



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 5101746 , Well #: MND 6 AHS

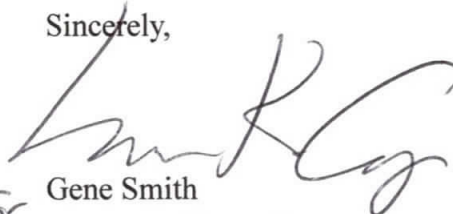
Added 16" casing

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,


for Gene Smith
Assistant Chief of Permitting
Office of Oil and Gas

Promoting a healthy environment.



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:

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4705101745

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 AHS Well Pad Name: MND 6
- 3) Farm Name/Surface Owner: Consolidation 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
- 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: 18,804'
- 11) Proposed Horizontal Leg Length: 8,992'
- 12) Approximate Fresh Water Strata Depths: 128' and 265' *Ju 4/29/14*
- 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 of coal mine maps attached
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- 17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No **MAY 08 2014**
- (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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18)

CASING AND TUBING PROGRAM

AP# 47-051-01746

<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 / F.W	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#	18,804'	18,804'	TOC 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 / F.W	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:				

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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 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%, 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, 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.

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*Note: Attach additional sheets as needed.

51-01746 MOD

JIN 8/13/14



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

Ground Elevation		722'		MND-6A SHL (Lat/Long)		(482531.55N, 1637172.52E) (NAD27)					
Azim		325°		MND-6A LP (Lat/Long)		(483791.48N, 1637816.48E) (NAD27)					
MND-6A BHL (Lat/Long)		(493722.74N, 1630862.54E) (NAD27)									
WELLBORE DIAGRAM	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	Auger	To Surface	N/A	Ensure the hole is clean at TD.	Stabilize surface soil	
	17 1/2	13-3/8" 54.5# J-55 BTC	Pittsburgh Coal	284	294	AIR	15.6 ppg Type 1 + 2% CaCl ₂ , 0.25# Lost Circ 30% Excess Yield = 1.18	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.	Intermediate casing = 0.360" wall thickness Burst=2730 psi	
	12 3/8	9-5/8" 36# K-55 BTC	Surface Casing	694	694	AIR	15.6ppg Class A +0.4% Ret, 0.15% Disp, 0.2% Antifoam, 0.125#/sk Lost Circ 20% Excess Yield=1.19 To Surface	Bow spring centralizers every third joint to 100' feet from 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.	Casing to be ran 250' below the 5th Sand. Intermediate casing = 0.352" wall thickness Burst=3520 psi	
	8.75" Vertical				3019	3065	8.0ppg -	14.8ppg Class A 25:75:0 System +2.6% Cement extender, 0.7% Fluid Loss additive, 0.45% high temp retarder, 0.2% friction reducer 10% Excess Yield=1.27 TOC >= 200' above 9.625" shoe	Rigid Bow Spring every third joint from KOP to TOC	Once at TD, circulate at max 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.	Production casing = 0.361" wall thickness Burst=12640 psi Note: Actual centralizer schedules may be changed due to hole conditions
					4570	4665	9.0ppg SOBOM				
					4665	4752					
					4752	5334					
					5334	5655					
	8.75" Curve				5655	5727	12.0ppg -		Rigid Bow Spring every joint to KOP		
5727					5750	12.5ppg SOBOM					
5750					5811						
5811					5836						
5836					5860						
8.75" - 8.5" Lateral				5860	5895						
				5895	5950						
				18804 MD	5940 TVD	12.0ppg - 12.5ppg SOBOM					
	5950		Onondaga	5950							

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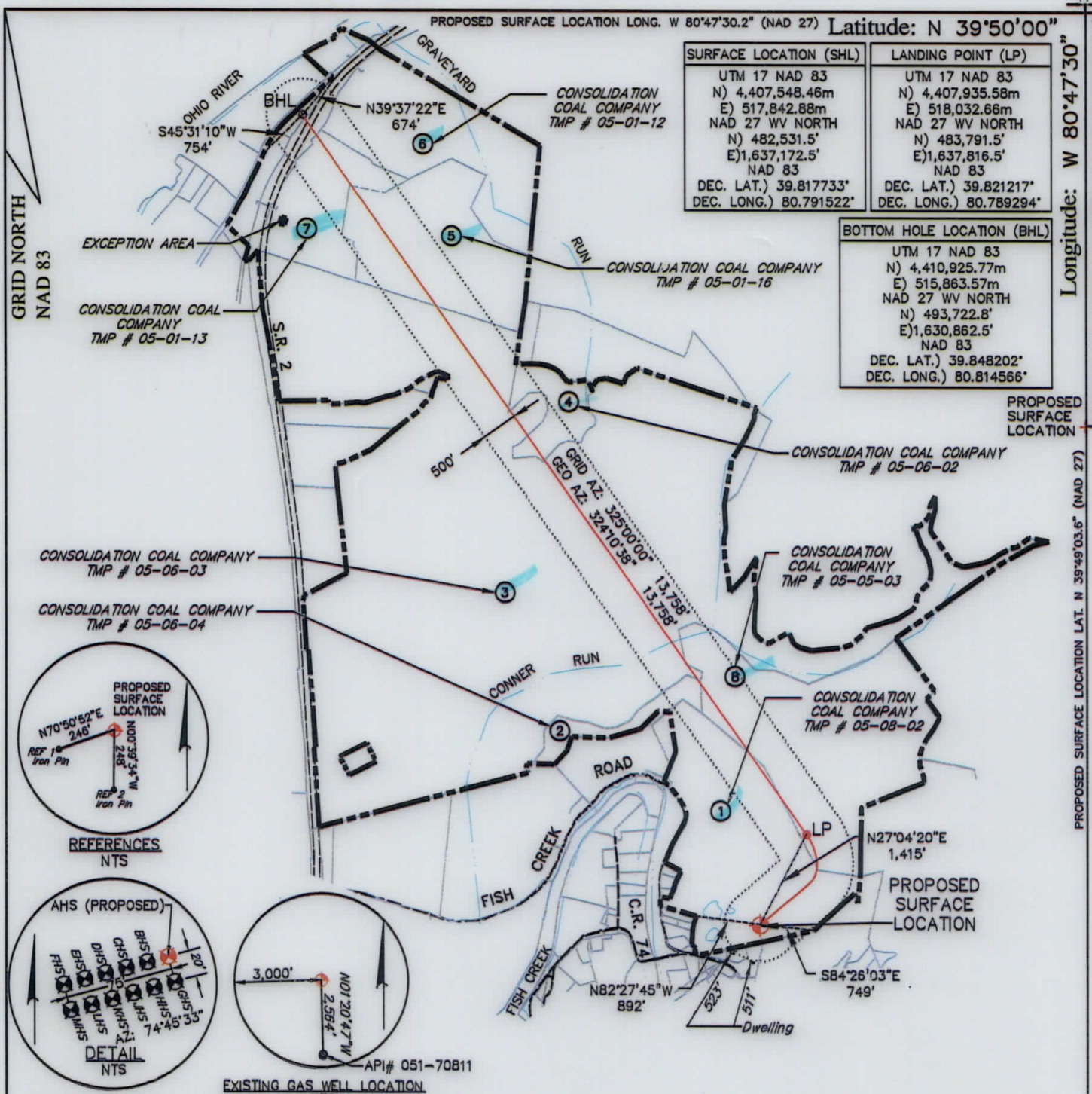
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LP @ 5940' TVD / 6678' MD
 8.75" / 8.5" Hole - Cemented Long String
 5-1/2" 20# HCP-110 TYP BTC
 +/-12125' ft Lateral
 TD @ +/-5940' TVD +/-18804' MD
 X=centralizers



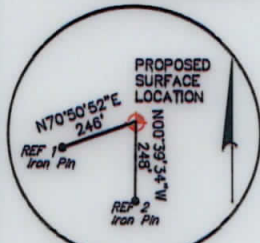
<p>MND6 SITE SAFETY PLAN - FLOODPLAIN ZONES -</p>	<p>0 750 1,500 3,000 Feet</p> <p>Scale 1" = 1,500'</p> <p>Projection: NAD_1927_StatePlane_West_Virginia_North_FIPS_4701 Units: Feet US</p>		<p>Date: 12/10/2013 Author: Christopher Glaver</p>
<p>X Access Road Intersection - - - Proposed Access Road</p> <p>● Well Pad ■ Proposed Unit ▨ Floodplain</p>	<p>Disclaimer: All data is licensed for use by Noble Energy Inc. use only.</p>		

11'
 Longitude: W 80°47'30"
 5.727
 PROPOSED SURFACE LOCATION LAT. N 39°49'03.6" (NAD 27)

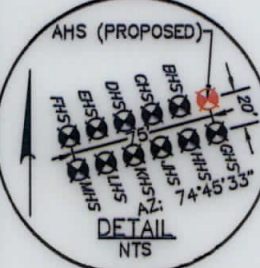


SURFACE LOCATION (SHL)		LANDING POINT (LP)	
UTM 17 NAD 83	N) 4,407,548.46m	UTM 17 NAD 83	N) 4,407,935.58m
	E) 517,842.88m		E) 518,032.66m
	NAD 27 WV NORTH		NAD 27 WV NORTH
	N) 482,531.5'		N) 483,791.5'
	E) 1,637,172.5'		E) 1,637,816.5'
	NAD 83		NAD 83
	DEC. LAT.) 39.817733'		DEC. LAT.) 39.821217'
	DEC. LONG.) 80.791522'		DEC. LONG.) 80.789294'

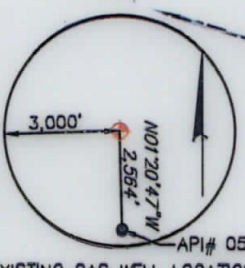
BOTTOM HOLE LOCATION (BHL)	
UTM 17 NAD 83	N) 4,410,925.77m
	E) 515,863.57m
	NAD 27 WV NORTH
	N) 493,722.8'
	E) 1,630,862.5'
	NAD 83
	DEC. LAT.) 39.848202'
	DEC. LONG.) 80.814566'



REFERENCES
NTS



DETAIL
NTS



EXISTING GAS WELL LOCATION
NTS

GENERAL NOTES:

1. THE LOCATION OF BOUNDARY LINES SHOWN HEREON ARE BASED ON RECORD DEED, PLATS, AND TAX MAPS BEST FIT TO FOUND FIELD EVIDENCE AND AERIAL PHOTOS, UNLESS OTHERWISE NOTED.
2. THIS PLAT DOES NOT REPRESENT AN ACTUAL BOUNDARY SURVEY OF THE INDIVIDUAL PARCELS.
3. THERE ARE NO EXISTING WATER WELLS OR DEVELOPED SPRINGS WITHIN 250' OF PROPOSED WELL.
4. PROPOSED WELL IS GREATER THAN 100' FROM PERENNIAL STREAM, WETLAND, POND, RESERVOIR OR LAKE.
5. THERE ARE NO NATIVE TROUT STREAMS WITHIN 300' OF PROPOSED WELL.
6. THERE ARE TWO DWELLINGS LOCATED WITHIN 650' OF PROPOSED WELLBORE.
7. THE SURROUNDING LANDS ARE BEING SERVED BY PUBLIC WATER BY THE GRAND VIEW DOOLIN WATER SYSTEM PROVIDED BY MARSHALL COUNTY PUBLIC HEALTH AND SANITATION DIVISION.

LEGEND

- PROPOSED GAS WELL
- PROPOSED BORE
- TIE LINE
- OIL & GAS LEASE BOUNDARY
- PROPERTY LINE
- STREAM LINE
- 500' SETBACK LINE

FILE #: 093842010
 DRAWING #: 093842010_SV-Plat
 SCALE: PLAT & TICK: 1" = 2,000'
 MINIMUM DEGREE OF ACCURACY: 1/200
 PROVEN SOURCE OF ELEVATION: NGS (CORS)

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 RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.
 SIGNED: Craig Robert West
 R.P.E.: _____ L.L.S.: 2241



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



DATE: FEBRUARY 7, 2014
 OPERATOR'S WELL #: MND 6 AHS
 API WELL #: 47 051 1745
 STATE COUNTY PERMIT
 STATE COUNTY PERMIT
 STATE COUNTY PERMIT

WELL TYPE: OIL GAS WASTE DISPOSAL LIQUID INJECTION PRODUCTION STORAGE DEEP SHALLOW
 WATERSHED: FISH CREEK ELEVATION: 722'
 COUNTY/DISTRICT: MARSHALL / FRANKLIN QUADRANGLE: POWHATAN POINT, OHIO-W.VA
 SURFACE OWNER: CONSOLIDATION COAL COMPANY ACREAGE: 136.587±
 OIL & GAS ROYALTY OWNER: CNX GAS COMPANY LLC and NOBLE ENERGY, INC. ACREAGE: _____
 CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PERFORATE NEW FORMATION PLUG & ABANDON
 DRILL PLUG OFF OLD FORMATION CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): _____
 TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 5,940 ft. TMD: 18,804 ft.
 WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: STEVE M. GREEN
 ADDRESS: 333 TECHNOLOGY DRIVE, SUITE 116 ADDRESS: 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590
 CITY: CANONSBURG STATE: PA ZIP CODE: 15317 CITY: CHARLESTON STATE: WV ZIP CODE: 25301