



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

December 18, 2015

NORTHEAST NATURAL ENERGY LLC
707 VIRGINIA STREET EAST
CHARLESTO, WV 25301

Re: Permit Modification Approval for API Number 6101678, Well #: CAMPBELL 5H

Modified well bore direction

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: Northeast Natural Energy LLC 494498281 Monongalia Clay Blacksville
Operator ID County District Quadrangle

2) Operator's Well Number: Campbell 5H Well Pad Name: Campbell

3) Farm Name/Surface Owner: Ellen F. Campbell Public Road Access: State Route 218 (Daybrook Road)

4) Elevation, current ground: 1293.6' Elevation, proposed post-construction: 1293.6'

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

(b) If Gas Shallow Deep
Horizontal

6) Existing Pad: Yes or No Yes *MDK 12/15/2015*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus, 8,118' , 103' , 3,600 psi

8) Proposed Total Vertical Depth: 8,118'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 16,260.27'

11) Proposed Horizontal Leg Length: 7,486'

12) Approximate Fresh Water Strata Depths: 50' , 1,137'

13) Method to Determine Fresh Water Depths: Driller's Log from Offset Wells

14) Approximate Saltwater Depths: 1,521' , 2,363'

15) Approximate Coal Seam Depths: 316' , 1,135'

16) Approximate Depth to Possible Void (coal mine, karst, other): N/A

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: Adjacent Mine - Federal No. 2
Depth: 1,100'
Seam: Pittsburgh
Owner: Patriot Coal Corporation

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WW-6B
(04/15)

API NO. 47- 61 - OR 78 MOD
 OPERATOR WELL NO. Campbell 5H
 Well Pad Name: Campbell

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	24"	New	NA	94.71	40'	40'	GTS
Fresh Water	13-3/8"	New	J-55	54.5	1,280'	1,250'	CTS
Coal							
Intermediate	9-5/8"	New	J-55	40	2,430'	2,400'	CTS
Production	5-1/2"	New	P-110	20	16,260'	16,230'	3762 Cu. Ft.
Tubing	2-7/8"	New	N-80	6.5	NA	8,500'	NA
Liners							

MDK 12/15/2015

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	24"	30"	.375	415		4,500 psi Grout	NA
Fresh Water	13-3/8"	17 1/2"	.38"	2,760	2,000	Class A	1.23
Coal							
Intermediate	9-5/8"	12 1/4"	.395"	3,950	3,000	Class A	1.3
Production	5-1/2"	8 3/4"	.361"	12,530	9,700	50:50 Poz	1.21
Tubing	2-7/8"	NA	.217"	10,570	3,600	NA	NA
Liners							

PACKERS

Kind:					RECEIVED
Sizes:					Office of Oil and Gas
Depths Set:					DEC 16 2015

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WW-6B
(10/14)

API NO. 47- 61 - 01678 HD
OPERATOR WELL NO. Campbell 5H
Well Pad Name: Campbell

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

Drilling and completion of a horizontal Marcellus well. The well will be drilled on air to an approximate depth of 7,120.92' TVD/MD. The well will then be horizontally drilled on synthetic based mud from the KOP to approximately 8,118' TVD / 16,260.27' MD along a combination of 323 and 330 degree azimuth.

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

Multi-stage / high-rate slickwater fracture treatment using various size sands as proppant. First stage will be initiated via pressurization against a burst disc ran in the production casing string or perforated with coiled tubing. Subsequent stages will be perforated with pumped down guns ran on wireline. Individual stages will be isolated with composite frac plugs. Maximum pump rate during any stage will be 110 BPM with a maximum allowable surface pressure of 9,500 PSI. Composite bridge plugs will be set at the end of the last stage to isolate the treated formation.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): NA - Existing Pad

22) Area to be disturbed for well pad only, less access road (acres): NA - Existing Pad

23) Describe centralizer placement for each casing string:

Surface and intermediate casing strings will have bow spring centralizers placed every third joint (~120') from the shoe joint to surface. Production casing will have rigid body centralizers placed at a minimum of every fourth joint (~160') from TD to surface.

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

Surface string cement will be a Class A + Max 3% bwoc Calcium Chloride Fresh Water blend. Intermediate string cement will be a Class A Cement + Max 3% bwoc Calcium Chloride + Fresh Water. Production string cement will be (50:50) Poz (Fly Ash):Type I Cement with a gas migration additive.

25) Proposed borehole conditioning procedures:

Surface string will use a 25.0 bbls Gel Pill + LCM + 25 lbs Cello Flake + 20 lbs/bbl Bentonite @ 8.4 ppg & 10 bbls fresh water spacer prior to cement. Intermediate string will use a 25.0 bbls Gel Pill + LCM + 25 lbs Cello Flake + 20 lbs/bbl Bentonite @ 8.4 ppg & 10 bbls fresh water spacer prior to cement. Production string will use a 50.0 bbls SealBond 25 + 1 gal/bbl US-40 + 275 lbs/bbl Barite + 1 gal/bbl SS-2 Spacer @ 13.5 ppg prior to cement.

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*Note: Attach additional sheets as needed.

61-0167810D

WW-6A1
(5/13)

Operator's Well No. Campbell 5H

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

(1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;

(2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
See Attachment	See Attachment	See Attachment	See Attachment	See Attachment

**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

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The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Northeast Natural Energy LLC
 By: Hollie Medley *Hollie Medley*
 Its: Regulatory Coordinator

61-01678 H0

Operator's Well No. Campbell 5H

NNE Lease No.	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page	Tax Map & Parcel
WV-061-003293-000	CAMPBELL, ELLEN FOLEY	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1494/880	4-7-48
WV-061-003236-001	MCCOY, CHRISTINE DILLIE	*CHESAPEAKE APPALACHIA LLC	.125 or greater	1450/526	4-7-31
WV-061-003292-001	BREWER, RAYMOND C. AND RUBY T.	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1495/10	4-7-31
WV-061-002140-001	OLIVE CEMETERY OF PENTRESS	*CHESAPEAKE APPALACHIA LLC	.125 or greater	1396/669	4-7-32
WV-061-002140-002	MONONGALIA HOME CORPORATION	*CHESAPEAKE APPALACHIA LLC	.125 or greater	1397/616	4-7-32
WV-061-002140-003	UNITED OLIVE M.E. CHURCH OF PENTRESS	*CHESAPEAKE APPALACHIA LLC	.125 or greater	1410/526	4-7-32
WV-061-002140-004	CONN, JOHN L.	*CHESAPEAKE APPALACHIA LLC	.125 or greater	1419/595	4-7-32
WV-061-002140-005	AUSTIN, LINDA	*CHESAPEAKE APPALACHIA LLC	.125 or greater	1419/591	4-7-32
WV-061-002140-007	HERRON, ANNA MARGARET	Northeast Natural Energy LLC	.125 or greater	1506/764	4-7-32
WV-061-002140-008	HERRON, DONALD R. AND JENNIFER	Northeast Natural Energy LLC	.125 or greater	1507/411	4-7-32
WV-061-002140-009	HERRON, JAMES F. AND DIANE	Northeast Natural Energy LLC	.125 or greater	1507/403	4-7-32
WV-061-002140-010	HERRON, CHARLES K.	Northeast Natural Energy LLC	.125 or greater	1507/242	4-7-32
WV-061-002140-011	HERRON, HENRY G.	Northeast Natural Energy LLC	.125 or greater	1509/264	4-7-32
WV-061-001108-000	STATLER, ROBERT L.	*CHESAPEAKE APPALACHIA LLC	.125 or greater	1422/491	4-7-27.1
WV-061-000180-000	MOORE, REBECCA S., SAMUEL STATLER, DANIEL STATLER, AND BENJAMIN STATLER	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1428/594	4-7-25
WV-061-001039-001	MOHAMMADI, AMIR H.	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1483/499	4-7-24
WV-061-001039-002	AFSHARI, ALIAKBAR	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1483/829	4-7-24
WV-061-001041-001	MOHAMMADI, AMIR H.	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1483/495	4-2-26
WV-061-001041-002	AFSHARI, ALIAKBAR	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1483/831	4-2-26
WV-061-001040-001	MOHAMMADI, AMIR H.	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1483/495	4-2-25
WV-061-001040-002	AFSHARI, ALIAKBAR	NORTHEAST NATURAL ENERGY LLC	.125 or greater	1483/833	4-2-25
WV-061-001533-006	HARKER, BARBARA M.	*CHESAPEAKE APPALACHIA LLC	.125 or greater	1407/210	4-2-24

*See Attachment

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61-01678 MOD

Chesapeake Appalachia, LLC.



Northeast Natural Energy
Assignment
BK 120/769

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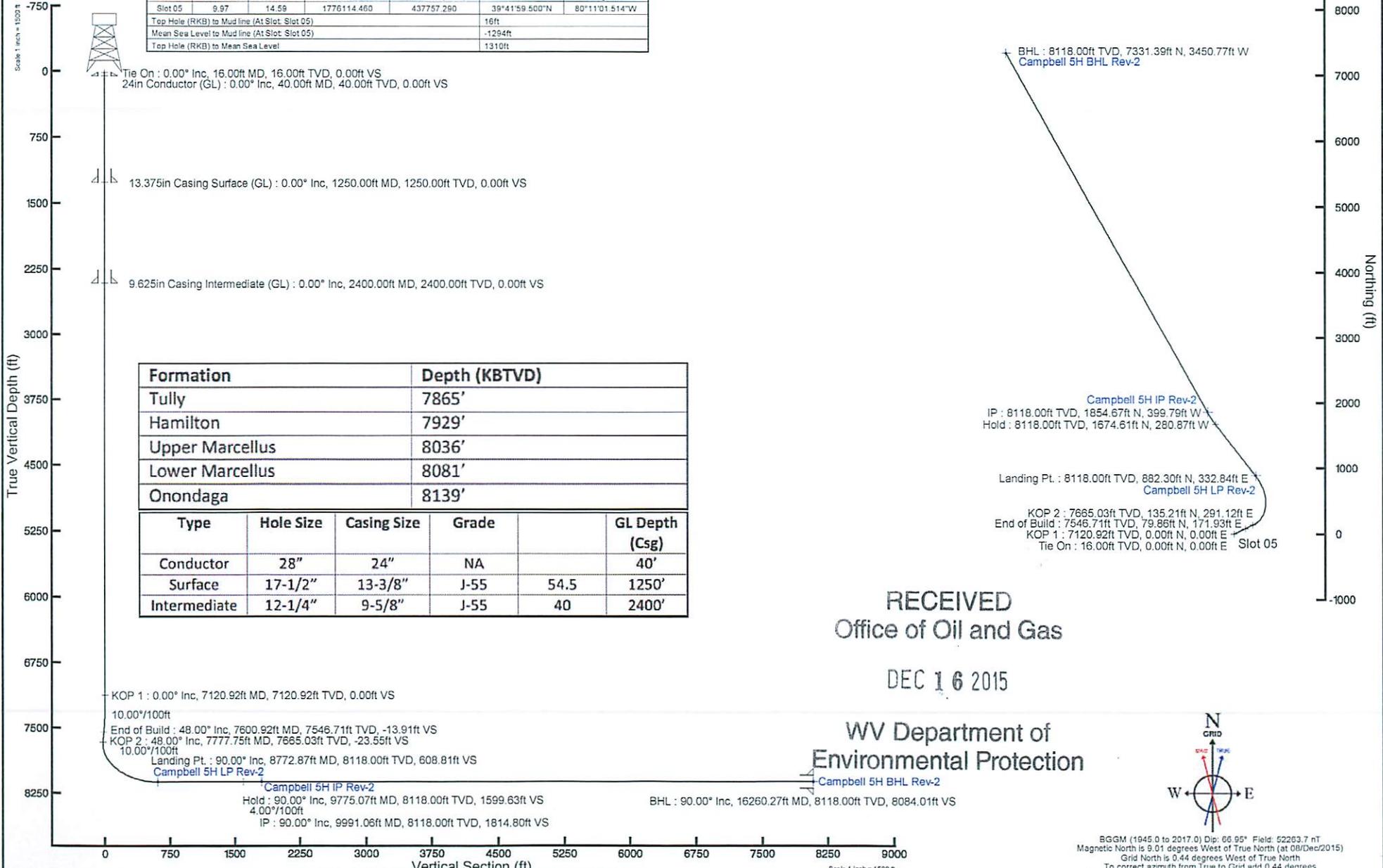
NORTHEAST NATURAL ENERGY, LLC

Location: Monongalia County, WV
 Field: Monongalia
 Facility: Campbell Pad

Slot: Slot 05
 Well: Campbell 5H
 Wellbore: Campbell 5H PWB



Location Information					
Facility Name	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	
Campbell Pad	1776099.874	437747.321	39°41'59.400"N	80°11'01.700"W	
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude
Slot 05	9.97	14.59	1776114.460	437757.290	39°41'59.500"N
Top Hole (RKB) to Mud line (At Slot Slot 05)			16ft		
Mean Sea Level to Mud line (At Slot Slot 05)			-1294ft		
Top Hole (RKB) to Mean Sea Level			1310ft		



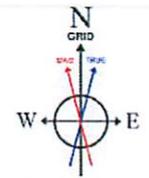
Formation	Depth (KBTVD)
Tully	7865'
Hamilton	7929'
Upper Marcellus	8036'
Lower Marcellus	8081'
Onondaga	8139'

Type	Hole Size	Casing Size	Grade	GL Depth (Csg)
Conductor	28"	24"	NA	40'
Surface	17-1/2"	13-3/8"	J-55	54.5
Intermediate	12-1/4"	9-5/8"	J-55	40

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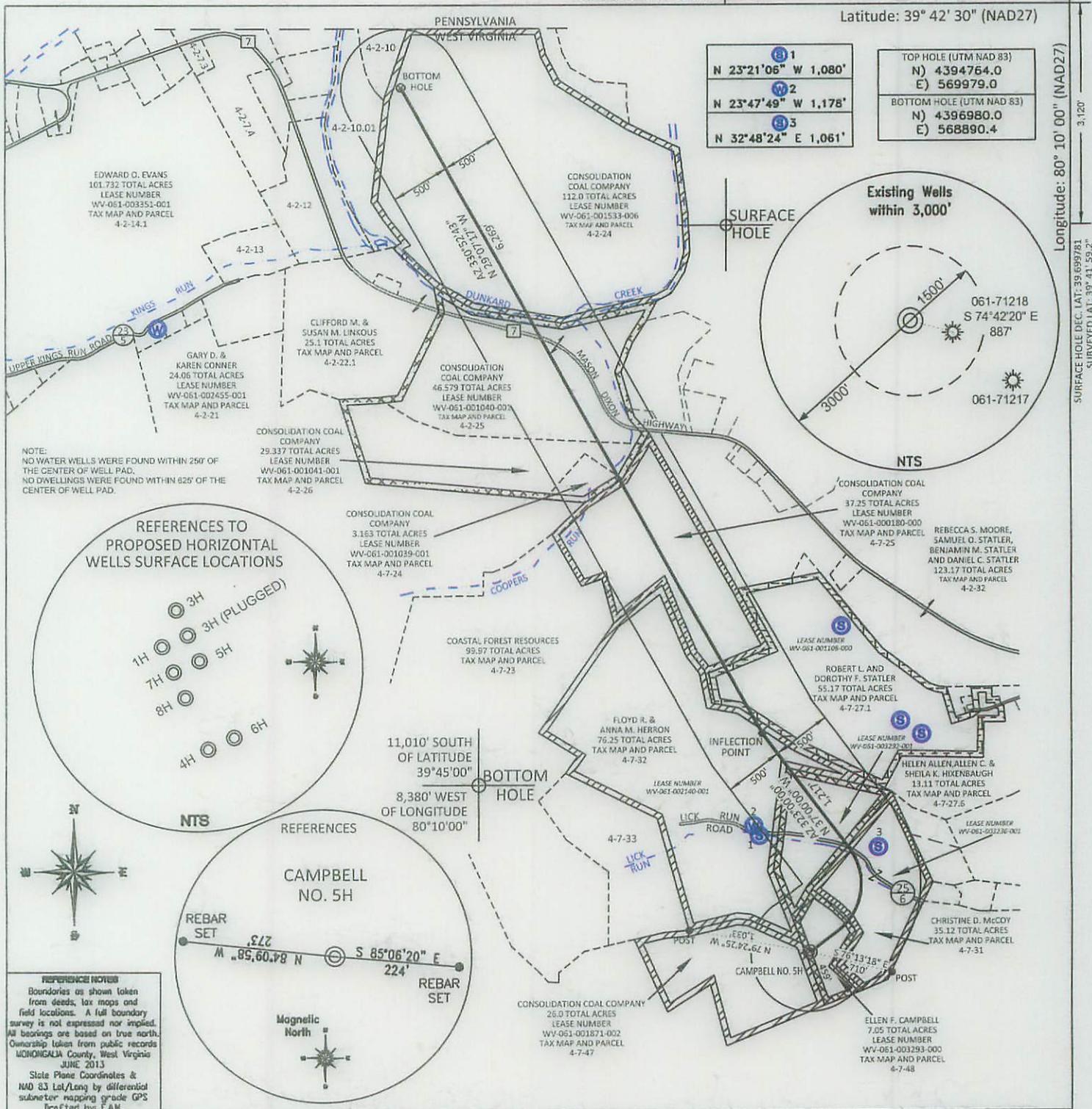
WV Department of
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BGGM (1945.0 to 2017.0) Dip: 66.95° Field: 52283.7 nT
 Magnetic North is 9.01 degrees West of True North (at 08/Dec/2015)
 Grid North is 0.44 degrees West of True North
 To correct azimuth from True to Grid add 0.44 degrees
 To correct azimuth from Magnetic to Grid subtract 8.57 degrees

Azimuth 330.88° with reference 0.00 N, 0.00 E

161-01688 Wm



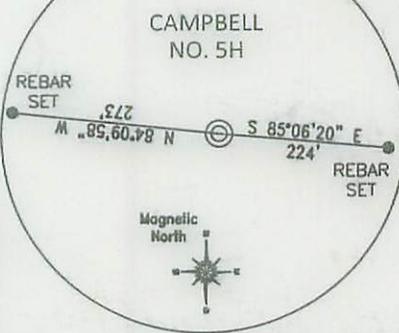
NOTE:
NO WATER WELLS WERE FOUND WITHIN 250' OF THE CENTER OF WELL PAD.
NO DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF WELL PAD.

REFERENCES TO PROPOSED HORIZONTAL WELLS SURFACE LOCATIONS



NTS

REFERENCES



Magnetic North

REFERENCE NOTES
Boundaries as shown taken from deeds, tax maps and field locations. A full boundary survey is not expressed nor implied. All bearings are based on true north. Ownership taken from public records MONONGALIA County, West Virginia JUNE 2013
State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS drafted by E.A.H.

FILE #: NNE12
DRAWING #: 2324
SCALE: PLAT: 1" = 1200'
TICK: 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1/200
PROVEN SOURCE OF ELEVATION: SUBMETER MAPPING GRADE GPS

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 REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: [Signature]
L.L.S. #2124: Ernest J. Benchek III



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

OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

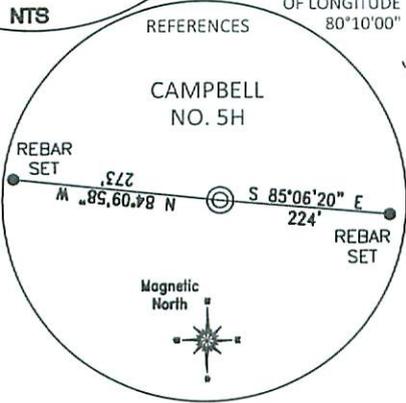
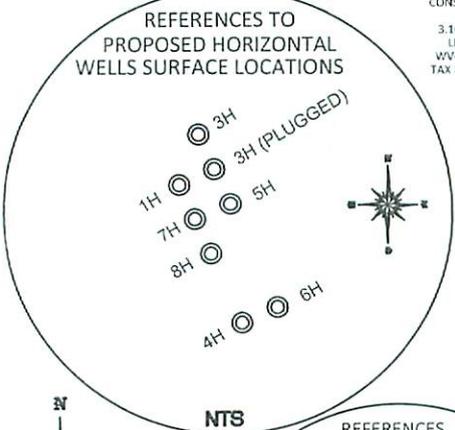
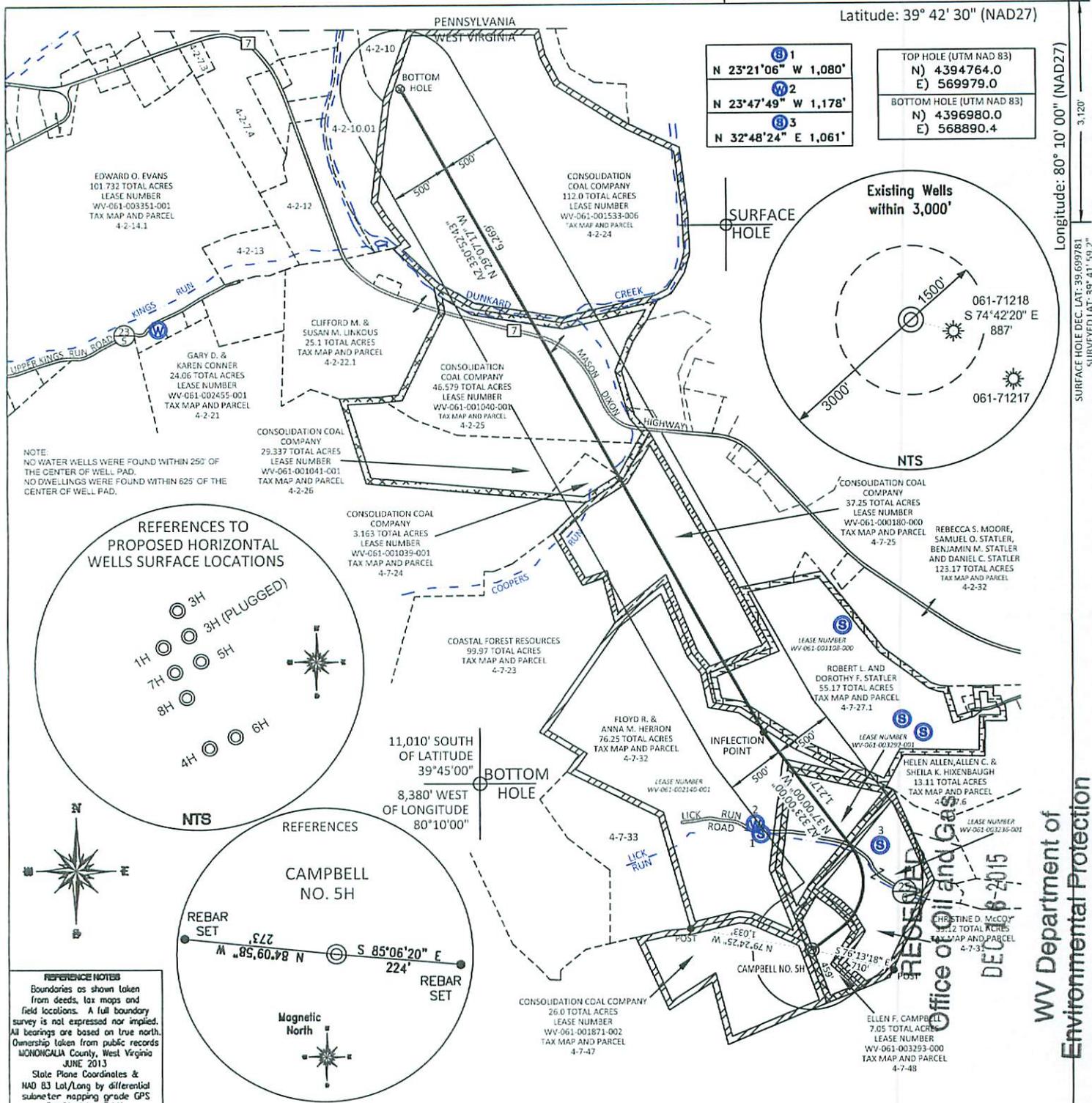
Well Type: Oil Waste Diposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: DUNKARD CREEK ELEVATION: 1,293.6'
COUNTY/DISTRICT: MONONGALIA / CLAY QUADRANGLE: BLACKSVILLE
SURFACE OWNER: ELLEN F. CAMPBELL ACREAGE: 7.05 +/-
OIL & GAS ROYALTY OWNER: ELLEN FOLEY CAMPBELL, ET AL ACREAGE: 375.919 +/-
LEASE NUMBERS: _____

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
PLUG OFF FORMATION PERFORATE NEW FORMATION PLUG & ABANDON
CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 8,118' TMD: 16,260.27'
WELL OPERATOR: NORTHEAST NATURAL ENERGY LLC DESIGNATED AGENT: JOHN ADAMS
ADDRESS: 707 VIRGINIA STREET EAST, SUITE 1200 ADDRESS: 707 VIRGINIA STREET EAST, SUITE 1200
CITY: CHARLESTON STATE: WV ZIP CODE: 25301 CITY: CHARLESTON STATE: WV ZIP CODE: 25301

SURFACE HOLE DEC. LAT: 39.699781 SURVEYED LAT: 39° 41' 59.2" Longitude: 80° 10' 00" (NAD27)



REFERENCE NOTES
Boundaries as shown taken from deeds, tax maps and field locations. A full boundary survey is not expressed nor implied. All bearings are based on true north. Ownership taken from public records MONONGALIA County, West Virginia JUNE 2013. State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS. Drafted by: EAM

FILE #: NNE12

DRAWING #: 2324

SCALE: PLAT: 1" = 1200'
TICK: 1" = 2000'

MINIMUM DEGREE OF ACCURACY: 1/200

PROVEN SOURCE OF ELEVATION: SUBMETER MAPPING GRADE GPS

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Signed: [Signature]

L.L.S. #2124 : Ernest J. Benchek III



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

Well Type: Oil Waste Diposal Production Deep Gas Liquid Injection Storage Shallow

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COUNTY/DISTRICT: MONONGALIA / CLAY QUADRANGLE: BLACKSVILLE

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LEASE NUMBERS: _____

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 PLUG OFF FORMATION PERFORATE NEW FORMATION PLUG & ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 8,118' TMD: 16,260.27'

WELL OPERATOR: NORTHEAST NATURAL ENERGY LLC DESIGNATED AGENT: JOHN ADAMS

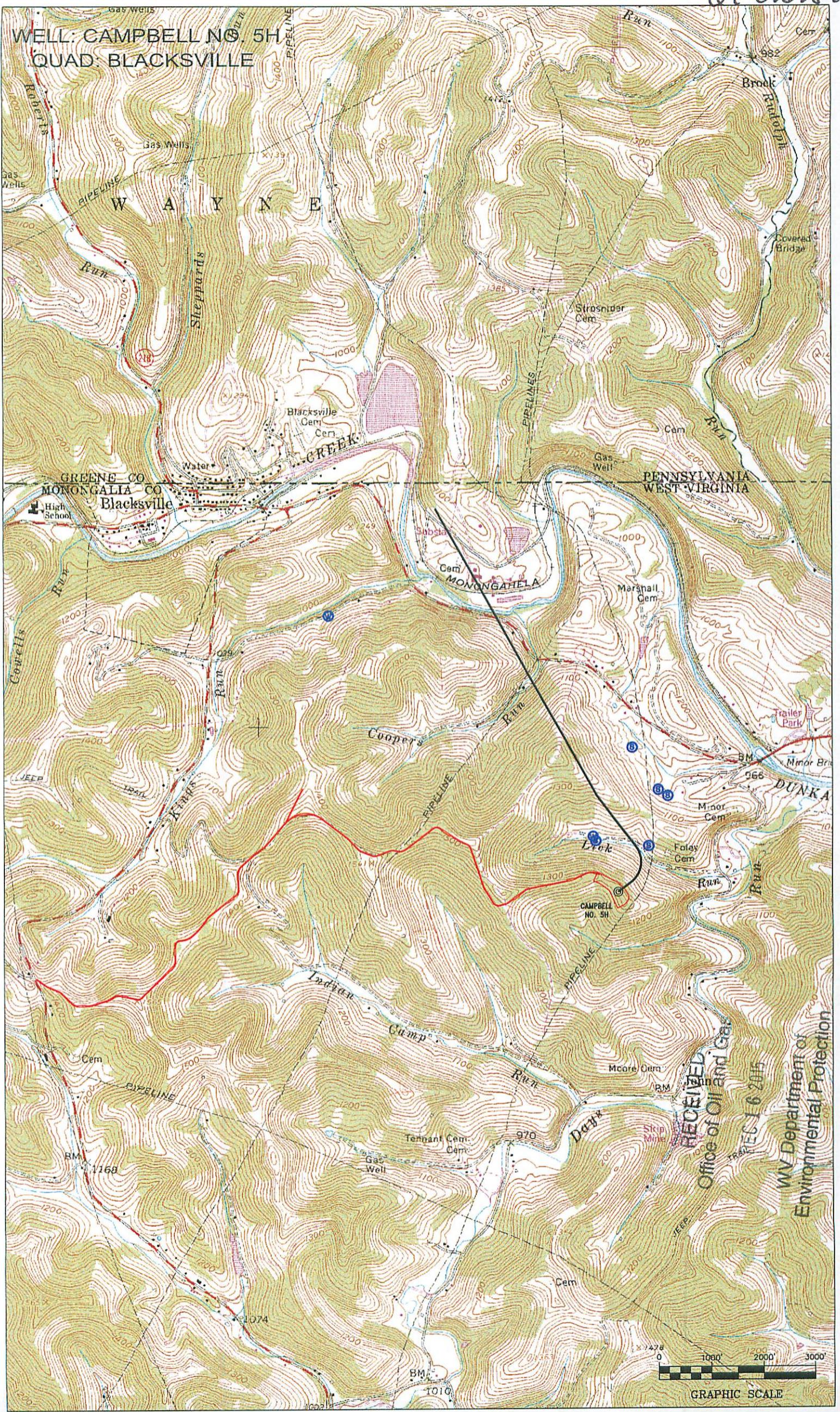
ADDRESS: 707 VIRGINIA STREET EAST, SUITE 1200 ADDRESS: 707 VIRGINIA STREET EAST, SUITE 1200

CITY: CHARLESTON STATE: WV ZIP CODE: 25301 CITY: CHARLESTON STATE: WV ZIP CODE: 25301

WV Department of Environmental Protection

Office of Oil and Gas
DECEMBER 16, 2015

WELL: CAMPBELL NO. 5H
QUAD: BLACKSVILLE



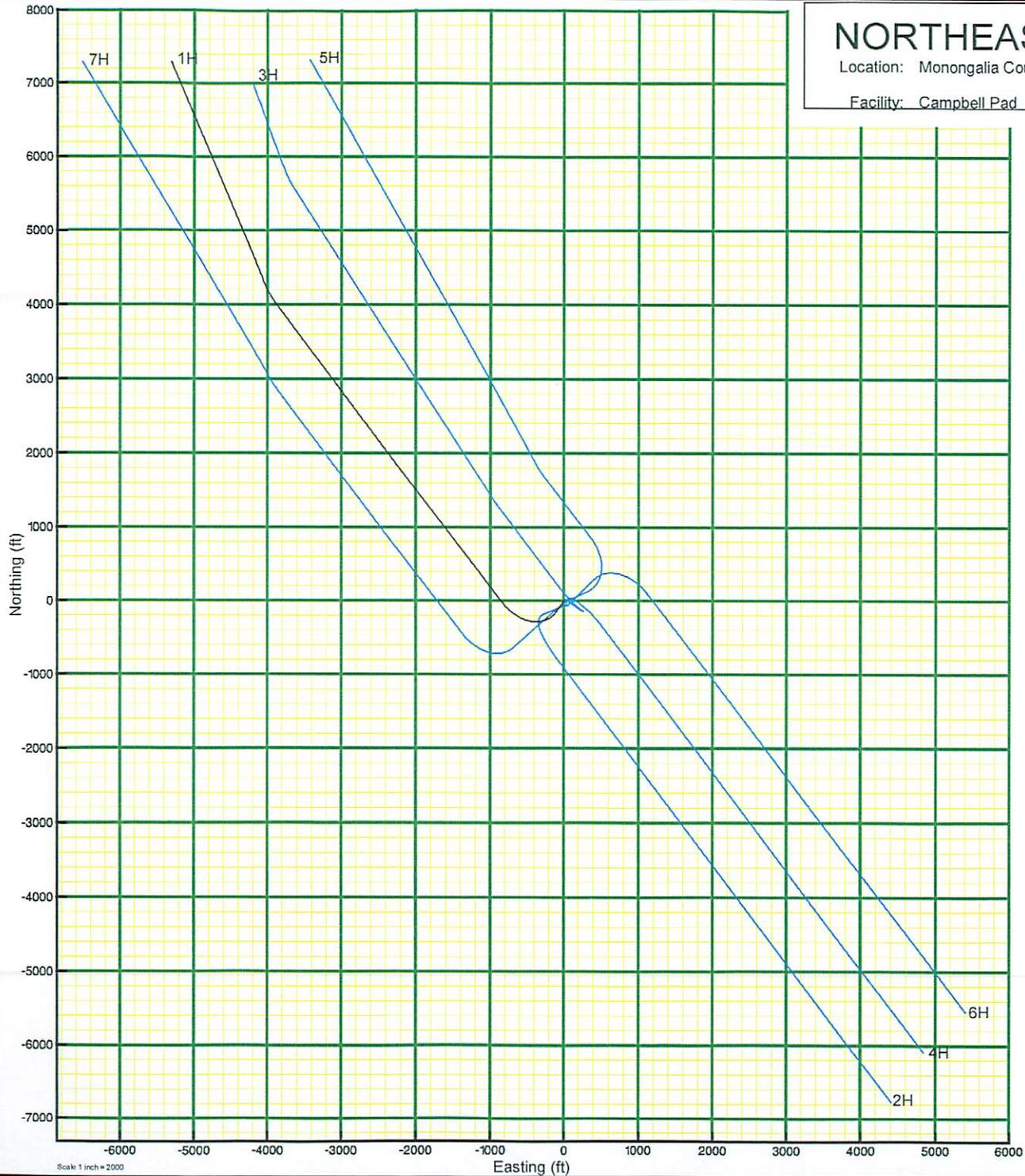
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NORTHEAST NATURAL ENERGY, LLC

Location: Monongalia County, WV

Facility: Campbell Pad



101-0167844