west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

PERMIT MODIFICATION APPROVAL

April 01, 2014

NOBLE ENERGY, INC.
333 TECHNOLOGY DRIVE, SUITE 110
CANONSBURG, PA 15317

Re: Permit Modification Approval for API Number 8510070 , Well #: PEN2EHS
Extended Lateral Legs

Oil and Gas Operator:

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

for

Gene Smith
Regulatory/Compliance Manager
Office of Oil and Gas

noble energy

085 10070
MOD

February 6, 2014

West Virginia Department of Environmental Protection

601 57th Street, SE

Charleston, WV 25304-2345

Re: PEN2 Wells API 47-085-10069 DHS/ 47-085-10070 EHS Modification 1

Dear Office of Oil and Gas:

Enclosed please find permit modifications to extend the lateral legs on the above referenced wells. I have enclosed a new casing program signed by the inspector, new survey plat and revised mineral exhibits. These wells are located in Ritchie County, WV.

Should you have any questions, or desire any additional information, please do not hesitate to contact me at 724-820-3061 or via email at dswiger@nobleenergyinc.com.

Sincerely,

Dee Swiger

Regulatory Analyst III

DS/

Enclosures:

Received

FEB 10 2014

Office of Oil and Gas
WV Dept. of Environmental Protection

WW - 6B
(3/13)

085 10070
MOD

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

API: 47-085-10070

1) Well Operator: Noble Energy, Inc.	494501907	085	Clay	Pennsboro
	Operator ID	County	District	Quadrangle

2) Operator's Well Number: PEN2EHS Well Pad Name: PEN2

3 Elevation, current ground: 1074.85 Elevation, proposed post-construction: 1075.4

4) Well Type: (a) Gas ■ Oil _____ Underground Storage _____
Other _____
(b) If Gas: Shallow ■ Deep _____
Horizontal ■

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Target-Marcellus, Depth- 6262-66324; Thickness- 62"; Pressure- 4174 # psi

7) Proposed Total Vertical Depth: 6314'

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 16850'

10) Approximate Fresh Water Strata Depths: 454'

11) Method to Determine Fresh Water Depth: Closest well & Seneca Technology data base

12) Approximate Saltwater Depths: 1244'

13) Approximate Coal Seam Depths: no coal

14) Approximate Depth to Possible Void (coal mine, karst, other): none

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: no

16) Describe proposed well work: Drill the vertical depth to the Marcellus at an estimated total vertical depth of approximately 6314 feet.
Drill Horizontal leg - stimulate and produce the Marcellus Formation.
Should we encounter a unanticipated void we will install a minimum of 20' of casing below the void but not more than 50' set a basket and grout to surface.

17) Describe fracturing/stimulating methods in detail:
The stimulation will be multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals.

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18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 8.43

19) Area to be disturbed for well pad only, less access road (acres): 8.0

DWR
1-21-14

WW - 6B
(3/13)

085 10070
MOD

20) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill -up (Cu. Ft.)
Conductor	20"	N	LS	52	40'	40'	GTS
Fresh Water	13 3/8"	N	J-55	54.5	579'	579'	CTS
Coal							
Intermediate	9 5/8"	N	HCK-55 BTC	36.0	5410'	5410'	CTS
Production	5 1/2"	N	HCP-110 TXP BTC	20.0	16850'	16850'	Class A tail slurry to inside intermediate casing
Tubing							
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	26"	.25	2730	Grout to Surface	Grout to Surface
Fresh Water	13 3/8"	17.5"	.380	2730	Type 1	1.18
Coal						
Intermediate	9 5/8"	12.25"	.352	3520	Class A	1.19
Production	5 1/2"	8.75/8.5"	.361	12,640	Class A	1.27
Tubing						
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

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DWK 1-21-14

085 10070 MOD

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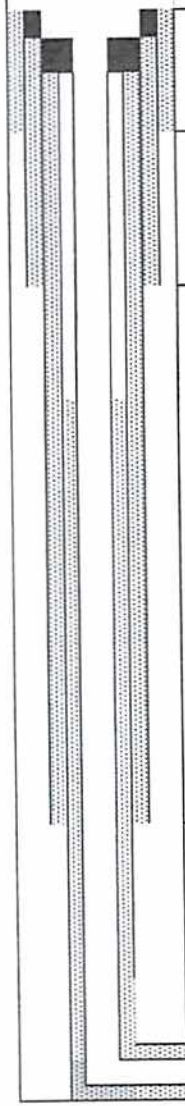
PENS-2 WELLBORE DIAGRAM

Marcellus Shale Horizontal
Ritchie County, WV
Ground Elevation 1076'

	PENS-2E SHL (Lat/Long)	(308294.61N, 1572187.95E) (NAD27)
Ground Elevation 1076'	PENS-2E LP (Lat/Long)	(308489.32N, 1573215.55E) (NAD27)
Azm 139.06°	PENS-2E BHL (Lat/Long)	(300859.34N, 1579615.75E) (NAD27)



HOLE	CASING	GEOLOGY	TVD Top	TVD Bottom	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS
26"	20" 52#				AIR	Grouted to surface	N/A	Ensure the hole is clean at TD.	Stabilize surface fill/soil. Conductor casing = 0.25" wall thickness
		Conductor		40					
17.5"	13-3/8" 54.5# J-55 BTC				AIR	15.6 ppg Type 1 + 2% CaCl, 0.25# Lost Circ 40% Excess Yield = 1.18 CTS	Bow Spring every 3 joints to surface	Fill with KCl water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Protect freshwater. Surface casing = 0.380" thick. Burst=2730 psi
		Surface Casing		579					
12.25"	9-5/8" 36# HCK-55 BTC	Maxton	1929	1973	SOBM 8.0 - 8.5 ppg	50 bbls 10 ppg spacer, 12.0 ppg lead slurry, (800') of 15.6 ppg Class A tail slurry cemented to surface.	Bow Spring centralizers on every joint to KOP, one every third joint from KOP to 100' from surface	Once at TD, circulate at least 2x bottoms up. Once casing is at setting depth, circulate a minimum of one hole volume pripr to pumping cement	Casing to be ran below the Alexander. Intermediate casing = 0.352" wall thickness Burst=3520 psi, Collapse 2980 psi
		Big Lime	2005	2082					
		Big Injun	2082	2130					
		Weir	2449	2465					
		Fifth	2921	2927					
		Gordon	2950	2952					
		Warren	3532	3566					
		Speechley	3850	4404					
		Riley	4601	4615					
		Benson	4955	4961					
		Alexander	5204	5210					
		Intermediate Casing	5410						
8.75/8.5"	5-1/2" 20# HCP-110 TXP BTC	Rhinestreet	5740	5908	SOBM 12.5- 13.0 ppg	120 bbls spacer with density and rheology heirarchy, lead slurry to 2000' to recover SOBM, 14.8 ppg Class A tail slurry to inside intermediate casing	Rigid Bow Spring every third joint from KOP to TOC Rigid Bow Spring every joint to KOP	Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.361" wall thickness Burst=12640 psi Note:Actual centralizer schedules may be changed due to hole conditions
		Marcellus	6262	6324					
		TD	16850						

8.75/8.5" Hole - Cemented Long String 5-1/2" 20# HCP-110 TXP BTC

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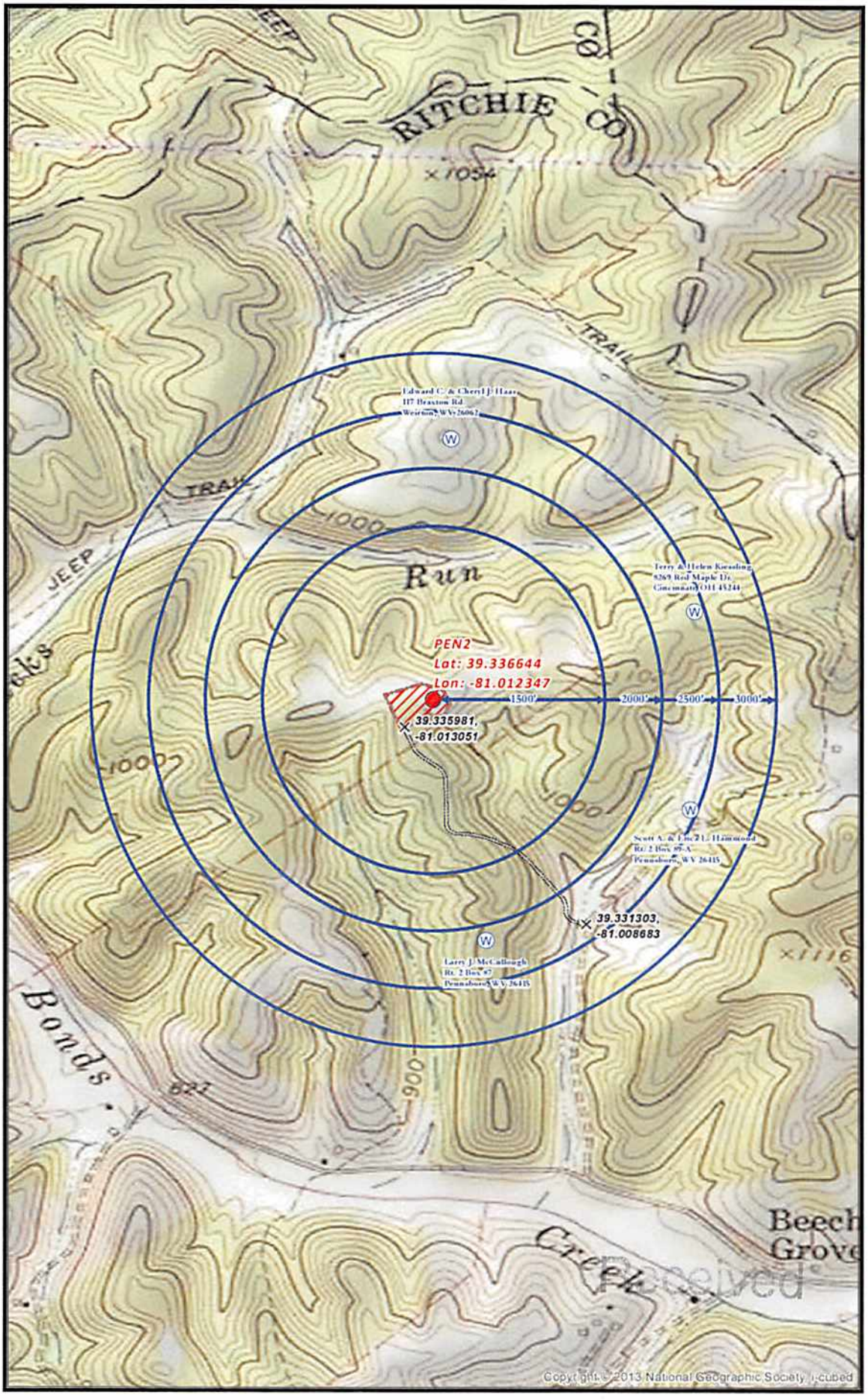
Dck 1-01-14

plat spotted on

85 10070



PENS2 SITE SAFETY PLAN
- WATER WELLS PROXIMITY -

Water Purveyor Buffer — Proposed Road
Road Intersection — Well Pad Boundary

0 500 1,000 2,000 Feet

Scale 1" = 1,000'

noble energy

Date: 7/31/2013

Disclaimer: All data is licensed for use by Noble Energy Inc. use only.

6/6

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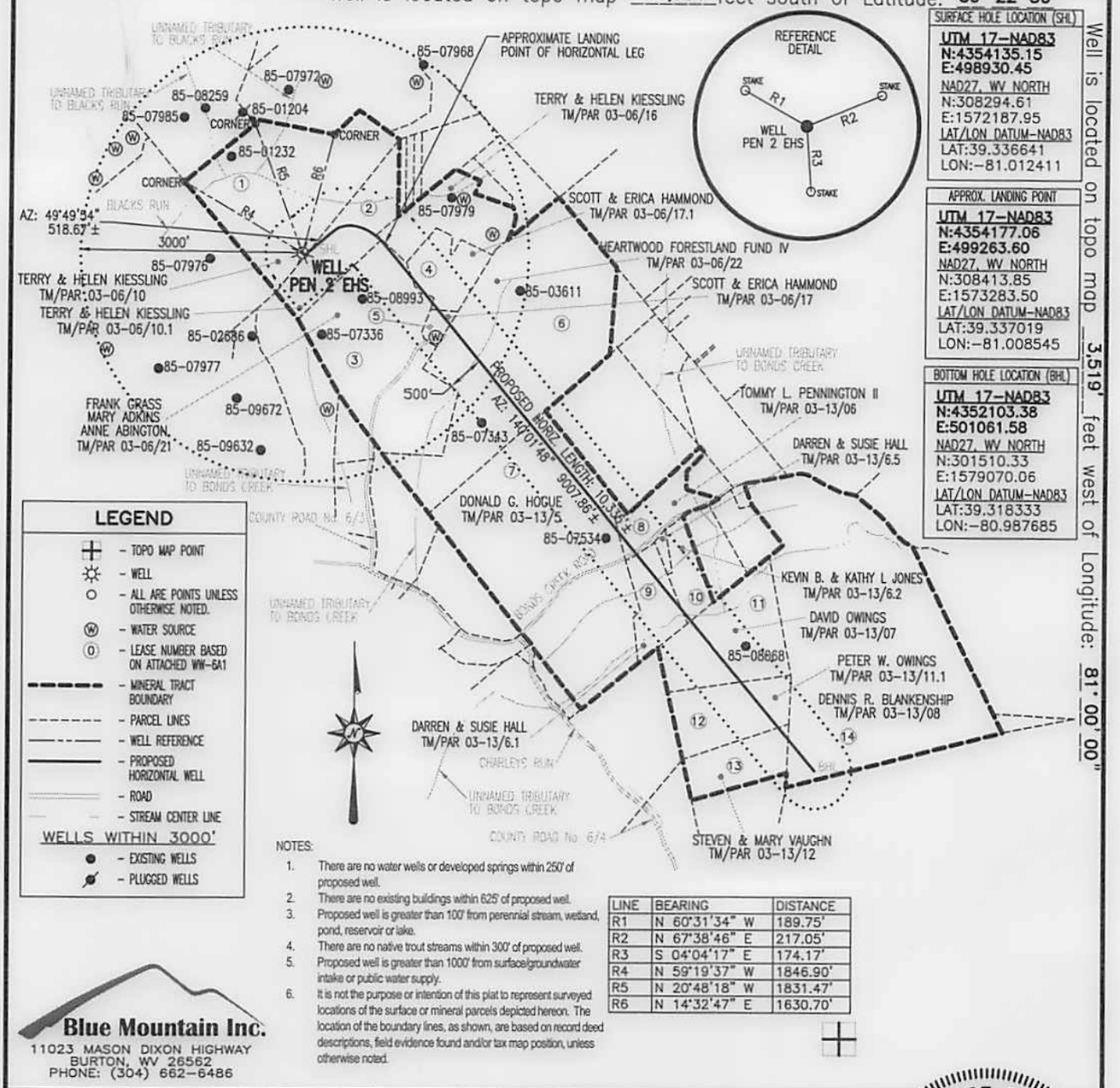
WV Department of Environmental Protection

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"



LEGEND

- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED.
- WATER SOURCE
- LEASE NUMBER BASED ON ATTACHED WW-6A1
- MINERAL TRACT BOUNDARY
- PARCEL LINES
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE

WELLS WITHIN 3000'

- EXISTING WELLS
- PLUGGED WELLS

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

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

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

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 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'

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

FILE #: PEN 2 EHS

DRAWING #: PEN 2 EHS

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: [signature]

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: JANUARY 30, 2014

OPERATOR'S WELL #: PEN 2 EHS

API WELL #: 47 (STATE) 85 (COUNTY) MOD 10070 (PERMIT) H6A

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: SEE ATTACHED WW-6A1 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