American Lung Association ● American Thoracic Society
American Public Health Association ● Asthma & Allergy Network
Alliance of Nurses for Healthy Environment● Physicians for Social Responsibility
Children's Environmental Health Network

December 4, 2015

The Honorable Gina McCarthy, Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Re: Oil and Natural Gas Sector -- New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants, and Control Techniques Guidelines. Docket ID No. EPA-HQ-OAR-2013-0685; EPA-HQ-OAR-2010-0505; EPA-HQ-OAR-2014-0606; and EPA-HQ-OAR-2015-0216

Dear Administrator McCarthy:

On behalf of our nation's medical and public health groups, we urge the U.S. Environmental Protection Agency to adopt the strongest possible standards to reduce harmful emissions of methane, volatile organic compounds and other pollutants from all new and modified production wells, processing plants, transmission pipelines, and storage units within the oil and natural gas industry. These standards will not only help to mitigate climate change and its associated health risks by curtailing emissions of methane – an especially potent greenhouse gas – from new and modified sources, but will also limit emissions of toxic and carcinogenic air pollutants, benefiting public health in communities across the country. As public health groups and medical societies, we are keenly aware of the harmful health effects of these air pollutants. Furthermore, we call on EPA to develop standards to limit similar emissions from existing sources as well, to truly protect public health.

The EPA must adopt stronger standards to reduce methane and other emissions from the oil and gas industry, including new, modified and existing sources

The Clean Air Act requires that EPA review and revise standards to see if they adequately protect public health from new sources of pollution and from hazardous air pollutants. The widespread and expanding oil and natural gas production in the United States represents sources of such emissions that must be addressed under the law.

Emissions can occur during the extraction, production, processing, flaring, transportation, unloading and distribution of oil and natural gas. Those emissions can be vented to the atmosphere (intentionally or unintentionally) and impact human health and must be adequately addressed, through requiring added monitoring and inspections. Additionally, the large engines used in drilling and production processes burn fossil fuels and produce emissions. Although those impacts are not covered under these proposed rules, they can add to the air pollution burden affecting local communities.

The rapid development of high volume, hydraulic fracturing ("fracking") and horizontal drilling technologies to recover natural gas from shale formations has driven the expansion of new and modified sources, as it expanded the nation's supply of natural gas resources.

As explained below, strong standards will not only help to mitigate climate change and its associated health risks by curtailing emissions of methane from new and modified sources, but will also limit emissions of toxic and carcinogenic air pollutants, benefiting public health in communities across the country. We call on EPA to:

- ensure that the full range of emission sources are covered, including storage, offloading and compressors;
- eliminate flaring;
- require stronger and more frequent inspections and maintenance; and
- adopt requirements for existing, as well as new and modified sources.

One recent analysis found that available technology and systems changes could reduce methane emissions by 40 percent and volatile organic compounds (VOCs) and hazardous air pollutants by 44 percent (ICF, 2014).

Methane worsens climate change with its serious threats to human health

The changing climate threatens the health of Americans alive now and in future generations. Growing evidence over the past few years has demonstrated the multiple, profound risks that imperil the lives and health of millions from climate change. Consequently, the nation has a short window to act to reduce those threats.

In 2014, the Intergovernmental Panel on Climate Change issued its most recent policy assessment of current observations and analyses about the changing climate. The IPCC found:

> "Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation, can limit climate change risks." (IPCC 2014)

This report makes clear the essential need to adopt and maintain the strongest possible measures to reduce methane and other greenhouse gases that endanger the long-term health of all people.

The *Unites States Third National Climate Assessment* issued in May 2014 provided the most recent summary of the research outlining these risks to the United States (Melillo, 2014). This review echoed reports previously produced by several of our organizations: the American Academy of Pediatrics technical report in 2007 on "Global Climate Change and Children's Health"(Shea et al., 2007); Trust for America's Health, *Health Problems Heat Up: Climate Change and the Public's Health*, in October 2009 (TfAH, 2009); the Asthma and Allergy Foundation of America's *Extreme Allergies and Global Warming*, issued with the National Wildlife Foundation in 2010 (NWF and AAFA, 2010); the American Public Health Association's *Climate Change: Mastering the Public Health Role*, in April 2011 (APHA, 2011); and the American Thoracic Society's workshop on Climate Change and Human Health published in 2012 (Pinkerton et al., 2012). All these reviews arrived at similar conclusions, summarized below.

Ground-level ozone is likely to be worse in some locations. Higher temperatures increase the likelihood that the precursor gases will react to form ground-level ozone, making it harder to protect people from this most widespread air pollutant. Ozone causes asthma attacks and respiratory distress, and may increase cardiovascular harm, risk of harm to the central nervous system and the risk of low birth weight in newborns as well as premature death (EPA, 2013).

Wildfires and drought conditions give rise to smoke and dust storms spreading miles from their source. Recent years have showcased the risks from wildfire smoke from blazes in the West. In September 2014, California had reported nearly 5,000 wildfires in 2014—1,000 *more than usual*—before fire season had even begun, as the *Los Angeles Times* noted (Rocha, 2014). This year has seen similar events from wildfires. As the *Washington Post* noted, during the week of July 8th, more than 700 fires in Alaska and Canada were blowing smoke that created unhealthy air pollution in Minneapolis and Colorado (Fritz, 2015).

Drought-driven dust storms also produce high levels of particulate matter. The impact of dust storms in recent years, such as one in Oklahoma in 2012 that shut down Interstate 35, demonstrate their power to threaten health in multiple ways (Juozapavicius, 2012).

Even short-term exposure to such levels of particulate matter threaten human health. As EPA concluded in the 2009 review of the research, short-term increases in particle pollution cause premature death and cardiovascular harm including increased numbers of heart attacks, especially among the elderly and in people with heart conditions increased and likely cause respiratory harm, including increased severity of asthma attacks in children (EPA, 2009b).

These examples show that these changes erect new hurdles to our ability to protect human health from air pollution. As EPA noted in its 2009 report on the impacts of global climate change on ground-level ozone, modeling for future pollution levels shows the complexity of the problem, with one compelling outcome: climate change had "the potential to make U.S. air quality management more difficult" (EPA, 2009a).

Extreme weather threatens health. Many cities across the U.S., such as Chicago and Milwaukee have experienced increased death rates from episodic heat waves in recent years. Hotter temperatures can increase the risk of heat stroke and heat exhaustion and can increase the risk of hospitalization for cardiovascular and respiratory diseases (Luber et al., 2014; Li et al., 2012).

Increased risk of dangerous hurricanes threatens not only damage and death directly from the high winds and water, but from the disruption in communities that suffer the hurricanes. As Hurricanes Katrina and Sandy showed, the disruption can last for years. Hospitals, clinics, medical care and public health services may be blocked from serving their patients and communities as resources are diverted to emergency response or too damaged to provide those services. Patients find themselves in emergency shelters or relocated to new homes far away from their previous medical caregivers.

According to the most recent assessments, the nation has experienced increased heavy rainfall and flooding since 1991 (Walsh et al., 2014). Flooding causes premature deaths, often through drowning, but the aftermath of flooding expands the burden. Water damage leaves behind lingering risks including dampness and mold, chemicals and sewage spread through flood waters, and contaminated debris in flooded homes, schools, hospitals and other community facilities. (Luber et al., 2014; APHA, 2011).

Allergens and risk of vector-borne diseases will increase. Warmer weather leads to shifting growing seasons that change flowering time and pollen development and can expand the habitat for allergen-rich plant species. Higher concentrations and longer growing seasons increase the exposure to allergens that trigger asthma and other respiratory and allergic responses. (NWF and APHA, 2010; Ziska et al., 2012; Luber et al., 2014). In the U.S., spread of diseases such as Lyme, West Nile Virus, and Rocky Mountain spotted fever, is linked to complex differences in weather, hosts and human behavior that can be profoundly affected by changes in climate (Luber et al., 2014).

Food and water supplies face uncertain challenges. The ongoing drought in the West, particularly in California, exemplifies the risks to supplying adequate water and food to the nation (USDA, 2014). As the water levels continue to drop, farmers confront more challenges growing food to supply the rest of the nation and the world. Certain communities, such as Alaska Natives, may suffer shortages of fresh water and food they have historically hunted or fished (Chapin et al, 2014).

Stress will complicate response and mental health issues. Mental health problems increase after disasters, such as seen after Hurricane Katrina. Moreover, even people with no history of mental health problems, including children, will risk increased stress from responding to and accommodating these severe changes. Among the expected impacts from these stresses are: post-traumatic stress disorder; depression and anxiety; increases in violence; and strains due to relocation (Luber et al., 2014; Clayton et al., 2014).

To help reduce climate change, the nation must reduce methane emissions, which have the second most powerful global warming potential according to the International Panel on Climate Change. The IPCC calculates that methane has a more than 30-times greater impact per pound emitted than carbon dioxide over 20 years and a more than 80-times greater over 100 years (IPCC, 2013).

Oil and gas emissions pose direct risks to human health

Clear evidence documents harm directly from emissions of VOCs, but also from ozone and fine particulate matter ($PM_{2.5}$) as VOCs are precursors to ozone and fine particulates. These pollutants can cause or increase risk of cardiovascular, respiratory, and other acute and chronic systemic damage, and may increase risk of cancer. The standards will help reduce ozone and fine particulate matter levels in areas where oil and gas production occurs and downwind. The air toxics standards for oil and natural gas wells will also reduce hazardous air pollutants, including the risk of benzene and formaldehyde, both carcinogens, in the oil and gas production process and for transmission and storage. The discussion below summarizes the evidence that these pollutants pose serious threats to health and must be reduced.

Volatile organic compounds (VOCs)

Volatile organic hazardous air pollutants are specific toxic gases that react easily with other gases and particles. These take in a host of carcinogens and other toxins. According to the EPA's Regulatory Impact Assessment, six organic hazardous air pollutants dominate the mass from oil and natural gas wells and can most harm human health: benzene, toluene, carbonyl sulfide, ethylbenzene, mixed xylenes, and n-hexane. Other major hazardous air pollutants from wells include formaldehyde, ethylene glycol, methanol, and 2,2,4-trimethylpentane. One recent study of locations near oil and gas development sites around the U.S. found evidence of high levels of benzene and formaldehyde present at levels that exceed the Agency Toxic Substances and Disease Registry (ATSDR) or EPA's Integrated Risk Information System (IRIS) standards for exposure (Macey et al., 2014). Current estimates likely also

understate the emissions. A study looking "top-down" found that the monitored emissions in northeastern Colorado were seven times greater than the state's estimated emissions inventory (Pétron et al., 2013)

Many of these toxic air pollutants can cause cancer, but they can also irritate the eyes, skin, and respiratory tract, impair lung function, and affect vital organs. Benzene and formaldehyde are recognized as known human carcinogens, while ethylbenzene is considered a probable carcinogen (HHS, 2011). Long-term exposures to benzene can cause leukemia, a blood cancer, and other blood disorders such as anemia and depressed lymphocyte count in blood. Exposure to formaldehyde can also cause chronic bronchitis and nasal epithelial lesions. A recent review of the research found evidence that formaldehyde may increase the risk of asthma, particularly in the young (McGwin et al., 2010). Non-cancer effects associated with exposure to these organics range from irritation of the skin, eyes, nose, throat, and respiratory tract, and dizziness, nausea, and vomiting. These compounds can also cause difficulty in breathing, impaired lung function and respiratory symptoms, damage to the liver and kidneys, and stomach discomfort. They may also cause developmental disorders, adverse effects to the nervous system, impairment of memory and neurological function, and slow response to visual stimuli. These pollutants can also affect hearing, speech, vision, and motor coordination (ATSDR, 1999a, 1999b, 2000, 2007a, 2007b, 2010).

Fine Particulate Matter ($PM_{2.5}$)

Reductions in some VOCs, specifically organic carbon aerosols, through the final oil and natural gas wells standards would provide an additional collateral benefit: reduction in secondary fine particulate matter. $PM_{2.5}$ is made up of microscopic particles, including aerosols, which can bypass the body's natural defenses and lodge deep within the lungs (EPA, 2009). In addition to the short-term effects of $PM_{2.5}$ discussed earlier, the evidence shows that long-term exposure to $PM_{2.5}$ also causes premature death, respiratory and cardiovascular harm and suggests that long-term exposure to $PM_{2.5}$causes reproductive and developmental effects (EPA, 2009). Most recently, $PM_{2.5}$ has been found to cause lung cancer (Hamra et al., 2014).

Volatile Organic Compounds as Precursors to Ozone (O_3)

One of the most crucial aspects of the rule is the limit it sets on the amount of VOCs that are emitted by oil and natural gas wells. Cleaning up VOCs with these standards is critical to protecting human health. As noted above, many VOCs are hazardous air pollutants. However, VOCs are also precursors to the formation of ground-level ozone when they react with nitrogen oxides (NOx) in the presence of sunlight. By limiting emissions of VOCs, the proposed oil and natural gas standard will indirectly reduce the amount of secondary ozone formed in the air, human exposure to ozone, and the incidence of ozone-related health effects.

Ozone is a colorless, odorless gas that reacts chemically ("oxidizes") with internal body tissues, such as those in the lung. Some have described the inflammation that ozone causes in the airways as similar to a "sunburn" on the lungs. It acts as a powerful respiratory irritant at the levels frequently found across the nation during the warmer months. EPA's most recent review of the research concluded that breathing ozone respiratory harm including increased risk of asthma attacks and increased susceptibility to respiratory infections, and need for medical treatment and for hospitalization for people with asthma or chronic obstructive pulmonary disease (COPD) and may lead to premature death. In addition, new

evidence suggests that ozone may worsen cardiovascular disease, may harm the central nervous system and have adverse reproductive and developmental effects (EPA 2013).

The expansion of oil and gas production has led to astonishing and unhealthy concentrations of ozone, including in unexpected areas. In Utah, spacious, rural Uintah County and Duchesne County have elevated levels of ozone that violate the 2008 national ambient air quality standard, and would also exceed the 2015 standard just adopted (EPA, 2015a). The emissions from the oil and gas extraction industry are the biggest contributor to these unhealthy air levels (Helmig et al., 2014). In Colorado, a study of the oil and gas extraction in the North Front Range area found not only a significant source of precursor VOC emissions for the ozone in the Denver metro area, but that the emissions had increased likely due to the expanded wells, despite Colorado's strengthening of emissions standards (Thompson et al., 2014).

Methane (CH_4)

Although the health effects of methane have been more commonly addressed as a result of methane's role as a greenhouse gas, methane itself also poses a serious health risk by itself. Methane is a VOC, and is an odorless gas that can burn or explode at concentrations of 5 percent to 15 percent by volume of air (ATSDR, 2001). Methane is also a concern from an occupational safety and health standpoint for workers at natural gas wells who would be exposed to explosions or uncontrolled fires during the hydraulic fracturing process (NIOSH, 2015). As a VOC, methane is also a precursor to ozone, particularly in remote areas (EPA, 2013).

The EPA has identified the oil and gas industry as the "single largest contributor to United States anthropogenic methane emissions" (EPA, 2011). The growing problem of methane in the atmosphere indicates that existing oil and gas infrastructure currently produce higher methane emissions than have been estimated (Brandt et al., 2014). One recent report estimated that nearly 90 percent of projected emissions from oil and gas development in 2018 will come from existing infrastructure (ICF, 2014).

Millions of Americans suffer greater vulnerability to these threats

Many people face greater risk or exposure, as documented in the large air pollution science assessments EPA has repeatedly completed. Children court special risks because their bodies are growing and because they are so active (Shear et al., 2007; AAP, 2004). Older adults are more likely to die during high heat events (Zannobetti et al., 2012). People with chronic respiratory diseases like asthma and chronic obstructive pulmonary disease, people with cardiovascular diseases and people with diabetes also risk greater harm from increased pollution (EPA, 2009; EPA 2013).

A growing body of research indicates that oil and gas development is associated with adverse health impacts, including premature birth, congenital heart defects, neural tube defects, and low birth weight for infants born to mothers living near natural gas development (Casey et al., 2015; McKenzie et al., 2014; Stacey et al., 2015).

Poorer people and some racial and ethnic groups are among those who often confront higher exposure to pollutants and who may experience greater responses to such pollution. Many studies have explored the differences in harm from air pollution to racial or ethnic groups and people who are in a low socioeconomic position, have less education, or live nearer to major sources (O'Neill et al., 2003; Brender et al. 2011).

Poorer people, people of color, older people and disabled people will have a harder time responding to the threats, especially if electricity is lost or relocation or evacuation is required (Luber et al., 2014; APHA, 2011). Hurricane Katrina demonstrated that many people in these groups had difficulty evacuating and relocating after a major weather event. Native American tribal communities may face threats to food supplies and difficulty relocating due to tribal land locations (Luber et al., 2014).

People most at risk of harm from breathing these air pollutants from the oil and natural gas industry include: infants, children and teenagers; older adults; pregnant women; people with asthma and other lung diseases; people with cardiovascular disease; diabetics; people with low incomes; and healthy adults who work or exercise outdoors, including employees of the oil and gas industry. Many live and work in communities near these oil and gas facilities, which are often located near lower income or minority communities.

Living nearer to oil and gas development may expose residents to greater risk. For example, a 2012 study found that people who lived within one-half mile of those developments in Garfield County, Colorado, faced increased risk from cancer, largely due to elevated benzene exposure (McKenzie et al., 2012). A Pennsylvania study found evidence of higher rates of hospital use for cardiovascular and neurological conditions associated with increased oil and gas extraction (Jemielita et al., 2015). Recent reviews of the research examining the health effects associated with proximity to oil and gas extraction and development have warned about the potential for harm from the emissions, the growth in the development and and the increased proximity to more people (Werner et al., 2014; Shonkoff et al., 2014; and Adgate et al., 2014).

A majority of the public supports stronger controls on methane, based on polling conducted by the American Lung Association in August. Two-thirds(67 percent) of registered voters support strong standards on methane and other toxic chemicals from the oil and gas industry.

Conclusion

To protect our children, our communities and the public, the United States must significantly reduce greenhouse gases. Methane is a powerful greenhouse gas. Reducing methane is an essential step to reduce the burden of climate change, but the benefits go far outside the impact on the climate, particularly in the reduction of other toxic and carcinogenic emissions with the same effort. Lifesaving benefits to public health can begin immediately.

The cleanup of air pollution from oil and natural gas wells is necessary for the protection of public health, appropriate for the EPA to undertake, and of growing importance. We urge EPA to ensure that all aspects of the oil and gas industry are included in the final rule, including existing sources of air pollution related to oil and natural gas production, not just new and modified ones. We appreciate EPA's efforts to respond to this growing source of air pollution and the opportunity to provide comments.

Sincerely,

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