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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](http://www.dep.wv.gov)

## PERMIT MODIFICATION APPROVAL

October 06, 2014

NORTHEAST NATURAL ENERGY LLC  
707 VIRGINIA STREET EAST, SUITE 1200  
CHARLESTON, WV 25301

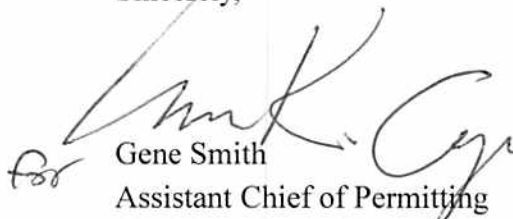
Re: Permit Modification Approval for API Number 6101673 , Well #: YOST 3H  
**Extended lateral, lengthened surface casing by 50'**

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

61-01673  
MOD



August 21, 2014

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

Re: Yost 3H (API # 47-6101673)  
Permit Modification Application

Received  
Office of Oil & Gas  
AUG 26 2014

Dear Permit Reviewer,

Northeast Natural Energy LLC ("NNE") received a Horizontal 6A permit for a well identified as the Yost 3H on May 27<sup>th</sup>, 2014. NNE has since leased an additional tract allowing for the extension of this well bore.

Therefore, please find enclosed an application to extend the Yost 3H well bore from a lateral length of 6,865' to 7,662'. Along with the application is a revised Well Bore Schematic, Site Safety Plan, Mylar Plat and Lease Information Form (WW-6A1).

Should you have any questions please contact me at 304.241.5752 Ext. 7108 or by email at hmedley@nne-llc.com.

Sincerely,

A handwritten signature in blue ink that reads 'Hollie M. Medley'.

Hollie M. Medley  
Regulatory Coordinator

WW-6B  
(9/13)

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, WV  
Operator ID County District Quadrangle

2) Operator's Well Number: Yost 3H Well Pad Name: Yost

3) Farm Name/Surface Owner: Yost Heritage Inc. Public Road Access: Daybrook Road 218

4) Elevation, current ground: 1,510' Elevation, proposed post-construction: 1485.2'

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

(b) If Gas Shallow  Deep   
Horizontal

6) Existing Pad: Yes or No No

*MDK 9/12/14*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Marcellus Shale, 8,050 TVD, 80', 3,500 PSI Formation Pressure

8) Proposed Total Vertical Depth: Pilot: 8,500', Horizontal: 8,050'

9) Formation at Total Vertical Depth: Pilot: Heldersburg, Horizontal: Marcellus

10) Proposed Total Measured Depth: 15,821'

11) Proposed Horizontal Leg Length: 7,662'

12) Approximate Fresh Water Strata Depths: 300', 1,150'

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

14) Approximate Saltwater Depths: 1,550', 2,500'

15) Approximate Coal Seam Depths: 450', 1,000'

16) Approximate Depth to Possible Void (coal mine, karst, other): NA

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: \_\_\_\_\_  
Depth: \_\_\_\_\_  
Seam: \_\_\_\_\_  
Owner: \_\_\_\_\_

**Received**

SEP 15 2014

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WV Dept. of Environmental Protection  
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10/10/2014

WW-6B  
(9/13)

18)

CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20"	New	NA	52.78	60'	60'	GTS
Fresh Water	13-3/8"	New	J-55	54.5	1,480'	1,450'	CTS
Coal							
Intermediate	9-5/8"	New	J-55	40	2,680'	2,630'	CTS
Production	5-1/2"	New	P-110	20	15,821'	15,775'	3,538
Tubing	2-7/8"	New	J-55	6.5	NA	8,000'	NA
Liners							

MSK 9/12/14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.25"	2,200	Grout	NA
Fresh Water	13-3/8"	17-1/2"	0.38"	2,730	Class A	1.23
Coal						
Intermediate	9-5/8"	12-1/4"	0.395"	3,950	Class A	1.3
Production	5-1/2"	8-3/4"	0.361"	12,530	50:50 Poz	1.21
Tubing	2-3/8"	NA	0.190"	7,700	NA	NA
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

Received

SEP 15 2014

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 WW Dept. of Environmental Protection  
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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 6,400' TVD/MD. After 6,400' a pilot hole will continue to be drilled vertically on fluid to an approximate depth of 8,500' TVD/MD. After geologic evaluation, wellbore will be plugged back with cement to approximately 6,400' TVD/MD. Well will be horizontally drilled from top of cement to approximately 8,050' TVD / 15,422' MD along a 345.6 degree azimuth.

from TD

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. After fracture treatment, composite frac plugs will be drilled out using a service rig and/or snubbing unit.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 14.5

22) Area to be disturbed for well pad only, less access road (acres): 10.4

23) Describe centralizer placement for each casing string:

Surface and intermediate casing strings will have bow spring centralizers placed every third joint (~120') from 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:

Surface string cement will be a Type 1 + 3% bwoc Calcium Chloride + 0.75 gals/100 sack FP-12L + 51.2% Fresh Water blend. Intermediate string cement will be a Type I Cement + 0.5% bwoc EC-1 + 0.75 gals/100 sack FP-12L + 0.25 lbs/sack Cello Flake + 0.5% bwoc Sodium Metasilicate + 0.5% bwoc BA-10A + 50.9% 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 35.0 bbls Gel Pill + LCM + 25 lbs Cello Flake + 20 lbs/bbl Bentonite + 80 lbs Fed Seal @ 8.4 ppg & 10 bbls fresh water spacer prior to cement. Intermediate string will use a 35.0 bbls Gel Pill + LCM + 25 lbs Cello Flake + 20 lbs/bbl Bentonite + 80 lbs Fed Seal @ 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, Bulk + 1 gal/bbl SS-2 @ 13.5 ppg spacer prior to cement.

\*Note: Attach additional sheets as needed.

APR 25 2014  
WV Department of  
Environmental Protection

## Northeast Natural Energy LLC Mine Contingency Plan

On all wells drilled, Northeast Natural Energy LLC ("NNE") has contingency strategies in place should an unanticipated void or mine be encountered while drilling the surface section of the well. If encountered, any accumulated gases will be diverted a safe distance away from the drilling operations through the blooey line and/or flare.

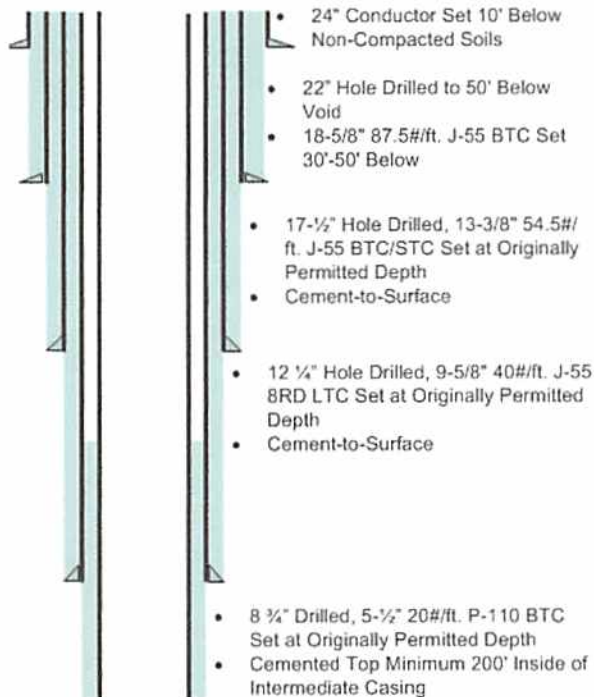
All casings programs submitted to the state incorporate the use of a 24" conductor over the previously used 20" that has long been the industry standard for a typical Marcellus design. The use of 24" conductor casing allows the use of a 22" bit to ream the surface hole, and drill 50' below the void to run a string of 18-5/8" 87.50#/ft J-55 through the section when needed.

The 18-5/8" would be set 30-50' below the void with cement baskets placed directly above and below. The section of pipe below the void would be cemented using the displacement method and 100% excess. The section above the void would be cemented simultaneously using a two-stage DV tool or separately by using remedial top fill techniques and 30% excess.

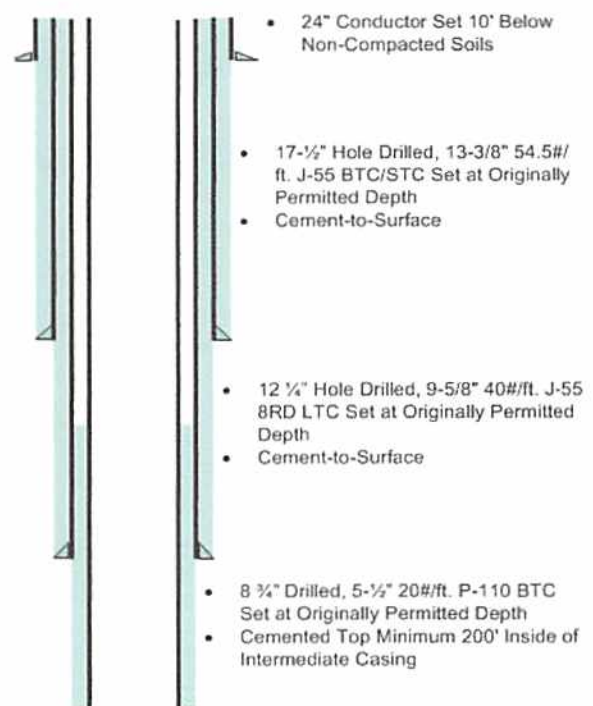
With the use of these string sizes and techniques, the surface and intermediate strings do not need to be altered. After a proper WOC time, the surface section of the well would continue to be drilled with a 17-1/2" bit and the 13-3/8" 54.50#/ft freshwater casing would be set at the originally permitted depth.

*\*The diagram below visually shows the alternative casing plan should an unanticipated void be encountered.*

### Casing Schematic w/ Mine String



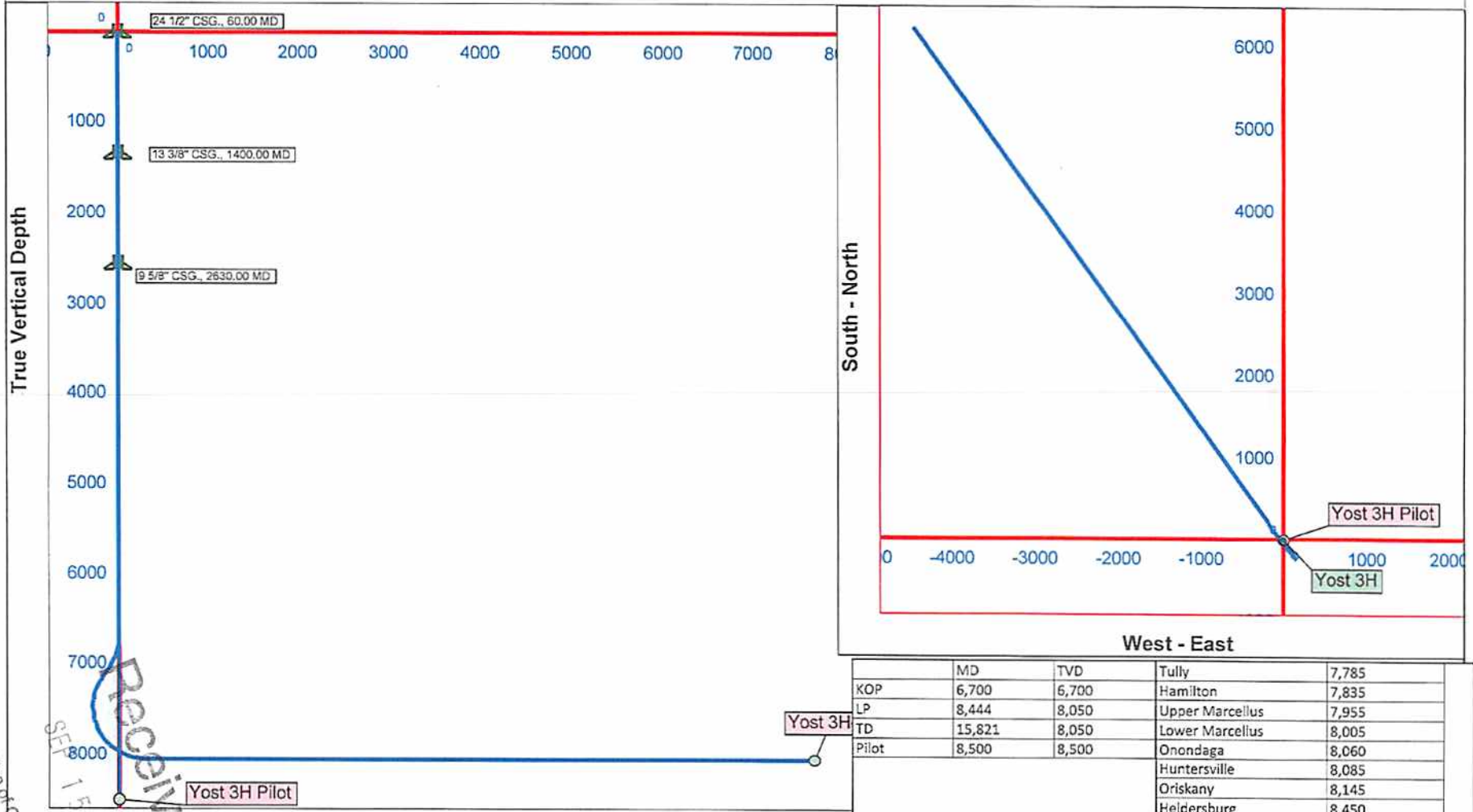
### Casing Schematic w/o Mine String





Job Number: 2  
 Company: Northeast Natural Energy  
 Lease/Well: Yost 3H  
 Location: Yost  
 Rig Name: Pioneer 63  
 State/County: WV/ Mon  
 Country: US  
 API Number:

Elevation (To MSL): 1488.20 ft  
 RKB: 18.00 ft  
 Projection System: US State Plane 1983  
 Projection Group: West Virginia Northern Zone  
 Projection Datum: GRS80  
 Magnetic Declination: -8.86  
 Grid Convergence: -0.45797 W  
 Date: Thursday, September 11, 2014



	MD	TVD	Tully	7,785
KOP	6,700	6,700	Hamilton	7,835
LP	8,444	8,050	Upper Marcellus	7,955
TD	15,821	8,050	Lower Marcellus	8,005
Pilot	8,500	8,500	Onondaga	8,060
			Huntersville	8,085
			Oriskany	8,145
			Heldersburg	8,450

Vertical Section (1000 Ft/Div) VSP: 324.33°

Performance Drilling Technology, Inc. - HawkEye™ ©2014

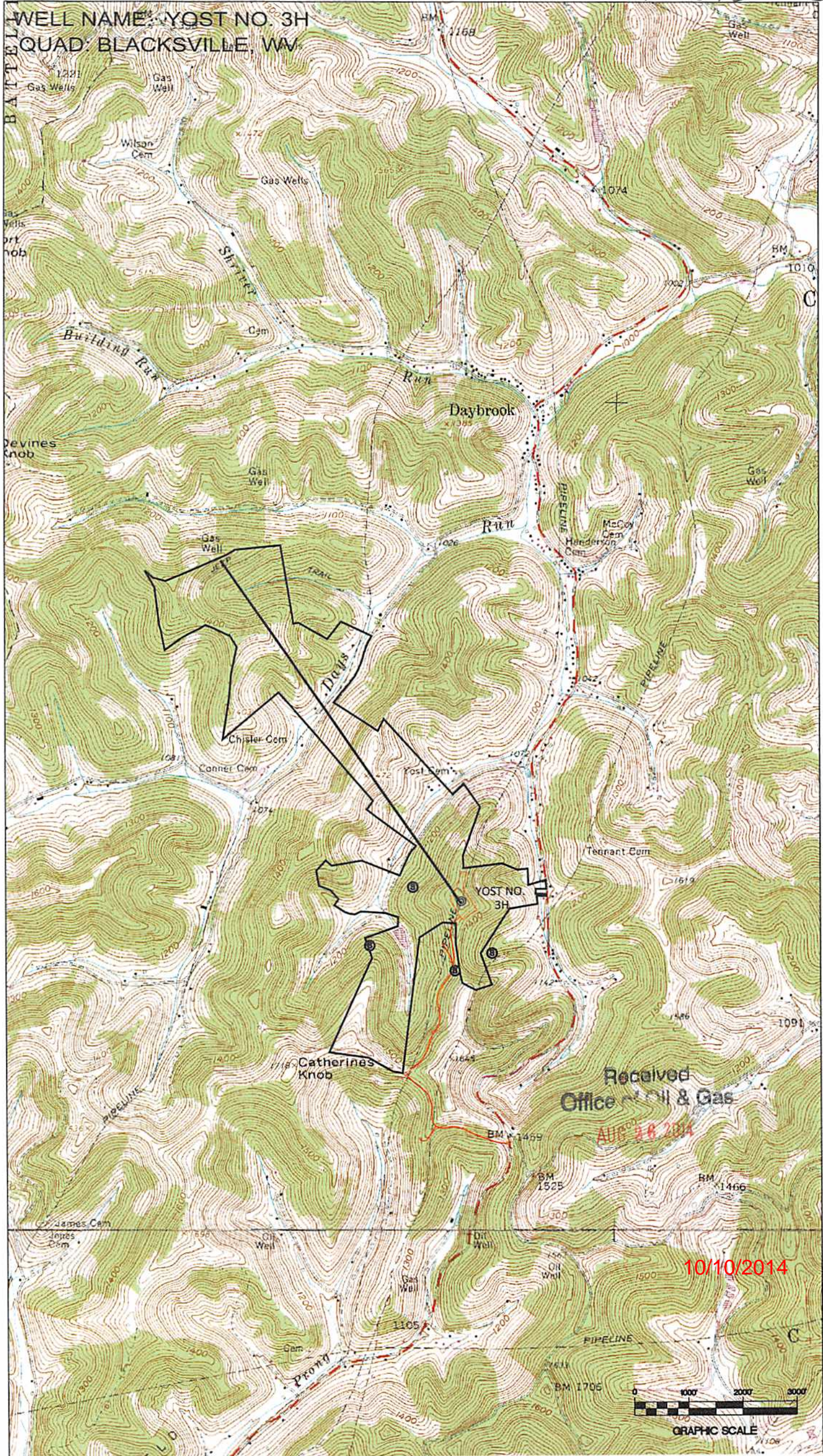
WV Dept. of Environmental Protection  
 Office of Oil and Gas

Received  
 SEP 11 2014

4706101673  
 MOD



WELL NAME: YOST NO. 3H  
QUAD: BLACKSVILLE, WV



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Office of Oil & Gas

AUG 26 2014

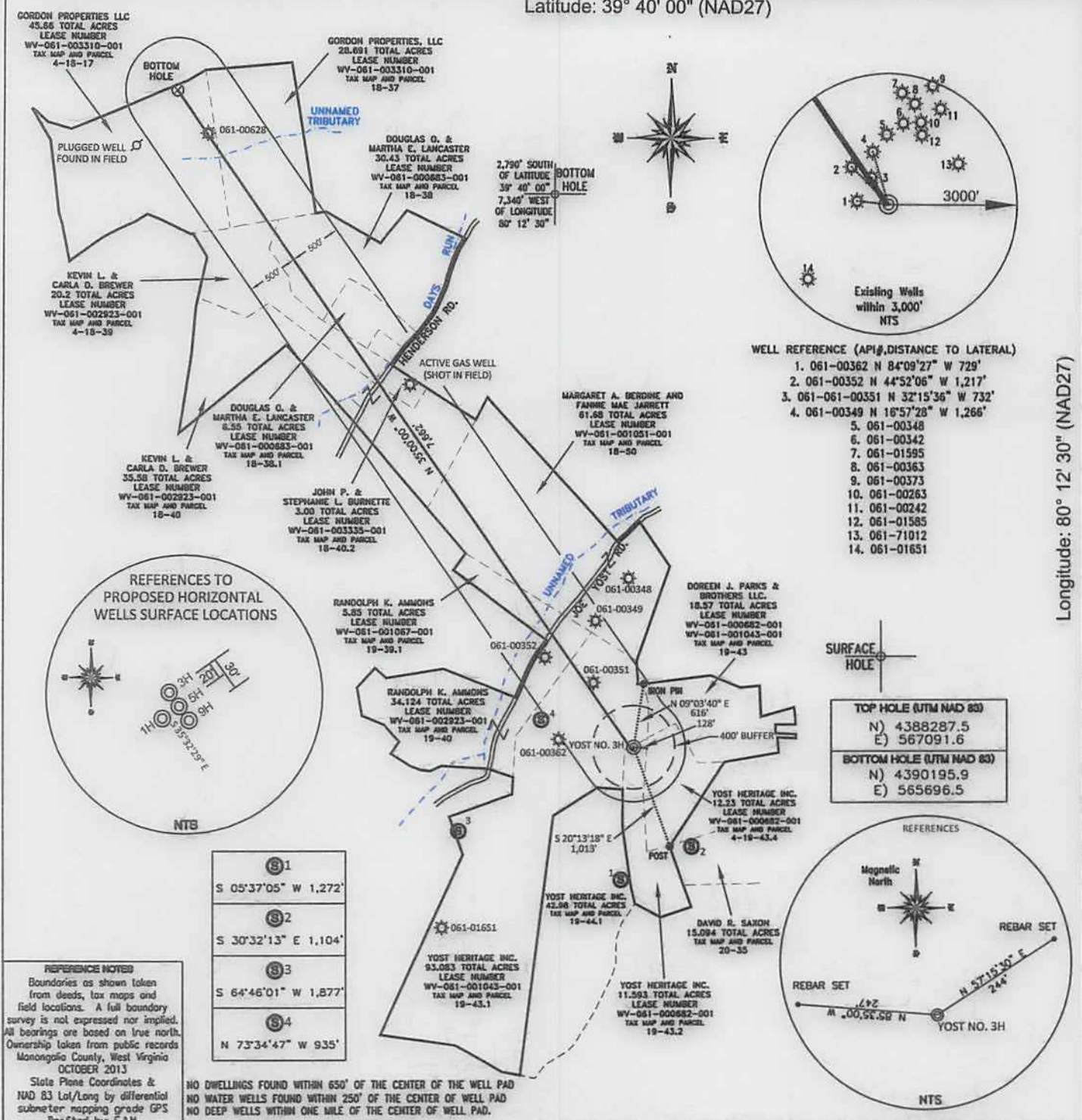
10/10/2014



GRAPHIC SCALE



Latitude: 39° 40' 00" (NAD27)



Longitude: 80° 12' 30" (NAD27)

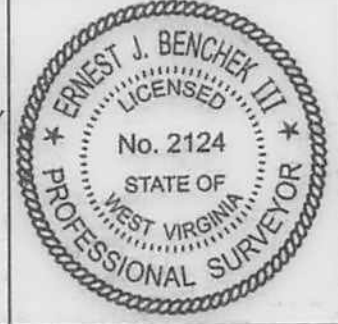
SURFACE HOLE DEC. LAT: 39° 38' 30.0"  
SURVEYED LAT: 39° 38' 30.0"

**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 OCTOBER 2013  
State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS  
Drafted by: EAM

FILE #: NNE10  
DRAWING #: 2297  
SCALE: PLAT - 1" = 1400'  
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. Benckek 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 ELEVATION: 1,510'  
COUNTY/DISTRICT: MONONGALIA / CLAY QUADRANGLE: BLACKSVILLE, WV  
SURFACE OWNER: YOST HERITAGE INC. ACREAGE: 11.593 +/-  
OIL & GAS ROYALTY OWNER: (SEE ATTACHMENT) ACREAGE: 407.24 **10/10/2014**  
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: PILOT 8,500' TVD: 8,050' TMD: 15,821'  
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