



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 5101765 , Well #: MND 6 MHS

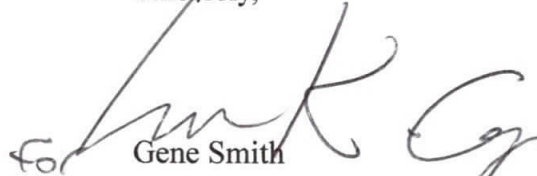
Added 16" casing

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

51-01765 Mod



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

August 14, 2014

Re: Casing Program Modification MND 6 Wells

To Office of Oil and Gas:

Enclosed please find a request to modify the casing programs adding a second conductor string due to hitting an unexpected layer of River Pebble for the Following wells:

MND 6 AHS API# 47-051-01746
MND 6 BHS API# 47-051-01744
MND 6 CHS API# 47-051-01745
MND 6 DHS API # 47-051-01762
MND 6 EHS API # 47-051-01761
MND 6 FHS API # 47-051-01763
MND 6 MHS API # 47-051-01765

Office of Oil and Gas Inspector, Jim Nicholson has given verbal approval and signed the revised WW-6B.

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

Sincerely,

A handwritten signature in black ink that reads 'Dee Swiger'.

Dee Swiger
Regulatory Analyst III

DS/
Enclosures:

RECEIVED
Office of Oil and Gas

AUG 18 2014

WV Department of
Environmental Protection

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 1	20"	New	LS	117#	40'	40'	CTS
Conductor 2	16"	New	LP	65.5#	120'	120'	CTS
Coal / FW	13 3/8"	New	LS	94#	694'	694'	CTS
Intermediate	9 5/8"	New	J-55	36#	2017'	2017'	CTS
Production	5 1/2"	New	P110	20#	13,804'	13,804'	FOC 200' above 9 625 casing shoe
Tubing							
Liners							

JIN 8/13/14

<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 1	20"	26"	.375		GTS	
Conductor 2	16"	18"	.375		GTS	
Coal / FW	13 3/8"	17 1/2"	.380	2730	Type 1/Class A	1.2
Intermediate	9 5/8"	12 3/8"	.352	3520	Type 1/Class A	1.19
Production	5 1/2"	8 3/4" & 8 1/2"	.361	12,640	Type 1/Class A	1.27
Tubing						
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

RECEIVED
Office of Oil and Gas

AUG 18 2014

WV Department of
Environmental Protection

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 5,940 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% 12% Accelerator, 0.2% Antifoam and 0.125#/sk Flake. Excess Yield=1.18 Production- 14.8 ppg class A 25:75:0 System + 2.0% 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.

RECEIVED
Office of Oil and Gas
WV Department of
Environmental Protection

25) Proposed borehole conditioning procedures:

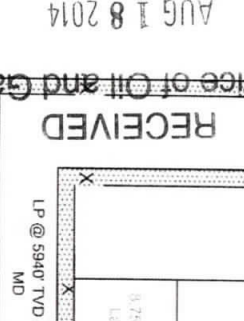
Conductor-The hole is drilled w/air and casing is run on air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Surface-The hole is drilled w/air and casing is run on air. Fill with KCl water once drilled to TD. Once casing is at setting depth, 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.



DRILLING WELL PLAN
MND-6M-HS (Marcellus HZ)
Marcellus Shale Horizontal
Marshall County, WV

Ground Elevation	721'	MND-6M SHL (Lat/Long)	(482492.29N, 1637105.4E) (NAD27)						
WELLBORE DIAGRAM	325°	MND-6M LP (Lat/Long)	(481692.5N, 1634888.2E) (NAD27)						
Azimuth		MND-6M BHL (Lat/Long)	(487327N, 1630943E) (NAD27)						
HOLE	CASING	GEOLOGY	TOP	BASE	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS
26	20" 94#	Conductor	40	40	AIR	To Surface	N/A	Ensure the hole is clean at TD	Stabilize surface fill/soil. Conductor casing = 0.438" wall thickness
18	16"	Conductor #2	120	120	Anger	To Surface	N/A	Ensure the hole is clean at TD	Stabilize surface soils
17 1/2	13-3/8" 54.5# J-55 BTC	FW Shows Pittsburgh Coal	137 274	137 274	AIR	15.6 ppg Type 1 + 3% CaCl ₂ 0.75 gal/s/100 sack anti-foam, 0.25# Lost Circ 50% Excess Yield = 1.21	Bow Spring on first 2 joints then every third joint to 100' from surface	Once casing is at setting depth, fill with fresh water and circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.380" wall thickness Burst=2730 psi
		Surface Casing	703	703		19.0 ppg Class A +0.4% Red 0.15% Disb 0.2% Anti-foam, 0.125#/sec Lost Circ 20% Excess Yield=1.19 To Surface	Bow Spring centralizers every third joint to 100' from surface.	Fill with KCl water once pulled to TD. Once cement is at setting depth circulate a minimum of one hole volume prior to pumping cement.	Designed to be run 250' below the 5th Sand. Intermediate casing = 0.452" wall thickness Burst=3500 psi
		2nd S&S Steel	1377	1413					
		Log Line	1438	1604					
		Flag Iron	1604	1717	AIR				
		Free Formation	1717	2232					
		Int. Casing	2017	2017					
		Speedway	3019	3065					
		Iron	4970	4965	9.0 ppg SOBM	14.0 ppg Class A 25.75% 0	Rigid Base Spring every third joint from KCB to TOC		
		Type Coal	4966	4752					
		Argill	4762	5334					
		Flintstone	5334	5656					
		Cast Iron	5655	5727		+2.0% Cement extender 0.7% Fluid Loss additive 0.45% High Temp retarder 0.2% Inclin reducer			
		Mudstones	5727	5790					
		West River	5750	5811	12.0 ppg SOBM				
		Burdick	5811	5836		10% Excess Yield=1.27	Rigid Base Spring every joint to KCB		
		Tuff Limestone	5836	5890					
		Herrin	5890	5895		TOC = 200' above 9.625' shoe			
		Marcellus	5895	5954					
		TD	18804	5940 TVD MD	12.0 ppg SOBM				
		Onshore	5950						



JIN 8/13/14

51-01765 MOD