



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 5101744 , Well #: MND 6 BHS

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 rev Gas 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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Office of Oil and Gas
AUG 18 2014
WV Department of
Environmental Protection

4705101744

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 BHS 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: 18,562'

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 WV Department of Environmental Protection

(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

API 47-051-01744

| <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# | 18,562' | 18,562' | 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: | | | | | RECEIVED Office of Oil and Gas |
| Sizes: | | | | | AUG 18 2014 |
| Depths Set: | | | | | 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%, 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. 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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MAY 08 2014

*Note: Attach additional sheets as needed.

51-01744 MOD

JIN 8/13/14



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

| Ground Elevation | | MND-6B SHL (Lat/Long) | | MND-6B LP (Lat/Long) | | MND-6B BHL (Lat/Long) | | CENTRALIZERS | | CONDITIONING | | COMMENTS | |
|------------------|----------------|------------------------|--------------------|----------------------|------|-----------------------|---|---|--|--|--|----------|--|
| Azim | | 722' | | 325° | | | | | | | | | |
| WELLBORE DIAGRAM | HOLE | CASING | GEOLOGY | TOP | BASE | MUD | CEMENT | | | | | | |
| | 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 = 0.380" 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 | 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 | | 2nd Salt Sand | 1377 | 1413 | | To Surface | Rigid Bow Spring every third joint from KOP to TOC | | | | | |
| | | 8.75" Curve | 5-1/2" HCP-110 BTC | Speechley | 3019 | 3065 | 8.0ppg - 9.0ppg SOBMB | 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 | | 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 | | |
| | | 8.75" Lateral | | Java | 4570 | 4665 | | 10% Excess Yield=1.27 TOC >= 200' above 9.625" shoe | | | | | |
| | | | | Pipe Creek | 4665 | 4752 | | | | | | | |
| | | | | Angola | 4752 | 5334 | | | | | | | |
| | | | | Rheinstreet | 5334 | 5655 | | | | | | | |
| | | | Cashaqua | 5655 | 5727 | | | | | | | | |
| | | | Middlesex | 5727 | 5750 | | | | | | | | |
| | | | West River | 5750 | 5811 | | | | | | | | |
| | | | Burkett | 5811 | 5836 | | | | | | | | |
| | | | Tully Limestone | 5836 | 5860 | | | | | | | | |
| | | Hamilton | 5860 | 5895 | | | | | | | | | |
| | | Marcellus | 5895 | 5950 | | | | | | | | | |
| | | TD | 18562 MD | 5940 TVD | | | | | | | | | |
| | | Onondaga | 5950 | 5950 | | | | | | | | | |

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 LP @ 5940' TVD / 6573' MD

8.75 / 8.5 Hole - Cemented Long String
 5-1/2" 20# HCP-110 TXP BTC
 +/-11989' ft Lateral
 TD @ +/-5940' TVD +/-18562' MD
 X=centralizers



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 WV Department of
 Environmental Protection

MND6 SITE SAFETY PLAN
- FLOODPLAIN ZONES -

| | |
|----------------------------|-----------------|
| ✕ Access Road Intersection | ● Well Pad |
| --- Proposed Access Road | ■ Proposed Unit |
| | ■ Floodplain |

0 750 1,500 3,000 Feet

Scale 1" = 1,500'

Projection: NAD_1983_StatePlane_West_Virginia_North_FWS_4701
 Units: Feet US

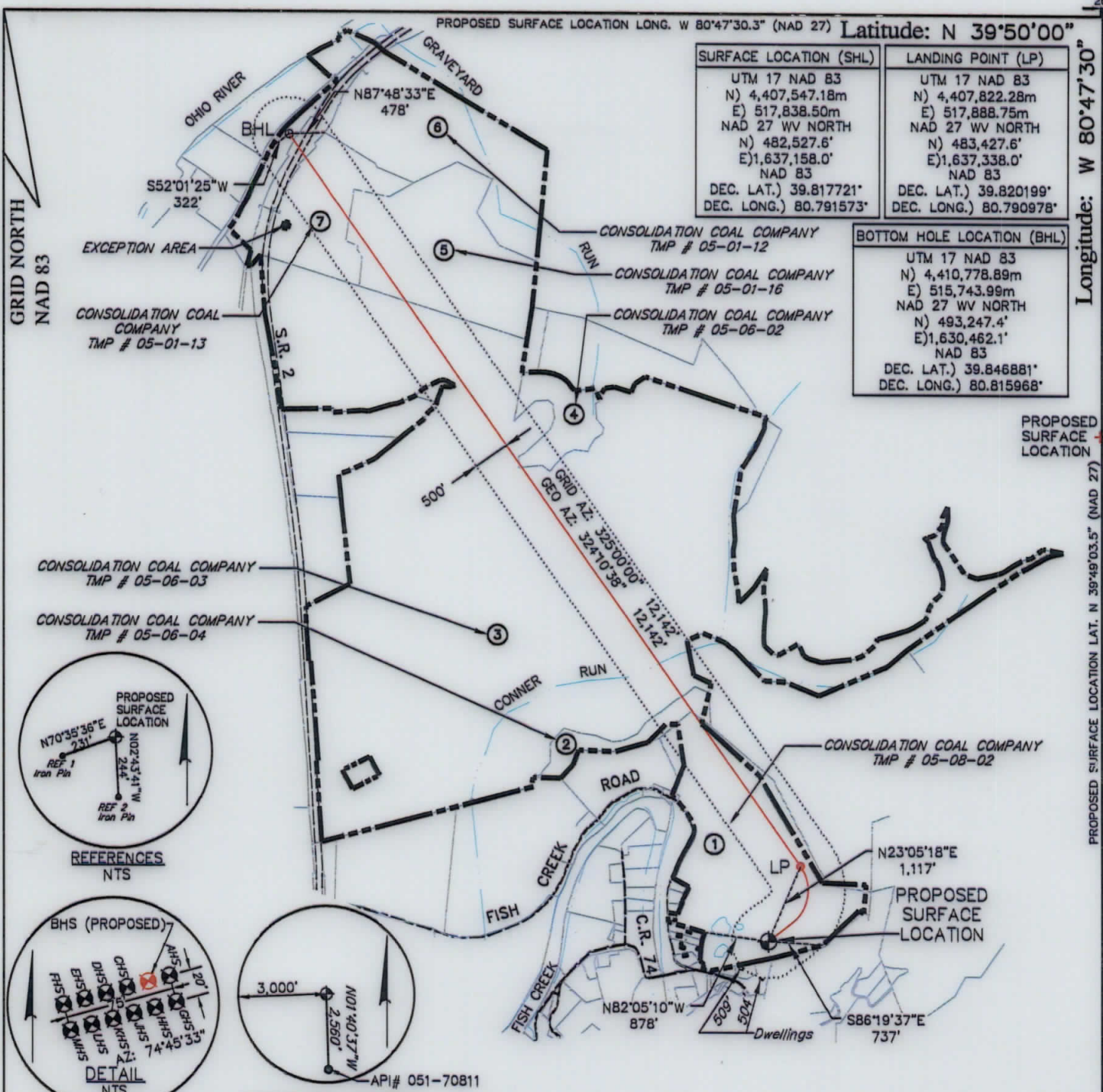
noble energy

Date: 12/10/2013
 Author: Christopher Glover

Disclaimer: All data is licensed for use by Noble Energy Inc. use only.

2/6

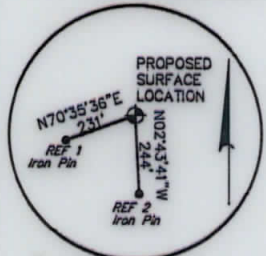
PROPOSED SURFACE LOCATION LONG. W 80°47'30.3" (NAD 27) Latitude: N 39°50'00"



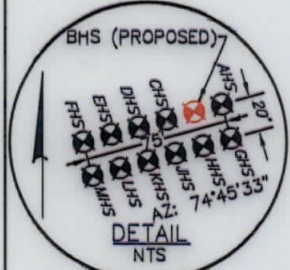
| SURFACE LOCATION (SHL) | |
|------------------------|------------------|
| UTM 17 NAD 83 | N) 4,407,547.18m |
| | E) 517,838.50m |
| NAD 27 WV NORTH | N) 482,527.6' |
| | E) 1,637,158.0' |
| | NAD 83 |
| DEC. LAT.) | 39.817721° |
| DEC. LONG.) | 80.791573° |

| LANDING POINT (LP) | |
|--------------------|------------------|
| UTM 17 NAD 83 | N) 4,407,822.28m |
| | E) 517,888.75m |
| NAD 27 WV NORTH | N) 483,427.6' |
| | E) 1,637,338.0' |
| | NAD 83 |
| DEC. LAT.) | 39.820199° |
| DEC. LONG.) | 80.790978° |

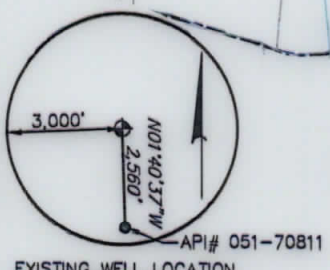
| BOTTOM HOLE LOCATION (BHL) | |
|----------------------------|------------------|
| UTM 17 NAD 83 | N) 4,410,778.89m |
| | E) 515,743.99m |
| NAD 27 WV NORTH | N) 493,247.4' |
| | E) 1,630,462.1' |
| | NAD 83 |
| DEC. LAT.) | 39.846881° |
| DEC. LONG.) | 80.815968° |



REFERENCES
NTS



DETAIL
NTS



EXISTING 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.

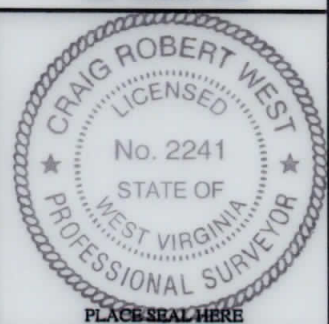
LEGEND

- 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:
 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 #: MND6 BHS
 API WELL #: 47 051 01744
 STATE COUNTY PERMIT
 HGA

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

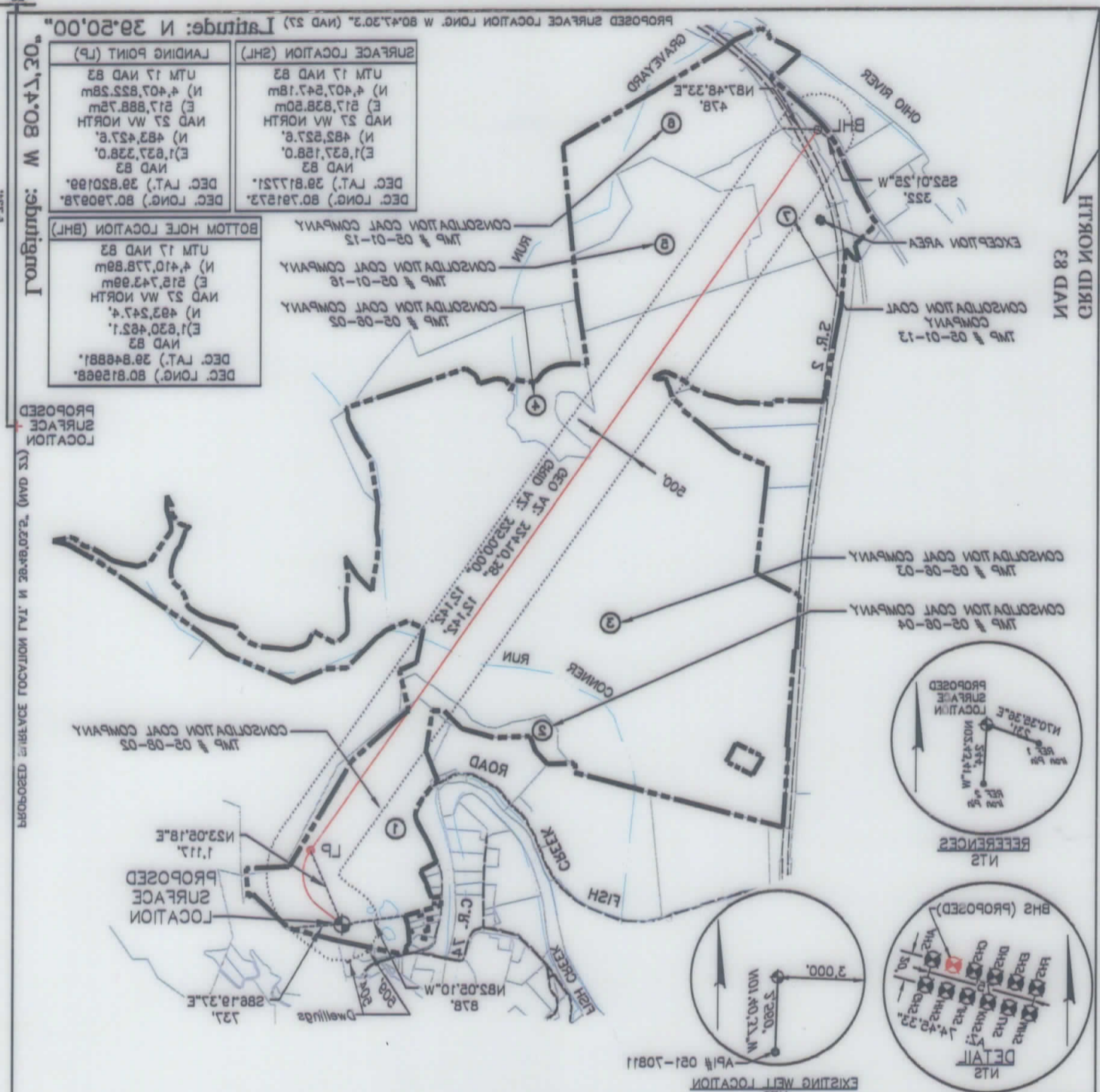
DRILL PLUG OFF OLD FORMATION CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TYD: 5,940' TMD: 18,562'

WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: STEVE M. GREEN

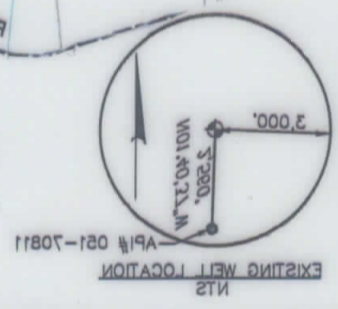
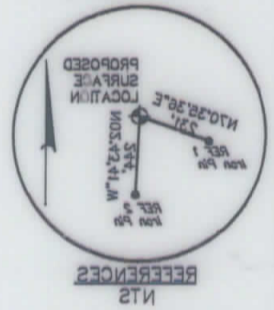
ADDRESS: 333 TECHNOLOGY DRIVE, SUITE 118 ADDRESS: 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590

CITY: CANONSBURG STATE: PA ZIP CODE: 15317 CITY: CHARLESTON STATE: WV ZIP CODE: 25301



| SURFACE LOCATION (SHL) | | LANDING POINT (LP) | |
|------------------------|---------------------|----------------------|---------------------|
| DEC. LONG. 80.791523 | DEC. LAT. 38.817221 | DEC. LONG. 80.790278 | DEC. LAT. 38.820199 |
| NAD 83 | NAD 83 | NAD 83 | NAD 83 |
| E) 1,637,188.0 | N) 482,827.8 | E) 1,627,238.0 | N) 483,427.8 |
| E) 817,828.50m | N) 4,407,847.18m | E) 817,888.75m | N) 4,407,822.28m |
| UTM 17 NAD 83 | UTM 17 NAD 83 | UTM 17 NAD 83 | UTM 17 NAD 83 |

| BOTTOM HOLE LOCATION (BHL) | |
|----------------------------|---------------------|
| DEC. LONG. 80.812668 | DEC. LAT. 38.846881 |
| NAD 83 | NAD 83 |
| E) 1,620,482.1 | N) 483,242.4 |
| E) 812,743.98m | N) 4,410,728.89m |
| UTM 17 NAD 83 | UTM 17 NAD 83 |



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.
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LEGEND

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



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

FILE #: 093842010
 DRAWING #: 093842010 2V-Plat
 SCALE: PLAT & TICK: 1" = 2,000'
 MINIMUM DEGREE
 OF ACCURACY: 1/200

PROVEN SOURCE
 OF ELEVATION: NGS (GORS)



DATE: FEBRUARY 7, 2014

OPERATOR'S WELL #: MINDS BHS

API WELL #: 47

STATE: COUNTY: PERMIT: HGR

WELL TYPE: OIL GAS WASTE DISPOSAL LIQUID INJECTION PRODUCTION STORAGE DEEP SHALLOW

WATERSHED: FISH CREEK

COUNTY/DISTRICT: MARSHALL / FRANKLIN

SURFACE OWNER: CONSOLIDATION COAL COMPANY

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY LLC and NOBLE ENERGY, INC.

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

DESIGNATED AGENT: STEVE M. GREEN

ESTIMATED DEPTH: TVD: 5,940' TMD: 18,582'

CITY: CHARLESTON STATE: WV ZIP CODE: 25301

ADDRESS: 233 TECHNOLOGY DRIVE, SUITE 116

WELL OPERATOR: NOBLE ENERGY, INC.

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WADER

OFFICE OF OIL & GAS

601 27th STREET

CHARLESTON, WV 25304

PROVEN SOURCE OF ELEVATION: NGS (GORS)

SCALE: PLAT & TICK: 1" = 2,000'

DRAWING #: 093842010 2V-Plat

FILE #: 093842010