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west virginia department of environmental protection

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Office of Oil and Gas  
601 57<sup>th</sup> Street, S.E.  
Charleston, WV 25304  
(304) 926-0450  
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Wednesday, Sept. 25, 2019  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

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

Re: Permit Modification Approval for LEMLEY 3H  
47-061-01842-00-00

**Update Intermediate casing weight, thickness, burst pressure, and anticipated maximum internal pressure.**

NORTHEAST NATURAL ENERGY LLC

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.

If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin  
Chief

A handwritten signature in blue ink, appearing to read 'James A. Martin', is written over the typed name and title.

Operator's Well Number: LEMLEY 3H  
Farm Name: CLARENCE W. LEMLEY JR. & CHARLOTTE E. LE  
U.S. WELL NUMBER: 47-061-01842-00-00  
Horizontal 6A New Drill  
Date Modification Issued: 09/25/2019

Promoting a healthy environment.



northeast  
NATURAL ENERGY

August 13, 2019

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

Re: Lemley Pad Modification

Dear Permit Reviewer,

Please find enclosed a permit modification request to update the casing plans on the intermediate casing string for the Lemley wells outlined below. These wells are located in Clay District, Monongalia County. Enclosed are WW-6B's with the updated changes.

- Lemley 1H - 47-061-01841
- Lemley 2H - 47-061-01850
- Lemley 3H - 47-061-01842
- Lemley 4H - 47-061-01846
- Lemley 5H - 47-061-01843
- Lemley 6H - 47-061-01847
- Lemley 7H - 47-061-01844
- Lemley 8H - 47-061-01835
- Lemley 9H - 47-061-01845
- Lemley 10H - 47-061-01860
- Lemley 12H - 47-061-01848
- Lemley 14H - 47-061-01861

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Should you have any questions please contact me at 304.212.0445 or by email at [kbrooks@nne-llc.com](mailto:kbrooks@nne-llc.com).

Sincerely,

Kristen Brooks

Operations Analyst

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

1) Well Operator: Northeast Natural Energy

|                  |                   |             |                        |
|------------------|-------------------|-------------|------------------------|
| <u>494498281</u> | <u>Monongalia</u> | <u>Clay</u> | <u>Blacksville, WV</u> |
|------------------|-------------------|-------------|------------------------|

  
Operator ID County District Quadrangle

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

3) Farm Name/Surface Owner: Clarence W Jr & Charlotte E Lemley Public Road Access: State Route 22

4) Elevation, current ground: 1,560' Elevation, proposed post-construction: 1540'

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

(b) If Gas Shallow  Deep \_\_\_\_\_  
Horizontal

6) Existing Pad: Yes or No No

*MSK 8/12/2019*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus; 8,206'; 53'; 3,600 psi

8) Proposed Total Vertical Depth: 8,206'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 18,728'

11) Proposed Horizontal Leg Length: 10,046'

12) Approximate Fresh Water Strata Depths: 50', 1,471'

13) Method to Determine Fresh Water Depths: Drillers Log from Offset Wells

14) Approximate Saltwater Depths: 2,361'; 2,511'

15) Approximate Coal Seam Depths: 501', 1,469'

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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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                   | 1,551'                     | 1,521'                       | CTS                           |
| Coal         |           |             |       |                        |                            |                              |                               |
| Intermediate | 9-5/8"    | New         | J-55  | 36 ✓                   | 2,591'                     | 2,561'                       | CTS                           |
| Production   | 5-1/2"    | New         | P-110 | 20                     | 18,728'                    | 18,698'                      | 4355 cu ft.                   |
| Tubing       |           |             |       |                        |                            |                              |                               |
| Liners       |           |             |       |                        |                            |                              |                               |

MDIC 8/12/2019

| 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"       | 38"                    | .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"                | .352" ✓             | 3,520 ✓              | 2,800 ✓                                  | 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:       |  |  |  |  |
| Sizes:      |  |  |  |  |
| Depths Set: |  |  |  |  |

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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 6,200 TVD/MD. The well will then be horizontally drilled on synthetic based mud from the KOP to approximately 8,206 TVD/18,728' MD along a 323° 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): 23.73

22) Area to be disturbed for well pad only, less access road (acres): 8.39

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 Type 1 + Max 3% bwoc Calcium Chloride Fresh Water blend. Intermediate string cement will be a Type 1 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.

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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.