



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

January 02, 2015

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-6101689, 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: KASSAY 13H
Farm Name: KASSAY, NEHEMIAH & PATTY A
API Well Number: 47-6101689
Permit Type: Horizontal 6A Well
Date Issued: 01/02/2015

Promoting a healthy environment.

01/02/2015

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.

4706101689

WW-6B
(9/13)

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

W!
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256

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

2) Operator's Well Number: Kassay 13H Well Pad Name: Kassay

3) Farm Name/Surface Owner: Nehemiah and Patty A. Kassay Public Road Access: County Route 25/3 (Yank Hollow Road)

4) Elevation, current ground: 1559' Elevation, proposed post-construction: 1535'

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

(b) If Gas Shallow Deep
Horizontal

MSDK
9/8/2014

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus ; 8,248' ; 115' , 3,580psi

8) Proposed Total Vertical Depth: 8,248'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 17,033'

11) Proposed Horizontal Leg Length: 7,642'

12) Approximate Fresh Water Strata Depths: 65' , 1,300'

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

14) Approximate Saltwater Depths: 1,450' , 2,100'

15) Approximate Coal Seam Depths: 700' , 1,252'

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: _____
Depth: _____
Seam: _____
Owner: _____

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WW-6B
(9/13)

4706101689

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	24"	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	2,330'	2,300'	CTS
Production	5 1/2"	New	P-110	20	17,033'	17,003'	4,124 Cu. Ft.
Tubing	2 3/8"	New	J-55	4.7	NA	9,000'	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. MJK 9/8/2014

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	24"	24"	.25	2,200	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						

PACKERS

Kind:				
Sizes:				
Depths Set:				

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4706101689

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 7,200' TVD/MD. The well will then be horizontally drilled on fluid from the KOP to approximately 8,248' TVD / 17,033' 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.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 16.12

22) Area to be disturbed for well pad only, less access road (acres): 13.25

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:

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 bbls Seal Bond 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.

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 blowby line and/or flare.

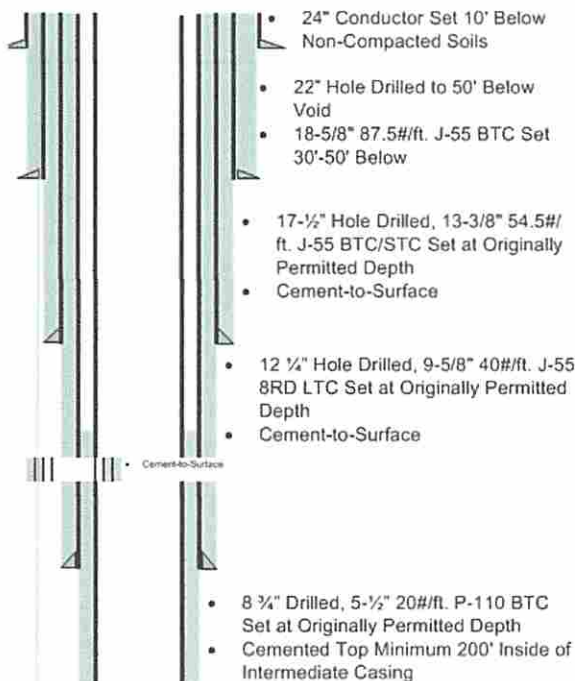
All casings programs submitted to the state incorporate the use of a 24" conductor over the previously used 20" that has long been the industry standard for a typical Marcellus design. The use of 24" conductor casing allows the use of a 22" bit to ream the surface hole, and drill 50' below the void to 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 balance method with 100% excess. The section above the void would be cemented separately by using remedial top fill techniques and 30% excess.

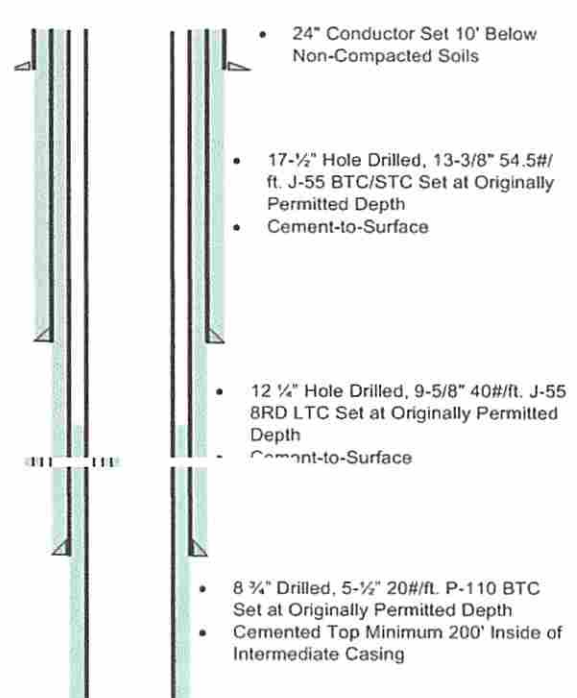
With the use of these string sizes and techniques, the surface and intermediate strings do not need to be altered. After a proper WOC time, the surface section of the well would continue to be drilled with a 17-1/2" bit and the 13-3/8" 54.50#/ft freshwater casing would be set at the originally permitted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

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

Casing Schematic w/ Mine String



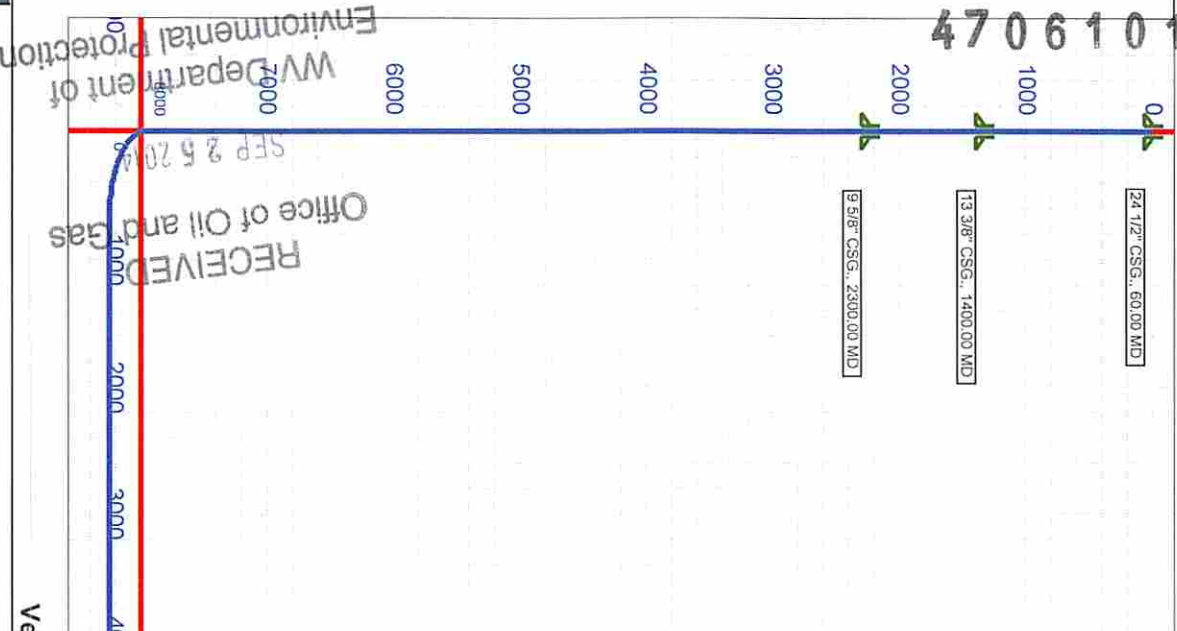
Casing Schematic w/o Mine String



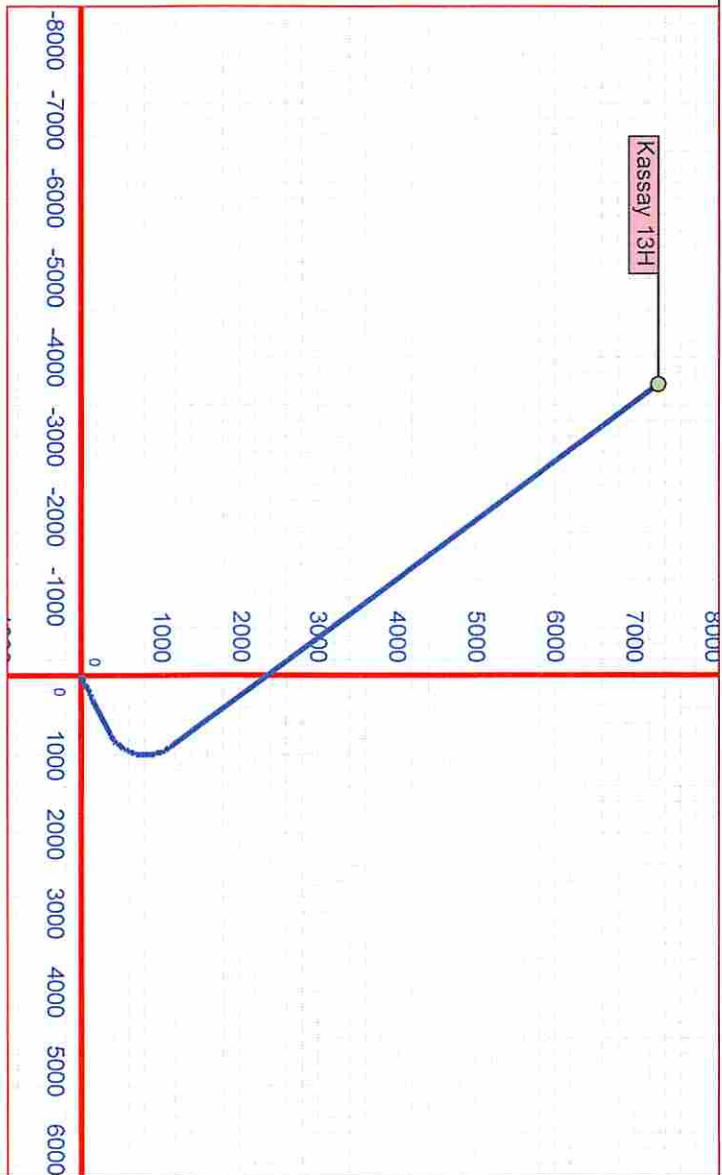
Job Number: Northeast Natural Energy
 Company: Northeast Natural Energy
 LeaseWell: Kassay 13H
 Location: Kassay
 Rig Name: Pioneer 63
 State/Country: WV/Mon
 Country: US
 API Number:

Elevation (To MSL): 1535.00 ft
 RKB: 18.00 ft
 Projection System: US State Plane 1983
 Projection Group: West Virginia Northern Zone
 Projection Datum: GRS80
 Magnetic Declination: -8.88
 Grid Convergence: -0.44282 W
 Date: Tuesday, September 02, 2014

True Vertical Depth



South - North



KOP	7,200	7,200
LP	9,391	8,248
TD	17,033	8,248

Tully	7,973
Hamilton	8,023
Upper Marcellus	8,143
Lower Marcellus	8,193
Onondaga	8,258

West - East

Vertical Section (1000 Ft/Div) VSP: 333.48°

Performance Drilling Technology, Inc. - HawKeye™ ©2014

WW-9
(9/13)

API Number 47 - 4706101689
Operator's Well No. Kassay 13H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Northeast Natural Energy LLC OP Code _____

Watershed (HUC 10) Dunkard Creek Quadrangle Blacksville, WV

Elevation 1559' 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 unknown at this time, TBD)
- 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) _____

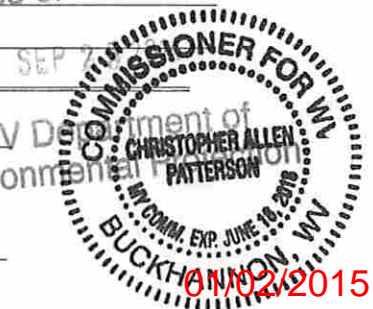
-Landfill or offsite name/permit number? See Attachment A

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
Company Official (Typed Name) Hollie Medley
Company Official Title Regulatory Coordinator

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Subscribed and sworn before me this 8th day of September, 20 14
Christy Ann Post Notary Public

My commission expires 6-18-2018

01/02/2015

4706101689

Form WW-9

Operator's Well No. Kassay 13H

Northeast Natural Energy LLC

Proposed Revegetation Treatment: Acres Disturbed 16.12 Prevegetation pH 4.5-8.0

Lime 2.0 Tons/acre or to correct to pH 6.5
10% Nitrogen, 20% Phosphate, 20% Potash

Fertilizer type _____

Fertilizer amount 500 lbs/acre

Mulch 3 Tons/acre

Seed Mixtures

Temporary

Permanent

Seed Type	lbs/acre
Kentucky Bluegrass	20
Red Top	20
Common White Clover	15

Seed Type	lbs/acre
Kentucky Bluegrass	20
Red Top	20
Common White Clover	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: Harvey J. Kirtland

Comments: Public road improvements subjected to D.O.H. approval

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SEP 25 2014

Title: INSPECTOR

Date: 9/8/2014

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Field Reviewed? (X) Yes () No

Attachment A to WW-9

Northeast Natural Energy LLC ("NNE") plans to utilize a closed loop process for its drilling of the Kassay 13H 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.

Kassay 13H 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:

- Fairmont Brine Processing (WV NPDES #0116408)
- 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)
- Ohio Oil Gathering Killbuck Disposal Well (Permit #34-075-24527)
- Ohio Oil Gathering Moran Disposal Well (Permit #34-089-24792)
- Ohio Oil Gathering Bells Run Disposal Well (Permit #34-167-29395)
- Ohio Oil Gathering Long Run Disposal Well (Permit #34-167-29658)
- Ohio Oil Gathering Newell Run Disposal Well (Permit #34-167-29685)
- Appalachian Oil Purchaser Greens Run Disposal Well (Permit #2D0732540)
- Appalachian Oil Purchaser BW#4 Disposal Well (Permit # 2D0732523)

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SEP 25 2014
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01/02/2015



4706101689

northeast

NATURAL ENERGY

Kassay 13H

SITE SAFETY PLAN

MSGK
9/8/14

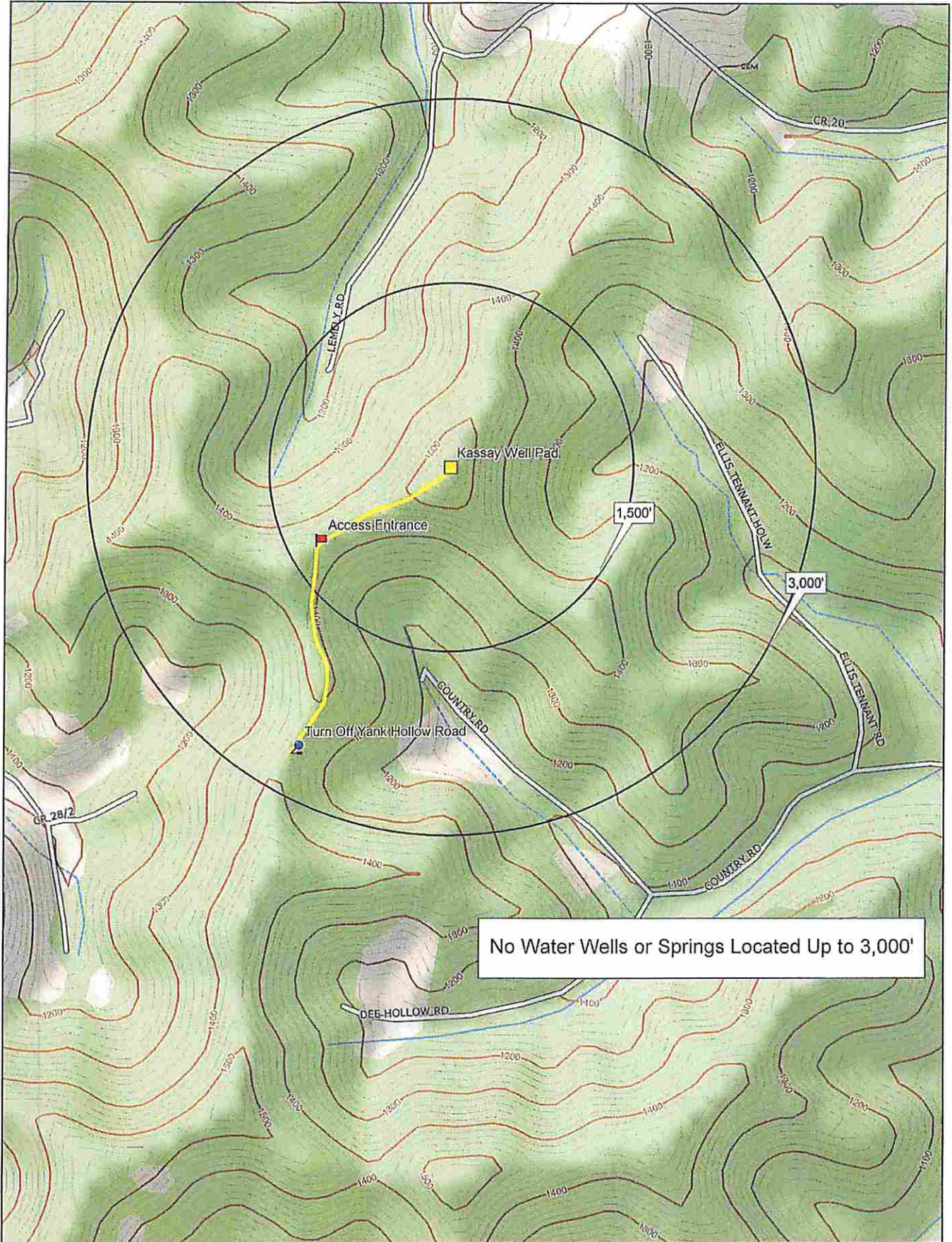
September 4, 2014

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SEP 25 2014

WV Department of
Environmental Protection

01/02/2015



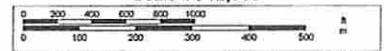
Data use subject to license.

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www.delorme.com



Scale 1 : 12,800



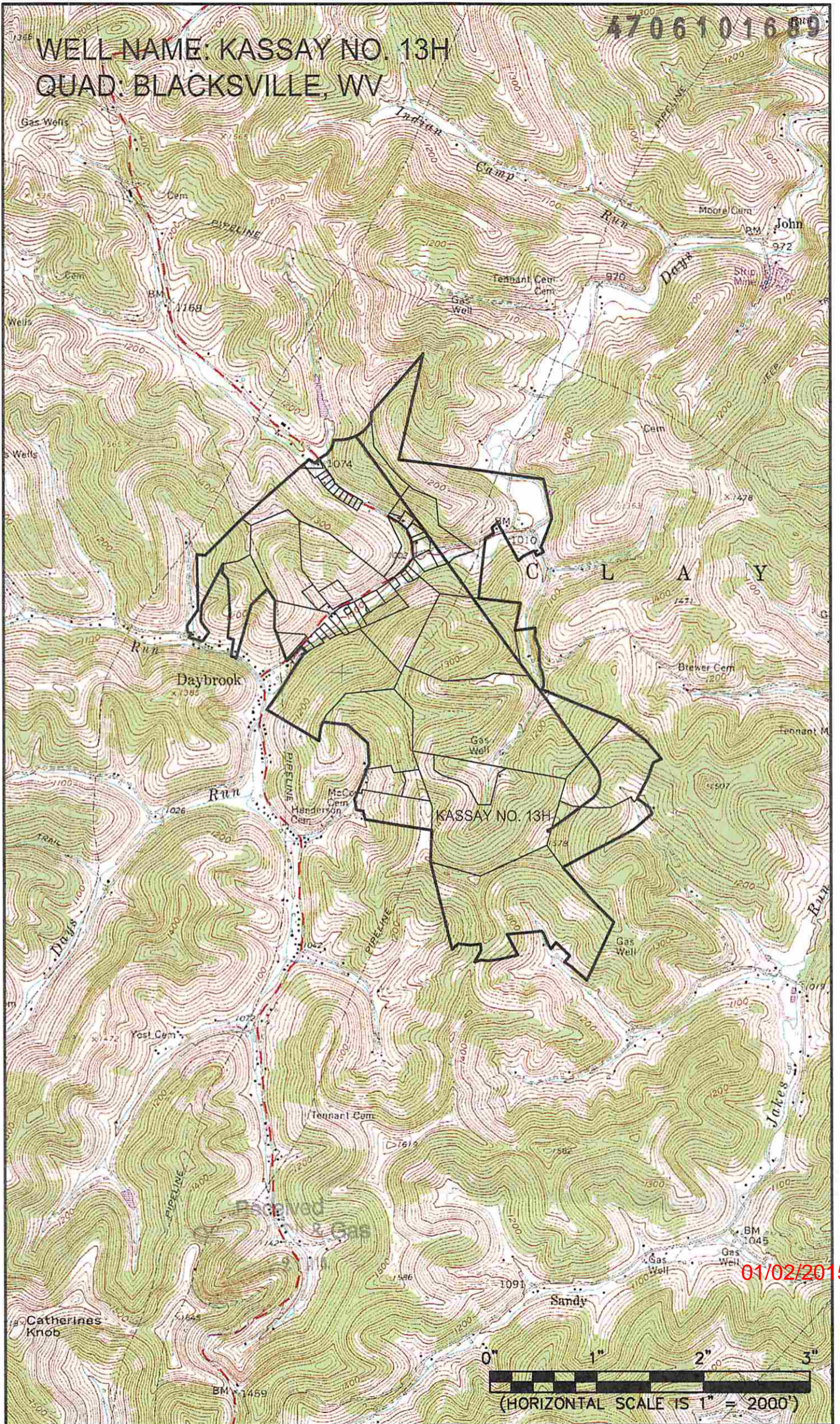
1" = 1,066.7 ft

Data: April 14, 2015

01/02/2015

4706101689

WELL NAME: KASSAY NO. 13H
QUAD: BLACKSVILLE, WV



01/02/2015

SURFACE HOLE DEC. LONG. = 80.19454528
 SURVEYED LONG. = 80°11'40.36"

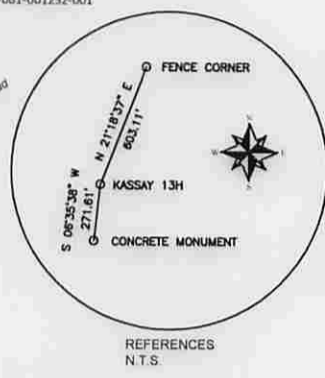
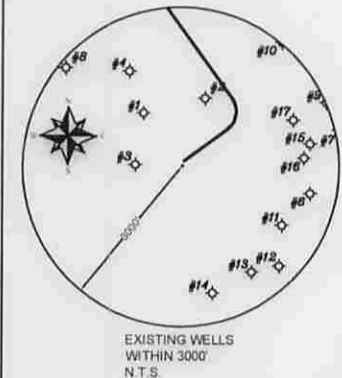
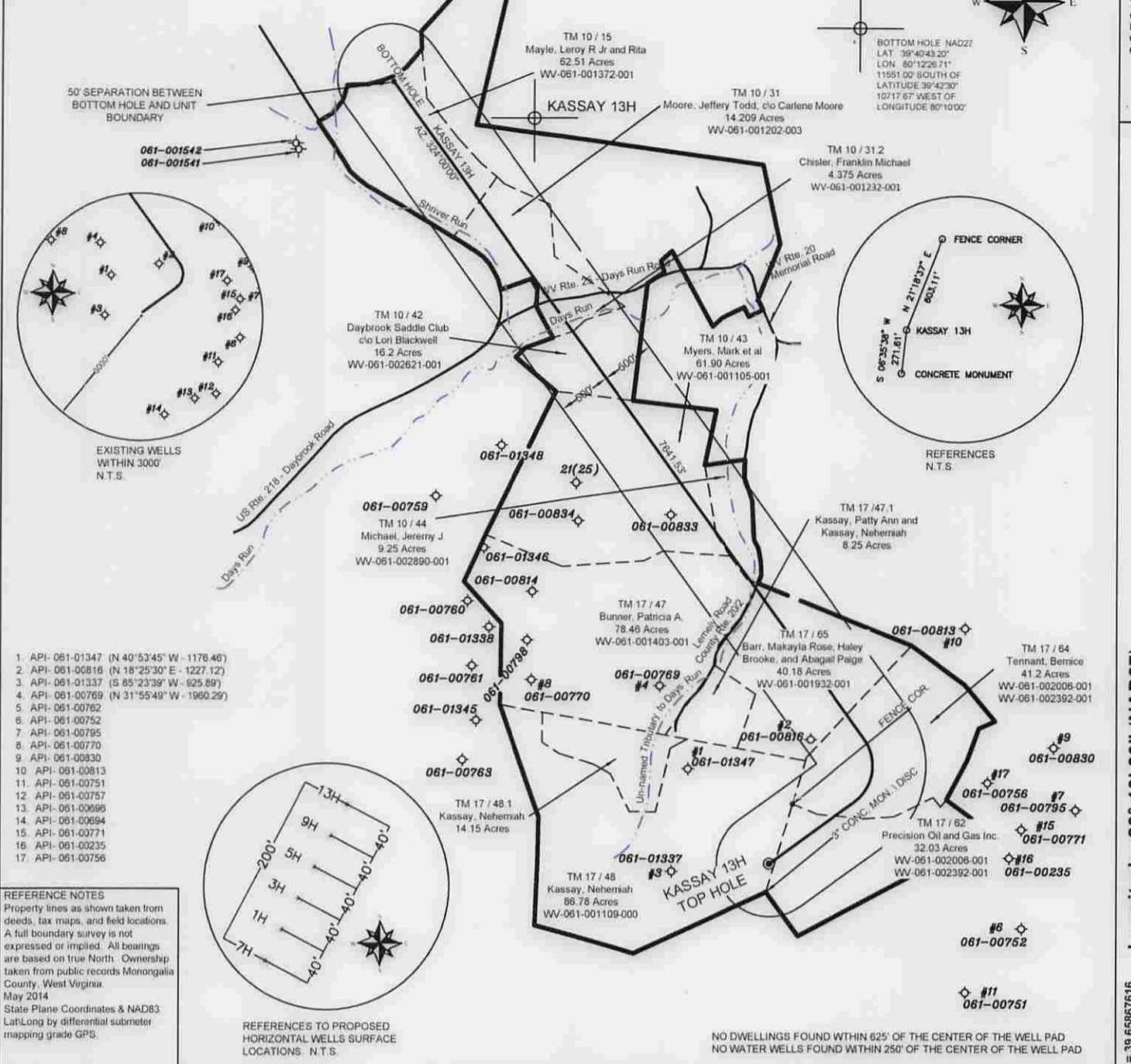
7870.65'

Latitude: 39° 40'00" (NAD27)

2850.93'

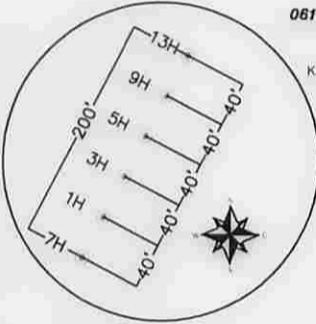
TOP HOLE (UTM, NAD83)
 N) 4390193.76
 E) 569112.37

BOTTOM HOLE
 N) 4392402.56
 E) 567988.32



1. API- 061-01347 (N 40°53'45" W - 1176.46')
2. API- 061-00816 (N 18°25'30" E - 1227.12')
3. API- 061-01337 (S 85°23'39" W - 625.89')
4. API- 061-00769 (N 31°55'49" W - 1960.29')
5. API- 061-00762
6. API- 061-00752
7. API- 061-00795
8. API- 061-00770
9. API- 061-00830
10. API- 061-00813
11. API- 061-00751
12. API- 061-00757
13. API- 061-00696
14. API- 061-00694
15. API- 061-00771
16. API- 061-00235
17. API- 061-00756

REFERENCE NOTES
 Property lines as shown taken from deeds, tax maps, and field locations. A full boundary survey is not expressed or implied. All bearings are based on true North. Ownership taken from public records Monongalia County, West Virginia. May 2014
 State Plane Coordinates & NAD83 Lat/Long by differential submeter mapping grade GPS.



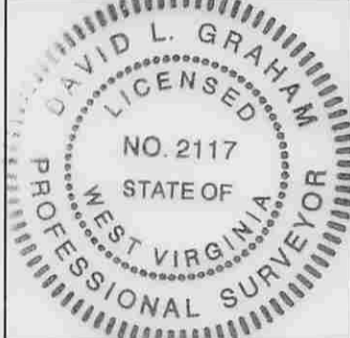
NO DWELLINGS FOUND WITHIN 625' OF THE CENTER OF THE WELL PAD
 NO WATER WELLS FOUND WITHIN 250' OF THE CENTER OF THE WELL PAD

Longitude: 80° 10' 00" (NAD27)
 SURFACE HOLE DEC. LAT. = 39.65867616
 SURVEYED LAT. = 39°39'31.23"

FILE#: 1338001
 SHEET#: 1 of 1
 SCALE: 1" = 1400'
 TICK SCALE: 1" = 2000'
 MINIMUM DEGREE OF ACCURACY: 1/200
 PROVEN SOURCE OF ELEVATION: By differential 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] 12.18.14
 P.S. #2117: David L. Graham, P.S.



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

DATE: DECEMBER 18, 2014
 OPERATOR'S WELL #: KASSAY NO.13H

API WELL #: 47 61 FBD
 STATE COUNTY PERMIT

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

WATERSHED: DUNKARD CREEK ELEVATION: 1554'
 COUNTY / DISTRICT: MONONGALIA \ CLAY QUADRANGLE: BLACKSVILLE, WV
 SURFACE OWNER: KASSAY, NEHEMIAH AND PATTY A. ACREAGE: 86.77
 OIL & GAS ROYALTY OWNER: NEHEMIAH AND PATTY A. KASSAY, ET AL ACREAGE: 400.43

LEASE NUMBERS: SEE ABOVE
 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
 WELL OPERATOR: NORTHEAST NATURAL ENERGY LLC
 ADDRESS: 707 VIRGINIA STREET, SUITE 1200
 CITY: CHARLESTON STATE: WV ZIP: 25301

ESTIMATED DEPTH: TVD: 8,248' TMD: 17,033'
 DESIGNATED AGENT: JOHN ADAMS, V.P. OPERATIONS
 ADDRESS: 707 VIRGINIA STREET, SUITE 1200
 CITY: CHARLESTON STATE: WV ZIP: 25301

01689H6A
 01/02/2015