.00000	0.00732	
			Water	7732-18-5	83.00000	0.00711	
			Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.00490	
			Ammonium acetate	631-61-8	13.00000	0.00212	
			Ethylene glycol	107-21-1	30.00000	0.00194	
			Triethanolamine Tri (Phosphate Ester), Sodium Salt	68171-29-9	30.00000	0.00194	
			Glutaraldehyde	111-30-8	14.00000	0.00120	
			Alcohols, C12-16, ethoxylated	68551-12-2	5.00000	0.00082	
			Alcohols, C12-14, ethoxylated	68439-50-9	5.00000	0.00082	
			Alcohols, (C10-16), ethoxylated	68002-97-1	5.00000	0.00082	
			Alcohols, C12-16, ethoxylated	68551-12-2	2.00000	0.00073	
			Oleic acid diethanolamide	93-83-4	2.00000	0.00073	
			Butyl diglycol	112-34-5	75.00000	0.00072	
			Copolymer of Maleic and Acrylic Acid	52255-49-9	20.00000	0.00065	
			Alcohols, (C10-16), ethoxylated	68002-97-1	50.00000	0.00048	
			Ammonium chloride	12125-02-9	1.00000	0.00037	
			Quaternary ammonium compound	68424-85-1	2.50000	0.00021	
			DETA phosphonate	15827-60-8	5.00000	0.00016	
			Hexamethylene Triamine Penta(Methylene Phosphonic Acid)	34690-00-1	5.00000	0.00016	
			Methanol	67-56-1	5.00000	0.00005	

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			Ethanol	64-17-5	0.30000	0.00003	
			Thiourea	62-56-6	1.00000	0.00001	
			Formaldehyde	50-00-0	1.00000	0.00001	

\* Total Water Volume sources may include various types of water including fresh water, produced water, and recycled water

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

\*\*\* If you are calculating a percentage of total ingredients do not add the water volume below the green line to the water volume above the green line

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)