



May 23, 2012

Via First Class and Electronic Mail

Naishadh Bhatt
Environmental Group Manager
Division of Permits, Bureau of Air Quality
12th Floor, Rachel Carson State Office Building
P. O. Box 8468
Harrisburg, PA 17105-8468
nabhatt@pa.gov

Re: Proposed Revisions to the General Plan Approval and/or General Operating Permit for Natural Gas Production and Processing Facilities (BAQGPA/GP-5)

Dear Mr. Bhatt,

Delaware Riverkeeper Network submits these comments and enclosed expert review of the proposed revisions to the general plan approval and/or general operating permit for natural gas production and processing facilities BAQGPA/GP-5 ("GP-5"). In this comment letter, Delaware Riverkeeper Network is focusing on the issue of atmospheric deposition of airborne pollutants from natural gas production and processing facilities.

Delaware Riverkeeper Network (DRN) is a nonprofit membership-supported organization dedicated to the Delaware River Watershed and works for its 10,000 members to protect, defend, and restore, the Delaware River, its habitats and communities. DRN speaks for its members who live and work throughout Pennsylvania, one of the four states that flow to the Delaware River.

Attached is a technical review commissioned by DRN, "Review of Pennsylvania Department of Environmental Protection's Proposed General Plan Approval and/or General Operating Permit for Natural Gas Production and/or Processing Facilities (BAQ-GPA/GP-5): Atmospheric Deposition", Cherelle Blazer MEd, May 22, 2012 ("Blazer Review"). The review is attached and is incorporated herein. In addition to these submitted comments, DRN has signed on to comments submitted separately by the Clean Air Council on May 23, 2012.

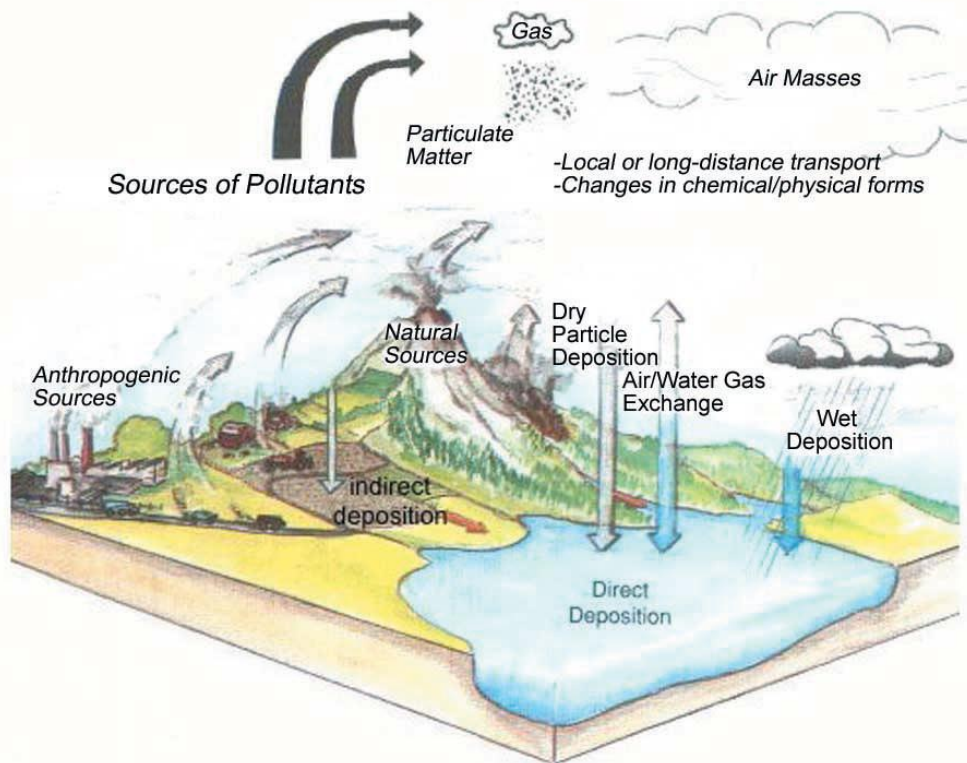
DELAWARE RIVERKEEPER NETWORK
925 Canal Street, Suite 3701
Bristol, PA 19007
Office: (215) 369-1188
fax: (215) 369-1181
drm@delawareriverkeeper.org
www.delawareriverkeeper.org

The Blazer Review explains the potential impacts to water quality from natural gas production and processing facilities, points out the deficiencies in the proposed GP-5 in regard to atmospheric deposition and makes some suggestions to correct them. Based on this Review, Delaware Riverkeeper Network concludes that the proposed GP-5 is not effective for the protection of human health or the environment and seeks to have the Department correct the deficiencies in the proposed permit before proceeding towards adoption. The deposition of pollutants from natural gas production and facilities will lead to water quality degradation and provides a substantial pollution pathway that must be addressed in the proposed GP-5 permit.

Pennsylvania Department of Environmental Protection (PADEP) acknowledges that the release of pollutants into the air by natural gas operations can cause atmospheric pollution that requires regulation under state and federal laws. The United States Environmental Protection Agency (EPA) states, “Atmospheric deposition is now recognized in many areas as a significant cause of water quality problems, acidification of streams and lakes, and toxic contamination of fish and the birds and mammals that eat them”.¹

It is important to recognize that air emissions do not only remain airborne but also deposit on to land, vegetation, and water and that the water quality impacts of this occurrence must be addressed. It is also crucial to recognize that the movement of air flow can transport these pollutants to nearby ground and water bodies as well as those distant to the original source. While airborne, changes in the chemical and physical forms of the pollution can occur, adding harmful effects. Therefore, the footprint of air pollution is large and can be long-lived, complex, and difficult to control once the pollutant is released. This means that water resources far from gas operations can be adversely impacted and this can occur in unanticipated ways. The picture below illustrates the pathway of air pollution from various sources to water.

¹ EPA's Office of Air and Radiation (OAR) and Office of Water (OW), Frequently Asked Questions about Atmospheric Deposition Handbook: A Handbook for Watershed Managers, EPA-453/R-01-009, September 2001.



Atmospheric Deposition Schematic, USEPA²

The Blazer Review points out that the real and cumulative effects of gas operations across the nation are poorly controlled by current regulations and practices. Atmospheric Nitrogen deposition is increasing; Sulfur deposition in gas development areas in the United States is increasing, despite the reduction of this pollutant nationally. The Review documents that both Sulfate and Nitrate, for instance, have increased in the Sublette County, Wyoming area where major gas fields have been developed over the past decade and Sulfur and Nitrogen compounds have increased in the nearby Bridger Wilderness Boundary. These pollutants have direct negative impact on ecosystem functions.

PADEP seeks to curb emissions from natural gas development through the GP-5 through the employment by the industry of Best Available Control Technology (BACT). However, Wyoming also requires BACT yet Sublette County is a non-attainment area for Ozone and deposition of toxics on water there is still evident, despite these controls. The Blazer Review concludes that BACT is simply not enough to control the harmful effects of the deposition of these pollutants on surface water, people, wildlife vegetation and soil. The persistence of this pathway of pollution requires more than BACT.

Limiting activities that are the source of the pollution is necessary. Reduction of the density and the number of wells or processing facilities and the establishment of off-limits areas to provide airshed and watershed buffers where water supplies are located must be considered. Further, the banning of the flaring of methane gas and the elimination of internal combustion engines that emit

² Ibid.

Volatile Organic Compounds (VOCs) and other hydrocarbon-based pollutants is an option that should be employed by PADEP. PADEP emphasizes “natural gas fired lean burn machinery” at Section B (2) (f) but this only attempts to reduce, not eliminate, the emissions from the large number of machines used at gas well sites³. Electric powered equipment is being used to reduce air emissions in other parts of the nation where there is intense gas development. Preventing the emission of pollution is the most effective means of addressing a pollution pathway, particularly the prevention of atmospheric deposition since the flow and fate of pollution is so difficult to address once the pollution is released and deposited.

It is also critically important to account for what happens to the pollutants that do escape. The deposition of pollutants on water results in water quality impacts that burden those who drink water from these water bodies and also affect the natural life in receiving waterways and ecosystems, such as forests. PADEP must consider how to clean up and treat the water polluted by the emissions and how to repair and restore health to the affected ecosystems and the life dependent on those habitats. The Blazer Review advises that EPA includes the option of using controls to clean up or treat resulting pollution from air emissions in the key options for reducing the effects of emissions and deposition. PADEP has not employed that option. This is particularly a problem in regards to atmospheric deposition of pollutants from natural gas activities that are intended to be addressed by the GP-5. The long reach of air pollution can impact literally millions of people and tens of thousands of miles of waterways. Pennsylvania’s 12,702,379 residents (2010 U.S. Census) are potentially affected. In addition, another 10 million people in other states beyond the 5.5 million Pennsylvanians that get their water from the Delaware River can be affected by air emissions from natural gas development in Pennsylvania and the Susquehanna River provides water to 6.2 million people, many of them living in New York or Maryland. This oversight needs to be corrected in the GP-5.

The Blazer Review points out that these pollutants bioaccumulate in the environment. Therefore, the cumulative effects of these emissions must be considered and addressed, particularly those that bioaccumulate and/or bind to sediments and vegetation that continue to slowly release to the environment and water bodies over time. Also, transformative properties of various chemicals that are released must be analyzed and addressed if the interaction results in further harmful impacts.

“Acid rain” is the penultimate example of the consequences of unaddressed atmospheric deposition that has long term cumulative impacts and is compounded by the reaction of water molecules to certain chemicals ([carbon dioxide](#), [sulfur dioxide](#) and [nitrogen oxides](#))⁴. Acid rain is documented to be harmful to ecosystems such as lakes and forests and to human health.⁵ By not addressing the cumulative and interactive impacts of natural gas emissions is a version of acid rain being created that will accumulate to the deadly level that has destroyed the health of many of our lakes and forests? PADEP does not address cumulative and reactive impacts to water and ecosystems from atmospheric deposition, allowing for those impacts to escape any limits. This needs to be corrected in the GP-5.

³ PROPOSED SUBSTANTIVE AMENDMENTS, GENERAL PLAN APPROVAL AND/OR GENERAL OPERATING PERMIT, BAQ-GPA/GP-5, page19.

⁴ <http://www.epa.gov/acidrain/what/index.html>

⁵ <http://www.epa.gov/acidrain/effects/index.html>

PADEP does not require mandatory sampling by operators in order to assess the local and immediate, regional and long range, cumulative and interactive impacts of emissions from natural gas operations they seek to regulate by the GP-5. Only through mandatory air sampling, designed through effective planning, can there be an accurate accounting of the emitted pollutants. Without monitoring it cannot be known if Pennsylvania is complying with federal air standards, if controls are working, and the cumulative and interactive impacts cannot be discovered. This leaves Pennsylvania noncompliant with federal requirements that the state demonstrate the effectiveness of its planning and permitting of air emissions from natural gas activities and it allows harmful impacts to continue and to compound in ignorance. This must be remedied in the GP-5 by a requirement for a robust air sampling program that targets all areas where these gas operations are occurring and also covers all areas that are part of the airsheds and watersheds that are potentially impacted by these emissions.

Finally, DRN advocates for the prevention of the emission of all pollutants from natural gas activities; DRN has signed on to comments submitted by the Clean Air Council for this reason. In addition to the direct health and environmental benefit that will result, this will co-benefit the release of dangerous pollutants that are subject to atmospheric deposition.

For instance, the inclusion of greenhouse gases in the GP-5, specifically methane and carbon dioxide, will reduce toxic emissions such as mercury and VOCs that are released through gas well development. It will also help reduce the formation of toxic formaldehyde in the atmosphere, which is formed by the conversion of methane. Formaldehyde has been classified as a known human carcinogen (cancer-causing substance) by the International Agency for Research on Cancer and as a probable human carcinogen by the U.S. Environmental Protection Agency.⁶ And it will help to reduce the greenhouse effects of methane on the atmosphere.

The uncontrolled release of methane through hydraulic fracturing of natural gas wells contributes a large volume of methane to the air. According to EPA, methane is, by weight, 21 times more powerful at warming the atmosphere than carbon dioxide.⁷ EPA has concluded that human-related natural gas operations are the single largest source of methane to the atmosphere today.⁸ And the U.S. release of greenhouse gases is increasing, not decreasing.⁹ This damaging release is worsening the destructive progression of global climate change. The GP-5 should include methane as well as carbon dioxide from natural gas operations in order to stem this increase and to co-benefit the reduction of the atmospheric deposition of pollutants and water quality degradation from these activities.

A literature review in the Blazer review is offered to assist PADEP to fill the gaps in the GP-5 in regards to atmospheric deposition. DRN advocates that PADEP not move ahead with the GP-5 as proposed but that further analysis and scientific research be conducted to address atmospheric

⁶ <http://www.cancer.gov/cancertopics/factsheet/Risk/formaldehyde>

⁷ <http://epa.gov/methane/scientific.html>

⁸ <http://www.epa.gov/outreach/sources.html> and <http://epa.gov/climatechange/emissions/usinventoryreport.html>

⁹ <http://www.epa.gov/outreach/sources.html>

deposition and the harmful impacts of natural gas emissions through the elimination of sources of pollution and a plan to address the cumulative and interactive impacts of natural gas operations.

Sincerely,



Maya van Rossum
the Delaware Riverkeeper



Tracy Carluccio
Deputy Director

Attachment: "Review of Pennsylvania Department of Environmental Protection's Proposed General Plan Approval and/or General Operating Permit for Natural Gas Production and/or Processing Facilities (BAQ-GPA/GP-5): Atmospheric Deposition", Cherelle Blazer MEd, May 22, 2012

Review of BAQ-GPA/GP-5: Atmospheric Deposition

Review of Pennsylvania Department of Environmental Protection's Proposed General Plan
Approval and/or General Operating Permit for Natural Gas Production and/or Processing Facilities

(BAQ-GPA/GP-5): Atmospheric Deposition

By: Cherelle Blazer MEd

Submitted to Delaware Riverkeeper Network

May 22, 2012

Review of BAQ-GPA/GP-5: Atmospheric Deposition

The proposed permitting, BAQ-GPA/GP-5 is not effective for the protection of human health or the environment. Based on a review of the best available research on atmospheric deposition from natural gas emissions, coal bed methane, and similar industrial processes; the effects of pollutants such as nitrogen compounds, sulfur compounds, non methane VOCs, known and suspected carcinogens, and other hazardous air pollutants are not fully mitigated for in GP-5ⁱ. The potential for adverse water quality impacts from atmospheric deposition require further review of GP-5 and reductions in gas production related air pollution emissions.

According to the U.S.EPA airborne pollution can fall to the ground in precipitation, in dust, or due to gravity, this is atmospheric depositionⁱⁱ. Water quality can be impacted by atmospheric deposition in two ways. Direct deposition is chemicals of concern depositing directly into surface water. Indirect deposition occurs with chemicals of concern deposit on soil and vegetation and then reaches surface waters by runoff. Once these pollutants are in the water, they can have adverse impacts on health and the environment, such as contaminated fish, harmful algal blooms, and unsafe drinking water.

Although this permit seeks to limit emissions of air toxics we need only look to areas of the country where drilling is happening on a large scale to see the real and cumulative effects of gas drilling on surrounding ecosystems and water bodies.

Atmospheric nitrogen deposition is increasing across the western United Statesⁱⁱⁱ. Despite national decreasing trends in sulfur deposition, increases are still evident at the local scale where gas drilling is occurring. Increases in atmospheric nitrogen and sulfur deposition can negatively alter the way an ecosystem functions. A recent academic review found increasing deposition of Sulfur and Nitrogen compounds in Bridger Wilderness Boundary, part of the second largest

National forest in the U.S. The Bridger area is 20 miles from two major gas fields in Sublette County that have both experienced a production boom during the last decade^{iv}. Along with natural gas production, Nitrate (NO_3^-) and sulfate (SO_4^{2-}) emissions have also increased in Sublette County over the past decade^v.

Like the Pennsylvania Department of Environmental Protection (DEP), the Wyoming Department of Environmental Quality (DEQ) requires the use of Best Available Control Technology (BACT)^{vi}. Yet Sublette County is still a non-attainment area for Ozone due toxic emissions from natural gas production and evidence of atmospheric deposition still persists in the water, soil and forests near gas fields. There is sufficient data available on both the Federal and state levels to suggest that simply requiring BACT in shale gas production permits is not enough to curb the effects of atmospheric deposition. While limiting the amount of pollution emitted from each source is necessary, it is equally important to account for what happens to that pollution once in the airshed and watershed. It is well documented that when toxics are emitted they deposit in surface water, on people and wildlife, on vegetation and in the soil where these chemicals can bio accumulate and cause harm.

The U.S. EPA states in their document, Frequently Asked Questions About Atmospheric Deposition: A Handbook for Watershed Managers, that there are three options for reducing emissions and the resulting deposition: Change the source material (input), change the process, or use controls to clean up or treat the output.

It is my professional opinion, with a reasonable degree of scientific certainty, that the proposed permitting, BAQ-GPA/GP-5 is not effective in protecting public health and the environment because it does not go far enough in addressing the problem of deposition. The DEP should explore Nox reducing options such as requiring electric drill rigs and banning flaring. If the Pennsylvania DEP does not revisit BAQ-GPA/GP-5 and require more substantive cuts to

emissions, the resulting atmospheric deposition of pollutants can adversely impact water quality and surrounding ecosystems.

Based on a literature review: Grenon, J. (2011). Can the lichens *Letharia vulpina* and *Usnea lapponica* be used as reliable and cost-effective bioindicators for nitrogen and sulfur deposition in the Northern Rocky Mountains? (Unpublished dissertation) Montana State University; *Atmospheric Deposition Handbook* (2012). United States Environmental Protection Agency <http://www.epa.gov/oar/oaqps/gr8water/> ; *RE: Oil and Gas Production Facilities Section 21 Permitting Guidance (Revision)* (January 6, 1999). Wyoming Department of Environmental Quality <http://deq.state.wy.us/aqd/Oil%20and%20Gas/oglette.pdf> ; *Survey of New Findings in Scientific Literature Related to Atmospheric Deposition to the Great Waters* (December 2007) United States Environmental Protection Agency http://www.epa.gov/oar/oaqps/gr8water/pdfs/fs_SurveyRpts.pdf ; Park, J. Atmospheric Deposition of Organic Contaminants to Galveston Bay, Texas. ; Environmental Defense Fund. (2009) *Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements*. Austin, Tx: Armindarez, A.

References

ⁱ Environmental Defense Fund. (2009) *Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements*. Austin, Tx: Armindarez, A.

ⁱⁱ *Atmospheric Deposition Handbook* (2012). United States Environmental Protection Agency
<http://www.epa.gov/oar/oaqps/gr8water/>

ⁱⁱⁱ Fenn M.E.; Geiser L.; Bachman R.; Blubaugh T.J.; Bytnerowicz A. 2007. Atmospheric deposition inputs and effects on lichen chemistry and indicator species in the Columbia River Gorge, USA. *Environmental Pollution*. 146: 77-91.

^{iv} Grenon, J. (2011). Can the lichens *Letharia vulpina* and *Usnea lapponica* be used as reliable and cost-effective bioindicators for nitrogen and sulfur deposition in the Northern Rocky Mountains? (Unpublished dissertation) Montana State University

^v Grenon, J. (2011). Can the lichens *Letharia vulpina* and *Usnea lapponica* be used as reliable and cost-effective bioindicators for nitrogen and sulfur deposition in the Northern Rocky Mountains? (Unpublished dissertation) Montana State University

^{vi} *RE: Oil and Gas Production Facilities Section 21 Permitting Guidance (Revision)* (January 6, 1999). Wyoming Department of Environmental Quality