



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

August 20, 2014

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

Re: Permit Modification Approval for API Number 5101732 , Well #: MND 6 HHS

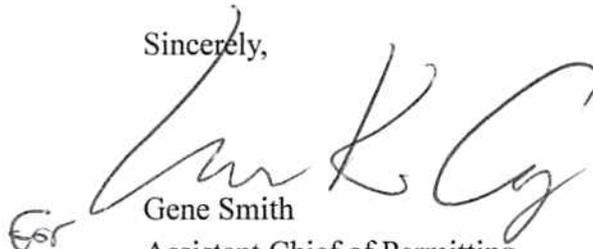
Added 16" casing

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

Promoting a healthy environment.

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 Franklin Powhatan Point
Operator ID County District Quadrangle

2) Operator's Well Number: MND 6 HHS Well Pad Name: MND 6

3) Farm Name/Surface Owner: Consolidated Coal Company Public Road Access: CR 7/4-Fish Creek Rd

4) Elevation, current ground: 722' Elevation, proposed post-construction: 721'

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

(b) If Gas Shallow Deep
Horizontal

JR 3/11/14
MJC 3/11/14

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus at 5895' and 55' in thickness. Anticipated pressure at 3927#.

8) Proposed Total Vertical Depth: 5940'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 18,882'

11) Proposed Horizontal Leg Length: 12,142'

12) Approximate Fresh Water Strata Depths: 128' and 265'

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

14) Approximate Saltwater Depths: None noted in offsets

15) Approximate Coal Seam Depths: 284' to 294'

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: 1082' to nearest active mining
Depth: Base at 294' at deepest point
Seam: Pittsburgh
Owner: Murray American Energy (Previously Consol)

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WW-6B
(9/13)

18)

CASING AND TUBING PROGRAM

HP = 47-05-01732

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	30"	New	LS	94#	120'	120'	GTS
Fresh Water	20"	New	LS	94#	694'	694'	CTS
Coal	13 3/8"	NEW	J-55	54.5#	2017'	2017'	CTS
Intermediate	9 5/8"	New	J-55	53#	8869'	8869'	CTS
Production	5 1/2"	New	P110	23#	18,882	18,882	TOC 100' above 9 625 casing shoe
Tubing							
Liners							UKC

JIN 8/13/14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	.375		GTS	GTS
Fresh Water	20"	26"	.438	2730	Type 1	1.18
Coal	13 3/8"	17 1/2"	.380	2730	Type 1	1.18
Intermediate	9 5/8"	12 1/4"	.545	10,900	Class A	2.47 lead and 1.57 tail
Production	5 1/2"	8 1/2"	.415	16,510	Class A	1.3
Tubing	See attached WBS					
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

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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 6,913 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.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 9.6

22) Area to be disturbed for well pad only, less access road (acres): 7.3

23) Describe centralizer placement for each casing string:

No centralizers will be used with conductor casing. Surface casing will have bow spring centralizers on first 2 joints then every third joint to 100' from surface. Intermediate casing will have bow spring centralizers on first 2 joints then every third joint to 100' from surface. Production string will have a rigid bow spring every joint to KOP, rigid bow spring every third joint from KOP to top of cement.

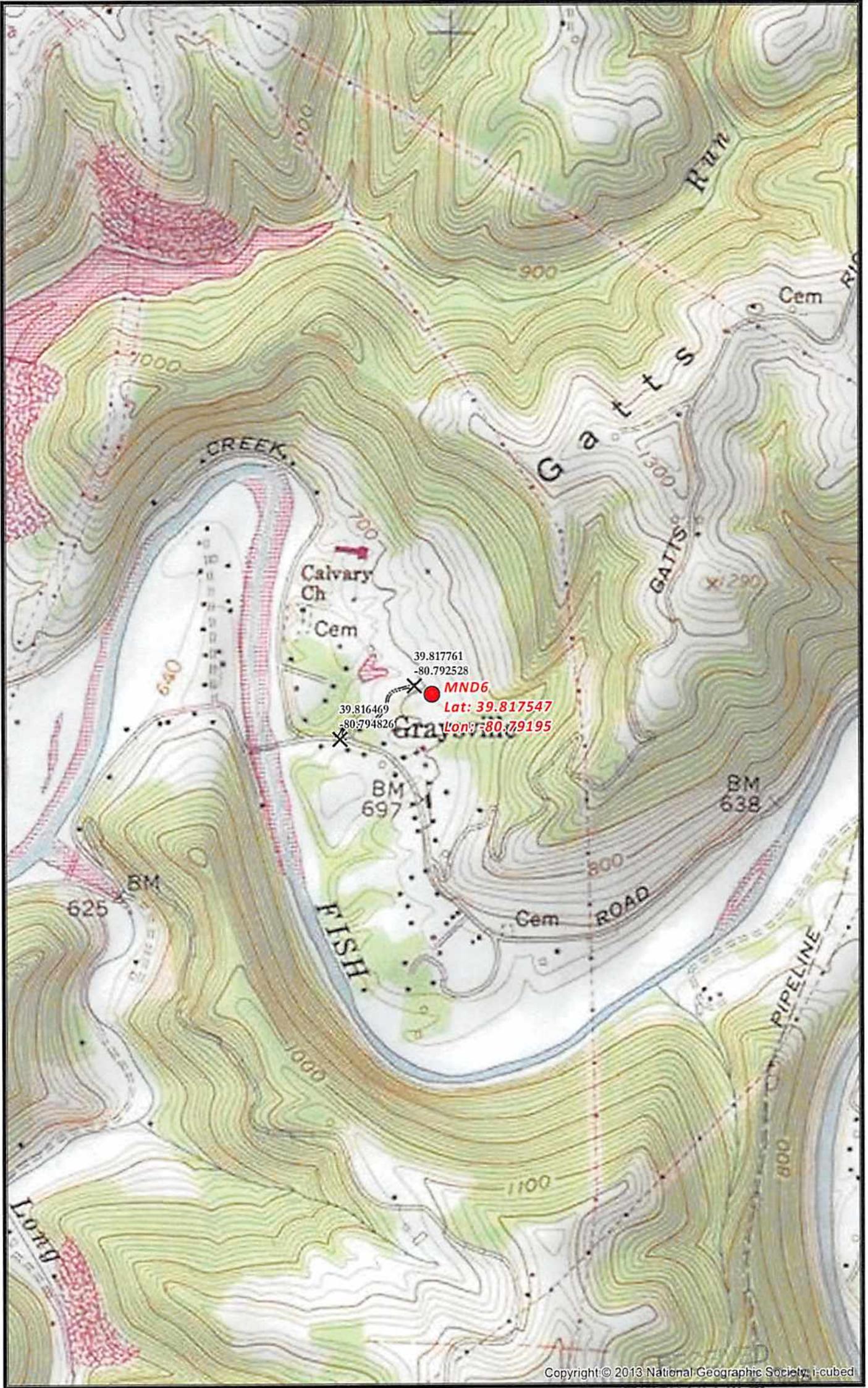
24) Describe all cement additives associated with each cement type:

Conductor-1.15% CaCl *Surface and Coal (Intermediate)- Class A Portland Cement CaCl 2%, 2% Accelerator, 0.2% Antifoam and 0.125#/sk Flake. Excess Yield=1.18 Production- 14.8 ppg class A 25:75:0 System +2.6% Cement extender, 0.7% Fluid Loss additive, 0.45% high temp retarder, 0.2% friction reducer 15% Excess Yield=1.27 TOC greater or equal to 200' above 9.625" shoe.
*Surface and Coal string WVDEP approved variance attached.

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 SOBM and filled with KCl water once drilled to TD. Production-The hole is drilled with SOBM 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.



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MND6 SITE SAFETY PLAN - SITE WELL LOCATION -	<p>Scale 1" = 1,000'</p>	<p>Date: 12/10/2013 Author: Christopher Glover</p>
	<p>Projection: NAD_1927_StatePlane_West_Virginia_North_IPS_4701 Units: Foot US</p>	<p>Disclaimer: All data is licensed for use by Noble Energy Inc. use only.</p>

