AMERICAN LUNG ASSOCIATION.

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The Honorable Andrew Wheeler,
Acting Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20640
Comments submitted via: Regulations.gov

Re: Comments on "Proposed Amendments to the NSPS for Residential Wood Heaters, New Residential Hydronic Heaters, and Forced-Air Furnaces" Docket No. EPA-HQ-2018-0195

Dear Acting Administrator Wheeler:

The American Lung Association appreciates the opportunity to provide comments to U.S. Environmental Protection Agency on the Proposed Amendments to the NSPS for Residential Wood Heaters, New Residential Hydronic Heaters, and Forced-Air Furnaces.

The American Lung Association opposes the proposed amendments and urges EPA to maintain the current standards. Any additional sales of higher-polluting wood heaters will result in years of dangerous emissions that threaten human life and health.

The Lung Association supported updating these standards during the review that led up to the 2015 standards, urging that they be even more protective than what EPA proposed and ultimately finalized. Strong protections against wood smoke emissions are critical because these emissions include particulate matter, carbon monoxide, nitrogen oxides, volatile organic compounds, and hazardous air pollutants that include several carcinogens. Millions of Americans face increased risk of harm from breathing these emissions, often exposed to them in their own neighborhoods.

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 (2017) 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

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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 wood smoke, 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). Wood smoke 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 wood smoke-related air pollutants.

Particulate Matter

The EPA recognized wood smoke 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). Wood smoke particles generally fall under one micrometer (1 µm) in size, making them largely ultrafine particles. Because of their size, wood smoke 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 wood smoke 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).

Newer research has provided more information about particles from wood smoke. 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.

In late 2013, the International Agency for Research on Cancer, part of the World Health Organization, concluded that particulate matter could cause lung cancer. The IARC reviewed the most recent research and reported that the risk of lung cancer increases as the particle levels rise (WHO, 2013).

A 2016 study confirmed the impact that wood burning devices have on $PM_{2.5}$ levels in the winter months. Looking at monitors in 17 western U.S. cities, the researchers found that the smoke from the residential wood burning comprised from 11.4 percent to 92.7 percent of the $PM_{2.5}$ in those days (Kotchenruther, 2016).

Wood smoke is recognized as a primary reason that the city of Fairbanks, Alaska currently fails to meet the annual and the 24-hour National Ambient Air Quality Standards for $PM_{2.5}$, as is recognized in their state implementation plan. (EPA News Release, 2017). During 2014-2016, Fairbanks had the annual highest design value for $PM_{2.5}$ in the nation; reaching 23 µg/m3, Fairbanks suffered nearly twice as much $PM_{2.5}$ as the annual standard allows. (EPA Design Values,

2017). Wood smoke from existing unregulated outdoor wood boilers has been found to create $PM_{2.5}$ concentrations that greatly exceeded the $PM_{2.5}$ 24-hr standard (Johnson, 2006).

Carbon Monoxide

Wood smoke 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 wood smoke 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 (NOx) in the 2016 *Integrated Science Assessment of Oxides of Nitrogen—Health Criteria* (NOx ISA, 2016). The NOx ISA cited Fairbanks, Alaska, as a location where the elevated NOx levels primarily come from wood burning. The NOx ISA identified residential wood burning as a source of indoor air levels of nitrogen oxides. As discussed in the NOx ISA, the Yale Childhood Asthma Study measured indoor levels of NOx by heat source in homes of 888 nonsmoking mothers in Connecticut and Virginia. Reporting NOx levels at the 90th percentile levels, Triche et al: (2005) found homes with fireplaces had two week average concentrations of 80 ppb NOx and homes with wood stoves had two-week average concentrations of 52 ppb NOx. 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

Wood smoke 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).

Wood smoke 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)

Wood smoke contains more than 20 different polycyclic aromatic hydrocarbons, or PAHs (Naeher et al., 2007). A recent review identified some of the most abundant PAHs in wood smoke 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, including Children, 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).

Children face special risks from air pollution because their lungs are growing and because they are so active. Just like the arms and legs, the largest portion of a child's lungs will grow long after he or she is born. Eighty percent of their tiny air sacs develop after birth. Those sacs, called the alveoli, are where the life-sustaining transfer of oxygen to the blood takes place. The lungs and their alveoli aren't fully grown until children become adults (Dietert et al., 2000). In addition, the body's defenses that help adults fight off infections are still developing in young bodies. Children have more respiratory infections than adults, which also seems to increase their susceptibility to air pollution (WHO, 2005).

EPA has underestimated the cost to human health

Allowing the continued sale of non-compliant devices is unacceptable. Due to the long lives of these devices, they would continue to spew toxic pollution for decades. The result would be years of harm to human health from wood smoke pollution that could have been prevented.

EPA begins to look at the impact of those in the Regulatory Impact Assessment (RIA) included with this proposal. In this RIA, EPA only examines the impact of the period from 2020 to 2022, offering to provide a complete assessment in the final rule. Even with this short look at the exposure, EPA underestimates the impacts that this rule with have on health across the nation.

To demonstrate the underestimation, consider the findings of similar analysis by the Northeast States for Coordinated Air Use Management (NESCAUM, 2018), using the same detailed estimate of emissions prepared for EPA in 2015 (EC/R Inc., 2015). NESCAUM used that data to estimate the annual excess $PM_{2.5}$ emissions and the related health costs that would occur if the deadline for implementing the Step 2 standards was shifted again to 2022. Their analysis examines the annual impact of these emissions from just the 3-year delay, which NESCAUM estimated to be 2,536 tons per year. Their findings were significant:

> "(W)e estimate 110 to 360 additional deaths per year from the excess PM2.5 emissions during 2020-2022. Similarly, we estimate the additional health costs from delaying the NSPS by 3 years to be in the range of $1.0 billion to $2.3 billion annually (2013$, 3% discount rate) during the 2020-2022 timeframe." (NESCAUM, 2018).

Their study also estimated 25,000 childhood asthma attacks, and 48,000 missed work days, among the other health impacts for each year of these additional emissions (NESCAUM, 2018).

By contrast, EPA's estimates in the Regulatory Impact Analysis paint a far rosier picture. Looking at EPA's worst case (Scenario 3, where manufacturers "take advantage of the additional 2 years" to produce and sell more Step 1 devices), EPA's estimate of the reductions in $PM_{2.5}$ emissions ranges each year are significantly lower, with the highest in 2022 of 790 tons (EPA, RIA 2018).

Evidence from other similar cases shows that EPA has likely underestimated the impact on sales, and therefore, emissions in the RIA. EPA predictions in the RIA have the manufacturers maintaining about the same sales of these Step 1 devices each year until 2022 (EPA RIA, 2018). However, in other cases, manufacturers increased the production and distribution of the older and less efficient models before the date when the requirements for new and more efficient models would begin. Studies that the U.S. Department of Energy did examining the transition to more efficient clothes dryers, central and room air conditioners and heat pumps found that manufacturers spiked their distribution of the older models by as much as 39 percent before the new models went on sale (U.S. DOE, 2011 and 2016).

Looking beyond the 3 years in their assessment, NESCAUM also calculated the impacts across the estimated 20-year lifespan of these devices. Their findings estimated that the devices sold during these 3 years would add, over the next 20 years, the equivalent of the "total 2014 annual residential wood combustion emissions occurring collectively in the states of California, Colorado, Idaho, New York, Utah, West Virginia, and Wisconsin." As they note, "While the timescales differ, the comparison does provide a comparative sense of the magnitude of the excess emissions." (NESCAUM. 2018).

EPA proposed changes fail the Clean Air Act requirements

Under Section 111 of the Clean Air Act, EPA must establish standards that reflect the "best system of emissions reduction" (BSER) that take into account "the cost of achieving such reduction and any nonair quality health and environmental impacts and energy requirements." EPA completed such an assessment in the 2015 standards, concluding that a two-step approach that allowed the existing units (Step 1) to be sold until 2020 as the industry developed the cleaner, more fuel efficient units (Step 2), meets the requirements for BSER.

However, in this proposal, EPA states that, despite allowing the dirtier devices to be manufactured and sold for two more years, the Agency "is not proposing any changes to its BSER determination and is not proposing any changes to the 5-year compliance period for Step 2 or that associated May 2020 compliance date." (83 FR 61579).

EPA provides no analysis to justify its determination that allowing the manufacturers to sell dirtier devices for two more years past the Step 2 deadline continues to meet with BSER requirements. Instead, EPA justifies its two-year delay in concerns from retailers that they will not be able to sell the

dirtier devices. This comes despite increasing availability of models that meet the Step 2 requirements.

Not only does this argument ignore the impact that such continued sales will have on public health, it fundamentally undercuts EPA's argument that there should be no changes to the BSER. It fails to address the reality that adding two more years for manufacturers to produce and sell non-compliant devices will allow more pollution. It also ignores the likelihood that the retailers would argue that they suffer that same dilemma in 2022. EPA has provided the industry with five years to phase in compliant products (following 28 years of no changes to the standards), and many have. EPA's explanation that these changes do not change the BSER determination ignores the realties that this proposal creates.

The EPA had neglected its responsibility to update the standards for new devices for nearly three decades when it finally adopted the current standards in 2015. That long delay increased the need to provide the best systems of emission reduction as soon as possible, not five or seven years down the road. Other industries that market to consumers manage with much shorter time to compliance. For example, EPA adopted the Tier 3 standards for the motor vehicle industry on March 3, 2014 and directed the industry to comply by model year 2017. That meant that the vehicles for sale in the fall of 2016 had to meet the standards just over two years after EPA adopted the regulation, a timetable the motor vehicle industry could meet. The motor vehicle industry is every bit as complex with as many models as the residential wood-burning device market, each requiring certification and approval. Yet the EPA proposal would provide the wood device industry with two additional years on top of the five it already had to continue to manufacture and sell higher-polluting devices.

Adding two more years for compliance with an already-in-place rule is unjustifiable. Building in a two-year delay that allows continued failure to comply and increases emissions undermines EPA's argument that this does not require a new BSER review.

EPA must retain and enforce the 2015 New Source Performance Standards

The 2015 New Source Performance Standards placed limits that are more protective on pollution from new wood-burning boilers, furnaces, and stoves – the first updates to the standards for these types of devices since 1988. The new standards reflected the improved technology that was already widely in use. Once fully in place in 2020, the standards will result in a nearly 70 percent reduction in fine particles and volatile organic compounds and a 62 percent reduction in carbon monoxide.

One of the ways the Lung Association urged EPA to strengthen the NSPS in our comments was to reduce the uncommonly long timeline for compliance. We said in 2014:

> "The EPA has neglected its responsibility to update the standards for new devices for 17 years, increasing the need to provide the best systems of emission reduction as soon as possible, not five or eight years down the road. Normally, new source performance standards must be met immediately by the affected industry… the technology needed to meet these standards exists and is in use today. The European System shows that comparable units are possible and produce greater efficiency in wood use and heat production (MusilSchläffer et al., 2010). Furthermore, many American manufacturers produce many product lines that already meet these standards."

The final rule did not heed our request and included what we deemed an "unusually long phase-in period" before the limits will come into effect in 2020. Any delay in the full implementation and enforcement of the 2015 standards will mean that homeowners install new wood-burning boilers, furnaces and stoves that produce far more dangerous air pollution than modern, state of the art, cleaner units would. The American Lung Association opposes any additional delays, including the sell-through period that EPA is proposing.

Sincerely,

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