



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street
Charleston, WV 25304
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Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

January 9, 2013

2012 Waiver Report

Pursuant to W. Va. Code § 22-6A-2(a)(6), commencing on January 1, 2013 and each year thereafter, the Office of Oil and Gas shall submit to the Legislature a written report of the number of waivers of certain minimum requirements of Chapter 22, Article 6A granted by the Secretary during the preceding year. During the 2012 calendar year, the Office of Oil and Gas granted one (1) waiver to Antero Resources Appalachian Corporation (“Antero”). That waiver was from the site restriction requirements of W. Va. Code § 22-6A-12(b), which states:

No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream...or a wetland...The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary.

The Office of Oil and Gas granted Antero a waiver pursuant to W.Va. Code § 22-6A-12(b)(3) per Order No. 2012-W-1, which was issued on December 27, 2012 (Attachment 1). The Order granted Antero a site restriction waiver for Wetlands No. 2, 4, and 5 and Perennial Stream No. 10 for its gas well identified as API # 47-017-06144, also known as the Flossie Unit 2H well, located on the Marsden well pad in Doddridge County, West Virginia.

Thus submitted, the 9th day of January 2013.

IN THE NAME OF THE STATE OF WEST VIRGINIA:

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

By: 
JAMES A. MARTIN, CHIEF



FILE COPY

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Earl Ray Tomblin, Governor
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**ORDER
ISSUED UNDER
WEST VIRGINIA CODE, CHAPTER 22, ARTICLE 6**

TO: Antero Resources Appalachian Corporation
1625 17th Street, Suite 300
Denver, CO 80202

DATE: December 27, 2012

ORDER NO.: 2012-W-1

INTRODUCTION

This Order (hereinafter "Order") is issued by the Office of Oil and Gas (hereinafter "OOG"), by and through its Chief, pursuant to the authority of W. Va. Code §§ 22-1-1, 22-6-1 and 22-6A-1 *et seq.* to Antero Resources Appalachian Corporation (hereinafter "Antero" or "Operator"), collectively the "Parties."

FINDINGS OF FACT

In support of this Order, the Chief hereby finds the following:

1. OOG, an office within the West Virginia Department of Environmental Protection, is the agency with the duty and authority to execute and enforce W. Va. Code § 22-6-1 *et seq.*, and the rules and regulations promulgated thereunder.
2. Antero is a "person" as defined by W. Va. Code § 22-6-1(n), with an official address registered with OOG as 1625 17th Street, Suite 300, Denver, CO 80202.
3. On September 11, 2012, Antero submitted a permit application for a gas well identified as API # 47-017-06144, also known as the Flossie Unit 2H well, located on the Marsden well pad in Doddridge County, West Virginia.
4. On December 13, 2012, Antero requested a waiver for wetlands 2, 4 and 5 and perennial stream 10, outlined in Exhibit 1, from well location restriction requirements in W. Va. Code § 22-6A-12(b) for a gas well permit application identified as API # 47-017-06144, also known as the Flossie Unit 2H well, located on the Marsden well pad in Doddridge County, West Virginia.

CONCLUSIONS OF LAW

1. West Virginia Code § 22-1-6(d) requires, in part, that “[i]n addition to other powers, duties and responsibilities granted and assigned to the secretary by this chapter, the secretary is authorized and empowered to... (3) Enter private lands to make surveys and inspections for environmental protection purposes; to investigate for violations of statutes or rules which the Office of Oil and Gas is charged with enforcing; to serve and execute warrants and processes; to make arrests; issue orders, which for the purposes of this chapter include consent agreements; and to otherwise enforce the statutes or rules which the Office of Oil and Gas is charged with enforcing”
2. West Virginia Code § 22-6A-2(a)(6) requires, in part, that “[c]oncomitant with the broad powers to condition the issuance of well work permits, the secretary should also have broad authority to waive certain minimum requirements of this article when, in his or her discretion, such waiver is appropriate: *Provided*, That the secretary shall submit a written report of the number of waivers granted to the Legislature commencing January 1, 2013, and each year thereafter;”
3. West Virginia Code § 22-6A-12(b) requires, in part, that “[n]o well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No wellpad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the Office of Oil and Gas shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The Office of Oil and Gas may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary.”

ORDER

Therefore, the Office of Oil and Gas grants Antero Resources Appalachian Corporation a waiver for wetlands 2, 4 and 5 and perennial stream 10 from well location restriction requirements in W. Va. Code § 22-6A-12(b) for a gas well permit application identified as API # 47-017-06144, also known as the Flossie Unit 2H well, located on the Marsden well pad in Doddridge County, West Virginia. The Office of Oil and Gas hereby **ORDERS** that:

1. Antero Resources Appalachian Corporation shall meet the following site construction and operational requirements for the Marsden well pad:
 - a. A berm shall be constructed around the perimeter of the pad to contain any potential spills and storm water runoff. Berm is to be at least 2.5 feet in height;
 - b. Filter/silt socks and erosion control blankets shall be installed on all slopes and down gradient locations of the pad, pit and topsoil pile areas as erosion and sediment controlling BMPs;
 - c. Disturbed areas not used for operations shall be seeded and mulched per the seeding tables in the WVDEP-OOG Erosion and Sediment Control Manual;
 - d. Perennial Stream (UNT 10) and Wetlands 2, 4 and 5 shall have three phases of fencing around the perimeter to protect the wetland from impacts during construction;
 - i. First phase-Steel corrugated fencing around outside edge of the identified wetlands;
 - ii. Second phase- Silt fencing outside of steel fencing; and
 - iii. Third phase- Orange construction fencing will be installed outside the silt fencing.
 - e. A Dura-Base matting and liner system shall be utilized during drilling and completion operations. Liner consists of 30 mil HDPE plastic underlain by felt pad and small pea size gravel;
 - f. Diesel fuel assembly shall be housed in a building, placed on Dura-Base mats and operated with closed doors to protect against collision and rupture;
 - g. Drilling rig generators shall be equipped with metal containment trays and placed on Dura-Base mats;
 - h. Drill cuttings shall be handled by a closed loop system via a conveyor belt and sent to a offsite disposal at a landfill permitted by the State of WV;
 - i. Drilling muds shall be reused or disposed of in a landfill permitted by the State of WV;
 - j. Flowback fluids shall be treated and reused to support subsequent well completions or disposed of in approved manner;
 - k. Waste generated by the flowback treatment systems shall be sent to offsite disposal at a landfill permitted by the State of WV;
 - l. Weekly site inspections shall be conducted during site construction to monitor and maintain the integrity of the wetland fencing and storm water controls;
 - m. Monthly storm water and spill prevention inspections shall be conducted focusing on storm water and spill prevention BMPs and maintenance of these BMPs;
 - n. Inspections of the storm water and spill prevention measures shall be conducted after any major storm event defined as a half inch (½”) rain within any twenty-four (24) hour period;

- o. Pit inspections shall be conducted no less than once a week to identify and mitigate potential deficiencies;
 - p. UNT 10 shall be sampled at least four (4) times, at intervals no closer than one week apart, to establish a baseline. Samples shall be taken every two weeks thereafter until pit reclamation is complete. All samples shall be analyzed for chloride, sulfate, pH, specific conductance, total dissolved solids and flow, at a minimum, and by a WVDEP certified laboratory;
 - q. Water samples must be collected from UNT 10 at the location where the road intersects with the tributary; and
 - r. All records from groundwater monitoring wells and the stream sampling shall be maintained on site for the life of the project and be available upon request.
2. Antero Resources Appalachian Corporation shall adhere to the following construction requirements for any pit located on the Marsden well pad:
- a. Site Preparation shall include the following:
 - i. The foundation for the pit embankment must be stripped and grubbed to a depth of two feet prior to any placement and compaction of earthfill; and
 - ii. Any encountered springs in the foundation area must be drained to the outside/downstream toe of the embankment with a drain section two foot by two foot in dimension consisting of WVDOT Type A sand, compacted by hand tamper. No geotextiles to be used around sand. The last three feet of this drain at the outside/downstream slope must be AASHTO #8 material.
 - b. Soils suitable for embankment construction as determined by appropriate soil tests as approved by a registered professional engineer shall be utilized;
 - c. Soil Compaction shall be performed as followed:
 - i. Compaction for embankments done with a sheepsfoot or pad roller;
 - ii. Lifts must be in horizontal layers and loose lift thickness shall be 9" or less;
 - iii. Maximum particle size must be no greater than 6";
 - iv. 5 pass minimum of the compaction equipment over the entire surface of each lift, and each lift shall be compacted to a minimum of 95% of the maximum density as determined by the Standard Proctor tests, ASTM D698, on the soils utilized for embankment construction; and
 - v. Compaction to visible non-movement of the embankment material, compactive effort shall not exceed optimum moisture limits as determined by the Standard Proctor Test, ASTM D698.
 - d. Embankment Design shall include the following:
 - i. Minimum embankment top width of 12' is required; and
 - ii. Exposed embankment slopes, not covered by compacted rockfill or riprap, must be limed, fertilized, seeded and mulched. Permanent vegetative ground covering compliant with the erosion and sediment control plan must be established upon completion of pit construction.
 - e. The bottom of the pit shall be 20 inches above the seasonal high groundwater table at a minimum; and
 - f. In order to preserve the integrity of the liner system the pit shall be equipped with a manifold system for delivering and withdrawing fluids from the pit.

3. Antero Resources Appalachian Corporation shall adhere to the following liner system requirements for any pit located on the Marsden well pad:
- a. The liner system for the Marsden pit shall include the following elements:
 - i. Sub-base;
 - ii. Secondary Liner;
 - iii. Leak Detection Zone; and
 - iv. Primary Liner.
 - b. Sub-base Requirements
 - i. The sub-base shall bear the weight of the liner system, water and equipment operating on the pit without causing or allowing a failure of the liner system;
 - ii. Accommodate potential settlement without damage to the liner system;
 - iii. Be a barrier to the transmission of liquids;
 - iv. Cover the bottom and sidewalls of the pit;
 - v. Consist of an upper 6 inches that is:
 1. Compacted to a standard proctor density of at least 95%;
 2. No more permeable than 1.0×10^{-6} cm/sec., based on laboratory and field testing. Soil compaction and permeability testing shall be conducted on the bottom and sides at a minimum rate of once per five acres to ensure permeability of no more than 1.0×10^{-6} cm/sec.;
 3. Hard, uniform, smooth and free of debris, rock fragments, plant materials and other foreign material; and
 4. Free of coarse rock fragments greater than 0.75" in diameter; and
 - vi. The sub-base shall be covered with non-woven geotextile fabric to cushion the secondary liner and allow for adequate venting between the secondary liner and sub-base to prevent entrapment of gases beneath the liner system/
 - c. Secondary Liner Requirements
 - i. The secondary liner shall prevent the migration of water or wastewater through the liner to the greatest degree that is technologically possible;
 - ii. The effectiveness of the secondary liner in preventing the migration of water or wastewater may not be adversely affected by the physical or chemical characteristics of water or wastewater from the pit;
 - iii. The liner shall be designed, constructed and maintained so that the physical and chemical characteristics of the liner are not adversely affected by the waste and the liner is resistant to physical, chemical and other failure during transportation, handling, installation and use. Liner compatibility shall satisfy EWV Method 9090, *Compatibility Test for Wastes and Membrane Liners*, or other documented data approved by the Office of Oil and Gas;
 - iv. Secondary liner shall cover the bottom and sidewalls of the pit;
 - v. The secondary liner shall:
 1. Be composed of a synthetic material with a coefficient of permeability not greater than 1.0×10^{-7} cm/sec., based on laboratory testing;
 2. Have a minimum thickness of 60mil unless a greater thickness is required by manufacturer recommendations;
 3. Be installed according to manufacturer's specifications under the supervision of an authorized representative of the manufacturer. An approved quality

assurance and quality control plan shall be implemented in the field during the installation of the liner;

4. Be inspected for uniformity, damage and imperfections during construction and installation; and
5. Use of a composite secondary liner does not relieve the operator of responsibility for a separate primary liner.

d. Leak Detection Zone

i. The leak detection zone shall:

1. Rapidly detect and collect liquid entering the leak detection zone, and rapidly transmit the liquid to the leak detection sump;
2. Withstand chemical attack from the water or wastewater being impounded;
3. Withstand anticipated loads, stresses and disturbances from impounded liquid;
4. Function without clogging;
5. Prevent the liner from puncturing, cracking, tearing, stretching or otherwise losing its physical integrity;
6. Cover the bottom and sidewalls of the pit;
7. Create a flow zone between the secondary liner and the primary liner equal to, or more permeable than 1.0×10^{-2} cm/sec., based on a laboratory testing and, when required by the Office of Oil and Gas, field testing;
8. Contain a perforated piping system capable of detecting and intercepting liquid within the leak detection zone and conveying the liquid to a collection sump;
 - a. The collection sump shall be equipped with a sump pump with a switch to automatically activate the pump when a leak occurs;
 - b. Discharge from the sump pump shall be directed back into the pit or other suitable containment. The sump shall have no outlet other than the sump pump discharge; and
 - c. The pump and sump shall be of sufficient size and capacity to convey any leak that may occur back into the pit without a discharge;
9. The piping system shall also meet the following requirements:
 - a. The slope, size and spacing of the piping system shall assure that liquids drain from the leak detection zone;
 - b. The pipes shall be installed primarily perpendicular to the flow and shall have a minimum post-settlement grade of at least 2%; and
 - c. The minimum diameter of the perforated pipe shall be 4 inches with a wall thickness of Schedule-80 or greater, as specified by ASTM, or equivalent.
 - d. The pipes shall be cleaned and maintained as necessary;
10. The leak detection zone shall have a minimum bottom slope of 2%;
11. The leak detection zone and sump shall be designed to allow the operator to monitor and record leakage rates;
12. Contain non-carbonate stones or aggregate with no sharp edges;
13. The operator shall monitor the leak detection zone weekly to determine whether liquid is flowing from the zone; and
14. The operator will report results of the weekly monitoring of the leak detection zone on a monthly basis to the Office of Oil and Gas, to include the quantities

detected. Any detected or suspected presence of flow back fluid or other waste fluid shall be immediately reported to Office of Oil and Gas.

- e. Primary Liner Requirements
 - i. The primary liner shall prevent the migration of water and wastewater through the liner to the greatest degree that is technologically possible;
 - ii. The effectiveness of the primary liner in preventing the migration of water and wastewater may not be adversely affected by the physical or chemical characteristics of water or wastewater from the pit; and
 - iii. The liner shall be designed, constructed and maintained so that the physical and chemical characteristics of the liner are not adversely affected by the waste and the liner is resistant to physical, chemical and other failure during transportation, handling, installation and use. Liner compatibility shall satisfy EWV Method 9090, *Compatibility Test for Wastes and Membrane Liners*, or other documented data approved by the Office of Oil and Gas. The primary liner shall cover the bottom and sidewalls of the pit;
 - iv. The primary liner shall:
 - 1. Be composed of a synthetic material with a coefficient of permeability not greater than 1.0×10^{-7} cm/sec., based on laboratory testing;
 - 2. Have a minimum thickness of 60mil unless a greater thickness is required by manufacturer recommendations;
 - 3. Be installed according to manufacturer's specifications under the supervision of an authorized representative of the manufacturer. An approved quality assurance and quality control plan shall be implemented in the field during the installation of the liner;
 - 4. Be inspected for uniformity, damage and imperfections during construction and installation; and
 - v. Use of a composite primary liner does not relieve the operator of responsibility for a separate secondary liner.
- 4. Antero Resources Appalachian Corporation shall meet the following water quality monitoring requirements for any pit located on the Marsden well pad:
 - a. Antero shall install, operate and maintain a monitoring system that can detect the entry of contaminants into the ground or surface water;
 - b. Antero may not construct, install or use a monitoring system for the Marsden pit until that system has first been approved by the Office of Oil and Gas in writing;
 - c. The water quality monitoring system shall accurately characterize groundwater flow, groundwater chemistry and flow systems on the site and adjacent area. The system shall consist of, for the purpose of establishing baseline groundwater data, at least one monitoring well hydraulically downgradient from the proposed pit area in the direction of decreasing static head that is capable of providing representative data of groundwater prior to the construction of the pit
 - d. The downgradient monitoring well/wells shall be:
 - i. Sufficient in number, location and depth to be representative of water quality;
 - ii. Located so that they do not interfere with routine well operations;
 - iii. Located within two hundred (200) feet of the permitted Marsden pit;
 - iv. Wells drilled under this section shall be drilled by drillers licensed under the West

- Virginia Monitoring Well Rules, West Virginia Code of State Rules § 47-59; and
- v. The well materials shall be decontaminated prior to installation.
- e. Standards for monitoring wells and casing of monitoring wells shall be as follows:
- i. The casing shall maintain the integrity of the monitoring well borehole and shall be constructed of material that will not react with the groundwater being monitored;
 - ii. The minimum casing diameter shall be 4 inches unless otherwise approved by the Office of Oil and Gas in writing;
 - iii. The well shall be constructed with a screen that meets the following requirements:
 1. The screen shall be factory-made;
 2. The screen may not react with the groundwater being monitored;
 3. The screen shall maximize open area to minimize entrance velocities and allow rapid sample recovery;
 4. The well shall be filter-packed with chemically inert clean quartz sand, silica or glass beads. The material shall be well rounded and dimensionally stable;
 5. The casing shall be clearly visible and protrude at least 1 foot above the ground, unless the Office of Oil and Gas has approved flush mount wells;
 6. The annular space above the sampling depth shall be sealed to prevent contamination of samples and the groundwater;
 7. The casing shall be designed and constructed in a manner that prevents cross contamination between surface water and groundwater; and
 8. Alternative casing designs for wells in stable formations may be approved by the Office of Oil and Gas;
- f. Monitoring well casings shall be enclosed in a protective casing that shall:
- i. Be of sufficient strength to protect the well from damage by heavy equipment and vandalism;
 - ii. Be installed for at least the upper 10 feet of the monitoring well, as measured from the well cap, with a maximum stick up of 3 feet, unless otherwise approved by the Office of Oil and Gas in writing;
 - iii. Be grouted and placed with a concrete collar at least 3 feet deep to hold it firmly in position;
 - iv. Be numbered for identification with a label capable of withstanding field conditions and painted in a highly visible color;
 - v. Protrude above the monitoring well casing;
 - vi. Have a locked cap; and
 - vii. Be made of steel or another material of equivalent strength.
- g. Analyses of data collected shall be submitted to the Office of Oil and Gas within 60 days of sampling or 15 days after completion of analyses, whichever is sooner, unless the Office of Oil and Gas approves another time period;
- h. Background sampling shall be conducted prior to the replacing of frac fluid to the Marsden pit. Water samples must be collected from monitoring wells on a minimum frequency of one sample taken every two weeks and analyzed by a laboratory in compliance with DEP's laboratory certification program requirements for the following parameters at a minimum:
- i. Total dissolved solids;
 - ii. Chloride;
 - iii. Sulfate;
 - iv. pH;

- v. Specific Conductance; and
 - vi. Depth to the Static Water Surface from top of well casing or elevation of the Static Water Surface; and
 - i. Monitoring wells shall be abandoned in accordance WVDEP monitoring well standards once the pit is ready for closure. The monitoring wells shall not be abandoned until Antero submits to the Office of Oil and Gas a written notification that the pit is proposed to be closed. No steps shall be initiated by Antero until they receive written approval from the Office of Oil and Gas.
5. Antero Resources Appalachian Corporation shall adhere to the following engineer certification requirements for any pit located on the Marsden well pad:
- a. Design plans for the Marsden pit must be developed signed and sealed by a registered professional engineer in West Virginia;
 - b. A qualified engineer shall provide oversight for all aspects of construction to ensure that construction is completed in substantial conformance with the design and quality assurance and quality control plan;
 - c. Upon completion, a facility completion and final certification report must be submitted to the Office of Oil and Gas. The report must be completed signed and sealed by the licensed professional engineer who provided oversight for construction and must contain the following items at a minimum:
 - i. A statement that the engineer provided oversight for all aspects of construction and that the pit was constructed as designed and in substantial conformance with these requirements and the quality assurance and quality control plan;
 - ii. Soils classification testing results for the embankments in accordance with Section II requirements;
 - iii. Soil compaction testing results for the sub-base in accordance with Section II requirements;
 - iv. As-built drawings noting any deviation from the original plans submitted to the Office of Oil and Gas, any deviations from original plans must be approved prior to construction;
 - v. Quarry tickets for drain material;
 - vi. Quality assurance and quality control test results in accordance with Section II requirements;
 - vii. Color photographs of the following at a minimum:
 - 1. The cleared and grubbed foundation;
 - 2. Leak detection system installation;
 - 3. Placement and compaction of fill;
 - 4. The completed embankments;
 - 5. The completed sub-base; and
 - 6. The completed secondary liner; and
 - d. The pit shall not be filled until the facility completion and final certification report is received and approved by the Office of Oil and Gas.

6. Upon the issuance of this waiver, Antero Resources Appalachian Corporation shall submit a detailed plan for the liner system installation, leak detection system, and proposed monitoring well locations. Antero shall submit construction and installation details and specifications for the proposed corrugated metal panel fence and submit an abandonment plan for pit closure. These plans must be certified by a registered professional engineer. All plans shall be provided to the Office of Oil and Gas for review within fourteen (14) days from the execution of this Order. These plans must be approved by the Office of Oil and Gas prior to implementation. A professional engineer shall be on site during construction activities to ensure that the site is constructed in accordance to the standards approved in such plans.

Thus ORDERED, the 27th day of December 2012.

IN THE NAME OF THE STATE OF WEST VIRGINIA:

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

By: 

JAMES A. MARTIN, CHIEF

Marsden Site Stream and Wetland Delineation Map Doddridge County, WV

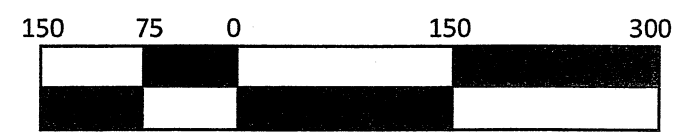
(Revised November 2012)

per the US Army Corp of Engineers Jurisdictional
Determinations as identified on the September 27,
2012 Approved NW-14.












Notes

1. Background is a 2003 SAMB image.
2. Streams and wetlands delineated by AllStar Ecology, LLC in December 2011.



SCALE: 1" = 150'
Map created November 19, 2012

LEGEND

- | | | |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
|  Area of Interest |  PEM Wetlands |  NRPW-Ephemeral |
|  RPW-Perennial |  Non- Jurisdictional Feature | |
|  Data Points |  Pad/ Pond |  LOD |
| | |  Road |

Prepared for ANTERO RESOURCES APPALACHIAN CORPORATION by:

AllStar Ecology LLC
Natural Resource Specialists

1582 Meadowdale Road
Fairmont, WV 26554