February 12, 2014

Submitted via email to:

Michael Skiffington
Regulatory Coordinator
Department of Mines, Minerals, and Energy
1100 Bank Street, 8th Floor
Richmond, VA 23219
michael.skiffington@dmme.virginia.gov

Re: Notice of Intended Regulatory Action for 4 VAC 25-150

Dear Mr. Skiffington:

Thank you for the opportunity to comment on the sufficiency of DMME’s gas and oil regulations. These comments are submitted by the Shenandoah Valley Network, the Shenandoah Riverkeeper, Friends of the North Fork of the Shenandoah River, Virginia Organizing, the Virginia League of Conservation Voters, the Community Alliance for Preservation, and the Southern Environmental Law Center.

The last ten years have witnessed tremendous advances in gas and oil drilling technology. The combination of horizontal drilling and high-volume hydraulic fracturing has opened previously inaccessible gas and oil plays like the Marcellus shale. Even though operators have used fracturing in Virginia since the 1960s, the state has not experienced modern high-volume hydraulic fracturing operations. But development of the Marcellus shale in western Virginia, the Taylorsville basin in Tidewater, or sandstones in Washington County could bring this industry to Virginia.

DMME’s existing regulations are not adequate to effectively minimize the risks of gas and oil development using high-volume hydraulic fracturing. Virginia must not repeat the lessons learned during the drilling boom in West Virginia and Pennsylvania where the fast pace of development forced regulators to play catch up with the industry’s widespread impacts on the environment and communities. We have an important opportunity to insure that Virginia’s regulatory framework is amended before high-volume hydraulic fracturing is underway in the state. We thank DMME for taking the first step in this direction and soliciting comments on the existing regulations.

DMME must update the state’s gas and oil regulations to reflect the rapid changes in technology that have occurred in gas and oil drilling. We urge DMME to review the hydraulic fracturing regulations adopted in other states and the model standards prepared by non-governmental organizations and, from these, select the best regulatory standards and practices that will protect our water and air resources, our other natural resources, and our communities. Below, we have identified the most important regulatory areas that must be addressed with amendments from DMME. But this list is not exclusive. North Carolina has identified 131 areas where
to address in the state’s new gas and oil regulations,¹ and even states with existing gas and oil industries have undertaken comprehensive reviews and updates for their regulatory framework.² We urge DMME to undertake a similarly comprehensive review of gas and oil regulation for Virginia, and we expect to have more comments as this process moves forward.

1. **Acknowledge local authority.**

Under Virginia law, a locality can exercise its traditional zoning powers to control the location, the scale, the timing, and other aspects of drilling operations, and even prohibit drilling entirely, as it would for any other industrial activity. We urge DMME to expressly acknowledge the important role of local governments in regulating gas and oil activities. DMME’s existing regulations state that “[n]othing in this chapter shall relieve a permittee of the duty to comply with other laws and regulations,”³ and agency officials routinely indicate that the department will not issue a drilling permit without written assurance that the permit complies with local ordinances. We urge DMME to provide local governments certainty about their role by incorporating language similar to the following in revised regulations: “DMME will not issue a gas or oil drilling permit under this chapter without written assurance from a locality that the proposed activities are in compliance with all local ordinances.”

2. **Incorporate siting restrictions.**

The local government has a critical role in the siting of gas and oil drilling activities within its jurisdiction that must be preserved. But DMME’s regulations should set certain state-wide standards for siting wells, wastewater pits, compressors stations, and other activities to protect streams, rivers, and other water resources; public and private water wells; public water supply watersheds; fisheries; communities; private property; special lands; and other special resources in Virginia. Modern hydraulic fracturing operations pose a risk of contamination for ground and surface waters. For example, a 2013 study found that drinking water wells in Pennsylvania within a kilometer of natural gas drilling had methane concentrations six times higher and ethane concentrations twenty-three times higher than wells farther away.⁴ Yet DMME’s existing regulations do not contain siting restrictions designed to protect water quality. In fact, the regulations have only one restriction for wells—conventional and injection wells are prohibited

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⁴ See Robert B. Jackson *et al.*, Increased stray gas abundance in a subset of drinking water wells near Marcellus shale gas extraction, 110 Proceedings of the Nat’l Acad. of Sciences 11250 (July 9, 2013).
closer than 200 feet to inhabited buildings—\(^5\)—and contain no restrictions for wastewater pits, compressors stations, or other activities.

We recommend that DMME develop appropriate regulatory siting restrictions—prohibitions and setbacks—that protect the 100-year floodplain; public water supply watersheds; wellhead protection areas; streams, rivers, and other water resources; public and private water wells; fisheries; communities; private property; special lands; and other special resources. These should include, but not be limited to, the following:

- Prohibiting wells and wastewater pits within the 100-year floodplain, public water supply watersheds, and wellhead protection areas; and
- Establishing minimum setbacks for the 100-year floodplain; wetlands; public water supply watersheds; wellhead protection areas; streams, rivers, and other water resources; public and private water wells; fisheries; buildings and roads; private property; special lands; and other special resources.

Other states have incorporated or are contemplating setbacks in their regulations. For example, regulators in New York have recommended a 2000-foot setback for public water supplies, a 500-foot setback for private drinking water wells, and prohibitions on drilling on certain aquifers and in the 100-year floodplain.\(^6\) Draft regulations in North Carolina include a 300-foot setback for wetlands and trout streams and a 500-foot setback for dwellings and water wells.\(^7\)

**3. Require full disclosure of drilling and fracking fluid constituents.**

Between 2005 and 2009, operators used 750 different chemicals in hydraulic fracturing operations in the U.S.; some of these chemicals like benzene are known carcinogens.\(^8\) We urge DMME to require operators to fully disclose, and make publically available, the constituent chemicals and their Chemical Abstract Numbers for all chemicals in their drilling and fracking fluids. This disclosure should be made without exceptions or omissions for an operator’s proprietary information. Disclosure is necessary to restore public confidence and ensure that DMME’s oversight is adequate to protect water quality and public health from hydraulic fracturing operations. Virginia’s drilling industry recognizes the importance of disclosure: in

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December, the Virginia Oil and Gas Association petitioned DMME to require full disclosure to “alleviate public concern” about the chemicals used in hydraulic fracturing.

4. **Require baseline water testing and monitoring before, during, and after drilling operations.**

Baseline water quality testing of surface and ground waters before drilling is necessary to assess the impacts of drilling on water quality. Subsequent monitoring, during and after drilling operations, further ensures that contamination events connected with hydraulic fracturing are identified and remedied as soon as possible and that responsible parties are identified. Baseline testing and monitoring benefits landowners and drilling operators because it can resolve the causation questions that arise when a well is contaminated. We urge DMME to develop requirements for baseline water quality assessment surrounding a proposed well site and for water quality monitoring during and after drilling operations. Draft rules in North Carolina propose baseline testing and subsequent monitoring for “[a]ll water supplies located within a radius of 5000 feet of the proposed oil or gas well.”

5. **Eliminate the use of wastewater pits.**

Wastewater pit failures and overflows are a significant source of groundwater and surface water contamination risk for drilling operations. Twenty-five percent of all environmental violations documented at Marcellus wells in Pennsylvania during 2010 stemmed from pit and storage problems. In 2012, the state’s Department of Environmental Protection recommended eliminating the storage of produced fluids in pits: “The long-term storage of production fluids in a pit presents an unacceptable risk to the environment through leaks or overtopping of the pit.” Proposed rules in New York prohibit open pit storage for flowback water and instead require the use of watertight tanks inside a secondary containment system. We urge DMME to eliminate the routine use of wastewater pits in Virginia for flowback and produced wastewater and require that all wastewater be managed in a closed loop system. Wastewater storage, if any, should be in watertight tanks placed inside secondary containment structures.

However, if DMME continues to authorize the use of wastewater pits for drilling operations, the existing regulations are inadequate to protect the environment from pit failures and overflows. We urge DMME to:

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12 See N.Y. Dep’t of Envt’l Conservation, supra n. 6, at 2.
• Develop construction requirements that consider the type of waste to be contained, the depth of the water table, the likelihood of intense precipitation events and flooding at a given site, and other local conditions that may influence the integrity of the impoundment;
• Develop requirements for liners that are specific to the wastewater produced during drilling and fracturing operations.
• Require inspections during construction and periodic inspections during and after drilling operations;
• Require leak detection systems and groundwater monitoring during and after drilling operations;
• Require the complete remediation of pit sites, including the proper disposal of all fluids and solids and the restoration of the site to its pre-drilling use.

6. **Eliminate wastewater disposal by land application or through local wastewater treatment facilities.**

Virginia’s existing regulations authorize wastewater disposal on-site through land application. But it is impossible to insure that this type of disposal will not result in the contamination of ground and surface waters—this is especially true when land disposal is authorized in the 100-year floodplain or near streams and creeks. Moreover, a well can generate several millions gallons of wastewater which will quickly saturate soils. Land application may render rural lands unsuitable for agriculture or forestry uses. A study from the U.S. Forest Service documented tree mortality rates over 50% and a 50-fold increase in soil sodium and chloride levels when fracking fluids were experimentally applied to forestland in West Virginia.

Existing regulations also authorize off-site disposal of wastewater through an “off-site facility” if the operator obtains “[d]ocumentation that the facility will accept the fluids.” DMME considers local wastewater treatment plants as “off-site facilities.” However, local

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13 See 4 Va. Admin Code § 25-150-420(B), (D).
14 See Letter from Bradley Lambert, Deputy Dir., Dep’t of Mines, Minerals & Energy, to R. Brooke Lewis & Kathryn M. Zunich, 2, 6–7 (June 24, 2010) (describing DMME’s consideration of the 100-year floodplain for a proposed Marcellus well in Bergton, Virginia, and approval of land application for produced fluids).
15 Mary Beth Adams, Land Application of Hydrofracturing Fluids Damages a Deciduous Forest Stand in West Virginia, 40 J. of Env’tl Quality 1340 (July 2011).
17 See Letter from Bradley Lambert, supra n. 14, at 6–7 (identifying disposal at a local wastewater treatment facility as an option for wastewater from a proposed Marcellus well in Bergton, Virginia).
treatment plants in Virginia cannot effectively process the chemicals and high concentration of chlorides, bromides, and other salts in these fluids which pass through untreated and cause damage to the receiving waters. Furthermore, salts can disrupt the plant’s biological systems so that other wastes are not treated.

We urge DMME to eliminate land application and local wastewater treatment facilities as disposal options for gas and oil drilling wastewater in Virginia.

7. Reduce water consumption.

Large water withdrawals for hydraulic fracturing—on average, a single Marcellus frack job requires 4.2 million gallons in Pennsylvania—can deplete water supplies for drinking, irrigation, and other uses. In the Northern Neck and the Middle Peninsula where gas and oil development of the Taylorsville basin is proposed, existing uses have already taxed the region’s aquifers. Recycling and reusing wastewater can reduce the drain on local aquifers, reduce truck traffic, and reduce the amount of wastewater requiring disposal at the end of a drilling operation. In response to the large volumes of water used by Marcellus wells, Pennsylvania now requires that operators have an approved water management plan which includes conditions on water withdraws to protect other uses and a reuse plan for wastewater. 19 We urge DMME to develop requirements to reduce water consumption that include, but are not limited to:

- Disclosure of proposed water sources and proposed quantities for drilling operations in their permit applications;
- DEQ approval for all ground and surface water withdraws for drilling operations with necessary conditions to protect other water uses, including in-stream flow, incorporated into drilling permits; and
- Standards and procedures for mandatory recycling and reuse of wastewater.

8. Require removal of drilling muds and cuttings.

Under Virginia’s existing regulations, operators can bury solid waste from drilling muds and cuttings on site at the end of the drilling operation. 20 This waste may contain heavy metals and naturally occurring radioactive materials which can leach into groundwater and contaminate soils. Yet there is no requirement in the existing regulations that operators test solids from drilling muds and cuttings before encapsulation or monitor the buried pits for leaks. If industrial gas and oil development reaches an area like the Taylorsville basin, a local government may have tens or hundreds of these mini-landfills to deal with if problems arise. We urge DMME to

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18 See N.Y. Dep’t of Env’tl Conservation, supra n. 2, at 6-10.


require that muds and cuttings be maintained in a closed loop system and disposed off-site at an
approved facility.

9. Require spill contingency planning and liability bonding.

Accidents, leaks, equipment failures, and spills can occur with any drilling operation and
have occurred with modern horizontal drilling and hydraulic fracturing operations.\(^{22}\) Virginia’s
existing regulations do not require operators to submit contingency plans for spills associated
with drilling operations, but states where drilling has boomed in recent years have made such
plans mandatory. For example, Pennsylvania requires “preparedness, prevention, and
contingency plans” for drilling permits.\(^{23}\) We urge DMME to develop regulatory guidelines for
spill contingency plans that insure that spills, when they happen, are reported, controlled,
contained, and remediated.

We also urge DMME to adopt bonding requirements that provide sufficient surety for
accidents, spills, and contamination events. DMME’s current practice of accepting blanket bonds
of $25,000 for one to fifteen wells is wholly inadequate to cover the costs of remediation from a
spill. The Gas and Oil Act authorizes the department to require a “bond with surety acceptable to
the Director” for the purpose of “ensur[ing] compliance with all laws and regulations.”\(^{24}\) DMME
should require separate bonds for each permit at a level sufficient to insure against the risks
associated with modern horizontal drilling and hydraulic fracturing operations.

10. Adopt technical requirements that specifically address the risks associated with
hydraulic fracturing

Virginia’s existing regulations do not include technical requirements—i.e., casing and
cementing standards and procedures, pressure management standards, standards for blowout
prevention equipment, and diagnostic assessment and reporting requirements—that are specific
to hydraulic fracturing operations. Modern horizontal drilling and high-volume hydraulic
fracturing operations use more water, drill longer shafts, and produce higher pressures than
conventional drilling, and improperly constructed wells and inadequate equipment have caused
water contamination. A 2013 study linked casing and cement failures at Marcellus wells in
Pennsylvania to numerous instances of methane contamination in drinking water wells.\(^{25}\) Even
states with a long history of drilling like Colorado have revised their regulations to reflect this
new technology.

We urge DMME to develop technical requirements that are specific to modern high-volume
hydraulic fracturing operations including, but not limited to:

\(^{22}\) See Laura Legere, Hazards posed by natural gas drilling not always underground, thetimes-
tribune.com (Scranton) (June 21, 2010), available at http://thetimes-tribune.com/news/hazards-

\(^{23}\) See 25 Pa. Code §§ 78.55, 91.34.


\(^{25}\) See Robert B. Jackson \textit{et al.}, supra n. 4.
• Casing and cement standards that are specific to the pressures expected during hydraulic fracturing and the geology of the region;
• Blowout prevention standards;
• Regular well (casing and cement) integrity testing before and during hydraulic fracturing;
• Continuous well pressure monitoring during hydraulic fracturing;
• Monitoring for other parameters.

11. Require transportation plans approved by local governments

In the Marcellus shale region, local governments are grappling with the destructive impact of drilling-related truck traffic on local roads. New York’s Department of Environmental Conservation estimated heavy truck traffic for a single Marcellus well to be 1,148 one-way loaded trips in the initial period of gas-field development. A single heavy truck causes the same amount of road damage as 9,000 cars. In some parts of Pennsylvania and West Virginia, heavy trucks have pulverized road surfaces and rendered roads useless for regular traffic. We urge DMME to require that operators prepare a local transportation plan that, at a minimum:

• Establishes mandatory truck routes that avoid schools, downtowns, and residential areas;
• Includes bonding requirements for road maintenance; and
• Must be approved by the local government before drilling begins.

12. Impose reporting and tracking requirements for all drilling wastes.

Illegal dumping of drilling wastes has prompted states to institute reporting and tracking requirements to insure accountability for this massive waste stream. In one case, a Pennsylvania waste hauler illegally dumped produced water from fracturing operations in six counties over a period of seven years. Regulators in New York proposed tracking and reporting requirements for drilling waste as a vital part of managing the danger of contamination from improper disposal. A similar draft rule is under consideration in North Carolina. We urge DMME to

26 N.Y. Dep’t of Envt’l Conservation, supra n. 2, at 6-302.
27 See id. at 6-311.
29 See N.Y. Dep’t of Envt’l Conservation, supra n. 2, at 7-59–7-60.
establish reporting and tracking requirements to insure that wastes reach their intended destination.

13. Improve erosion and sediment control standards and stormwater management requirements.

Gas and oil development involves a significant amount of land clearing for well pads, access roads, pipelines, and other infrastructure. For example, the Nature Conservancy calculated that a single Marcellus well pad in forested areas of Pennsylvania involved, on average, the clearing of 8.8 acres of forest.\(^{31}\) Cleared lands, in turn, increase the velocity and volume of stormwater runoff, accelerating erosion and serving a conduit for sediment and other pollutants to reach streams and rivers. Not surprisingly, gas and oil wells produce the same amount of sediment runoff as other construction sites, and the development of wells within a given watershed increases downstream sediment concentrations.\(^{32}\) We urge DMME to adopt erosion and sediment control standards and stormwater management requirements that are as stringent as those required by DEQ for other construction sites in Virginia.

14. Require emissions standards for methane, VOCs, NO\(_x\), and hazardous air pollutants that exceed federal standards.

Gas and oil operations are a significant source of air pollutants, including methane, volatile organic compounds, nitrogen oxides, and hazardous air pollutants like benzene. These pollutants are released during the flowback period of well completion, from open wastewater pits, from venting of wells and tanks, and from leaks during drilling, processing, and transmission.

In the U.S., the gas and oil industry is the largest emitter of methane,\(^{33}\) a greenhouse gas that is 86 times more potent than CO\(_2\) over twenty years. The gas and oil industry is also the country’s largest industrial emitter of VOCs, one of the principal ingredients in ground-level ozone pollution.\(^{34}\) Rural regions of Wyoming with significant natural gas development experience ozone pollution similar to that found in major metropolitan areas,\(^{35}\) and VOC and NO\(_x\) emissions in the Barnett Shale region of Texas are equivalent to the emissions of 4 million

\(^{31}\) Nels Johnson, Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind, 10 (Nov. 15, 2010).


\(^{33}\) See Ramón A. Alvarez & Elizabeth Paranhos, Air Pollution Issues Associated with Natural Gas and Oil Operations, 2 (June 2012), available at http://www.edf.org/content/air-pollution-issues-associated-natural-gas.


cars. Hazardous air pollutants include known carcinogens like benzene and other substances that can cause serious, irreversible health effects.

DMME’s existing regulations do not address emissions from gas and oil drilling operations. Despite new EPA emissions rules for hydraulically fractured wells, air pollution problems prompted Colorado’s governor to propose more stringent state-level standards in 2013. Colorado’s proposed rules are supported by some of the largest gas and oil operators in the state, many of which are already voluntarily using the proposed pollution control measures. Also in 2013, Pennsylvania ended an across-the-board air permitting exemption for gas and oil drilling—wells are exempt only if they meet emissions control standards more stringent than the federal standards. We urge DMME to develop, in conjunction with DEQ, requirements to limit methane, VOC, NO\(_x\), and hazardous air pollution emissions from gas and oil development that are more stringent than the federal standards. At a minimum, these requirements should include:

- A leak detection and repair program;
- VOC emissions control equipment for tanks and other equipment capable of achieving emissions reductions of 95% or greater;
- Emissions criteria for VOCs, hazardous air pollutants, NO\(_x\), and methane; and
- Enclosed combustion devices for all permanent flaring operations.

15. Require consultation with other state agencies before permits are issued.

Industrial-scale gas and oil development can affect many different aspects of the local environment and community. We urge DMME to require consultation with other state agencies for gas and oil drilling permits, including DEQ, the Department of Game and Inland Fisheries, the Marine Resources Commission, the Department of Conservation and Recreation, and the Department of Transportation.

Thank you for your consideration of these comments. We look forward to working with you during this process.

Sincerely,

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36 See Ramón A. Alvarez & Elizabeth Paranhos, supra n. 33, at 1.

37 See Michael Wines, Colorado Governor Proposes Strict Limits on Greenhouse Gas Leaks from Drilling, N.Y. Times (Nov. 8, 2013) at A12.

38 See id.

Gregory Buppert, Staff Attorney\textsuperscript{40}
Southern Environmental Law Center
201 West Main Street, Suite 14
Charlottesville, VA 22902-5065
434.977.4090
gbuppert@selcva.org

Kate Wofford, Director
Shenandoah Valley Network
P.O. Box 186
Luray, VA 22853
kwofford@svnva.org

Jeff Kelble
Shenandoah Riverkeeper
P.O. Box 405
Boyce, VA 22620
jeff@shenandoahriverkeeper.org

Margaret Lorenz, Legislative/Advocacy Co-Chair
Friends of the North Fork of the Shenandoah River
P.O. Box 746
Woodstock, VA 22664
margaret.lorenz@fnfsr.org

Brian Johns, Organizing Director
Virginia Organizing
272 Henderson Court
Abingdon, VA 24210
bjohns@virginia-organizing.org

Emily Francis, Interim Executive Director
Virginia League of Conservation Voters
530 East Main Street #410
Richmond, VA 23219
efrancis@valcv.org

\textsuperscript{40}Mr. Buppert is licensed in Tennessee and Washington, D.C.
Kim Sandum, Executive Director
Community Alliance for Preservation
2879 Rawley Pike
Harrisonburg, VA 22801