

# The League of Women Voters of Pennsylvania



## Marcellus Shale Natural Gas Extraction 2012

### Study Guide Addenda

# Developments in Air Quality

League of Women Voters of Indiana County

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**Marcellus Shale Natural Gas Extraction  
2012  
Study Guide Addenda  
Developments in Air Quality**

Since the completion of our 2009 Study Guides on Natural Gas Extraction from Marcellus Shale, additional issues regarding air quality have evolved. As a result, both the Environmental Protection Agency (EPA) at the federal level and the Department of Environmental Protection (DEP) at the state level have grown increasingly more involved in both regulating and monitoring air quality.

**Environmental Protection Agency**

**National Air Pollution Standards for the Oil and Gas Industry**

On April 17, 2012, the US Environmental Protection Agency (EPA) issued air quality regulations for the oil and gas industry. These were required by the Clean Air Act and ordered by the US Court of Appeals, DC Circuit. Such regulations, in part, address the types and sources of air polluting emissions characterized in the report from the Citizen's Marcellus Shale Commission (2011) as well as the original League of Women Voters of Pennsylvania (LWVPA) Study Guide II (Sweeney, et al, 2009). At the time of the Commission's report, more than 6,000 permits for Marcellus Shale gas wells had been issued without requirements for tight air pollution controls.

The key provisions of the EPA Air Pollution Standards for shale gas include (EPA, 2012):

- **Reduction of Volatile Organic Compounds (VOC)** emissions through the required use of green completions (i.e. reduced emission completions). This process uses special equipment to separate "gas and liquid hydrocarbons from the flowback that comes from the well as it is being prepared for production" (Overview, EPA, 2012). The EPA estimates that this practice will result in a 95% reduction in VOC emissions. Revenues from selling gas that is currently wasted will offset the cost of compliance to this rule and may indeed produce added income.
  - Rules for green completion will be required by January 1, 2015 with the EPA providing a transition period to ensure the availability of green completion equipment. In the interim, fractured and refractured wells must reduce their emissions through flaring.
- **Reduction of VOC emissions** that result from regulations on pneumatic controllers; storage tanks; wet centrifugal compressors and reciprocating compressors at natural gas well sites; gathering and boosting stations; processing plants; and compressor stations.
  - Rules for pneumatic controllers and storage tanks will be phased in over one year.
  - Rules for compressors will take effect at the initial startup or 60 days after the final rule is published in the Federal Register.
- **Reduction of methane emissions** from new and modified wells as a co-benefit of green completions. Methane is more than 20 times more intense than carbon dioxide as a greenhouse gas when emitted directly into the air. The EPA estimates that oil and natural gas production and processing are currently responsible for 40% of all US methane emissions.

- **Reduction of benzene, toluene, ethylbenzene and xylene (BTEX) emissions** as a result of regulations on small glycol dehydrators at natural gas well sites, gathering and boosting stations, processing plants and compressors.
  - This rule will take effect immediately upon startup or within 60 days after the final rule is published in the Federal Register, whichever is later.
- **A 99.9% reduction of Sulfur Dioxide (SO<sub>2</sub>) emissions** at sweetening units (which remove SO<sub>2</sub> from natural gas) as part of natural gas processing plants.
- **Strengthened leak detection and repair requirements** at processing plants.

New technologies such as the EPA's Energy Star air quality voluntary programs (EPA, nd) are available to assist companies to meet new standards. Others are under development. For example, Kansas State University is collaborating with industrial partners to develop small engine emission controls for the many types of engines used in natural gas drilling and production (US Department of Energy, 2011). When applied to existing engines, these controls provide an alternative to the more costly replacement of the engines themselves.

### **Single Stationary Source Interim Determinations Guidelines or When Does 5 = 1?**

The natural gas industry consists of a conglomeration of small units, rather than one large industrial facility. During the drilling and/or production of natural gas, there are many sources of air pollutants. When considered singly (for example, one engine, one truck, one pneumatic valve, or one compressor engine), many of these sources do not emit significant amounts of pollutants. However, when sources from a site or series of contiguous sites are taken together, they can emit enough pollutants to meet higher regulation standards.

The EPA has ruled that oil and gas pollution sources must be considered as an aggregate (i.e., as one) when they are interdependent or linked by pipelines or other infrastructure. The DEP has issued its own guidelines "to assist the DEP's Air Program permitting staff in making single stationary source determination for the oil and gas industries in PA" (DEP, 2011a, Legere, 2011). Contradicting the federal ruling, the DEP will require single sources to be aggregated into one source for the purpose of permitting if they: 1) belong to the same industrial grouping, 2) are located on one or more contiguous or adjacent properties, and 3) are under the control of the same person (or persons under common control). Adjacent pollution sources are defined as being within one quarter mile of each other. Sources that are more than a quarter of a mile apart will be considered on a case-by-case basis.

Hopey (2011b) reports that the EPA has criticized these guidelines and will review and comment on DEP's definition of source aggregation. Hopey quotes from a November 21, 2011 letter by Diana Esher, EPA Region III air protection division director, who states, "The [DEP] draft guidance appears to alter the conventional way in which aggregation determinations have been made federally and by PADEP... For example the guidance imposes new terms and requirements when considering the 'contiguous or adjacent' nature of two or more sources and provides a bright line test of distance between sources when making aggregation determinations." In other words, PADEP's definition of "adjacent," as a distance of a quarter mile, is not consistent with federal or previous PADEP practices. Indeed, it narrows the federal government's common reading of the rule. Legere (2012) reports "none of the oil and gas air pollution sources permitted in Northeastern Pennsylvania have been aggregated" according to a

DEP spokeswoman. However, all have been evaluated for aggregation.

### **PA Department of Environmental Protection**

**Data Availability and Reliability:** Penn Future (2011) noted that the Pennsylvania Department of Environmental Protection (DEP) did not currently have data available on air emissions from Marcellus Shale drilling operations. When asked for data, DEP confirmed that no records are available. However, in December 2011, DEP required Marcellus Shale industries to provide an inventory of selected air emissions by March 2012 (Epps, 2011, Hohey, 2012, Department of Environmental Protection, 2011b). Hohey (2012) of the *Pittsburgh Post Gazette* reported that, according to the Philadelphia Clean Air Council (PCAC), several Marcellus Shale companies were not notified of reporting requirements by the DEP. The PCAC reports that, of the 99 notices that the DEP claims to have sent, some were duplicates, and, in fact, only 73 companies actually received notices. Among the companies which were *not* notified included: Mark West Energy Partners, L.P.; NiSource Inc., a subsidiary of Columbia Natural Gas of Pennsylvania; and Central New York Oil and Gas Co., LLC, a subsidiary of Inergy Midstream, LLC; and Inergy, L.P. According to PCAC President Minot, those companies that were not notified are not required to report air emissions. This will, in turn, adversely affect the accuracy of the emissions report sent to the EPA.

**Short-Term Air Quality Measurements in Marcellus Shale Drilling/Production Areas:** In 2010, the DEP completed short-term air quality studies in three areas of Pennsylvania with high concentrations of drilling/production in the Marcellus Shale. Using portable air monitoring equipment in the Southwest, Northeast and North Central areas of the state, they found no evidence of air pollution in concentrations that would affect the health of local citizens. However, they did detect “concentrations of certain natural gas constituents including methane, ethane, propane, and associated compounds such as benzene” (Governor’s Marcellus Shale Advisory Committee, 2011, p. 76). These levels were found in the air near Marcellus Shale drilling operations, particularly around two compressor stations in Greene and Washington counties. Readings taken at nearby, geographically similar areas of the Commonwealth with no corresponding drilling or production operations served as controls. Although reported as screening studies, the scientists stated that they could not address or project the long-term effects of such air pollution from their work. A December 2011 news release indicates that long-term studies would begin in 2012. Emission data collected from industries as part of these studies should assist in selecting long-term monitoring sites (DEP, 2011b, Lazor, 2011).

**New Air Quality Monitors** In June 2012, the DEP submitted the 2012-13 Proposed Ambient Monitoring Network Plan (DEP, 2012). Since the publication of the original LWVPA Study Guide, it reports the following:

- In Lebanon County, an air quality monitor for eight-hour ozone has been added.
- A new ozone and NOx monitoring site has been proposed in Bradford County as a result of the increased natural gas activity in the area.
- In response to the short-term studies conducted in 2010, DEP also plans to install four special-purpose VOC monitoring sites in Washington County as well as a “main station near a large compressor facility in an area of maximum impact. The main station will house a full array of monitors including a VOC/carbonyl sampler and will operate on the

standard EPA 1-in-6 day schedule with monthly random samples (DEP, 2012, p. 23).” Two of the sites will be smaller in scale, but will monitor the same pollutants on the same schedule. The fourth site will be located at a distance from Marcellus Shale activity and will serve as a control site.

### **Potential Litigation**

Concerns about the health implications of Marcellus Shale drilling/production in Pennsylvania resulted in a “notice of intent to sue” by the Clean Air Council (Hopey, 2011a). This 60-day notice was issued to the EPA for failure to enforce the 2008 Ground-level Ozone Regulations. Pennsylvania was not required to submit a state implementation plan because the EPA claims that the standards are not protective of human health. Hopey (2011a) reports that the EPA does not plan to penalize states for missing deadlines, but notes that they may face litigation for failure to do so. Pennsylvania is implementing the weaker 1997 ozone pollution standards. According to the EPA, appropriate revisions will be in place by the fall of 2013 (McCarthy, 2011).

### **Shale Natural Gas vs. Coal**

Studies are starting to emerge regarding the greenhouse gas (GHG) emissions of natural gas during the life cycle of electricity production. Burnham, et al (2011) report that from production to combustion, greenhouse gas emissions from shale gas are 33% lower than over the life cycle of coal, even when fugitive emissions of methane are factored in. In another study, Jiang, et al (2011) estimate a 20-50% reduction of GHG relative to coal. On the other hand, Howarth, Santoro, and Ingraffea (2011) of Cornell University state that natural gas drilling and production produce higher emissions than coal because of methane escape. Venkatesh, Jaramillo, Griffin and Matthews (2011) address these contradictory reports by analyzing the use of natural gas as an energy source. Using probabilistic modeling methods to estimate life cycle GHG emissions, they find that there is a higher probability of GHG reductions from the use of natural gas rather than coal for power generation. However, when natural gas is used for transportation there is less probability of emission reduction. After reviewing several studies and using the EPA’s revised methodologies for estimating fugitive methane emissions, Fulton, Mellquist, Kitasei and Bluestein (2011) of the Worldwatch Institute, conclude that natural gas offers greenhouse gas advantages over coal. However, they also indicate that shale gas production has an 8-11% larger GHG footprint than conventional gas over the life cycle. This may change as many companies have reduced vented and flared methane emissions by voluntarily implementing best practices as established by EPA’s natural Energy Star program (EPA, 2012).

### **New Studies Underway**

The National Energy Technology Laboratory (NETL) has begun studies to assess the longer term effects of Marcellus Shale drilling and production on air quality (NETL, 2011a, 2011b).

## References

### Developments in Air Quality

*The web addresses for the references below have all been checked by the committee. However, we recognize that some of the documents may not be maintained at the addresses given. If the links do not work for you, we recommend entering the title of document into your web browser.*

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- In Lebanon County, an air quality monitor for eight-hour ozone has been added.
- A new ozone and NO<sub>x</sub> monitoring site has been proposed in Bradford County as a result of the increased natural gas activity in the area.
- In response to the short-term studies conducted in 2010, DEP also plans to install four special-purpose VOC monitoring sites in Washington County as well as a "main station near a large compressor facility in an area of maximum impact. The main station will house a full array of monitors including a VOC/carbonyl sampler and will operate on the standard EPA 1-in-6 day schedule with monthly random samples (DEP, 2012, p. 23)." Two of the sites will be smaller in scale, but will monitor the same pollutants on the same schedule. The fourth site will be located at a distance from Marcellus Shale activity and will serve as a control site.

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