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November 15, 2012

Gina McCarthy, Assistant Administrator
Office of Air and Radiation
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Mail Code: 6101A
Washington, DC 20460

Re: New Source Performance Standards for Wood-burning Devices

Dear Ms. McCarthy:

The American Lung Association strongly urges the U.S. Environmental Protection Agency to propose updated health-protecting New Source Performance Standards (NSPS) for residential wood heaters without further delay. **We urge EPA to swiftly adopt rigorous, health-protective standards for all classes of residential wood heaters that require the best emission reduction systems.** We also urge EPA to develop emissions testing methods that reflect real-world performance of residential heating devices.

Residential wood heaters include open fireplaces, outdoor and indoor wood-fired boilers, indoor heaters, furnaces, masonry heaters and wood and pellet stoves. The U.S. Census (2011) reports that nearly two percent of all U.S. households use wood as a primary heat source. In 2006, one study estimated that approximately 14 to 17 million such devices were then in use in the United States (Johnson, 2006). Annual sales of outdoor wood boilers grew ten-fold between 2000 and 2005 – a rate suggesting that 500,000 outdoor wood boilers may have been in use by 2010 (NESCAUM, 2006; New York State Office of the Attorney General, 2008).

Emissions from Wood-Burning Threaten Public Health

Burning wood produces emissions that are widely recognized as harmful to human health. Emissions from woodsmoke, discussed below, include particulate matter, carbon monoxide, nitrogen oxides, volatile organic compounds, hazardous air pollutants and carcinogens. Many of these emissions can occur in both indoor and outdoor environments (Naeher et al., 2007). Woodsmoke is also a significant source of many of these pollutants, especially primary particulate matter. New source performance standards should recognize the diversity and toxicity of these woodsmoke-related air pollutants.

Particulate Matter

The EPA recognized woodsmoke as a major source of particulate matter emissions in the 2009 *Integrated Science Assessment for Particulate Matter* (PM ISA, 2009). The PM ISA reports that emissions from residential wood burning comprised seven percent (7 %) of the source of anthropogenic emissions of primary PM_{2.5} in 2002 (PM ISA, 2009). Woodsmoke particles generally fall under one micrometer (1 µm) in size, making them largely ultrafine particles. Because of their size, woodsmoke particles can be transported hundreds of kilometers from the source (Naeher et al., 2007). The EPA concluded in the PM ISA that fine particulate matter cause premature death and cardiovascular disease and likely causes respiratory harm (PM ISA, 2009). The PM ISA reported studies that specifically found woodsmoke and vegetative burning associated with an increased risk of cardiovascular mortality (Mar et al., 2000), as well as increased emergency department visits from cardiovascular disease (Sarnat et al., 2008) and respiratory diseases (Schreuder et al., 2006).

Since the EPA completed work on the PM ISA, additional research has provided more information about particles from woodsmoke. A major review (Bølling et al., 2009) found evidence that combustion conditions, including moisture content, insufficient air, and wood constituents, can impact the characteristics of the resulting particles. Bølling et al., (2009) found the lowest particle emissions when burning incorporates high temperatures, plentiful supply of oxygen and ample mixing of the air and gases.

Carbon Monoxide

Woodsmoke is a primary source of carbon monoxide, as identified in both the EPA's 2010 *Integrated Science Assessment for Carbon Monoxide* (CO ISA, 2010) and the Agency for Toxic Substances and Disease Registry (ATSDR) 2012 *Toxicological Profile of Carbon Monoxide* (ATSDR, 2012). Carbon monoxide emissions from woodsmoke add to the outdoor levels of carbon monoxide, as well as increasing indoor concentrations (Naeher et al., 2007).

High, short-term levels of carbon monoxide can be fatal, and contribute to over 20,000 nonfatal emergency room visits each year in the U.S (CDC, 2008; ATSDR, 2012). The CO ISA concluded that short-term ambient levels of carbon monoxide are likely to cause cardiovascular morbidity. The CO ISA also concluded that the evidence suggests that short-term exposure to outdoor levels of carbon monoxide may cause premature death, adverse birth outcomes and developmental effects, harm to the central nervous system and respiratory harm. The ATSDR concluded that even low levels of exposure to carbon monoxide can impact the cardiovascular and nervous system, as well as the fetus and the newborn. Consequently, the ATSDR concludes that even low levels of carbon monoxide cannot be assumed to be acceptable:

Although there may be an exposure level that can be tolerated with minimal risk of adverse effects, the currently available toxicological and epidemiological data do not identify such minimal risk levels (ATSDR, 2012).

Nitrogen oxides

The EPA recognized wood smoke, including residential wood burning, as a source of nitrogen oxides in the 2008 *Integrated Science Assessment of Oxides of Nitrogen—Health Criteria* (NO_x ISA, 2008). The NO_x ISA estimated that residential wood burning produced 40,000 metric tons of nitrogen oxides in 2002

(Table 2.2-1). The NO_x ISA identified residential wood burning as a source of indoor air levels of nitrogen oxides. As discussed in the NO_x ISA, the Yale Childhood Asthma Study measured indoor levels of NO_x by heat source in homes of 888 nonsmoking mothers in Connecticut and Virginia. Reporting NO_x levels at the 90th percentile levels, Triche et al: (2005) found homes with fireplaces had two week average concentrations of 80 ppb NO_x and homes with wood stoves had two-week average concentrations of 52 ppb NO_x. Each hour of use of fireplaces, though not wood stoves, were linked in increased cough and sore throat. A review article calculated that using fireplaces in these homes for four hours would be expected to increase the risk of such symptoms by 16-20 percent (Naeher et al., 2007).

Volatile organic compounds, including carcinogens and HAPs

Woodsmoke contains “many hundreds” of hydrocarbons and oxygenated organics, many of which are carcinogens and hazardous air pollutants (Naeher et al., 2007). Benzene, formaldehyde, and 1,3-butadiene are recognized as known human carcinogens (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).

Woodsmoke contains at least 26 pollutants specified in the Clean Air Act as hazardous (Naeher et al., 2007). Some include the carcinogens listed above but others have non-carcinogenic impacts. These gases can also irritate the eyes, skin, and respiratory tract, impair lung function, and affect vital organs.

Polycyclic aromatic hydrocarbons (PAHs)

Woodsmoke is estimated to contain over 20 different polycyclic aromatic hydrocarbons, or PAHs (Naeher et al., 2007). A recent review identified some of the most abundant PAHs in woodsmoke as naphthalene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene and pyrene. In addition two others, benzo(a)pyrene and fluoranthene are carcinogens (Bølling et al., 2009).

Many People Face Higher Risk

Many people are more susceptible to harm from emissions from wood smoke. Large populations face higher risk: those at vulnerable life stages, including fetuses, children, teens and adults over age 65; those who have chronic lung diseases, such as asthma and chronic obstructive pulmonary disease; those who have heart disease, high blood pressure, coronary artery disease and congestive heart failure; diabetics; and those with low incomes (PM ISA, 2009).

Initial Recommendations for NSPS standards

Given the evidence of that wood-burning emits so many hazardous air pollutants, including carcinogens, the American Lung Association recommends that EPA propose NSPS that are based in each new unit meeting the average emission rate for the top twelve percent (12 %) of similar units. That standard would be comparable to other new sources and reductions in existing sources of hazardous air pollutants. Since so many units can currently meet those limits, not only is the technology available, it is already in wide use.

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The Lung Association also strongly urges that standards be set on three major categories of uses, rather than the myriad varieties of wood-burning devices now available. Groups such as “room heating,” “central heating” and “thermal storage units” would allow much more consistency among standards for units with similar functions. Three categories would ensure greater public health protection regardless of the predominant use of a specific device in a community.

As noted earlier, burning wood can produce high levels of carbon monoxide that can place particular risk to the public. The Lung Association strongly recommends that EPA establish a specific carbon monoxide emissions standard for these devices.

EPA Needs To Take Action Now

The EPA set the current NSPS for wood-burning devices nearly a quarter century ago. That year, 1988, was six years before the first of the landmark studies that taught that particulate matter can be deadly. Since then, research into the pollutants from wood-burning has grown rapidly, creating abundant evidence that the standards are woefully out of date. Technology to reduce and control emission has expanded the ability to protect human health. Still, the NSPS reflect the limited understanding from a generation ago.

The American Lung Association calls on the EPA to move swiftly to adopt rigorous, health-protective standards for all classes of residential wood heaters. These standards should require the best emission reduction systems that reflect real-world performance of residential heating devices. Until that happens, these devices will continue to be built and installed, compounding the outdoor problem and causing people to mistakenly bring harmful sources of pollution directly into their homes. That reality will make it ever harder to protect the health of the public.

Now is the time for the EPA to act. We strongly urge the EPA to propose standards that protect public health.

Sincerely,



Paul G. Billings
Senior Vice President
Advocacy and Education

CC: Steve Page, Director, Office of Air Quality Planning and Standards, U.S. EPA
Arthur Marin, Executive Director, NESCAUM
Dan Johnson, Executive Director, WESTAR

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