



# pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

SECRETARY

November 29, 2011

U.S. Environmental Protection Agency  
EPA Docket Center (EPA/DC)  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

Attention: Docket ID No. EPA-HQ-OAR-2010-0505

The Department of Environmental Protection (DEP) appreciates the opportunity to submit comments on the U. S. Environmental Protection Agency's (EPA) "Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews" published in the *Federal Register* on August 23, 2011 (76 *Fed. Reg.* 52738). The EPA is proposing revised new source performance standards (NSPS) pursuant to Section 111(b) of the Clean Air Act (CAA) and revised national emission standards for hazardous air pollutants (NESHAP) under Section 112(d) of the CAA.

These revised rules for the oil and gas sector will apply to the following new and existing source categories: crude petroleum and natural gas extraction, natural gas liquid extraction, pipeline distribution of crude oil, and pipeline transportation of natural gas. After EPA promulgates the final rules, these rules will automatically be adopted and incorporated by reference in their entirety into Pennsylvania's regulations codified at 25 *Pa. Code* §§ 122.3 and 127.35, respectively. The federal NESHAP provisions are also incorporated by operation of law in Section 6.6(a) of Pennsylvania's Air Pollution Control Act (35 P.S. §§ 4001-4015).

The DEP understands the need to address criteria and hazardous air pollutants (HAPs) from the oil and natural gas sector in accordance with Section 112 and Section 111 of the CAA. However, certain provisions in the proposed rules must be addressed prior to final rulemaking. Issues of concern, including those which would adversely affect the operation of oil and natural gas production in Pennsylvania are discussed herein.

Additionally, although the DEP is a member agency of the Ozone Transport Commission and the National Association of Clean Air Agencies, comments submitted to the docket on the proposed NSPS and NESHAP rules by those organizations do not represent Pennsylvania's position on the proposed rules. Comments provided herein provide DEP's perspective on federal rules that will significantly impact Marcellus Shale operations in this Commonwealth. However, before the DEP makes specific comments on the proposals, it is important to understand the depth of experience Pennsylvania has in relation to the development of natural gas generally, and to the regulation of the natural gas industry specifically. We believe that EPA can benefit from our experience in finalizing its proposed rules for the oil and gas sector.

## I. Introductory Comments

Pennsylvania has a long and productive history related to the extraction of natural gas. Natural gas producing pools were known in Pennsylvania within two years of the first North American oil well, drilled by Colonel Drake near Titusville in 1859. Throughout the entire 20th century natural gas production proved to be a steady, but slowly dwindling supply of natural gas to the Commonwealth. That situation changed with natural gas production from the Marcellus Shale starting in 2008. If current estimates are accurate, the Marcellus may contain more than 500 trillion cubic feet of natural gas. Using some of the same horizontal drilling and hydraulic fracturing methods that had previously been applied in the Barnett Shale of Texas, perhaps ten percent of that gas (50 trillion cubic feet) might be recoverable. That volume of natural gas would be enough to supply the entire United States for about two years and have a wellhead value of about one trillion dollars.

While Pennsylvania has been presented with a tremendous economic opportunity by fostering the development of the Marcellus Shale, we also understand the importance of protecting public health and the environment in the development of this resource. The Marcellus Shale development, including drilling, gas collection and processing, pose challenges with respect to air emissions. Generally, pollutants of concern include nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), particulate matter, hazardous air pollutants (HAP) such as benzene, and toluene, other volatile organic compounds (VOC) and particulate matter. Radionuclides such as radium, thorium, and radon from the wastewater treatment of fluids, malodors and methane are additional sources of air pollution. Methane, the major component of natural gas and a green-house gas pollutant, is released into the atmosphere as fugitive emissions through leaks from processing equipment and pneumatic devices. Fugitive emissions including dust from truck traffic and fugitive VOC emissions from leaking valves and pipes are also pollutants of concern.

In response to the proliferation of Marcellus Shale natural gas development, the DEP conducted short-term air sampling near natural gas operations in densely drilled areas in the southwest, northcentral, and northeast regions of the Commonwealth. These sampling efforts did not find that these emissions created ambient air pollution conditions where acute adverse health impacts would be expected. These reports may be accessed at <http://www.dep.state.pa.us/dep/deputate/airwaste/aq/default.htm>. The DEP is currently planning to conduct a longer-term sampling program in response to the public's questions concerning ambient impacts of Marcellus Shale activity.

In addition, the DEP has a robust air quality permitting program that is anchored by best available technology (BAT), which is equipment, devices, methods, or techniques that the DEP determines will prevent, reduce or control emissions of air contaminants to the maximum degree possible. For instance, the DEP currently regulates certain natural gas activities under General Permit-5 (GP-5) that regulates natural gas production facilities which may include internal combustion (compressor) engines, gas dehydration units, vents, and other equipment associated with this activity. In addition, operation of air contamination sources under the general permit

must be consistent with best available technology. Because of recent technology improvements the DEP, on March 26, 2011, modified GP-5 to allow for the installation of even cleaner engines.

In cases where use of a general permit is not appropriate, an applicant is required to submit a plan approval application to the DEP. During the review of the plan approval application, the DEP determines, on a case-by-case basis, that new sources must control the emissions to the maximum extent, consistent with BAT.

We believe that our monitoring efforts and BAT requirements demonstrate the strength of our expertise and the depth of our commitment in protecting public health and the environment in Pennsylvania. It is within the context of this history and experience that the Department offers the following comments on the proposals.

## **II. Specific Comments on the Proposal**

### **A. Wet Seals versus Dry Seals for Centrifugal Compressors**

The EPA has proposed equipment standards for centrifugal compressors which require the use of dry seals rather than wet seals. However, the EPA is considering an option that would allow the emissions from wet seals to be routed to control equipment as an alternative to the dry seals. EPA has identified two potential control techniques for reducing emissions from degassing of wet seal systems: 1) Routing the gas back to a low pressure fuel stream to be combusted as fuel gas, and 2) routing the gas to a flare.

The DEP concurs that seals in centrifugal compressors are warranted to prevent high pressure natural gas from escaping the compressor casing. Replacing wet seals with dry seals has been reported to reduce operational and maintenance costs as well as methane emissions.

For example, an uncontrolled wet seal system can emit, on average, approximately 20.5 tons per year (tpy) of VOC during the venting process (production segment) or about 3.5 tpy (transmission and storage segment). VOC emission reductions from a wet seal system would be an average of 19.5 tpy (production segment) or 3.3 tpy (transmission and storage segment), whereas a dry seal system can have fugitive emissions of, on average, approximately 2.6 tpy of VOC (production segment) or about 0.4 tpy (transmission and storage segment). Based on these figures, VOC emission reductions achieved by dry seal systems compared to uncontrolled wet seal systems would be 18 tpy (production segment) and 3.1 tpy (transmission and storage segment). Consequently, the DEP supports EPA's proposal that dry seal systems are the Best System for Emission Reduction (BSER) for reducing VOC emissions from centrifugal compressors.

Additionally, the DEP supports the proposed compliance option of routing emissions from the wet sealed compressors to a control device which provides an alternative option for compliance. There may be cases where wet seal is the only option, because a dry seal system is infeasible or otherwise inappropriate. However, the practicality of routing the emissions of wet seal system to

a control device is questionable. As a result, this compliance option should be available to industry, as appropriate.

#### B. Piston Rod Packing Replacement Frequency in Reciprocating Compressors

The EPA has proposed that piston rod packing in reciprocating compressors be replaced before the hours of operation reach 26,000 hours.<sup>1</sup> The packing system is described as follows: "Packing systems are used to maintain a tight seal around the piston rod, preventing the gas compressed to high pressure in the compressor cylinder from leaking, while allowing the rod to move freely."<sup>2</sup>

The DEP supports EPA's analytical approach to this issue which looked at industry experience in the Natural Gas STAR program and other sources, to evaluate the rod packing replacement costs for reciprocating compressors at different segments of this industry. Based on industry experience reported to the Natural Gas STAR program, you determined that packing rods should be replaced every three years of operation. Three years of continuous operation would be 26,280 hours, or rounded to the nearest thousand, 26,000 hours.

Based on the above analytical approach, the DEP believes that replacing the piston rod packing in reciprocating compressors before the hours of operation reach 26,000 is reasonable and an adequate operational standard. This replacement threshold will minimize the fugitive emissions due to various equipment leaks.

As indicated in the EPA proposal, some industry partners of the Natural Gas STAR program currently conduct periodic testing to determine the leakage rates that would identify economically beneficial replacement of rod packing based on natural gas savings. The DEP believes that it is appropriate to incorporate into the NSPS a method similar to that in the Natural Gas STAR's Lessons Learned document entitled, Reducing Methane Emissions from Compressor Rod Packing Systems ([http://www.epa.gov/gasstar/documents/11\\_rodpack.pdf](http://www.epa.gov/gasstar/documents/11_rodpack.pdf)).

#### C. Notification Methodology for Notification of Planned Well Completions

The EPA is seeking comment on potential methodologies for reporting each completion or recompletion of a hydraulically fractured gas well that would minimize burden on operators, while providing timely and useful information for regulators and the public.<sup>3</sup> The DEP agrees that a publicly accessible web-based electronic reporting which reduces paperwork and that is transparent to the public and other regulatory agencies would be the most appropriate avenue of reporting completions and recompletions of gas wells.

The proposed NSPS rule requires a 30-day advance notification of each well completion or recompletion of a hydraulically fractured gas well. The EPA has indicated that the 30-day

<sup>1</sup> 76 *Federal Register* at 52746.

<sup>2</sup> [http://www.ontime.methanetomarkets.org/m2mtool/files/docs/11\\_rodpack.pdf](http://www.ontime.methanetomarkets.org/m2mtool/files/docs/11_rodpack.pdf)

<sup>3</sup> 76 *Federal Register* at 52748.

advance notification would allow for inspections or audits to certify or verify that the operator has the proper controls in place. However, the proposed 30-day advance notification requirement could be unduly burdensome and may also require a significant number of follow-up notifications because the completions could deviate from the initial date for completions or recompletions of hydraulically fractured gas wells.

Under Pennsylvania's Oil and Gas Act, well operators must register wells and keep records of any well that is drilled or altered. The records must be submitted to the DEP within 30 days after the cessation of drilling activities. Well completion reports must also be filed with the DEP within 30 days after the completion of the well. Clearly, DEP recognizes the importance of registration and notification requirements for well completions. However, the proposed 30-day advance notification requirement should be reevaluated and limited to no more than five to ten days. If a reasonable period of time is established for advance notices, follow-up notices of one to two days prior to an impending well completion may not be necessary. Where feasible, the final notification and reporting requirements should be streamlined to eliminate unduly burdensome notification and reporting requirements.

#### D. Third Party Verification of Compliance

The proposed rule solicits comments on the potential use of third-party verification to assure compliance with the proposed rule as part of annual compliance certification.<sup>4</sup> In order for a third-party verification program to be successful, the EPA would have to train and certify third-party verifiers, which would be costly. Furthermore, EPA states clearly in the proposed rule that third-party verification would not supersede or substitute for inspections or audit of data and information by state, local, tribal agencies, and the EPA.<sup>5</sup> However, the DEP does not believe that third party verification requirements should be adopted because this approach would add unnecessary expenses to the operating costs. The DEP recommends that EPA require self-certification of compliance by a responsible official and take enforcement action for noncomplying activities. This approach is consistent with longstanding practices in the Acid Rain and Title V permitting programs.

#### E. Electronic Reporting Using Existing Mechanisms

The proposed rule solicits comments on requiring sources to electronically submit their emissions data for the proposed rules.<sup>6</sup> Currently, under EPA's Greenhouse Gas (GHG) Mandatory Reporting Rule, 40 CFR Part 98, subpart W, annual methane and other greenhouse gas emissions are required to be submitted to EPA electronically.

While the DEP supports the electronic submission of data under the NSPS and NESHAP rules, the proposed reporting requirements including periodic reports, excursions and performance test data would be submitted to EPA more frequently than the GHG emissions data, which is

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<sup>4</sup> 76 *Federal Register* at 52750.

<sup>5</sup> *Id.*

<sup>6</sup> *Id.* at 52750.

submitted on an annual basis. Use of the existing electronic database should not be used as a rationale to expand the proposed NSPS and NESHAP reporting requirements. However, as required under 5 CFR 1320.9 (b), the proposed collection of information must “not be unnecessarily duplicative of information otherwise reasonably accessible to the agency.” Subsection (e) also requires that the recordkeeping and reporting requirements be “...implemented in ways consistent and compatible, to the maximum extent practicable, with the existing reporting and recordkeeping practices of those who are to respond” (5 CFR 1320.9 (e)). To this end, Pennsylvania is opposed to any recordkeeping or reporting provisions in the proposed rules that would be burdensome, duplicative or create unnecessary paperwork.

#### F. Applicability of an LDAR Program

The proposed rule requires the owners/operators of gas processing plants to address equipment leaks of VOC by establishing a leak detection and repair (LDAR) program (40 CFR Part 60 subpart VVa).<sup>7</sup> The rule is not proposing to address emissions from equipment leaks at production facilities associated with wellheads, at gathering and boosting stations or at gas transmission and storage facilities as part of the proposed NSPS. The proposed rule solicits comments on the applicability of an LDAR program based on the use of optical imaging and other means.

LDAR regulations affect almost all United States industry processes in which VOCs are used or manufactured. Typical large scale facilities can contain over 100,000 pieces of regulated process equipment which may leak VOCs to the atmosphere, thereby contributing to the formation of ground level ozone. Generally, LDAR regulations require periodic inspections. Damaged or leaking components are tagged, which remain in place until the leaking component is repaired. Repairs must be made within a five day period. A variety of leak detection methods are used by industry.<sup>8</sup> But infrared camera technology, or optical imaging, is considered to be the state-of-the-art method for industry.

The DEP believes that the use of optical imaging in all areas of the proposed sector rule, not just gas processing facilities, would be beneficial in reducing emissions. The LDAR program would be simplified by the use of optical imaging systems such as infrared cameras and fixing the leaks as expeditiously as possible. At a minimum, audible, visual and olfactory (AVO) inspections can be required to minimize the fugitive emissions from equipment leaks. The DEP's field personnel have successfully used optical imaging cameras and quickly adapted to the use of the cameras in observing equipment leaks of VOCs and methane. The DEP also understands that the State of Wyoming and other states are successfully using optical imaging for their LDAR programs.

EPA evaluated whether a LDAR program would be cost effective for the entire production segment of the industry that would include everything from the well head to the point that the

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<sup>7</sup> *Id.* at 52754.

<sup>8</sup> 40 C.F.R. §60.18.

gas enters the processing plant, transmission pipeline or distribution pipeline.<sup>9</sup> EPA found two of the four options were not cost effective, and could not estimate the cost effectiveness of the other two options.<sup>10</sup> The EPA was unable to estimate the VOC emissions achieved by an optical imaging program alone, and because GHG emissions such as methane were not used, they were unable to estimate the cost effectiveness of that option. Therefore, the DEP suggests that the EPA base the cost effectiveness of LDAR on all VOC pollutants as well as GHG emissions such as methane.

#### G. Reduced Emissions Completions (REC)

The proposed rule would require all non-exploratory and non-delineation wells to reduce emissions through “reduced emission completions” or otherwise known as “green completions” by routing the recovered gas to the gas gathering line.<sup>11</sup> Reduced emissions completion procedures are already being implemented voluntarily in Pennsylvania by certain owners and operators of affected sources.

While the DEP supports EPA on the proposed requirement to minimize the gas venting during the green completions, the final rule should allow the owners and operators to vent the gas if they document to the satisfaction of the permitting authority that it is not feasible to employ reduced emission completions with flaring for reasons such as high levels of nitrogen or carbon dioxide or any other issues that are identified by the industry and approved by the permitting agency.

There are a number of states that currently require green completion from the natural gas industry. For instance, Colorado developed a regulation that requires green completion.<sup>12</sup> Wyoming makes green completion a part of its permit requirements.<sup>13</sup> So there is technical support for providing this requirement in the final NSPS.

#### H. Conducting Dispersion Modeling, Determining Inhalation Exposures and Estimating Individual and Population Inhalation Risks

The DEP appreciates the time and energy that EPA took in developing the risk assessment for this rule which analyzes the distribution of cancer risks within the exposed populations, cancer incidence and an evaluation of the potential for adverse environmental effects for each source category. The DEP understands all too well the complexity of these assessments. We have a high level of expertise in risk assessments through our Air Toxics and Risk Assessment Section in the Division of Permits, which evaluates the adverse health impacts of air toxics emitted from sources operating within the Commonwealth. Over the past five years, risks assessments have

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<sup>9</sup> 76 *Federal Register* at 52764.

<sup>10</sup> *Id.* at 52766.

<sup>11</sup> *Id.* at 52757.

<sup>12</sup> Colorado Oil and Gas Commission Rule 805 b.(3). <http://cogcc.state.co.us/>

<sup>13</sup> Wyoming Air Quality Standards and Regulations, Chapter 6, Section 2.

been required for numerous projects in Pennsylvania. As a result, we are well qualified to provide comments in this area of the rule.

In this rule, EPA provided estimates for each source in a category of the Maximum Individual Risk (MIR) posed by the HAP emissions, the Hazard Index (HI) for chronic exposures to HAP with the potential to cause non-cancer health effects, and the hazard quotient (HQ) for acute exposures to HAP with the potential to cause non-cancer health effects. The assessment looked at seven factors – the nature and magnitude of emissions; the relationship of those emissions; modeling, exposure, and risk; multi-pathway analysis; emission control options; facility-wide assessments; and demographic analysis. Based on the complexity of this assessment, the DEP will limit our comments to the third factor (modeling, exposure, and risk) and the use of occupational values in the analysis of the ambient air concentrations of benzene.

The proposed rule modeled the maximum estimated worst-case 1-hour exposure to benzene outside a facility property line to be  $12 \text{ mg/m}^3$ .<sup>14</sup> This conservative value was then compared to the 6-hour Reference Exposure Level (REL) of  $1.3 \text{ mg/m}^3$  and the 1-hour Acute Exposure Guideline Level-1 of  $170 \text{ mg/m}^3$ , resulting in HQs of 9 and 0.07, respectively. A HQ of less than one is considered an acceptable non-cancer risk. EPA believes that the HQ of nine is not problematic for a variety of reasons.<sup>15</sup> While EPA used the AEGL in this risk assessment, which is not an occupational standard, but rather an evacuation standard, EPA solicited comments on the appropriateness of occupational values in their analysis of the ambient air concentrations of benzene.

The DEP believes that the use of occupational values is appropriate for this risk assessment and recommends that setting acute exposure limits on benzene, and any other air pollutant, be based upon the short-term exposure limit (STEL). In the DEP's own risk assessments in the absence of an appropriate one-hour REL value, an acute risk benchmark is based on STEL, which the National Institute for Occupational Safety and Health (NIOSH) defines as a 15 minute time weighted average (TWA) exposure that should not be exceeded at any time during a work day. A divisor of four is used for converting the 15 minute TWA to a 1-hour TWA and a divisor of ten is used for sensitivity variation in the general human population. Using this approach, the DEP recommends the use of acute exposure benchmark of  $0.4 \text{ mg/m}^3$  for benzene. Based on our calculations this benchmark would result in a HQ of 30. While a HQ of 30 generally presents non-cancer health concerns, this is probably not the case in this situation because the acute modeling scenario is based is worst-case due to the confluence of peak emission rates and worst case conditions.

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<sup>14</sup> *Id.* at 52773.

<sup>15</sup> *Id.* at 52779.

### I. CEMS to Monitor BTEX Emissions for Small Glycol Dehydration Units

The proposed rule requires that parametric monitoring of the control device be performed for small glycol dehydration units.<sup>16</sup> Parametric monitoring measures a parameter (or multiple parameters) that is a key indicator of system performance. The parameter is generally an operational parameter of the process or the air pollution control device (APCD) that is known to affect the emissions levels from the process or the control efficiency of the APCD. Examples of parametric monitoring include temperature, pressure, or flow rate monitoring.<sup>17</sup> The EPA is considering the use of continuous emission monitoring systems (CEMS) to monitor compliance.

The DEP agrees with the EPA questioning of the technical feasibility of operating CEMS correctly in this sector, due to the necessary electricity, weather-protective enclosures, and daily staffing which are not usually available. In light of these justifiable concerns, the DEP believes that parametric monitoring is sufficient.

### J. Lack of Emission Limits for NO<sub>x</sub>

In section VI of the preamble to the proposed rule, the EPA acknowledges that significant emissions of oxides of nitrogen (NO<sub>x</sub>) from engines, turbines, heaters and boilers occur at oil and natural gas sites. EPA also indicates that while these sources are co-located with processes in the oil and gas sector, they are not being addressed in the proposed rule because they are not in the Oil and Natural Gas source category.<sup>18</sup> We understand that the NO<sub>x</sub> emissions from engines and turbines are covered by the Standards of Performance for Stationary Spark Internal Combustion Engines (40 CFR part 60, subpart JJJJ) and Standards of Performance for Stationary Combustion Turbines (40 CFR part 60, subpart KKKK). However, the DEP believes that NO<sub>x</sub> emissions from reciprocating engines and combustion turbines should be addressed in a subsequent rulemaking for the oil and gas sector. The subpart JJJJ and subpart KKKK rules were promulgated in 2008 and 2006, respectively. Under subpart JJJJ, NO<sub>x</sub> emission limits of 1.0 to 2.0 grams per horsepower hour (gm/bhp-hr) were promulgated for stationary spark internal combustion engines. However, technology for these engines has substantially improved to achieve significantly lower NO<sub>x</sub> emissions. For example, engine vendors are guaranteeing a NO<sub>x</sub> emission limit of 0.5 gm/bhp-hr for lean burn engines; rich burn engines with a non-selective catalytic reduction system are capable for meeting NO<sub>x</sub> limits of less than 0.2 gm/bhp-hr. At a minimum, EPA should reassess the NO<sub>x</sub> emission standards included in NSPS subparts JJJJ and KKKK.

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<sup>16</sup> *Id.* at 52787.

<sup>17</sup> [http://cfpub.epa.gov/oarweb/mkb/Basic\\_Information.cfm](http://cfpub.epa.gov/oarweb/mkb/Basic_Information.cfm)

<sup>18</sup> 76 *Federal Register* at 52756.

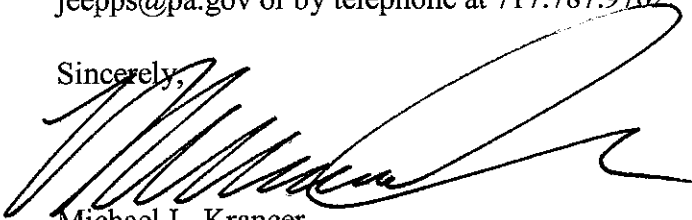
November 29, 2011

### III. Conclusion

While the DEP supports the overall goals of the proposed revisions to the oil and natural gas sector rules, the DEP does have some recommendations related to the proposal. We urge EPA to consider the DEP's comments prior to finalizing the rules, which will be incorporated by reference in the *Pennsylvania Code*.

Thank you for the opportunity to comment on the proposed rule. Should you have questions or need additional information, please contact Vincent J. Brisini, Deputy Secretary for Waste, Air, Radiation and Remediation, by e-mail at [vbrisini@pa.gov](mailto:vbrisini@pa.gov) or by telephone at 717.772.2724. You may also contact Joyce E. Epps, Director of the Bureau of Air Quality, by e-mail at [jeepps@pa.gov](mailto:jeepps@pa.gov) or by telephone at 717.787.9702

Sincerely,

A large, stylized handwritten signature in black ink, appearing to read 'Michael L. Krancer', is written over the word 'Sincerely,'.

Michael L. Krancer  
Secretary