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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

May 01, 2015

NOBLE ENERGY, INC.  
333 TECHNOLOGY DRIVE, SUITE 116  
CANONSBURG, PA 15317

Re: Permit Modification Approval for API Number 5101768 , Well #: MND 1 BHS

**Casing Revised**

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,

Gene Smith  
Assistant Chief of Permitting  
Office of Oil and Gas



Office of Oil & Gas  
601 57<sup>th</sup> street, SE  
Charleston, WV 25304-2345

April 22, 2015

Re: MND 1 AHS and BHS Permit Modifications

Dear Office of Oil & Gas:

Enclosed please find request for casing modifications for the MND 1 AHS API # 47-051-01810 and MND 1 BHS API# 47-051-01768.

Should you have any questions or desire additional information, please do not hesitate to contact me at [dswiger@nobleenergyinc.com](mailto:dswiger@nobleenergyinc.com) or 724-820-3061.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Dee Swiger'.

Dee Swiger  
Regulatory Analyst III

DS/

Enclosures:

Received

APR 27 2015

Office of Oil and Gas  
WV Dept. of Environmental Protection

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

1) Well Operator: Noble Energy, Inc. 494501907 Marshall Clay Powhatan Point  
Operator ID County District Quadrangle

2) Operator's Well Number: MND 1 BHS Well Pad Name: MND 1

3) Farm Name/Surface Owner: Murray Energy Corporation (formerly Consol) Public Road Access: County Highway 88/8

4) Elevation, current ground: 1152.08 Elevation, proposed post-construction: 1152.08'

5) Well Type (a) Gas  Oil  Underground Storage   
Other

(b) If Gas Shallow  Deep   
Horizontal

6) Existing Pad: Yes or No No

*JN 4/21/15*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Marcellus at 6315'-6370' and 55' in thickness. Anticipated pressure at 4204 psi.

8) Proposed Total Vertical Depth: 6360'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 15,774'

11) Proposed Horizontal Leg Length: 8274'

12) Approximate Fresh Water Strata Depths: 538', 801', 898', 947'

13) Method to Determine Fresh Water Depths: Offset well data

14) Approximate Saltwater Depths: none

15) Approximate Coal Seam Depths: 687'-697'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated, drilling in pillar-mine maps attached

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes  No

(a) If Yes, provide Mine Info: Name: Wells are located in abandoned area of McElroy Mine  
Depth: 692' to seam base  
Seam: Pittsburgh #8  
Owner: Consol Mining Company, LLC

*Received*

APR 27 2015

18)

**CASING AND TUBING PROGRAM**

<u>TYPE</u>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill-up (Cu. Ft.)</u>
Conductor	20"	New	LS	94#	40'	40'	surface to TD
Fresh Water	13 3/8"	New	J-55	54.5#	1097'	1097'	CTS
Coal	13 3/8"	New	J-55	54.5#	1097'	1097'	CTS
Intermediate	9 5/8"	New	J-55	36#	2437'	2437'	CTS
Production	5 1/2"	New	P110	20#	15774'	15774'	TOC 200' above 9.625 casing shoe
Tubing							
Liners							

*JN 4/21/15*

<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	20"	26"	0.438		Type III	surface to TD
Fresh Water	13 3/8"	17 1/2"	0.380	2730	Type 1	1.18
Coal	13 3/8"	17 1/2"	0.380	2730	Type 1	1.18
Intermediate	9 5/8"	12 3/8"	0.352	3520	Class A	1.18
Production	5 1/2"	8 3/4" & 8 1/2"	0.361	12,640	Class A	1.27
Tubing				Max Associated Surface Pressure (psi) 13 3/8) Freshwater casing 1200		
Liners						

**PACKERS**

Kind:				
Sizes:				Received
Depths Set:				APR 27 2015

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill the vertical depth to the Marcellus at an estimated total vertical depth of approximately 6360 feet. Drill Horizontal leg - stimulate and produce the Marcellus Formation. If we should encounter an unanticipated void we will install casing at a minimum of 20' below the void but not more than 100' below the void, set a basket and grout to surface.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

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. See attached list. Maximum pressure not to exceed 10,000 lb.

Received

APR 27 2015

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 9.0

22) Area to be disturbed for well pad only, less access road (acres): 7.6

Office of Oil and Gas  
WV Dept. of Environmental Protection

23) Describe centralizer placement for each casing string:

No centralizers will be used with conductor casing. Surface casing will have bow spring centralizers every 3 joints to surface. First Intermediate casing will have bow spring centralizers on first 2 joints then every third joint to 100' from surface. Second Intermediate will have bow spring centralizers every three joints to 100' from surface. Production string will have a rigid bow spring every third joint to KOP to TOC. Rigid bow spring every joint to KOP.

24) Describe all cement additives associated with each cement type:

Conductor Type III surface to TD. Freshwater/Coal 15.6 Type 1 +2% CaCl<sub>2</sub> (CA-100), 0.25# lost circ. 30% Excess Yield =1.18. Intermediate 15.6ppg Class A +0.25% bwoc (CLC-CPF) cellophane flakes 30% Excess Yield=1.18 to Surface. Production 14.6ppg 65/35 Class A/Poz +/-0.5% fluid Loss additive, +/-0.03% retarder, +/-0.6% dispersant, +/-0.2% antifoam, +/-0.1% anitsettling 10% Excess Yield=1.27 TOC>=200' above 9.625" shoe.

25) Proposed borehole conditioning procedures:

Conductor-The hole is drilled w/air and casing is run on air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Surface-The hole is drilled w/air and casing is run on air. 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. Coal-The hole is drilled and cased w/air or on Freshwater based mud. Once casing is at setting depth, the hole is filled w/KCl water and a minimum of one hole volume is circulated prior to pumping cement. Intermediate-Once surface casing is set and cemented, intermediate hole is drilled either on air or SOBMs and filled with KCl water once drilled to TD. Production-The hole is drilled with SOBMs and once to TD, circulated at maximum 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.

\*Note: Attach additional sheets as needed.

