

Blue Ridge Environmental Defense League

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Mr. Benne Hutson
Chairman, North Carolina Environmental Management Commission
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

September 12, 2013

Dear Chairman Hutson and Commissioners:

On behalf of our members and directors in North Carolina, Blue Ridge Environmental Defense League (BREDL) is requesting that the North Carolina Environmental Management Commission direct the North Carolina Division of Air Quality to develop rules for the regulation of all activities related to the exploration and production of natural gas. This would include but not be limited to drilling exploratory wells, operating production wells, gathering lines, waste containment facilities, equipment used for all stages of the process, and all emission sources necessary for a typical drilling operation.

The Environmental Management Commission's charge is to "[adopt] rules for the protection, preservation and enhancement of the state's air and water resources."¹ Studies and areal monitoring results in states where shale gas development is currently occurring increasingly show that dozens of uncontrolled air pollutants are being emitted into the air of the communities that surround hydraulic fracturing operations. Additionally, methane, a potent greenhouse gas, is also released into the atmosphere. The amounts and types of chemicals emanating from drill sites are not adequately quantified, monitored or reported. In a report earlier this year, the U.S. Environmental Protection Agency's (EPA) Office of Inspector General (OIG) found that,

*"...EPA has limited directly-measured air emissions data for air toxics and criteria pollutants for several important oil and gas production processes and and sources, including well completions and evaporative ponds." The report cautioned, "Harmful pollutants emitted from this industry include air toxics such as benzene, toluene, ethylbenzene, and xylene; criteria pollutants and ozone precursors such as NOx and VOCs; and greenhouse gases such as methane. These pollutants can result in serious health impacts such as cancer, respiratory disease, aggravation of respiratory illnesses, and premature death."*²

The EPA table on the following page details these health impacts.³

¹ Environmental Management Commission website: <http://portal.ncdenr.org/web/emc/>

² "EPA Needs to Improve Air Emissions Data for the Oil and Natural Gas Production Sector." *US Environmental Protection Agency. Office of Inspector General.* February 2013. <http://www.epa.gov/oig/reports/2013/20130220-13-P-0161.pdf>

³ "EPA Needs to Improve Air Emissions Data for the Oil and Natural Gas Production Sector." *US Environmental Protection Agency. Office of Inspector General.* February 2013. Table 2: Health impacts of significant pollutants

Pollutant(s)	Health impacts
Greenhouse gases (methane/ carbon dioxide)	Potential health impacts related to climate change will vary, but threats include increased incidence of serious infectious disease, extreme temperatures that lead directly to loss of life, and warmer temperatures that can increase air and water pollution and result in human health impacts.
NOx and VOCs, which contribute to ground-level ozone	Health impacts may include reduction of lung function, inflammation of airways, aggravation of asthma, increased susceptibility to respiratory illnesses (e.g., pneumonia and bronchitis) and premature death. Vulnerable populations (e.g., people with lung disease, children, and the elderly) are especially at risk.
Fine particulate matter (PM_{2.5})	Health impacts may include worsening of lung function, asthma attacks, bronchitis, increased susceptibility to respiratory infections, and premature death.
Air toxics including benzene, toluene, ethylbenzene, and xylenes	Health impacts from short-term exposure may include skin and sensory irritation, central nervous system problems, and respiratory problems. Health impacts from long-term exposure may include problems with kidney, liver, and blood systems. For example, benzene is a human carcinogen and health impacts from short-term exposure may include drowsiness, dizziness, headaches, and irritation of the eyes, skin, and respiratory tract. Long-term exposure has been linked to various blood disorders, reproductive effects, and increased incidence of leukemia.

Source: OIG-developed table.

The North Carolina Mining and Energy Commission is currently developing regulations for hydraulic fracturing, including setback distances from well pads and associated appurtenances. On September 5, 2013, the Environmental Standards Committee (ESC) presented the first draft of setback recommendations.⁴ The ESC's draft recommended a setback of 150 feet from an occupied dwelling, even in light of recent results from a study in West Virginia showing that a 625-foot setback is inadequate. Conducted by Michael McCawley, PhD, from the School of Public Health, West Virginia University, the study found that:

- Measurements of air contaminants in this study were taken to characterize levels that might be found at 625 feet from the well pad center at unconventional gas drilling sites during the activities at those sites.
- There were detectable levels of dust and volatile organic compounds found to be present at the set-back distance.
- The duration of the specific activity of interest at each of the sites was a week or less. This time constraint did not allow comparison of the collected data to limits in the NAAQS and therefore did not allow recommendations to be made for a setback distance based on the NAAQS values.
- Some benzene concentrations were, however, found to be above what the CDC calls the "minimum risk level for no health effects." This is a concern for potential health effects that might arise due to these exposures over a long time.
- One or all of the BTEX (i.e. organic chemicals Benzene, Toluene, Ethylbenzene and Xylenes) compounds were found at all drilling sites - which is similar to what other studies have reported. It appears that any of these compounds could come from diesel

emitted from upstream oil and gas production activities, <http://www.epa.gov/oig/reports/2013/20130220-13-P-0161.pdf>

⁴ North Carolina Mining and Energy Commission. Environmental Standards Committee. Proposed setback rules. 5 September 2013. http://portal.ncdenr.org/c/document_library/get_file?uuid=0fbfd3c6-b7b7-45ec-a6ca-c782a8cc4449&groupId=8198095

emissions rather than from drilling at the well pad, but diesel traffic is still part of the activity on all the sites and needs to be taken into account.

Other studies show health problems associated with exposure to air emissions from hydraulic fracturing. For example, in Pennsylvania, health surveys showed that, "...many symptoms showed a clearly identifiable pattern: as the distance from facilities increases, the percentage of respondents reporting the symptoms generally decreases."⁵ A 2012 study conducted by the Colorado School of Public Health, University of Colorado, has shown that air pollution caused by high-volume horizontal drilling and ancillary activities "may contribute to acute and chronic health problems for those living near natural gas drilling sites." The study stated that most of the air impacts were during the well completion stage, and are likely to affect those that live up to ½ mile away.⁶ Dr. Theo Colborn, founder of The Endocrine Disruption Exchange, published a peer-reviewed study in "Human and Ecological Risk Assessment."⁷ Dr. Colborn's findings were:

- **FINDING:** In this closed-loop system, the number and concentrations of chemicals detected were highest during the early stage of drilling, and fracking events did not substantially alter the number or concentration of chemicals present.

IMPLICATION: This study demonstrates the need to focus on a new suite of toxic volatile chemicals, the NMHCs released during drilling, that heretofore have received little attention.

- **FINDING:** There can be large variations from week to week in the types and numbers of volatile chemicals detected.

IMPLICATION: Grab samples reveal what is in the air at a particular moment and cannot accurately represent the different chemicals that can be released during all stages of well development and production, or the range of their concentrations. Under-sampling could lead to false negative results.

IMPLICATION: To better interpret the results from systematic sampling, weather patterns and seasonal changes need to be measured (e.g. using wind roses). Sampling during seasons of low temperature and low wind velocity is particularly important in areas that are prone to inversions.

⁵Steinzor, Nadia. Subra, Wilma. Sumi, Lisa. "Investigating Links between Shale Gas Development and Health Impacts Through a Community Survey Project in Pennsylvania." *New Solutions: A Journal of Environmental and Occupational Health Policy*. Volume 23, Number 1, 2013.
<http://baywood.metapress.com/media/804t6y8yqh4rjjevtw3p/contributions/k/2/4/3/k243k37712348302.pdf>

⁶ McKenzie LM, et al, "Human health risk assessment of air emissions from development of unconventional natural gas resources." *Sci Total Environ* (2012), doi:10.1016/j.scitotenv.2012.02.018.
<http://www.ucdenver.edu/about/newsroom/newsreleases/Pages/health-impacts-of-fracking-emissions.aspx>

⁷Colborn T, Schultz K, Herrick L, and Kwiatkowski C. 2012 (in press). "An exploratory study of air quality near natural gas operations." *Hum Ecol Risk*
Assess. <http://www.endocrinedisruption.com/files/HERA12137NGAirQualityManuscriptforwebwithfigures.pdf>

- **FINDING:** Chemical concentrations were below federal exposure limits, but above concentrations found to have health effects in scientific studies.

IMPLICATION: Government standards do not take into account low-level, chronic exposure experienced by the increasing numbers of people in close proximity to gas operations. Some VOCs are endocrine disrupting chemicals, which can cause adverse effects at low-concentrations, even in parts per trillion, for which there are no government standards yet.

- **FINDING:** Polycyclic aromatic hydrocarbons (PAHs), detected in parts per trillion, were at greater concentrations than were reported in urban studies of prenatal exposure, in which adverse effects on fetal growth and childhood cognitive development were demonstrated.

IMPLICATION: Concentrations of PAHs should be investigated in rural neighborhoods with and without natural gas activity.

- **FINDING:** Methylene chloride was detected in 73% of the samples, sometimes at extremely high concentrations, but was not listed as an ingredient in any of the products reported in two lists of several hundred products used by the natural gas industry.

IMPLICATION: This suggests that it is time to require full disclosure for all toxic chemicals used during natural gas operations, including those that might only be used above ground.

Natural gas typically contains hydrogen sulfide, or H₂S. Hydrogen sulfide can be recognized by its “rotten egg” odor. Gas with high levels of this strong irritant and highly potent neurotoxin is called “sour.” Despite the well known pernicious effects of this pollutant, the control of H₂S is exempted from the federal Clean Air Act for the oil and gas industry.⁸ It is not known whether gas deposits in North Carolina are sour or not, but the coal producing counties of Lee, Chatham and Moore are known for their high-sulfur coal.⁹ Workers and communities alike can experience serious health effects from exposure to hydrogen sulfide. “Exposure to low concentrations of hydrogen sulfide may cause irritation to the eyes, nose, or throat. It may also cause difficulty in breathing for some asthmatics. Brief exposures to high concentrations of hydrogen sulfide

⁸ Roth, Sammy. “Common Sense Bills Would Close Unwarranted Loopholes for Fracking.” *Environmental Health Policy Institute*. Accessed 10 September 2013. <http://www.psr.org/environment-and-health/environmental-health-policy-institute/responses/common-sense-bills.html>

⁹ Toenges, Albert, et al. “Coal Deposits in the Deep River Field; Moore, Chatham, Lee and Moore Counties.” *Bulletin* 515. United States Government Printing Office. 1952. <http://digital.library.unt.edu/ark:/67531/metadc12674/m1/1/?q=sulfur>

(greater than 500 ppm) can cause a loss of consciousness and possibly death.”¹⁰ There is evidence that H₂S can contribute to depression and exacerbate suicidal ideations.¹¹

Of additional concern are the large quantities of uncontrolled emissions that will come from gas flaring, the explosion of heavy truck traffic in the shale basins, and other activities associated with hydraulic fracturing. In a 2012 report, the General Accounting Office found that, “Oil and gas development, whether conventional or shale oil and gas, pose inherent environmental and public health risks...” pointing to “(1) engine exhaust from increased truck traffic, (2) emissions from diesel-powered pumps used to power equipment, (3) gas that is flared (burned) or vented (released directly into the atmosphere) for operational reasons, and (4) unintentional emissions of pollutants from faulty equipment or impoundments.”¹²

The addition of hundreds of emission sources without adequate standards and monitoring will be detrimental to the health of thousands of citizens across the state. Now is the time to adopt rules for the chemicals emanating from drill sites. We urge you to be unwavering in your obligation to protect North Carolina communities.

Sincerely,



Therese Vick

North Carolina Healthy, Sustainable Communities Campaign Coordinator

Cc: Louis Zeller
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¹⁰“Hydrogen Sulfide.” Division of Toxicology and Environmental Medicine ToxFAQs. Agency for Toxic Substances and Disease Registry. July 2006. <http://www.atsdr.cdc.gov/tfacts114.pdf>

¹¹ Jennrich, Katherine. “Undergrads Use Stanback Internships for Real-World Study on Suicide Rates, Cancers and Environmental Toxins.” *Action/Student News*. Duke Nicholas School of the Environment. <http://www.nicholas.duke.edu/DEarchives/sp06/action.html>

¹² “Information on Shale Resources, Development, and Environmental and Public Health Risks.” *United States Government Accountability Office, Report to Congressional Requestors*. September 2012. <http://www.gao.gov/assets/650/647791.pdf>