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

May 16, 2014

**WELL WORK PERMIT**

**Horizontal 6A Well**

This permit, API Well Number: 47-6101671, issued to NORTHEAST NATURAL ENERGY LLC, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.

James Martin
Chief

Operator's Well No: YOST 9H
Farm Name: YOST HERITAGE INC.
**API Well Number: 47-6101671**
**Permit Type: Horizontal 6A Well**
Date Issued: 05/16/2014



05/16/2014

API Number: 4706101671

# PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

## CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.

2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.

3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.

4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.

5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.

6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.

7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.

8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.

05/16/2014

WW-6B
(9/13)

4706101671

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

3 256

| 1) Well Operator: | Northeast Natural Energy LLC | 494498281 | Monongalia | Clay | Blacksville, WV |
|---|---|---|---|---|---|
| | | Operator ID | County | District | Quadrangle |

2) Operator's Well Number: Yost 9H 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: 1,485.2'

5) Well Type (a) Gas ■ Oil _____ Underground Storage _____
Other _____
(b)If Gas Shallow ■ Deep _____
Horizontal ■

3/5/14

6) Existing Pad: Yes or No No

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: 8,050'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 15,944'

11) Proposed Horizontal Leg Length: 6,631'

12) Approximate Fresh Water Strata Depths: 300'-1,350'

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

14) Approximate Saltwater Depths: 2,000' - 2,600'

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: _____

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(9/13)

4706101671

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 | 1,430' | 1,400' | CTS |
| Coal | | | | | | | |
| Intermediate | 9-5/8" | New | J-55 | 40 | 2,830' | 2,800' | CTS |
| Production | 5-1/2" | New | P-110 | 20 | 15,944' | 15,900' | 3,708 |
| Tubing | 2-7/8" | New | J-55 | 6.5 | NA | 8,000' | NA |
| Liners | | | | | | | |

3/5/14

| 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 | Type I | 1.23 |
| Coal | | | | | | |
| Intermediate | 9-5/8" | 12-1/4" | 0.395" | 3,950 | Type I | 1.3 |
| Production | 5-1/2" | 8-3/4" | 0.361" | 12,530 | 50:50 Poz | 1.21 |
| Tubing | 2-7/8" | NA | 0.217" | 7,260 | NA | NA |
| Liners | | | | | | |

**PACKERS**

| | | | | |
|---|---|---|---|---|
| Kind: | | | | |
| Sizes: | | | | |
| Depths Set: | | | | |





05/16/2014

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 to an approximate depth of6,900' TVD/MD. Well will be horizontally drilled from KOP to 8,050' TVD / 15,944' MD along a 324 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. 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.

4706101671

## *Northeast Natural Energy LLC Mine Contingency Plan*

northeast
NATURAL ENERGY

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.

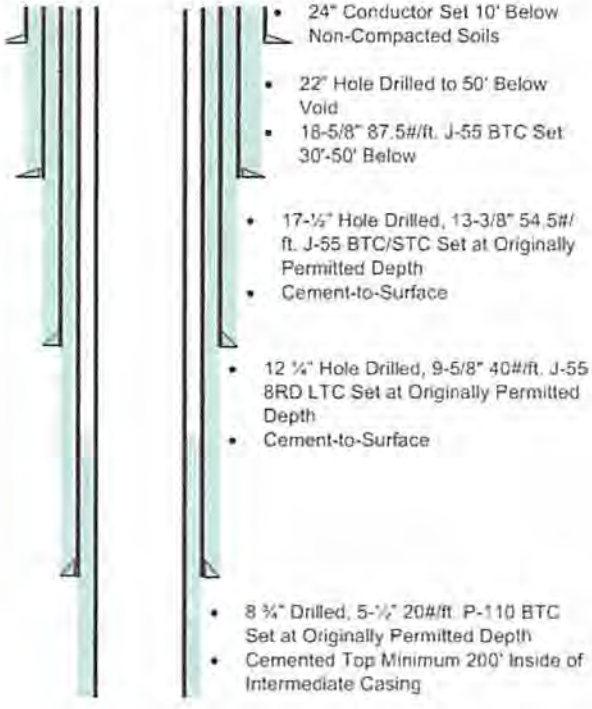
All casings programs submitted to the state incorporate the use of a 24" conductor over the previously used 20" that has long been the industry standard for a typical Marcellus design. The use of 24" conductor casing allows the use of a 22" bit to ream the surface hole, and drill 50' below the void to 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.

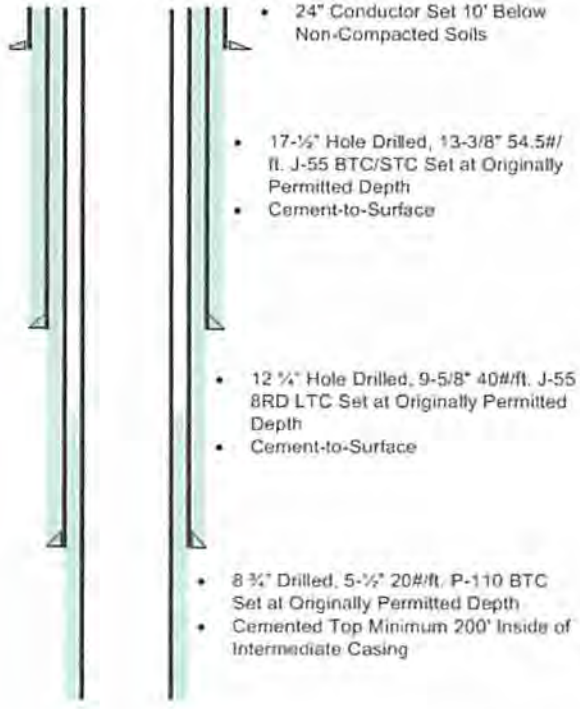
With the use of these string sizes and techniques, the surface and intermediate strings do not need to be altered. After a proper WOC time, the surface section of the well would continue to be drilled with a 17-1/2" bit and the 13-3/8" 54.50#/ft freshwater casing would be set at the originally permitted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



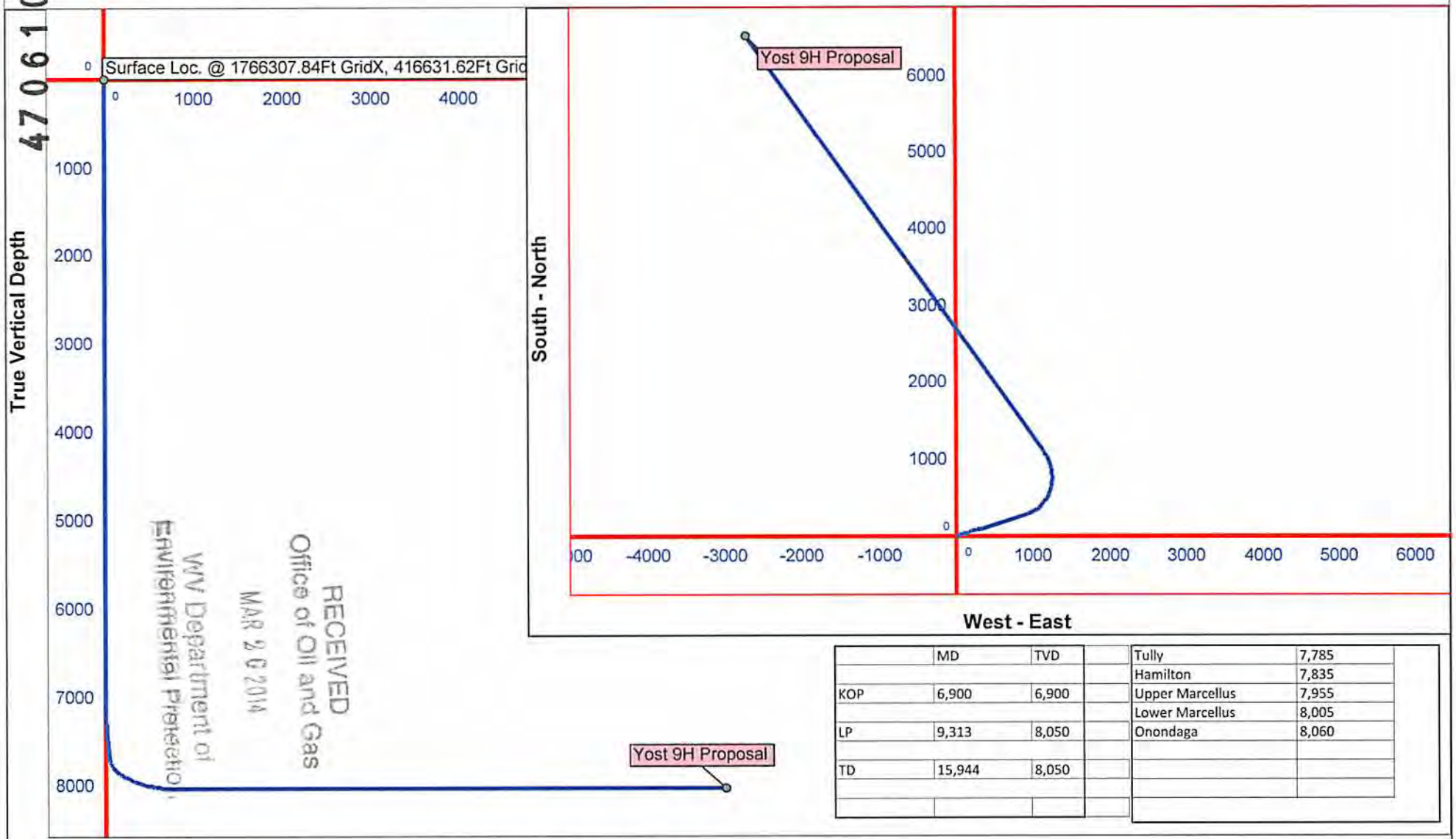

05/14 - IC

05/16/2014

47061017

**Job Number:**
**Company:** Northeast Natural Energy
**Lease/Well:** Yost 9H
**Location:** Yost
**Rig Name:** Pioneer 63
**State/County:** PA/ Mon
**Country:** US
**API Number:**

**Elevation (To MSL):** 1486.20 ft
**RKB:** 18.00 ft
**Projection System:** US State Plane 1983
**Projection Group:** West Virginia Northern Zone
**Projection Datum:** GRS80
**Magnetic Declination:** -8.85
**Grid Convergence:** -0.45792 W
**Date:** Tuesday, February 11, 2014




| | MD | TVD |
|---|---|---|
| | | |
| KOP | 6,900 | 6,900 |
| | | |
| LP | 9,313 | 8,050 |
| | | |
| TD | 15,944 | 8,050 |
| | | |
| | | |

| | |
|---|---|
| Tully | 7,785 |
| Hamilton | 7,835 |
| Upper Marcellus | 7,955 |
| Lower Marcellus | 8,005 |
| Onondaga | 8,060 |
| | |
| | |
| | |
| | |



**Vertical Section (1000 Ft/Div) VSP: 345.60°**

WW-9
(9/13)

API Number 47 - _____ - 4706101671
Operator's Well No. Yost 9H

**STATE OF WEST VIRGINIA**
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**
**OFFICE OF OIL AND GAS**

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

2/27/14 SDW 2/27/2014

Operator Name Northeast Natural Energy LLC OP Code 494498281

Watershed (HUC 10) Dunkard Creek Quadrangle Blacksville, WV

Elevation 1,510' County Monongalia District Clay

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes ☑ No ☐

Will a pit be used? Yes ☐ No ☑

If so, please describe anticipated pit waste: N/A

Will a synthetic liner be used in the pit? Yes ☐ No ☑ If so, what ml.? _____

Proposed Disposal Method For Treated Pit Wastes:

_____ Land Application
_____ Underground Injection ( UIC Permit Number _____ )
_____ Reuse (at API Number _____ )
■ Off Site Disposal (Supply form WW-9 for disposal location)
_____ Other (Explain _____

Will closed loop system be used? If so, describe: Yes - See Attachment A

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air - Vertical/Oil Based-Curve & Horizontal

-If oil based, what type? Synthetic, petroleum, etc. Synthetic Oil Based Mud

Additives to be used in drilling medium? Organophilic Clay Viscosifiers, Lime, Unsaturated Fatty Acids, CaCl, Barite, Emulsifiers, Mica LCM, Water Loss Agents

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Removed Offsite - See Attachment A

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) _____

-Landfill or offsite name/permit number? See Attachment A

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature Hollie Medley

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Office of Oil and Gas
MAR 26 2014

Company Official (Typed Name) Hollie Medley

Company Official Title Regulatory Coordinator

Subscribed and sworn before me this 26th day of February, 20 14

Andrew J. Travis Notary Public

My commission expires April 11, 2017

OFFICIAL SEAL
Andrew J. Travis
Notary Public
State of West Virginia
My Commission Expires
April 11, 2017
6240 Mid Atlantic Drive
Morgantown, WV 26505

03/28/2014

4706101671

Form WW-9

Operator's Well No. Yost 9H

Northeast Natural Energy LLC

Proposed Revegetation Treatment: Acres Disturbed 14.5 Prevegetation pH unknown

Lime 3 Tons/acre or to correct to pH 7

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch 3 Tons/acre

**Seed Mixtures**

| Temporary | | Permanent | |
|---|---|---|---|
| Seed Type | lbs/acre | Seed Type | lbs/acre |
| Orchard Grass | 46 | Orchard Grass | 46 |
| Red Clover | 8 | Red Clover | 8 |
| Tetraploid Perennial Rye | 16 | Tetraploid Perennial Rye | 16 |
| Timothy - 15 and Annual Rye - 15 | | Timothy - 15 and Annual Rye - 15 | |

Attach:
Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [signature]

Comments: Seed & Mulch ASAP.

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Office of Oil and Gas
MAR 20 2014
WV Department of
Environmental Protection

Title: Oil & Gas Inspector Date: 2/27/14

Field Reviewed? (✓) Yes ( ) No

05/16/2014

4706101671

Attachment A to WW-9

Northeast Natural Energy LLC ("NNE") plans to utilize a closed loop process for its drilling of the Yost 9H well. Return flow from the well will be separated into its liquid and solid form. Liquids will be held in steel tanks and reused in the drilling and completion process or disposed of at an approved facility listed below. Solids removed from the stream will be diverted to steel half-round tanks where they will be solidified on site and taken to disposal as they are accumulated.

Yost 9H Drill Cuttings will be taken to disposal at one or more of the following disposal/approved waste facilities, unless listed facilities are no longer approved to accept waste at time of disposal:

- Westmoreland Landfill (Tervita) – Belle Vernon, PA (Permit # 100277)
- Meadowfill Landfill (Waste Management) – Bridgeport, WV (Permit # SWF 103298)
- Max Environmental – Yukon, PA (PAD004835146 and 301071)
- Max Environmental – Bulger, PA (PAD059087072 and 301359)
- Chestnut Valley Landfill (Advanced Disposal) – Export, PA (Permit # 101421)

NNE plans to reuse and recycle all flowback fluid and/or reach out to other operators in the area who may be able to reuse and recycle such fluid. However, in the event that reuse is not obtainable the fluid will be disposed of at one, or multiple, of the following disposal/approved waste facilities unless listed facilities are no longer approved to accept waste at time of disposal:

- Green Hunter M. E. Elder 1 Disposal Well (Permit # 47-085-05151)
- Green Hunter Mason 1 Disposal Well (Permit #47-085-09721)
- Green Hunter Warren Disposal Well (Permit #34-121-2-3995)
- Green Hunter Travis Unit Disposal Well (Permit #34-121-2-4086)
- Viking Energy Corporation 20320 Disposal Well (Permit#47-039-02210)

4706101671

northeast
NATURAL ENERGY

# Yost 9H

# SITE SAFETY PLAN

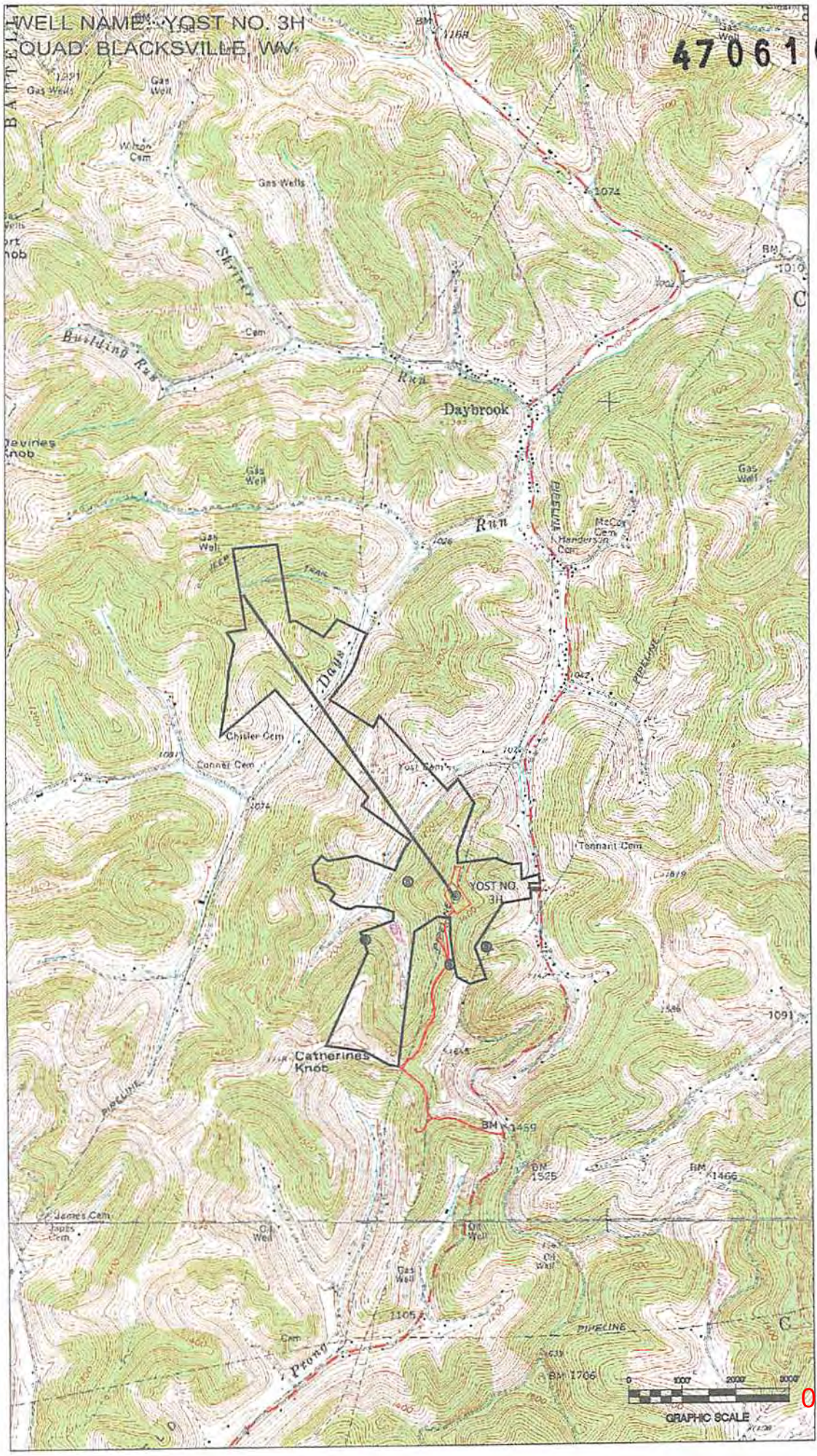
**February 20, 2014**

2/27/14

SOW 2/27/2014

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

4706101671

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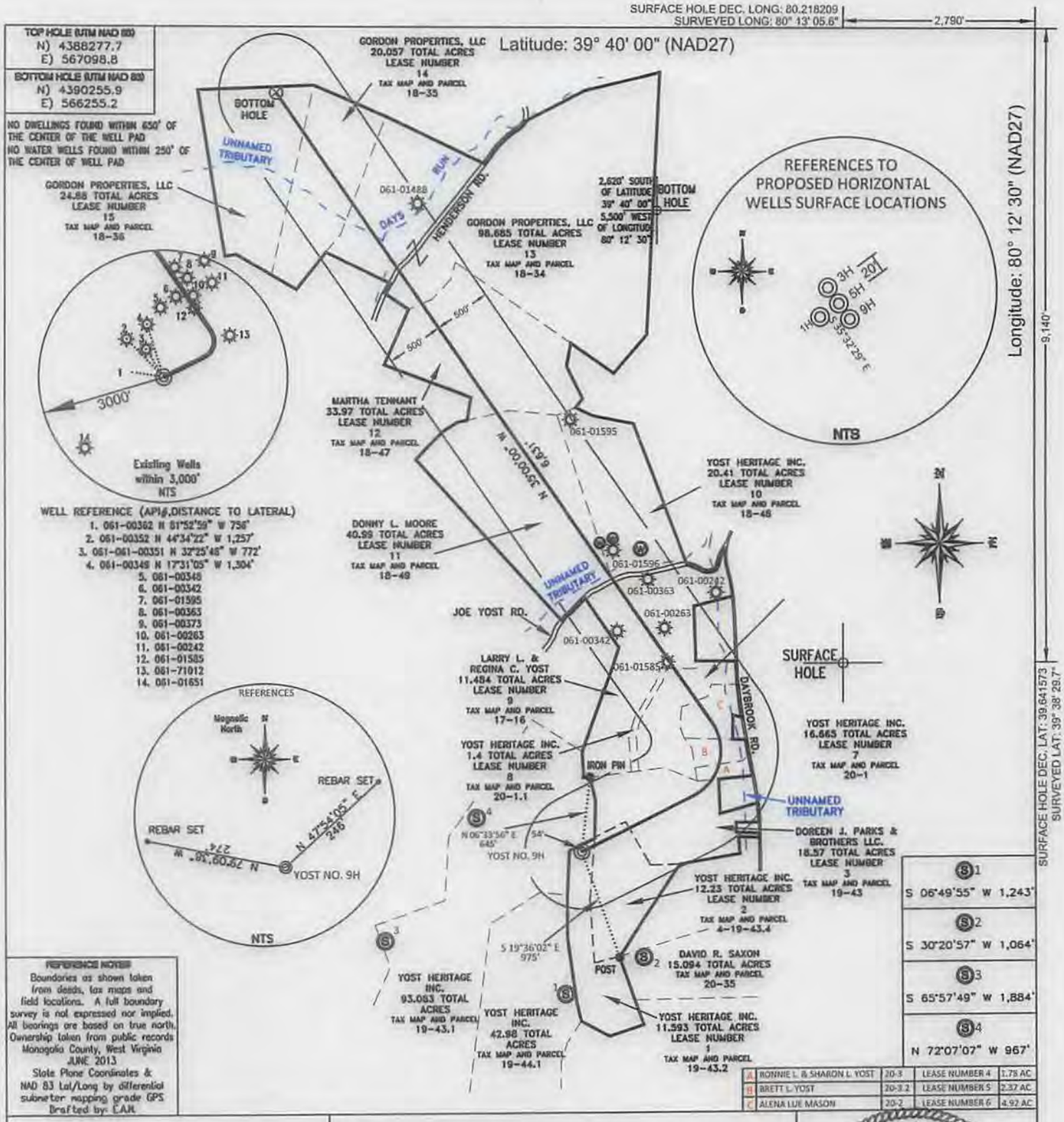


FILE #: NNE10

DRAWING #: 2300

SCALE: PLAT - 1" = 1200'
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: _____

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

ERNEST J. BENCHEK III LICENSED No. 2124 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

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

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

DATE: FEBRUARY 12, 2014

OPERATOR'S WELL #: YOST NO. 9H

API WELL #: 47 (STATE) 61 (COUNTY) 01671 (PERMIT) H6A

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

WATERSHED: DUNKARD CREEK

ASBUILT ELEVATION: 1,510'

COUNTY/DISTRICT: MONONGALIA / CLAY

QUADRANGLE: BLACKSVILLE, WV

SURFACE OWNER: YOST HERITAGE INC.

ACREAGE: 11.593 +/- 05/16/2014

OIL & GAS ROYALTY OWNER: (SEE ATTACHMENT)

ACREAGE: 318.60 +/-

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: 8,050' TMD: 15,944'

WELL OPERATOR: NORTHEAST NATURAL ENERGY LLC.

DESIGNATED AGENT: JOHN ADAMS

ADDRESS: 707 VIRGINIA STREET, SUITE 1200

ADDRESS: 707 VIRGINIA STREET SUITE 1200

CITY: CHARLESTON STATE: WV ZIP CODE: 25301

CITY: CHARLESTON STATE: WV ZIP CODE: 25301