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west virginia department of environmental protection

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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](http://www.dep.wv.gov)

## PERMIT MODIFICATION APPROVAL

October 01, 2013

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

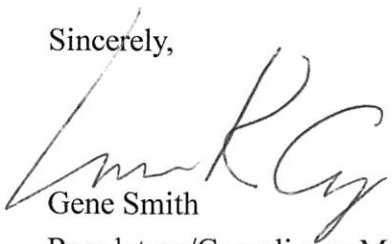
Re: Permit Modification Approval for API Number 8510034 , Well #: PENS 1 JHS  
**extended lateral**

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



Laura Adkins  
Regulatory Analyst  
333 Technology Dr.  
Suite 116  
Canonsburg, WV 15317

Laura Cooper  
Environmental Analyst  
501 57<sup>th</sup> Street, SE  
Charleston, WV 25304

RE: Well PENS1JHS API 85-10034

Dear Laura,

We have obtained additional mineral acreage on the PENS1 pad and Noble Energy, Inc. respectfully requests a permit modification to the PENS 1 JHS, API 85-10034 permit. I have included an updated mylar plat, casing program, well schematic and mineral exhibits. The leases and memorandums of lease that have not yet been recorded are enclosed as well.

Please do not hesitate to contact me if you need additional information or have questions.

Best,

A handwritten signature in black ink that reads 'Laura L. Adkins'.

Laura L. Adkins

**RECEIVED**  
**Office of Oil and Gas**  
**SEP 13 2013**  
**WV Department of**  
**Environmental Protection**

10/04/2013

**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION**

1) Well Operator: Noble Energy, Inc.

494501907	085-RITCHIE	Clay	Pennsboro
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Operator ID County District Quadrangle

2) Operator's Well Number: PENS1JHS Well Pad Name: PENS1HS

3 Elevation, current ground: 1110' Elevation, proposed post-construction: 1110'

4) Well Type: (a) Gas  Oil   
Other \_\_\_\_\_  
(b) If Gas: Shallow  Deep   
Horizontal  \_\_\_\_\_

5) Existing Pad? Yes or No: Yes

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
MARCELLUS, Depth 6291'. Thickness-78', Pressure-4204#

7) Proposed Total Vertical Depth: 6369'

8) Formation at Total Vertical Depth: MARCELLUS

9) Proposed Total Measured Depth: 14,842'

10) Approximate Fresh Water Strata Depths: 130'

11) Method to Determine Fresh Water Depth: Offset well data

12) Approximate Saltwater Depths: 1525', 1805'

13) Approximate Coal Seam Depths: No known coal in area

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

15) Does land contain coal seams tributary or adjacent to, active mine? No

16) Describe proposed well work: Drill a horizontal well and produce the Marcellus. Case and cement well as prescribed in the following casing program.

17) Describe fracturing/stimulating methods in detail:  
Well will be completed following the procedure attached. Offset wells will be monitored as described in attached procedure.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 15 acres

19) Area to be disturbed for well pad only, less access road (acres): 8.08 acres

**RECEIVED**  
**Office of Oil and Gas**  
**SEP 13 2013**  
**WV Department of**  
**Environmental Protection**

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"	New	LS	81.3#	40'	40'	cts 15.6 PPG yield 1.2 to surface
Fresh Water	13 3/8"	New	J-55	54.5#	650'	650'	cts 15.6 ppg 40% excess yield 1.19
Coal							
Intermediate	9 5/8"	New	HCN80	40#	5500'	5500'	cts 15.6 ppg 30% excess yield 1.19
Production	5 1/2"	New	HCP110	20#	14,842'	14,842'	at least 500' above shallowest producing formation
Tubing							
Liners							

Noble Energy, Inc. requests to run surface casing to 650' so that our casing point will be in competent rock.

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	26"	.438	2110	Type 1	1.2
Fresh Water	13 3/8"	17 1/2"	.380	2730	Type 1	1.2
Coal						
Intermediate	9 5/8"	12 3/8"	.352	7910	Type 1	1.19
Production	5 1/2"	8 3/4" & 8 1/2"	.361	12,630	Type 1	1.27
Tubing						
Liners						

PACKERS

GCS 10/1/13

Kind:				
Sizes:				
Depths Set:				



**DRILLING WELL PLAN**  
**PENS-1J-HS**  
**Macellus Shale Horizontal**  
**Ritchie County, WV**

**PENS-1J-HS (Marcellus HZ)**

Ground Elevation	1112'		Landing Point (NAD 27)				N 308608.10 E 1578055.61			
SHL (NAD 27)	N 307643.15, E 1577729.63		BHL (NAD 27)				N 314750.71, E 1572901.34			
WELLBORE DIAGRAM	HOLE	CASING	GEOLOGY	TOP TVD	BASE TVD	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS
	26"	20" 52# LS	Conductor	40	40	AIR	15.6 ppg Type I/II + 2% CaCl Yield = 1.2 To Surface	N/A	Ensure the hole is clean via air circulation at TD.	Conductor casing = 0.25" wall thickness
	17.5"	13-3/8" 54.5# J-55 BTC	Surface Casing	650	650	AIR	15.6 ppg Type I/II + 2% CaCl, 0.25# Lost Circ 40% Excess Yield = 1.2 To Surface	Bow Spring on first 2 joints then every third joint to 100' form 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.	Surface casing = 0.380" wall thickness Burst=2730 psi
	12.25"	9-5/8" 36# HCK-55 BTC	Maxton Sand	1968	2012	AIR or 8.5ppg SOBM	Two stage cement job, stage tool at +/-2500' TVD. 1st stage lead=14.2 ppg. TOC=2500' TVD; 1st stage tail=15.6 ppg. TOC=4750' TVD; 2nd stage 14.2 ppg. TOC=Surface	Bow Spring on first 2 joints then every third joint to 100' form surface	Once at TD, circulate at drilling pump rate for at least three hours. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.352" wall thickness Burst=3520 psi
			Big Lime	2044	2121					
			Big Injun	2121	2169					
			Weir Sand	2488	2504					
			5th Sand	2960	2966					
			Gordon	2989	2991					
			Warren Sand	3571	3605					
			Speechley	3889	4443					
			Riley	4640	4654					
	Benson	4994	5000							
Alexander	5243	5249								
Int. Casing		5300								
8.75" Vertical	5-1/2" 20# HCP-110 TXP BTC	Marcellus	6291	6369	12.5ppg SOBM	14.8ppg Class A 25.75:0 System +2.6% Cement extender, 0.7% Fluid Loss additive, 0.5% high temp retarder, 0.2% friction reducer 10% Excess TOC >= 200' above 9.625" shoe	Rigid Bow Spring every joint to KOP. Rigid Bow Spring every third joint from KOP to TOC	Once at TD, circulate at drilling pump rate for at least three hours. 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	
8.75" Curve										
8.75" - 8.5" Lateral			6369	6372						Onondaga

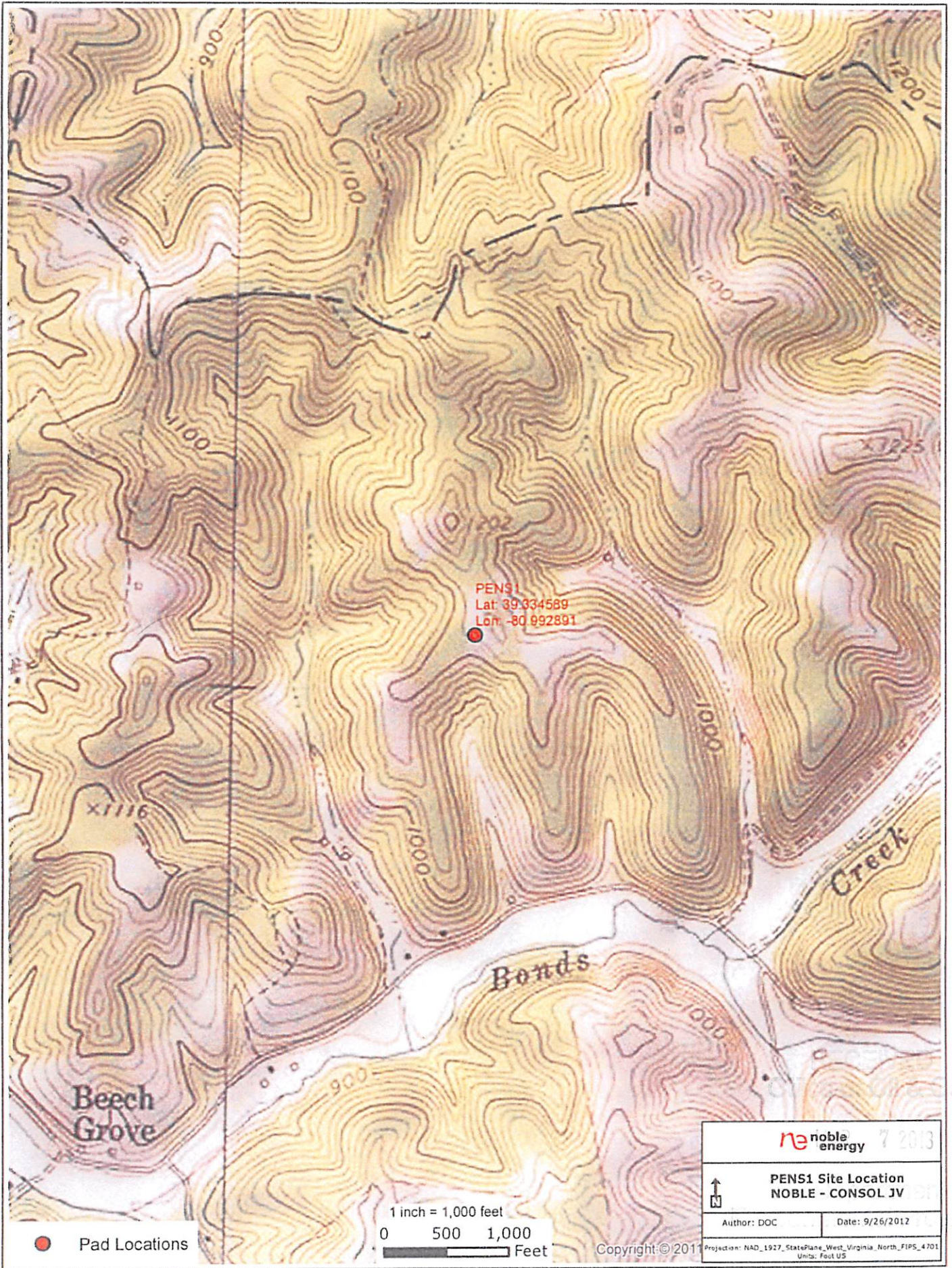
LP @ +/-6359 TVD

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

+/-8020 Ft Lateral

TD @ +/-6359 TVD  
 +/-14,842 MD

X=centralizers



Well is located on topo map 14,560' feet south of Latitude: 39° 22' 30"

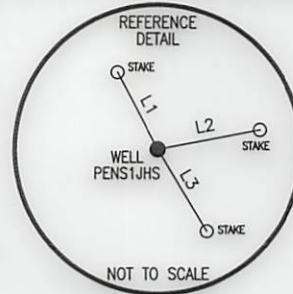
Well is located on topo map 9,799' feet west of Longitude: 80° 57' 30"

**LEGEND**

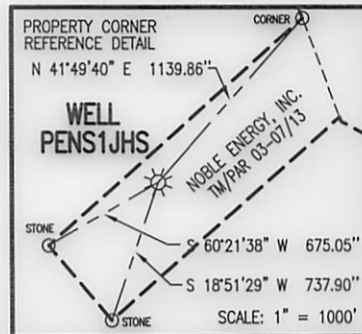
- TOPO MAP POINT
  - PROPOSED GAS WELL
  - ALL ARE POINTS UNLESS OTHERWISE NOTED.
  - WATER SOURCE
  - LEASE NUMBER BASED ON ATTACHED WW-6A1
  - SURFACE BOUNDARY
  - PARCEL LINES
  - WELL REFERENCE
  - PROPOSED HORIZONTAL WELL
  - ROAD
  - STREAM CENTER LINE
- WELLS WITHIN 3000'**
- EXISTING WELLS
  - PLUGGED WELLS

**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
L1	N 28°03'20" W	180.49'
L2	N 79°14'04" E	217.25'
L3	S 31°08'53" E	197.51'



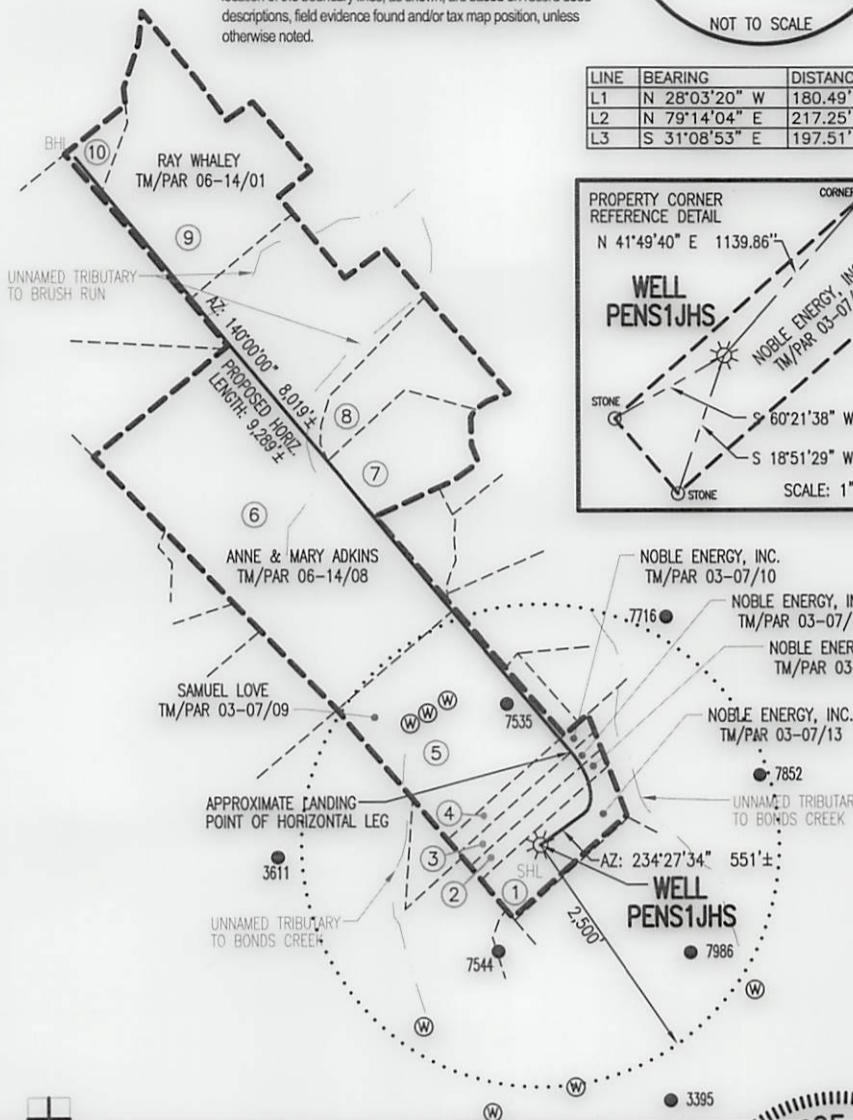
**SURFACE HOLE LOCATION (SHL)**  
UTM 17-NAD83  
N:4353964.917  
E:500622.023  
NAD27, WV NORTH  
N:307643.15  
E:1577729.63

**APPROX. LANDING POINT**  
UTM 17-NAD83  
N:4354260.55  
E:500716.42  
NAD27, WV NORTH  
N:308608.09  
E:1578055.61

**BOTTOM HOLE LOCATION (BHL)**  
UTM 17-NAD83  
N:4356105.65  
E:499114.93  
NAD27, WV NORTH  
N:314750.71  
E:1572901.34



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



FILE #: PENS1JHS  
DRAWING #: PENS1JHS  
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



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



DATE: JUNE 5, 2013  
OPERATOR'S WELL #: PENS1JHS  
API WELL #: 47 85  
STATE COUNTY PERMIT

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

WATERSHED: BONDS CREEK ELEVATION: 1117.96'  
COUNTY/DISTRICT: RITCHIE / CLAY QUADRANGLE: PENNSBORO, WV 7.5'  
SURFACE OWNER: NOBLE ENERGY, INC. ACREAGE: 19.759±  
OIL & GAS ROYALTY OWNER: SEE ATTACHED WW-6A1 ACREAGE: 453.743±

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: 6,359± TMD: 14,842±  
WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: STEVEN M. GREEN  
Address: 333 TECHNOLOGY DRIVE, SUITE 110 Address: 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 1001  
City: CANONSBURG State: PA Zip Code: 15317 City: CHARLESTON State: WV Zip Code: 25301

10/04/2013