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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

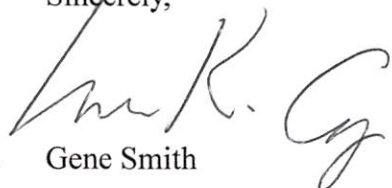
Re: Permit Modification Approval for API Number 8510032 , Well #: PENS 1 GHS  
**extended lateral**

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  
724.820.3118 direct  
412.841.9567 mobile

July 16, 2013

Laura Cooper  
West Virginia Department of Environmental Protection  
Office of Oil and Gas  
601 57<sup>th</sup> St. S.E  
Charleston, WV 25304

Permit Modification Request – Wells PENS1FHS/PENS1GHS/PENS1HHS

Dear Laura,

Enclosed are permit modification requests to extend laterals on the above referenced wells. Please let me know of any deficiencies and we will provide the information you have requested.

If any further information or correspondence is required, please contact me at the above or by email [ladkins@nobleenergyinc.com](mailto:ladkins@nobleenergyinc.com)

Sincerely,

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

Laura Adkins

Enclosure(s):

Received

JUL 19 2013

Office of Oil and Gas  
WV Dept. 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  
Operator ID County District Quadrangle

2) Operator's Well Number: PENS1GHS 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: 14,824'

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

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10/04/2013

WW - 6B  
(1/12)

20)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<b>Size</b>	<b>New or Used</b>	<b>Grade</b>	<b>Weight per ft.</b>	<b>FOOTAGE: For Drilling</b>	<b>INTERVALS: Left in Well</b>	<b>CEMENT: Fill -up (Cu. Ft.)</b>
Conductor	20"	New	LS	81.3#	40'	40'	cls 15.6 PPG yield 1.2 to surface
Fresh Water	13 3/8"	New	J-55	54.5#	650'	650'	cls 15.6 ppg 40% excess yield 1.19
Coal							
Intermediate	9 5/8"	New	HCN80	40#	5500'	5500'	cls 15.6 ppg 30% excess yield 1.19
Production	5 1/2"	New	HCP110	20#	14,824'	14,824'	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.

<b>TYPE</b>	<b>Size</b>	<b>Wellbore Diameter</b>	<b>Wall Thickness</b>	<b>Burst Pressure</b>	<b>Cement Type</b>	<b>Cement Yield</b>
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**

*ACS 10-1-13*

Kind:				
Sizes:				
Depths Set:				

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

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

Ground Elevation	1112'		Landing Point (NAD 27)				N 307650.61 E 1576890.27			
SHL (NAD 27)	N 307609.06, E 1577708.62		BHL (NAD 27)				N 313810.07, E 1571721.86			
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 SOBMM	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 SOBMM	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										Onondaga
LP @ +/-6359 TVD		8.75 / 8.5 Hole - Cemented Long String 5-1/2" 20# HCP-110 TXP BTC				+/-8041 Ft Lateral		TD @ +/-6359 TVD +/-14,824 MD		

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