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west virginia department of environmental protection

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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

October 02, 2015

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

Re: Permit Modification Approval for API Number 6101700, Well #: CAMPBELL 6H

### Extend Vertical and Lateral

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,

A handwritten signature in black ink that reads "Gene Smith".

Gene Smith  
Assistant Chief of Permitting  
Office of Oil and Gas

Promoting a healthy environment.

10/02/2015



**northeast**  
NATURAL ENERGY

September 17, 2015

4706101700 Mod

WV Department of Environmental Protection  
Office of Oil and Gas  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304

Re: Campbell 1H and 6H Modification Request  
API # 47-6101710; 47-6101700

Dear Permit Reviewer,

Northeast Natural Energy LLC ("NNE") would like to request a modification to its existing Campbell 1H and 6H permits identified by the API nos. 47-06101710 and 47-06101700. NNE has adjusted the horizontal well bores to allow for more efficient development of the natural gas surrounding its Campbell Well Pad. No additional leases will be affected by these adjustments; therefore, a WW-6A1 form has not been attached but can be provided upon request. Please find enclosed with this request: updated Mylar Plats, Well Bore Schematics and WW-6B forms with revised TVD and TMD for both wells.

Should you have any questions please contact me at 304.241.5752 Ext. 7108 or by email at [hmedley@nne-llc.com](mailto:hmedley@nne-llc.com).

Sincerely,

  
Hollie M. Medley  
Regulatory Coordinator

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 6H Well Pad Name: Campbell

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

4) Elevation, current ground: 1,320' Elevation, proposed post-construction: 1,293.6'

5) Well Type (a) Gas  Oil  Underground Storage

Other

(b) If Gas Shallow  Deep

Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s): Marcellus ; 8,118' ; 103' , 3,485psi

*4706101700 Mod*

8) Proposed Total Vertical Depth: 8,118'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 15,921'

11) Proposed Horizontal Leg Length: 7,098'

12) Approximate Fresh Water Strata Depths: 300' , 1,100'

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

14) Approximate Saltwater Depths: 1,400' , 2,100'

15) Approximate Coal Seam Depths: 900' , 1,000'

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: 900' - 1,000'

Seam: Pittsburgh

Owner: Patriot Coal Corporation

WW-6B  
(9/13)

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	24"	New	NA	52.78	50'	50'	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	15,921'	15,891'	Cu. Ft.
Tubing	2 3/8"	New	J-55	4.7	NA	8,500'	NA
Liners							

Northeast Natural Energy LLC will not set Freshwater Casing beyond elevation without prior approval from the WV DEP Office of Oil and Gas Management.

<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	24"	24"	.25	415	Grout	NA
Fresh Water	13 3/8"	17 1/2"	.38"	2,760	Class A	1.23
Coal						
Intermediate	9 5/8"	12 1/4"	.395"	3,950	Class A	1.3
Production	5 1/2"	8 3/4"	.361"	12,530	50:50 Poz	1.21
Tubing	2 3/8"	NA	.190"	7,700	NA	NA
Liners						

4706101700 Mod

**PACKERS**

Kind:				
Sizes:				
Depths Set:				

WW-6B  
(9/13)

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 or fluid to an approximate depth of 6,923' TVD/MD. The well will then be horizontally drilled on fluid from the KOP to approximately 8,118' TVD / 15,921' MD along a 142 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 every fourth joint (~160') from TD to surface.

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

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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.

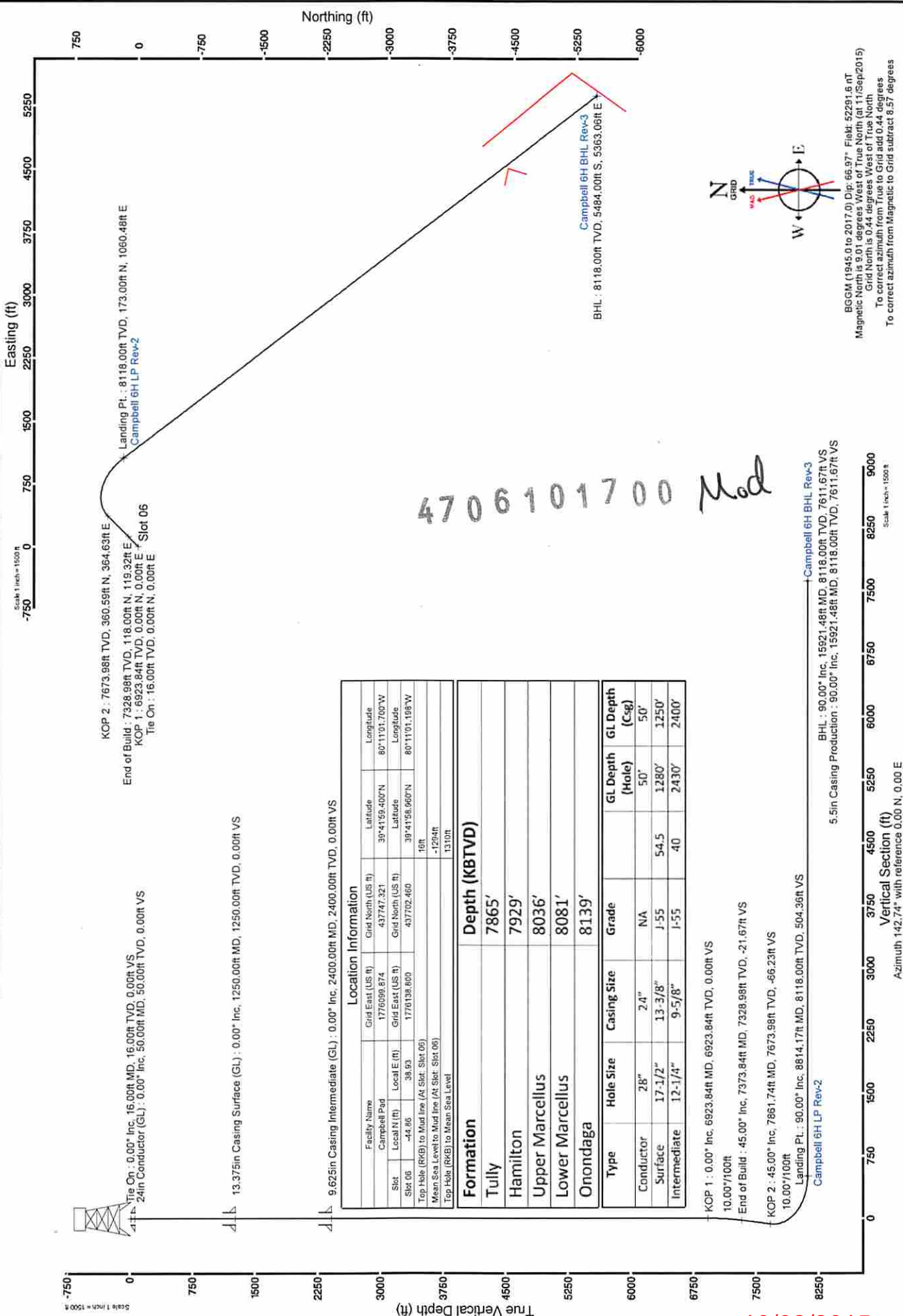
\*Note: Attach additional sheets as needed.



# NORTHEAST NATURAL ENERGY, LLC

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

Slot: Slot 06  
 Well: Campbell 6H  
 Wellbore: Campbell 6H PWB

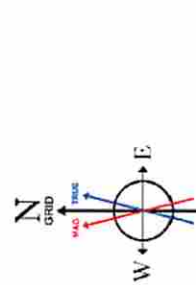


Location Information			
Facility Name	Grid East (US ft)	Grid North (US ft)	Longitude
Campbell Pad	1776099.874	437747.321	80°11'01.700"W
Slot	Local N (ft)	Local E (ft)	Local N (ft)
Slot 06	-44.86	38.93	1776138.800
Top Hole (RKB) to Mud line (At Slot: Slot 06)			
Mean Sea Level to Mud line (At Slot: Slot 06)			
Top Hole (RKB) to Mean Sea Level			

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

Type	Hole Size	Casing Size	Grade	GL Depth (Hole)	GL Depth (Csg)
Conductor	28"	24"	NA	50'	50'
Surface	17-1/2"	13-3/8"	J-55	1280'	1250'
Intermediate	12-1/4"	9-5/8"	J-55	40	2400'

KOP 1 : 0.00' Inc, 6923.84ft MD, 6923.84ft TVD, 0.00ft VS  
 10.00' / 100ft  
 End of Build : 45.00' Inc, 7373.84ft MD, 7328.98ft TVD, -21.67ft VS  
 KOP 2 : 45.00' Inc, 7861.74ft MD, 7673.98ft TVD, -66.23ft VS  
 10.00' / 100ft  
 Landing Pt.: 8118.00ft TVD, 173.00ft N, 1060.48ft E  
 Campbell 6H LP Rev-2

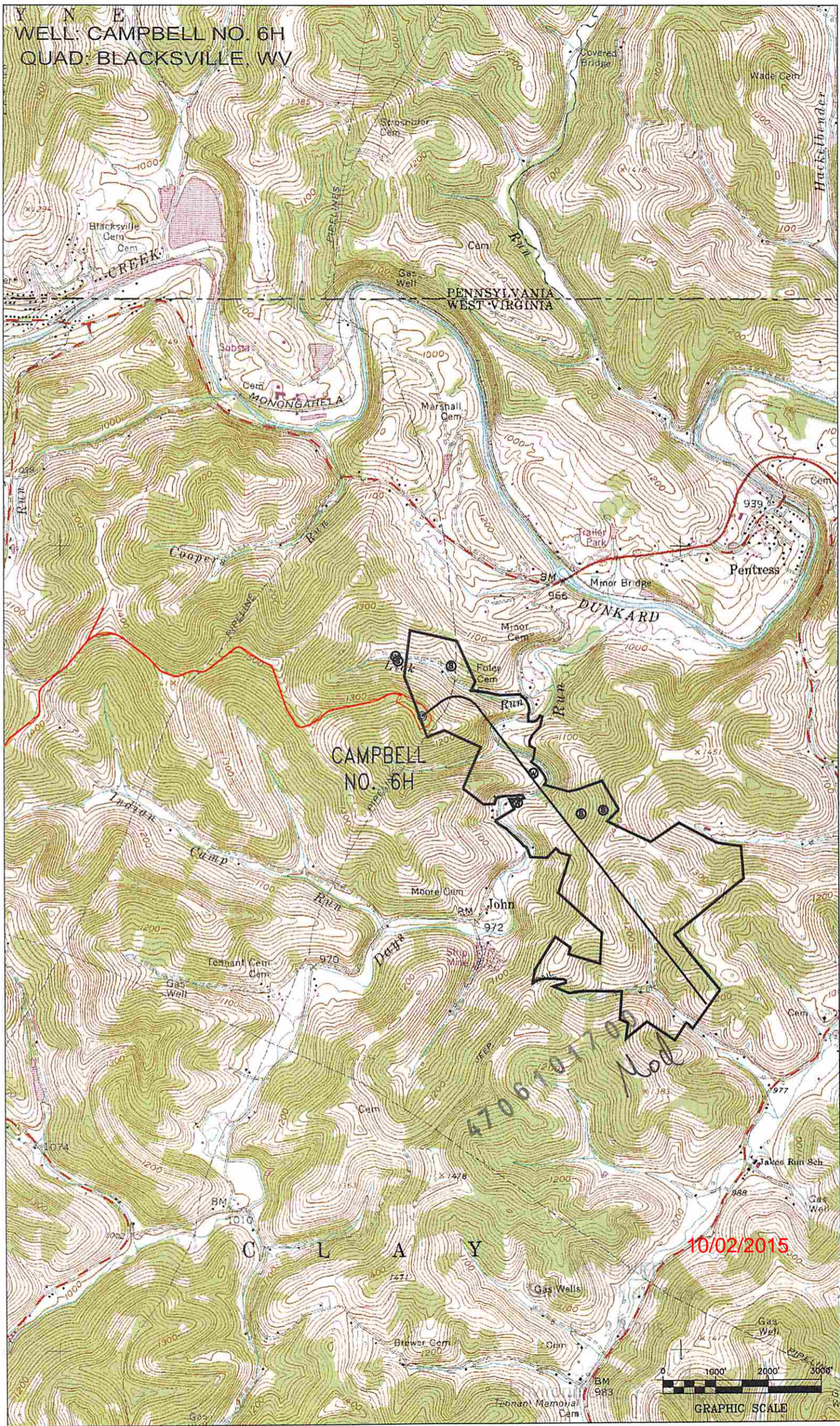


BGGM (1945.0 to 2017.0) Dip: 66.97° - Flair: 52291.6 6T  
 Magnetic North is 9.01 degrees West of True North (at 11/Sep/2015)  
 Grid North is 0.44 degrees West of True North  
 To correct azimuth from True to Grid add 0.44 degrees  
 To correct azimuth from Magnetic to Grid subtract 8.57 degrees

Campbell 6H BHL Rev-3  
 BHL : 90.00' Inc, 15921.48ft MD, 8118.00ft TVD, 7611.67ft VS  
 5.5in Casing Production : 90.00' Inc, 15921.48ft MD, 8118.00ft TVD, 7611.67ft VS  
 Scale 1 inch = 100ft

11/02/2015

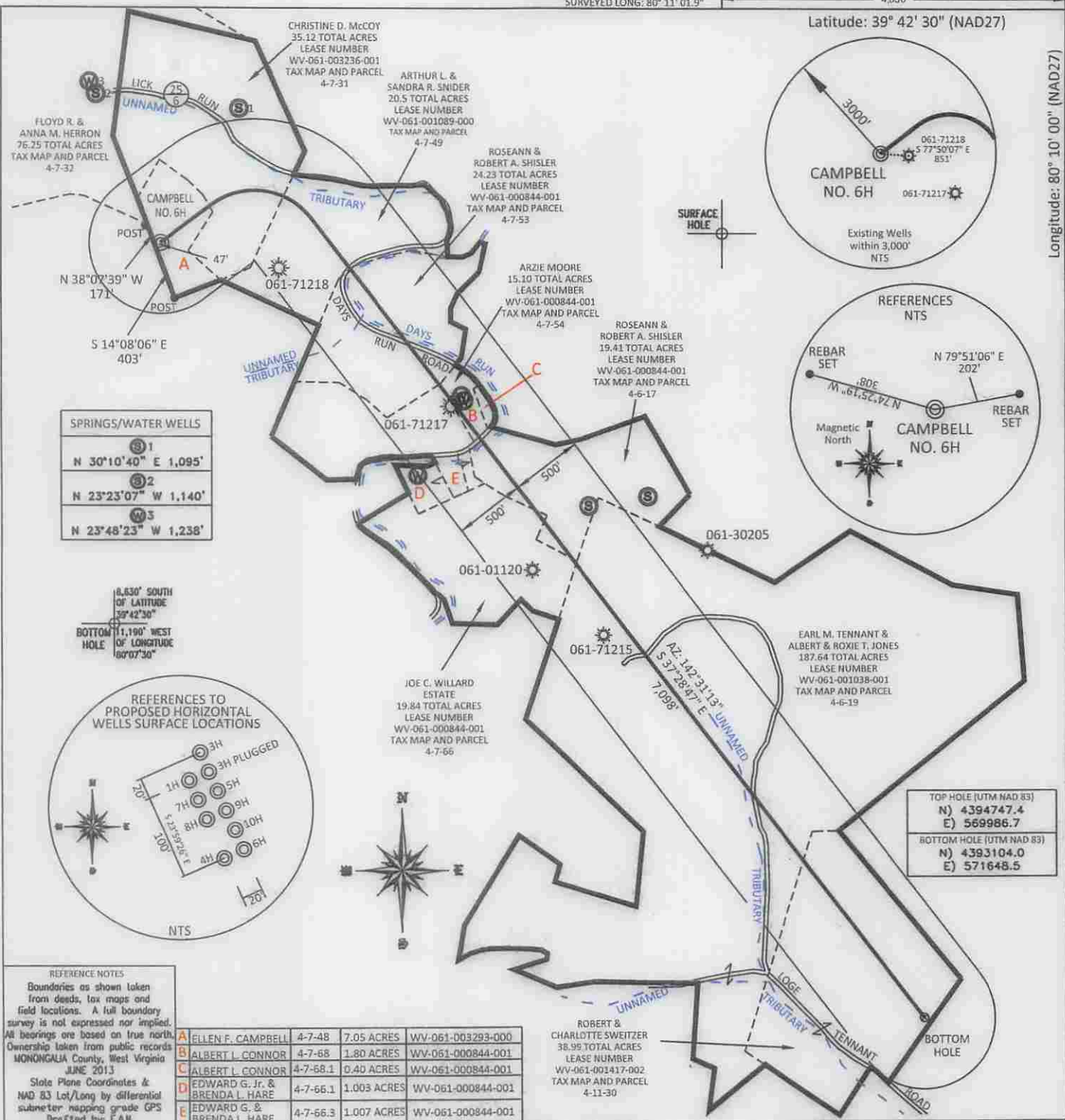
WELL CAMPBELL NO. 6H  
QUAD BLACKSVILLE, WV



CAMPBELL  
NO. 6H

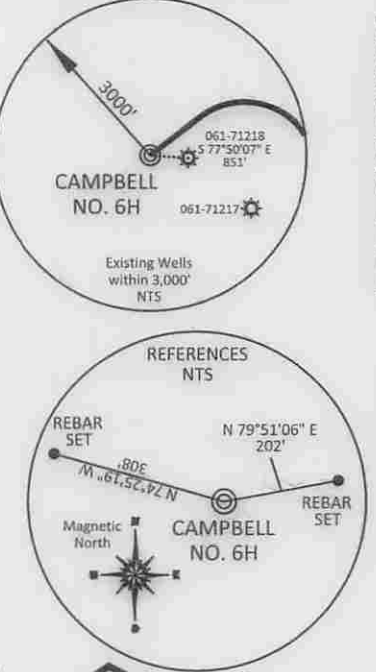
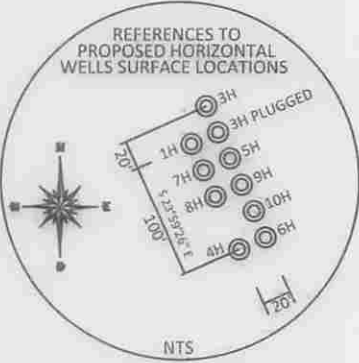
10/02/2015





SPRINGS/WATER WELLS	
1	N 30°10'40" E 1,095'
2	N 23°23'07" W 1,140'
3	N 23°48'23" W 1,238'

8,630' SOUTH OF LATITUDE 39°42'30"  
BOTTOM HOLE 11,190' WEST OF LONGITUDE 80°07'30"



TOP HOLE (UTM NAD 83)	
N)	439474.4
E)	569986.7
BOTTOM HOLE (UTM NAD 83)	
N)	4393104.0
E)	571648.5

**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 Lot/Long by differential submeter mapping grade GPS drafted by E.A.H.

A	ELLEN F. CAMPBELL	4-7-48	7.05 ACRES	WV-061-003293-000	
B	ALBERT L. CONNOR	4-7-68	1.80 ACRES	WV-061-000844-001	
C	ALBERT L. CONNOR	4-7-68.1	0.40 ACRES	WV-061-000844-001	
D	EDWARD G. JR. & BRENDA L. HARE	4-7-66.1	1.003 ACRES	WV-061-000844-001	
E	EDWARD G. & BRENDA L. HARE	4-7-66.3	1.007 ACRES	WV-061-000844-001	

FILE #: NNE13  
DRAWING #: 2365  
SCALE: PLAT: 1" = 1000'  
TICK MARK: 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 WVDEP  
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  
COUNTY/DISTRICT: MONONGALIA / CLAY  
SURFACE OWNER: ELLEN F. CAMPBELL  
OIL & GAS ROYALTY OWNER: ELLEN FOLEY CAMPBELL, ET AL  
LEASE NUMBERS: \_\_\_\_\_  
DATE: SEPTEMBER 18, 2015  
OPERATOR'S WELL #: CAMPBELL NO. 6H  
API WELL #: 47 61 01700H6A  
STATE COUNTY PERMIT MOO  
AS-BUILT ELEVATION: 1,293.6'  
QUADRANGLE: BLACKSVILLE, WV  
ACREAGE: 7.05 +/-  
ACREAGE: 372.09 +/-  
10/02/2015  
TARGET FORMATION: MARCELLUS  
ESTIMATED DEPTH: TVD: 8,118' TMD: 15,921'  
WELL OPERATOR: NORTHEAST NATURAL ENERGY LLC  
DESIGNATED AGENT: JOHN ADAMS  
ADDRESS: 707 VIRGINIA STREET EAST, SUITE 1200  
CITY: CHARLESTON STATE: WV ZIP CODE: 25301