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U.S. ENVIRONMENTAL PROTECTION AGENCY

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*Improving air quality
Compliance with the law*

The EPA's Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers

Report No. 23-E-0012

February 28, 2023



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Abbreviations:

ADEC	Alaska Department of Environmental Conservation
CAA	Clean Air Act
C.F.R.	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
NAAQS	National Ambient Air Quality Standards
NESCAUM	Northeast States for Coordinated Air Use Management
NSPS	New Source Performance Standards
OAR	Office of Air and Radiation
OECA	Office of Enforcement and Compliance Assurance
OIG	Office of Inspector General
PM _{2.5}	Fine Particulate Matter

Key Definitions:

Stationary Source	Any building, structure, facility, or installation that emits or may emit an air pollutant for which a national standard is in effect.
Cord Wood	Conventional firewood that is used as a fuel source to test residential wood heater emissions.
Crib Wood	Dimensional lumber cut into two-by-fours or four-by-fours that are used as a fuel source to test residential wood heater emissions.

Cover Image: Residential wood heater in home. (EPA OIG photo)

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Office of Inspector General U.S. Environmental Protection Agency **At a Glance**

23-E-0012
February 28, 2023

Why We Did This Evaluation

The U.S. Environmental Protection Agency Office of Inspector General conducted this evaluation to determine whether the EPA effectively uses its oversight and enforcement authority to ensure that all residential wood heaters reaching consumers are properly tested and certified.

Pursuant to the EPA's 2015 New Source Performance Standards for residential wood heaters, manufacturers must apply for a certificate of compliance from the EPA for each residential wood heater model line before it reaches consumers. The application must include valid certification tests that demonstrate the model line's compliance with applicable emission standards.

The EPA's Office of Air and Radiation and Office of Enforcement and Compliance Assurance provide oversight of the Agency's residential wood heater program.

This evaluation supports these EPA mission-related efforts:

- *Improving air quality.*
- *Compliance with the law.*
- *Operating efficiently and effectively.*

This evaluation addresses top EPA [management challenges](#):

- *Enforcing environmental laws and regulations.*
- *Integrating and leading environmental justice, including communicating risks.*

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The EPA's Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers

What We Found

The EPA's residential wood heater program does not provide reasonable assurance that wood heaters are properly tested and certified before reaching consumers. The EPA's 2015 New Source Performance Standards for residential wood heaters is flawed, and the EPA has approved methods that lack clarity and allow too much flexibility. As a result, certification tests may not be accurate, do not reflect real-world conditions, and may result in some wood heaters being certified for sale that emit too much particulate-matter pollution. In fact, data from an EPA-approved testing lab indicate that some certified wood heaters do not meet emission standards. Although the EPA withdrew some flawed certification test methods, wood heaters certified based on those withdrawn test methods remain available for sale.

The EPA's ineffective residential wood heater program puts human health and the environment at risk for exposure to dangerous fine-particulate-matter pollution by allowing sales of wood heaters that may not meet emission standards.

Additionally, the EPA lacks internal controls to ensure that certification test reports are valid and that certification tests are conducted appropriately. As a result, test reports contained deficiencies that should have been found during the certification process. Effective internal controls would include policies, procedures, and guidance; standardized certification test report formats; and systematic compliance audit tests. State regulators told us that they cannot rely on the EPA's certifications of wood heaters and, therefore, develop their own standards and lists of approved wood heaters for sale.

The EPA operates and supports changeout programs intended to replace older, dirtier wood heaters with newer, cleaner models. The EPA distributed approximately \$82 million in grants for residential wood heater changeout programs from fiscal years 2015 through 2021. However, if the replacement models do not meet emission standards because of the reasons described above, millions of federal, state, and local dollars could be wasted.

Recommendations and Planned Agency Corrective Actions

We make six recommendations to the EPA, including clarifying certification test report expectations in upcoming rule revisions; developing a reliable certification test method based on real-world conditions; and implementing internal controls to, among other things, review certification test reports and conduct systematic compliance audit tests. The Agency disagreed with one recommendation and did not clearly indicate concurrence or nonconcurrence with the others. Therefore, all recommendations are unresolved.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

February 28, 2023

MEMORANDUM

SUBJECT: The EPA's Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers
Report No. 23-E-0012

FROM: Sean W. O'Donnell *Sean W O'Donnell*

TO: Lawrence Starfield, Acting Assistant Administrator
Office of Enforcement and Compliance Assurance

Joseph Goffman, Principal Deputy Assistant Administrator
Office of Air and Radiation

This is our report on the subject evaluation conducted by the U.S. Environmental Protection Agency Office of Inspector General. The project number for this evaluation was [OSRE-FY22-0026](#). This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. Final determinations on matters in this report will be made by EPA managers in accordance with established audit resolution procedures.

The Office of Air and Radiation and the Office of Enforcement and Compliance Assurance are responsible for the issues discussed in this report, which contains six recommendations.

ACTION REQUIRED

All six recommendations in this report are unresolved. EPA Manual 2750 requires that recommendations be resolved promptly. Therefore, we request that the EPA provide us within 60 days its responses concerning specific actions in process or alternative corrective actions proposed on the recommendations. Your response will be posted on the OIG's website, along with our memorandum commenting on your response. Your response should be provided as an Adobe PDF file that complies with the accessibility requirements of section 508 of the Rehabilitation Act of 1973, as amended. The final response should not contain data that you do not want to be released to the public; if your response contains such data, you should identify the data for redaction or removal along with corresponding justification. The Inspector General Act of 1978, as amended, requires that we report in our semiannual reports to Congress on each audit or evaluation report for which we receive no Agency response within 60 calendar days.

We will post this report to our website at www.epa.gov/oig.

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Chapter 1

Introduction

Purpose

The U.S. Environmental Protection Agency Office of Inspector General [initiated](#) this evaluation to determine whether the EPA effectively uses its oversight and enforcement authority to ensure that all residential wood heaters reaching consumers are properly tested and certified in accordance with established standards.

Top Management Challenges Addressed

This evaluation addresses the following top management challenges for the Agency, as identified in the OIG's *U.S. Environmental Protection Agency Fiscal Year 2023 Top Management Challenges [report](#)*, issued October 28, 2022:

- Enforcing environmental laws and regulations.
- Integrating and leading environmental justice, including communicating risks.

Background

Residential wood heaters are enclosed, wood-burning appliances that consumers use for residential space heating and domestic water heating. Residential wood heaters can be freestanding, incorporated into existing fireplaces as inserts, or built into walls. These appliances are often used as primary or supplementary sources of heat and have life spans of 20 or more years. As shown in Figure 1, there are several types of appliances that burn solid fuel, such as wood, that people use in their homes. Except for fireplaces, all the appliances listed in Figure 1 are types of residential wood heaters.

Figure 1: Types of solid-fuel heating appliances

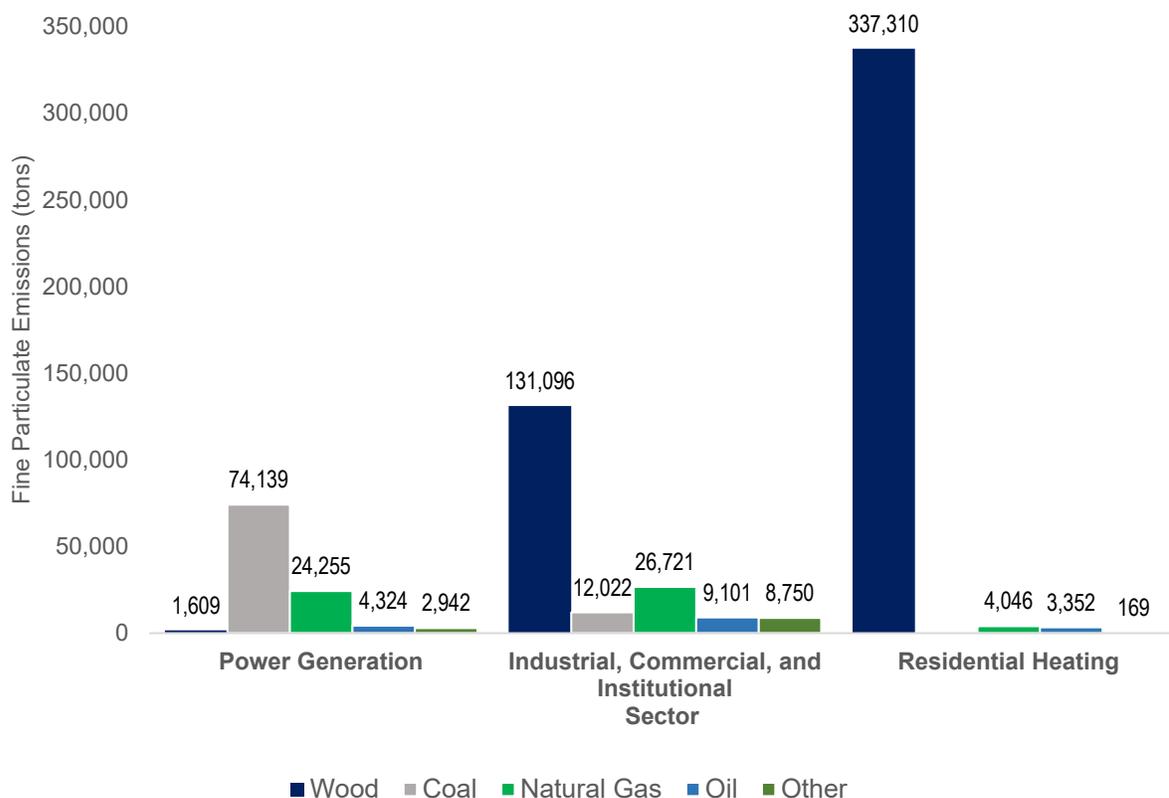
Fireplaces	<ul style="list-style-type: none">• Intended to be used primarily for aesthetic enjoyment and not as a space heater.• Not regulated by the EPA's New Source Performance Standards for residential wood heaters.
Wood stoves	<ul style="list-style-type: none">• Made of cast iron, steel, or stone.• Can be freestanding or inserted into existing fireplaces.• Can be used as a primary or secondary source of heat.
Hydronic heaters	<ul style="list-style-type: none">• Designed to use pressurized or unpressurized fluid to produce heat.• Known as wood boilers, pellet boilers, outdoor boilers, and outdoor water stoves.
Forced-air furnaces	<ul style="list-style-type: none">• Designed to burn cord wood, wood pellets, or wood chips to heat an entire residence.
Pellet stoves	<ul style="list-style-type: none">• Designed to be an enclosed device that burns pellets or chip fuel.• Intended for residential space heating and domestic water heating.

Source: OIG summary of EPA [webpage](#) and 2015 New Source Performance Standards for residential wood heaters. (EPA OIG image)

This report focuses on residential wood heaters covered by the EPA’s New Source Performance Standards, or NSPS, for residential wood heaters, which contains emission limits for air pollutants emitted by those appliances. Although there are many types of wood heaters and NSPS for many sources of pollution, for simplicity in this report, we refer generally to residential wood heaters as **wood heaters** and to the NSPS for residential wood heaters as **the NSPS**.

Smoke from wood heaters contains fine particulate matter, also known as **PM_{2.5}**, and other pollutants, including carbon monoxide; volatile organic compounds; black carbon; and air toxics, such as benzene. Wood smoke poses serious health concerns, such as heart disease and reduced lung capacity, and can cause premature death. PM_{2.5} consists of tiny particles that are 28 times smaller than the diameter of a human hair. They are so small that, when inhaled, they can get deep into the lungs and cause lung cancer, reduced lung capacity, heart disease, and even death with exposure over time. Besides wood heaters, other sources of PM_{2.5} include fires, unpaved roads, and construction site activities. The U.S. Energy Information Administration estimates that 12.5 million homes in the United States use wood for energy. As shown in Figure 2, this residential wood heating releases approximately 340,000 tons of PM_{2.5} each year and accounts for 10,000 to 40,000 premature deaths.

Figure 2: Annual PM_{2.5} emissions from fuel combustion



Source: OIG analysis of the 2017 EPA Emissions Inventory, which contains data for multiple emission sources and pollutants. (EPA OIG image)

Seasonal and daily patterns in wood heater use worsen the effects of smoke on human health. Although the EPA regulates wood heaters based on average emissions over time, wood heaters generally have distinct periods of high emissions, such as when they are started on cold mornings or filled with large loads for slow overnight burns. In areas with high rates of wood burning, residents are likely to use their

wood heaters in similar daily patterns, resulting in periods of high-impact exposure to PM_{2.5} pollution. In some areas, wood smoke constitutes a significant portion of the PM_{2.5} pollution and can contribute over 50 percent of the daily wintertime PM_{2.5} emissions.

Changeout programs provide financial incentives, such as rebates, to encourage households to replace, retrofit, or remove old, inefficient wood heaters in favor of cleaner-burning units. Changeout programs can be an effective way to reduce particulate-matter pollution, air toxics, and other harmful pollutants. For example, the EPA operates the Burn Wise program, which promotes upgrades to cleaner-burning technologies and educates consumers how to properly use their wood-burning appliances. The program offers outreach tools and other information to help consumers make informed decisions.

National Ambient Air Quality Standards for Particulate Matter

The Clean Air Act, or CAA, requires the EPA to set National Ambient Air Quality Standards, or NAAQS, for six common air pollutants that can be harmful to public health and the environment, including particulate matter, both coarse and PM_{2.5}.¹ The EPA is responsible for monitoring these pollutants and identifying whether areas across the United States meet the NAAQS for each one. If an area meets the NAAQS for a specific pollutant, the EPA designates it as being **in attainment** for that pollutant. If an area does not meet the NAAQS for a specific pollutant, the EPA designates it as being **in nonattainment** for that pollutant. For example, smoke from a wood heater can increase PM_{2.5} pollution and may be a primary contributor to an area's nonattainment for PM_{2.5}. For areas in attainment with the NAAQS, the CAA requires states to develop a general plan to maintain compliance with the standards. For areas in nonattainment, states must develop a specific plan to attain the standards. State and local air quality management agencies develop these plans, known as state implementation plans, and submit them to the EPA for approval.



A particulate-matter monitoring station in Alaska. (EPA OIG photo)

NSPS for Residential Wood Heaters

The CAA requires the EPA to develop emissions standards for categories of stationary sources of air pollution. Congress established the NSPS as part of the CAA and set specific expectations to reduce emission limits to align with improvements in technology. In 1988, the EPA issued the first NSPS limiting PM_{2.5} emissions from new wood heaters. Over 25 years later, the Agency revised the wood heater NSPS, which became effective on May 15, 2015.² Among the revisions in the 2015 NSPS was a reduction in the allowable PM_{2.5} emissions to reflect the latest wood heater technologies. Wood heaters covered by the 2015 NSPS include wood stoves, wood pellet heaters, and wood-burning hydronic and central heaters. The NSPS does not affect wood heaters sold before its effective date and does not apply to new or existing heaters that are fueled solely by oil, gas, or coal.

A **stationary source** is any building, structure, facility, or installation that emits or may emit an air pollutant.

¹ In addition to particulate matter, the other five pollutants regulated under the NAAQS are carbon monoxide, lead, nitrogen oxides, ozone, and sulfur dioxides.

² *Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces*, [80 Fed. Reg. 13671](#), March 16, 2015.

As shown in Table 1, the 2015 NSPS provided a two-phased approach for wood heater manufacturers to meet the revised standards for PM_{2.5} emissions. The first phase required manufacturers to comply with an emission standard of 4.5 grams of PM_{2.5} per hour upon the effective date of 2015 NSPS. The second phase required manufacturers to comply with an emission standard of 2.0 or 2.5 grams of PM_{2.5} per hour, depending on the type of fuel used to conduct the emission testing. This second phase was to be implemented five years after the 2015 NSPS effective date, or by May 15, 2020. The EPA also intended for the 2015 NSPS to streamline the certificate-of-compliance process for wood heaters.

Table 1: 2015 NSPS phased standards

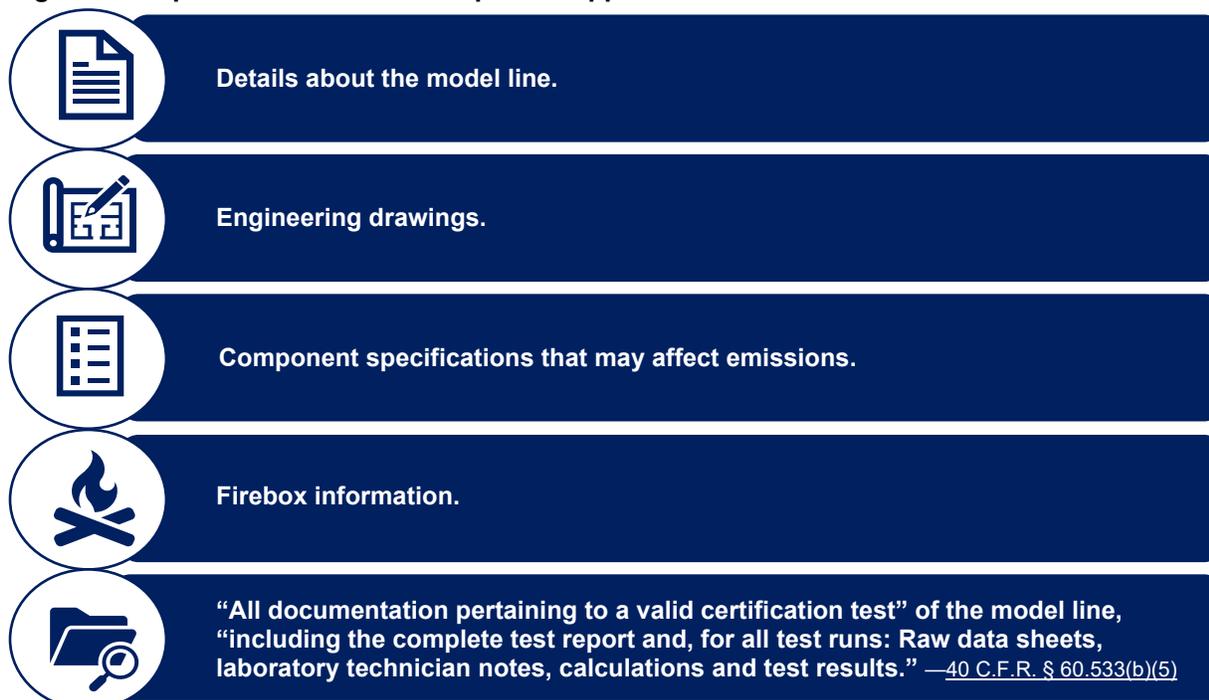
	Phase 1	Phase 2
Emission standard	4.5 grams of PM _{2.5} per hour	2.0 grams of PM _{2.5} per hour (crib wood fuel) 2.5 grams of PM _{2.5} per hour (cord wood fuel)
Deadline	May 15, 2015	May 15, 2020

Source: OIG analysis of the 2015 NSPS. (EPA OIG table)

The EPA’s Wood Heater Program

Per the 2015 NSPS, all wood heater model lines for sale must comply with the applicable PM_{2.5} emission standards, and manufacturers must apply for a **certificate of compliance** from the EPA for each model line before it reaches consumers. Each application for a certificate of compliance must include, among other information, the materials listed in Figure 3.

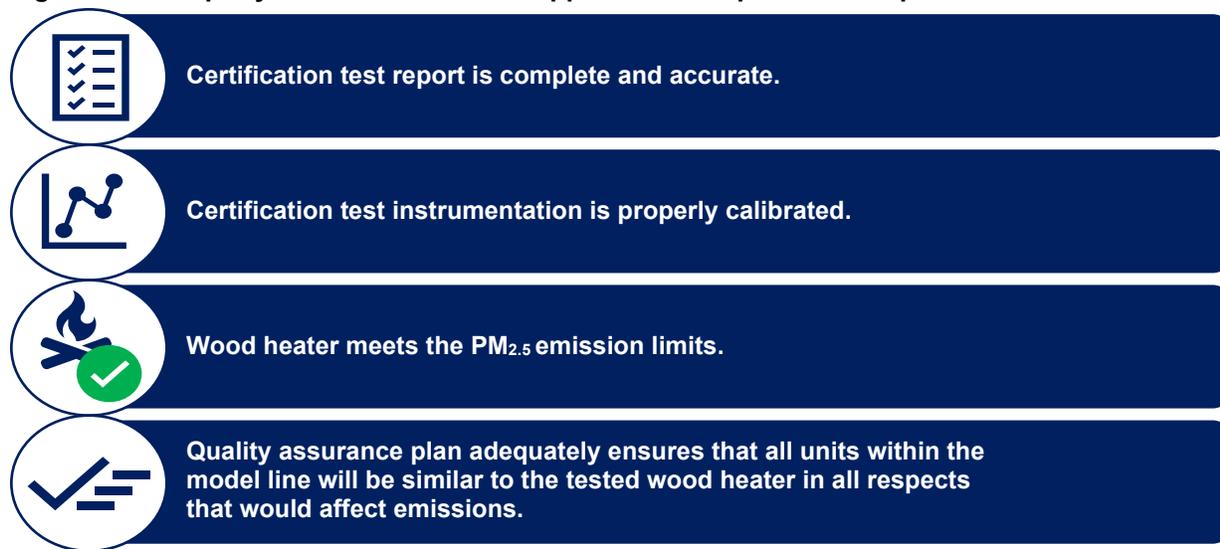
Figure 3: Required certificate-of-compliance application materials



Source: OIG summary of 2015 NSPS. (EPA OIG image)

The purpose of the valid **certification test** listed in Figure 3 is to demonstrate that the wood heater complies with applicable PM_{2.5} emission standards. Although a third-party **testing lab** conducts the certification test, the EPA must approve each testing lab. In addition to the materials listed in Figure 3, the 2015 NSPS requires that each certificate-of-compliance application submitted to the EPA be accompanied by a **certificate of conformity**. To obtain a certificate of conformity, the wood heater manufacturer contracts with a **third-party certifier**, who is required to check the conditions listed in Figure 4.

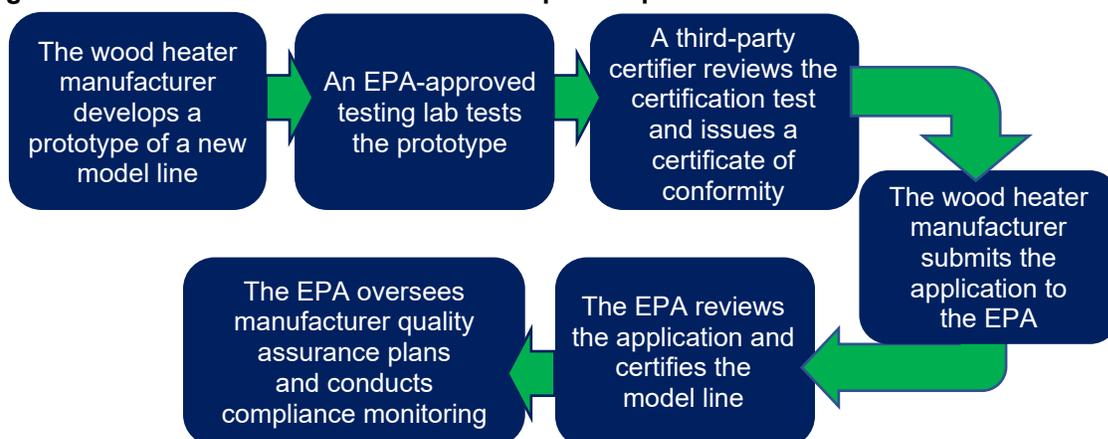
Figure 4: Third-party certifier checks that application complies with requirements



Source: OIG summary of 2015 NSPS. (EPA OIG image)

The EPA then reviews the submitted application and issues a certificate of compliance if the Agency determines that the application contains all the required information and that there is a valid certificate of conformity demonstrating that the wood heater complies with the applicable emission standards. As of 2021, the EPA has issued certificates of compliance for 311 model lines. Figure 5 depicts the certificate-of-compliance process for wood heaters.

Figure 5: The wood heater certificate-of-compliance process under the 2015 NSPS



Source: OIG summary of the 2015 NSPS. (EPA OIG image)

A certificate of compliance remains valid for five years from the date of issuance or until a more stringent emission standard takes effect. At that point, the manufacturer must request a renewal of the certificate of compliance or must recertify the model line. If the model line remains similar to the appliance originally tested in all material respects that would affect emissions, the manufacturer may request a waiver from certification testing and a renewal of the certificate of compliance. If there has been any design change to the model line that would affect emissions, the manufacturer must once again follow the process depicted in Figure 5 to retest the wood heater and recertify the model line.

Oversight of Certified Wood Heaters

After a wood heater is certified, the EPA is responsible for overseeing and conducting compliance monitoring to ensure that the manufacturer and the wood heater are operating as required.

In addition to issuing a certificate of conformity, the third-party certifier is responsible for conducting unannounced audits of the wood heater manufacturer at least annually to ensure that it is implementing the quality assurance plan. The third-party certifier must submit the results of these quality assurance audits to the EPA within 30 days and must identify any deficiencies and corrective actions taken to address the deficiencies.

Furthermore, after the EPA has certified a wood heater, the Agency can conduct **compliance audit tests** of the wood heater to determine its compliance with applicable emission standards. The EPA can choose the testing lab, and the wood heater manufacturer pays for the test. The testing lab must conduct the compliance audit test using the same test method used during the certificate-of-compliance process. The 2015 NSPS states that certifications may be revoked:

[I]f it is determined that the wood heaters being manufactured or sold in that model line do not comply with the requirements of this subpart. Such a determination will be based on all available evidence, including but not limited to ... [t]est data from retesting of the original unit on which the certification test was conducted.

The EPA has the authority to suspend and revoke a certification if emissions measured during the compliance audit test exceeds the NSPS emission standards by more than 50 percent. The manufacturer may then have additional testing conducted at its own expense and provide other relevant information to demonstrate achievement of the emission standards.

Test Methods for Wood Heaters

The 2015 NSPS prescribes certain test methods for wood heater manufacturers and testing labs to use to determine compliance with the applicable emission standards. Wood heater emissions are highly variable, however, and are impacted by many different wood characteristics and operating practices. Even though most consumers use conventional firewood, known as **cord wood**, as the fuel for their wood heaters, the only test method for measuring PM_{2.5} emissions specified by the 2015 NSPS is based on crib wood. This test method is referred to as EPA Method 28R. The green sidebar below provides more information about different fuel types used to test and operate wood heaters.

Fuel Types

Three types of fuel are generally used during emission testing. **Cord wood**, pictured below at left, is conventional firewood. **Crib wood**, pictured below at right, is test fuel cut into four-inch by four-inch and two-inch by four-inch dimensional lumber. **Wood pellets** are refined and densified fuel that has been shaped into small pellets or briquettes.



Source: EPA image.

The 2015 NSPS allows the EPA to consider the use of alternative test methods on a case-by-case basis. To meet the need for a PM_{2.5} test method based on cord wood, ASTM International—which develops and publishes consensus technical standards for a wide range of materials, products, systems, and services—developed the ASTM E3053 test method. The EPA also allows the use of several other ASTM test methods for various parts of the wood heater emission testing process. We list the allowable ASTM test methods in Appendix A.

According to an EPA manager, the ASTM E3053 test method was still in draft form when the EPA issued the 2015 NSPS, but

the EPA allowed its use on a case-by-case basis until ASTM International finalized the method in 2017. In 2018, the EPA adopted two alternative test methods, ALT-125 and ALT-127, based upon ASTM E3053 and made them “broadly applicable,” meaning manufacturers and testing labs no longer needed to obtain approval to test wood heaters with those methods.

External Stakeholder Review of the EPA’s Wood Heater Program

Because of concerns about the effectiveness of the EPA’s framework for certifying residential wood heaters, the Alaska Department of Environmental Conservation, or ADEC, in collaboration with the Northeast States for Coordinated Air Use Management, or NESCAUM,³ reviewed 242 certification test reports for appliances certified via the EPA’s wood heater program. They identified deficiencies in all 242 reports, as shown in Figure 6. In addition, according to the resulting *Assessment of EPA’s Residential Wood Heater Certification Program* report that was published by NESCAUM in March 2021, of the 69 test reports based on ALT-125 or ALT-127, 64 reports had three or more deficiencies and 59 reports had five or more deficiencies.

Figure 6: Deficiencies identified in certification test reports



Source: ADEC and NESCAUM review of certification test reports. (EPA OIG image)

³ NESCAUM is a nonprofit association that provides scientific, analytical, and policy support to air quality agencies in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

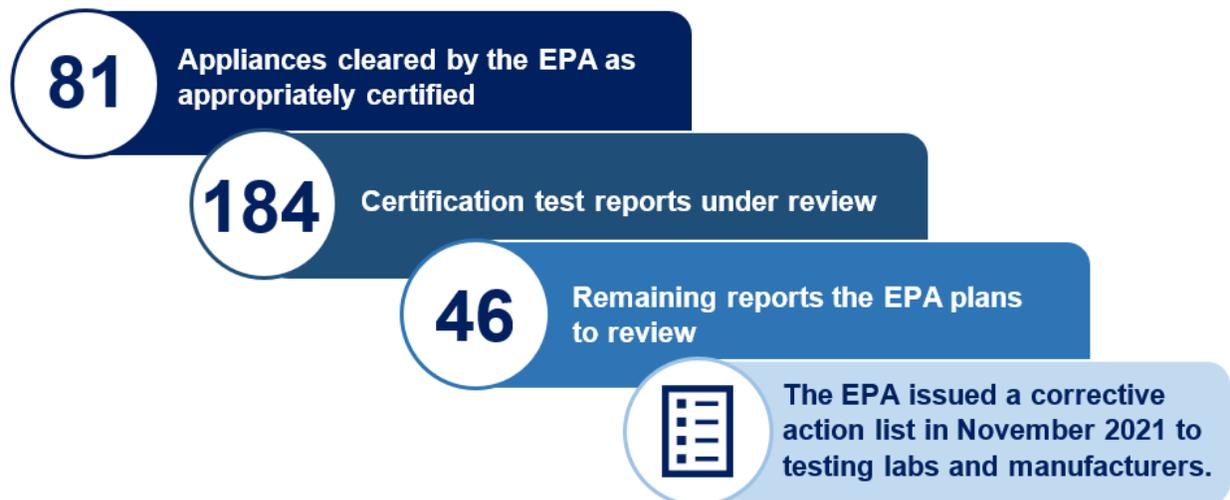
Ultimately, the NESCAUM report classified the EPA’s wood heater program as “dysfunctional.” The report highlighted deficiencies in lab testing and reporting that neither the EPA nor the third-party certifiers identified through the certification process or their oversight. NESCAUM found the third-party certifier system to be “highly ineffective” because of “poor program design, the lack of competency of the groups involved, improper complicity between third-party reviewers and manufacturers, or some combination of the three.” NESCAUM made several recommendations, including an EPA OIG review of the wood heater program; an EPA review of existing certification test reports; the withdrawal of certain cord wood test methods; increased enforcement; and program transparency.

Following NESCAUM’s report, ADEC issued a letter to the EPA in April 2021 requesting withdrawal of the two cord wood test methods, ALT-125 and ALT-127. A consortium of nine state attorneys general sent a similar letter to the EPA on May 21, 2021. These letters asserted that flexibilities in the ALT-125 and ALT-127 test methods allow testing labs and manufacturers to artificially generate lower emissions such that any appliance, regardless of its design, can meet the emission standard. After reviewing subsequent data submitted by ADEC, the EPA withdrew approval for the ALT-125 and ALT-127 test methods on January 24, 2022, effective February 23, 2022.

Furthermore, the EPA began reviewing the certification test reports for all 311 certified model lines to assess the potential deficiencies that ADEC and NESCAUM identified. The EPA has shifted staff and hired contract support to review certification test reports, and managers and staff from the EPA’s Office of Air and Radiation, or OAR, also assisted in reviewing certification test reports. As the contractor and Agency staff completed their review of the test reports, they provided recommendations as to whether the tests were valid. OAR staff also provided other technical support, such as communicating with testing labs and third-party certifiers about the certification test report deficiencies.

As of May 2022, based on its review of the certification test reports, the EPA cleared 81 appliances as appropriately certified, had 184 certification test reports under review, and planned to review the remaining 46 reports. In addition, the EPA issued a corrective action list in April 2021 to the manufacturers, testing labs, and third-party certifiers to clarify its testing expectations. The EPA updated this corrective action list in April 2022. Figure 7 illustrates the status of EPA actions based on the Agency’s review of the certification test reports.

Figure 7: EPA review of certification test results, as of May 2022



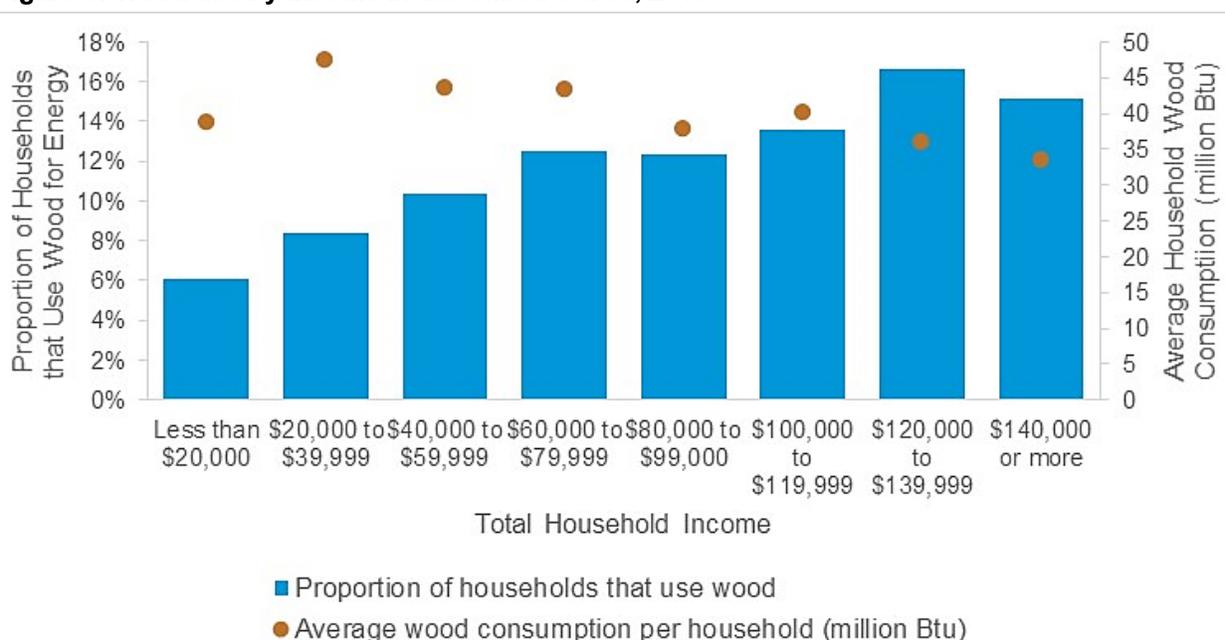
Source: OIG analysis of EPA data. (EPA OIG image)

Wood Smoke and Environmental Justice

According to the EPA, “environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” Tribal, low-income, and minority populations are all impacted by air toxics from wood smoke. As shown in Figure 8, while households in higher-income brackets are more likely to use wood, those that use wood at lower-income levels consume more wood on average. Many of the external stakeholders we spoke to in Alaska, California, and New York referenced environmental justice concerns in their communities, especially in nonattainment areas and areas with high wood heater use.

The case study presented below the figure further details the effects of excess PM_{2.5} emissions in Alaska’s Fairbanks North Star Borough, an area where residential wood burning is considered part of its culture and history.

Figure 8: Wood use by income in the United States, 2015



Note: “Btu” means British thermal unit and is the quantity of heat required to raise the temperature of one pound of liquid water by one degree Fahrenheit.

Source: OIG analysis of U.S. Energy Information Administration data. (EPA OIG image)

Case Study: Fairbanks North Star Borough, Alaska

The Fairbanks North Star Borough in Alaska consists of both the City of Fairbanks and the City of North Pole. A borough in Alaska is akin to a county and similarly denotes administrative divisions of the state. According to the 2020 Census, the population of the Fairbanks North Star Borough is about 95,000.

The borough faces significant challenges with wood smoke pollution, especially $PM_{2.5}$, which impacts the region's indoor and outdoor air quality. According to ADEC, in October 2021, an air monitor in North Pole reported $PM_{2.5}$ levels over twice the health-based standard. ADEC also stated that wood combustion accounts for approximately 80 percent of the $PM_{2.5}$ pollution recorded at that air monitor.

Approximately 14,000 (39 percent) households in Fairbanks North Star Borough use wood heaters to heat their homes in the winter. According to local officials and residents, burning wood for heat is a part of their culture. In our discussions with them, local stakeholders also noted the high energy prices relative to wages, and state and local officials reported that extreme winter temperatures and an unreliable power grid make it unsafe to remove wood burning as an option for heating homes.

Because it is surrounded by hills, the Fairbanks North Star Borough is susceptible to a unique temperature inversion, which traps a layer of cold air close to the ground. This layer of cold air then traps pollution near the ground for days or weeks at a time. The inversion is apparent from the suspended layer of smoke and haze depicted in the left photograph below. Cold weather can also exacerbate $PM_{2.5}$ levels, as inversions tend to worsen as it gets colder while the need for burning fuel for heat increases.



Left to right: View of Fairbanks (EPA OIG image). Map of nonattainment area (Fairbanks North Star Borough image).

Responsible Offices

The Office of Enforcement and Compliance Assurance is responsible for reviewing the wood heater certification test reports that are the basis for certifying wood heaters. According to OECA, after the 2015 NSPS introduced the third-party certifier to comprehensively review certification applications as part of the certification process, its review of applications was limited to a high-level administrative check for completeness.

The OAR is responsible for rulemakings, including NSPS revisions, and the test methods relevant to the wood heater program. The OAR also oversees the EPA-approved testing labs and third-party certifiers and is considered the subject-matter expert for technical aspects of the program. Figure 9 outlines the responsible EPA offices and external entities during the certification process.

Figure 9: Primary responsibilities for certification of wood heaters

		Roles and Responsibilities		
		OAR	OECA	Third Parties
Certificate-of-compliance process for wood heaters	The wood heater manufacturer develops a prototype of a new model line.	Develop and update the NSPS.	Provide point of contact for manufacturers.	Manufacturer: Perform research and development. Contract with testing lab and third-party certifier.
	An EPA-approved testing lab tests the prototype.	Approve and conduct oversight of labs. Conduct oversight of lab proficiency testing. Develop and approve test methods.	No defined role during testing phase.	Testing lab: Obtain accreditation from International Organization for Standardization. Perform certification tests. Contractor: Perform lab proficiency testing.
	A third-party certifier reviews certification test and issues a certificate of conformity.	Approve and oversee third-party certifiers.	No defined role during third-party certifier phase.	Third-party certifier: Obtain accreditation from International Organization for Standardization. Certify certification test reports.
	The wood heater manufacturer submits the application to the EPA.	No defined role during application phase.	Provide point of contact for manufacturers.	Manufacturer or delegated third-party certifier: Prepare and submit application.
	The EPA reviews the application and certifies the model line.	Perform technical review of certification test reports.	Review application. Issue certificate of compliance. Maintain database of certified wood heaters.	No defined role during review phase.
	The EPA oversees manufacturer quality assurance plans and conducts compliance monitoring.	No defined role during compliance monitoring phase.	Conduct oversight of quality assurance audits and compliance audit tests. Conduct compliance monitoring. Conduct enforcement in cases of noncompliance.	Third-party certifier: Conduct annual, unannounced quality assurance audits.

Source: OIG interviews with EPA managers and staff and OIG analysis of the *EPA Small Entity Compliance Guide for Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heater and Forced-Air Furnaces*. (EPA OIG graphic)

Scope and Methodology

We conducted this evaluation from October 2021 to November 2022 in accordance with the *Quality Standards for Inspection and Evaluation* published in January 2012 by the Council of the Inspectors General on Integrity and Efficiency. Those standards require that we perform the evaluation to obtain sufficient and appropriate evidence to support our findings.

We assessed the effectiveness of the EPA’s wood heater program by examining three key program areas: certification tests, the EPA’s review of applications for certificates of compliance, and compliance monitoring. We met with EPA managers from OECA and the OAR. We reviewed relevant sections of the

CAA, as well as EPA regulations and guidance for the wood heater program. We visited Portland, Oregon, to conduct interviews with personnel at two EPA-approved testing labs, and Fairbanks, Alaska, to conduct interviews with state and local officials, community members, and other stakeholders. We also conducted interviews with air pollution managers and staff from two other states, nonprofit and state organizations, and manufacturers. To verify the deficiencies identified in NESCAUM's March 2021 *Assessment of EPA's Residential Wood Heater Certification Program* and in subsequent correspondence from NESCAUM to the EPA that described deficiencies across eight EPA-cleared test reports, we reviewed those eight test reports and compared information contained in each report to applicable requirements.

We assessed the internal controls necessary to satisfy our objective.⁴ Internal controls help an entity achieve its objectives and help the organization operate efficiently and effectively. To be effective, an internal control system must be designed, implemented, and operated in an integrated manner. The five components of internal controls are control environment, risk assessment, control activities, information and communication, and monitoring. Together, these components provide reasonable assurance that the organization's objectives will be achieved. Any internal control deficiencies we found are discussed in this report. Because we limited our evaluation to the internal control components significant to our objective, our report does not disclose all potential internal control deficiencies that may have existed at the time of the evaluation.

⁴ An entity designs, implements, and operates internal controls to achieve its objectives related to operations, reporting, and compliance. The U.S. Government Accountability Office sets internal control standards for federal entities in GAO-14-704G, *Standards for Internal Control in the Federal Government*, issued September 10, 2014.

Chapter 2

The EPA Does Not Have an Effective Program for Testing and Certifying Wood Heaters

The EPA's wood heater program does not provide reasonable assurance that wood heaters are properly tested and certified before reaching consumers. The 2015 NSPS is flawed, and the EPA has approved the use of certification test methods that lack clarity and allow too much flexibility in how emissions testing is conducted. The validity of the certification test results is therefore at risk. When an EPA-approved testing lab retested seven wood heaters previously certified by the EPA, it found that none of the seven wood heaters met the PM_{2.5} emission standards. In response to these issues and retest data, the EPA withdrew approval for two test methods: ALT-125 and ALT-127. According to the EPA's interpretation of the CAA and 2015 NSPS, however, the certificates of compliance based on these withdrawn methods remain valid, including the certificates of compliance for the seven retested wood heaters. As a result, wood heaters certified based on the ALT-125 and ALT-127 test methods remain eligible for sale until their certificates of compliance expire, which in some cases is not until 2027. Given a wood heater's life span of over 20 years, continued sales mean that these appliances, which may not meet emission standards, could remain in homes for decades.

In addition, the EPA lacked internal controls to ensure that test labs conducted and documented certification tests appropriately. For example, the EPA lacked policies and procedures detailing how to review certification test reports, did not conduct compliance audit tests, did not have standard templates for certification test reports, did not use staff with the appropriate subject-matter technical expertise, and did not exercise regulatory or oversight authority. This lack of internal controls resulted in deficiencies in certification testing and certification test reports that the third-party certifier or the EPA should have caught during the certificate-of-compliance process. As a result, state regulators and the public cannot rely on the EPA's wood heater program to ensure that only compliant appliances reach homes, and the EPA and states may be wasting millions of dollars on changeout programs by subsidizing new appliances that may not be substantially cleaner in real-world conditions. Further, the EPA requires states to develop and implement expensive control measures to mitigate PM_{2.5} pollution in nonattainment areas, even when these sources are not the most significant contributors of PM_{2.5} emissions. While the EPA has taken interim measures, such as hiring contractors to review certification test reports for already certified wood heaters, the Agency remains unclear on how it will operate the wood heater program in the future.

The 2015 NSPS and Certification Test Methods Are Flawed

The 2015 NSPS and the methods used to test PM_{2.5} emissions are flawed. The 2015 NSPS has unclear expectations for certification test procedures and documentation, which led to testing labs and manufacturers using their own interpretations during testing. For example, the 2015 NSPS does not clearly define what information testing labs must document and submit in the certification test reports. Additionally, certification test methods contain vague language, establish imprecise expectations for the fuel that testing labs must use during PM_{2.5} emission tests, and do not represent real-world conditions. An EPA-approved testing lab demonstrated the weaknesses of the ALT-125 and ALT-127 certification test methods by independently retesting seven EPA-certified wood heaters and finding that none of them met the PM_{2.5} emission standards. Based largely on that retest data and requests from state

agencies, the EPA withdrew approval of ALT-125 and ALT-127. According to the EPA's interpretation of the CAA and 2015 NSPS, appliances certified based on the now-withdrawn test methods continue to have valid certificates of compliance. These appliances can therefore remain for sale and will not be reevaluated until their certificates of compliance expire. As a result of these issues, state regulators told us that they cannot rely on the EPA's certificates of compliance, choosing instead to conduct their own reviews of certification test reports based on their own interpretations of the NSPS and test methods.

The 2015 NSPS Is Flawed

The 2015 NSPS established imprecise expectations for certification test documentation and reporting. For example, while one NSPS section requires "all documentation pertaining to a *valid* certification test" (emphasis added), another section requires that documentation be submitted regardless of test validity, stating that the manufacturer should submit a "summary and the full test reports with all supporting information, including ... any data not used in the calculations and, for any test runs not completed, the data that were collected and the reason that the test run was not completed." The vice president of one testing lab whom we interviewed interpreted the NSPS as saying that while the testing labs are supposed to notify the EPA of failed tests, there is no requirement to finish a test if it fails, and the unfinished test would be invalid. Under this interpretation, because invalid test runs do not need to be submitted, testing labs can exclude unfinished test runs with emissions that exceed the certification standard from their documentation and reports. However, such a test run is a *failing* run, not an *invalid* run. Without the data from failing runs, the EPA may be certifying appliances that do not consistently meet emission requirements. The EPA cannot know the frequency of failing runs, absent notification by testing labs or through the EPA's observations of testing.

As another example, the 2015 NSPS requires testing labs to determine an appliance's efficiency and heat output, in addition to measuring emissions. We learned that a deficiency in the 2015 NSPS allows inconsistencies in how the test labs can measure appliance efficiency. As a result, some testing labs are taking advantage of the deficiency to generate higher efficiency values without impacting emission certification values. According to an OAR manager, testing labs can conduct test runs to produce data that misrepresent wood heater performance to regulators and consumers.

Finally, the EPA regulates wood heaters based on average emissions over time, using a grams-per-hour measurement as opposed to an emissions-per-unit-of-fuel or -energy measurement. Wood heater emissions are not, however, consistent over time. Rather, there are emission rate peaks, such as when the wood heater is first started or filled with a large load for slow overnight burns. Those peak emissions could harm human health, even if the emissions at other times are lower. Further, the grams-per-hour measurement can make it easier for an appliance to pass the certification test by adjusting the test conditions such that the test run lasts for a longer time. An appliance with excess emissions can, for example, measure at half the emissions per hour if the test run time doubles. The grams-per-hour measurement might therefore result in the EPA certifying wood heaters that could not otherwise meet emission standards.

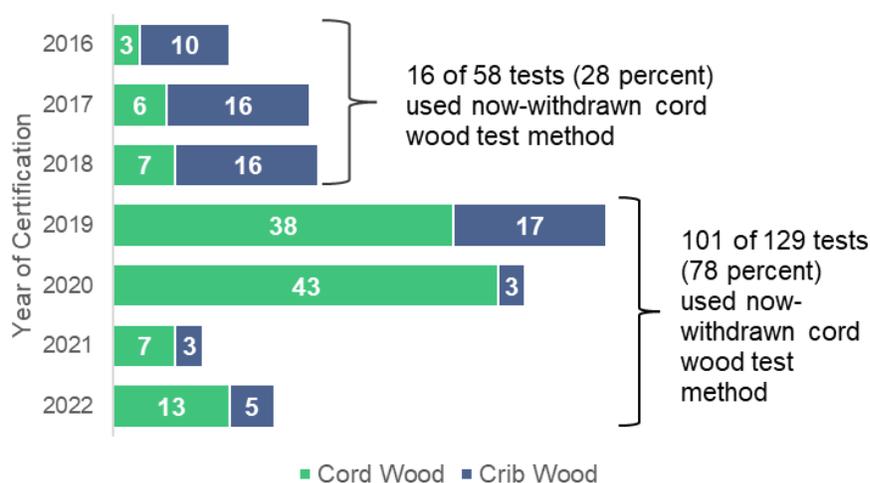
The EPA is scheduled to revise the 2015 NSPS in 2023, which presents an opportunity for the Agency to set clear testing and reporting expectations for the wood heater sector.

The EPA Approved the Use of Flawed Test Methods

The test methods the EPA approved to certify compliance with the PM_{2.5} emission standard are unclear and are therefore not consistently applied during certification testing. After allowing the use of the cord-wood-based ASTM E3053 test method on a case-by-case basis, the EPA adopted two alternative cord wood test methods based on ASTM E3053: ALT-125 and ALT-127. By adopting ALT-125 and ALT-127 as “broadly applicable,” manufacturers and testing labs no longer needed to obtain prior approval to use those methods. According to the EPA and other stakeholders, including some from industry, the EPA did not conduct research or collect the necessary data to support or validate the use of ALT-125 and ALT-127. Rather, the ASTM E3053 foundation of ALT-125 and ALT-127 was developed mostly by a consensus of industry stakeholders and test labs, according to an OAR manager. One public-sector stakeholder that we interviewed explained that it did not participate in the development of the method because finalized ASTM test methods are proprietary.

After the EPA’s approval of ALT-125 and ALT-127 in 2018, manufacturers began widely using these cord wood test methods. As shown in Figure 10, from 2019 through 2022, 78 percent of the EPA-certified wood heaters were tested using ALT-125 or ALT-127.

Figure 10: Test method used for certification testing, 2016–2022



Source: OIG analysis of EPA wood heater certification data. (EPA OIG image)

In addition, the 2015 NSPS and the test methods, including ALT-125 and ALT-127, lack specificity and allow testing labs too much flexibility in how they conduct emissions testing. According to one OAR manager who has expertise in wood heater certification testing, testing labs sometimes take advantage of that flexibility, which can affect data quality and possibly generate a lower-measured rate of emissions. The OAR manager and other external stakeholders noted that testing labs are careful to, within the bounds of the test method being used, drive test results to the lowest possible emissions rate and make it easier for the appliance to pass. The OAR manager acknowledged that the existing testing approach encourages labs to pass appliances rather than to objectively measure emissions.

For example, the cord wood test method specifies that the fuel used during testing is “representative of the fuel actually burned in homes” and defines cord wood as “typically round wood 12 to 24 [inches] long that has been split into triangular, half-round, quarter-round, wedge-shaped, or trapezoidal

segments.” The wood shape is important. The intent of transitioning to a cord wood test was to move away from the squared dimensional shape of crib wood used in older test methods because:

- Crib wood is not representative of the fuel burned in homes.
- Third-party lab testing demonstrated that squared wood decreases emissions in the lab.

Our review of the certification test reports showed that the cord wood did not always conform with the shape expectations. While the test methods include some measurable constraints for the shape of the wood, they do not clearly disallow square-shaped fuel. In addition, when we asked the OAR about the fuel-shape requirement, a manager described the fuel criteria as nuanced and noted that the Agency used its own criteria to determine whether to invalidate test reports based on fuel shape. Using square-shaped fuel could increase the likelihood that an appliance could pass the certification testing but still exceed emission standards under real-world conditions, since homeowners are unlikely to use similarly shaped wood in their homes. The EPA focused much of the 2015 NSPS on transitioning from certification tests using square crib fuel to cord wood, but the OAR described a continued dependence on square-shaped fuel during certification tests.



As shown in this photo from a certification test report, the cord wood used by testing labs did not always comply with shape requirements.

In April 2021, the EPA issued a [corrective action list](#) to testing labs, third-party certifiers, and manufacturers. The EPA updated the list in April 2022. The list clarifies the EPA’s expectations with respect to conducting emissions testing pursuant to the 2015 NSPS and the certification test methods. For example, the list specifies cord wood fuel-length requirements and requires photos documenting the tests to be clear, not from “across the room” or “illegible.” Overall, the April 2022 corrective action list addresses 49 deficiencies that the EPA observed in certification test reports for wood heaters. Testing labs, third-party certifiers, and one manufacturer told us that, before they received the corrective action list, they were not fully aware of the EPA’s expectations regarding emissions testing. One manufacturer said that it believed it had submitted adequate certification test reports to the EPA and relied on the EPA’s past approvals when submitting new certification test reports.

One external stakeholder told us that it would prefer the EPA revoke past certifications, while another told us it would require retests the first time any wood heater is up for renewal. The EPA’s position is that the corrective action list will be used prospectively because of manufacturers’ and labs’ reliance upon the Agency’s past acceptance of their certification test reports. For certification test reports going forward, OECA has categorized the corrective action list into minor, moderate, and major deficiencies. Minor deficiencies are mostly paperwork issues that testing labs can correct by providing more information. Moderate deficiencies are issues related to an NSPS requirement; thus, the Agency requires that appliances with moderate deficiencies be retested when up for renewal. The Agency requires manufacturers of appliances with major deficiencies, which are deficiencies that the EPA has determined could affect emissions, to stop sales and retest the appliances within days. As of August 2022, OECA had issued ten major deficiency letters to manufacturers.

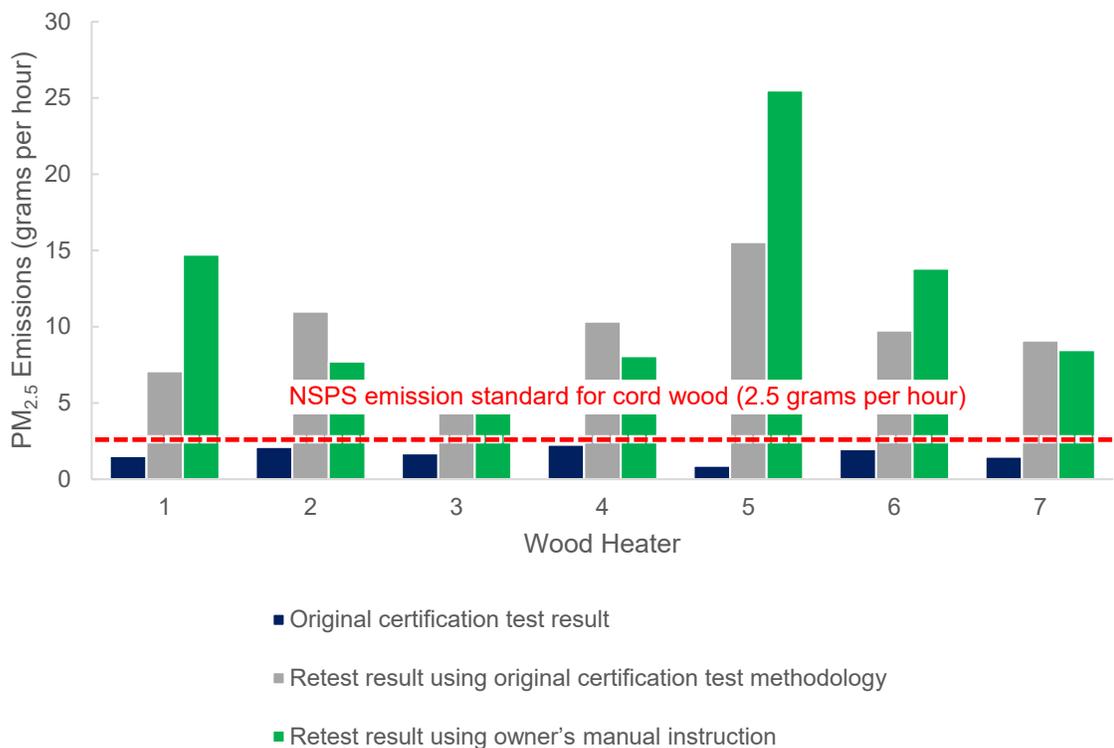
Although the EPA published a corrective action list to identify the deficiencies it found during its rereview of certification test reports, the EPA and third-party certifiers should have caught some of

those deficiencies earlier during the initial certificate-of-compliance process. Given that the certification test methods are neither based on data nor specific enough to prevent different interpretations of the requirements, and given the EPA’s lack of attention to deficiencies during the certification process, two states have stated they cannot rely on the EPA’s certification process. For example, Alaska has set its own standards and does not allow the sale of wood heaters that it believed the EPA should not have certified.

The EPA Withdrew Widely Used Cord Wood Test Methods, but Tested Appliances Can Remain Certified

In addition to clarifying testing expectations via the corrective action list, the EPA withdrew the ALT-125 and ALT-127 test methods in a January 2022 Federal Register notice. However, pursuant to the EPA’s interpretation of the CAA and 2015 NSPS, appliances certified based on these test methods can remain certified. When ADEC requested in April 2021 that the EPA withdraw ALT-125 and ALT-127, it submitted data from an EPA-approved testing lab that retested the emissions of seven EPA-certified wood heaters. In the retests, the lab attempted to replicate the certification tests by using the manufacturer instructions to the original testing lab, which were included in the certification test reports submitted to the EPA. The lab also conducted additional tests by following the instructions in the appliance owner’s manuals, which should be consistent, per the 2015 NSPS, with the certification tests. The retests measured significantly higher PM_{2.5} emission values than those measured by the original certification tests, with one wood heater testing at over 25 grams of PM_{2.5} per hour, ten times greater than the emission standard. As shown in Figure 11, none of the seven retested wood heaters met the EPA’s emission standard during the retest.

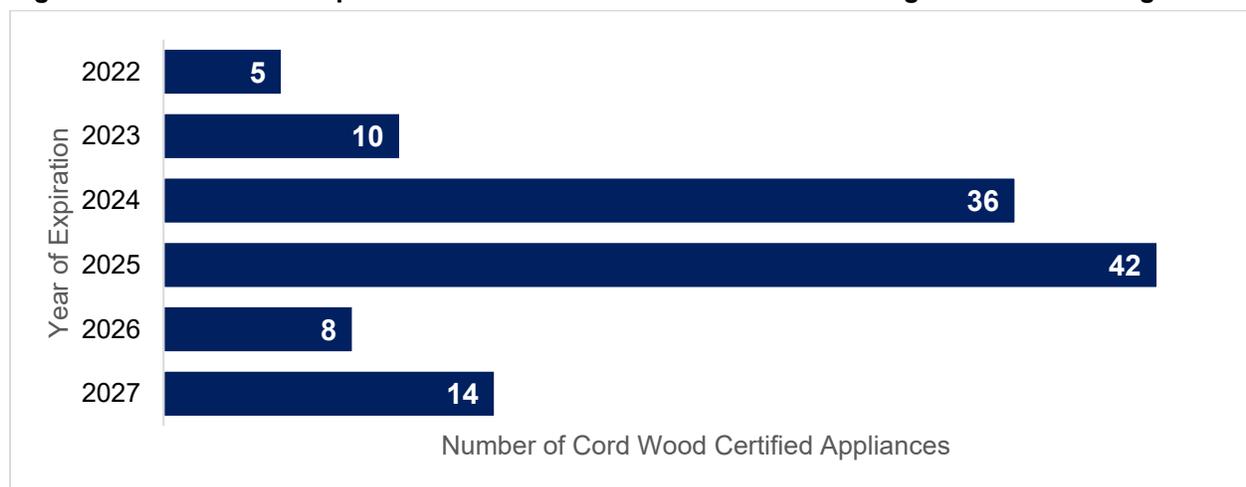
Figure 11: Results from wood heater retests conducted by an EPA-approved testing lab



Source: OIG summary of data from NESCAUM’s *ASTM E3053 Test Method Study*, March 2022. (EPA OIG image)

The Federal Register notice withdrawing ALT-125 and ALT-127 stated that certification tests completed prior to the effective date of the withdrawal will be considered valid if they otherwise meet NSPS requirements, but it specified that manufacturers must retest appliances certified using ALT-125 and ALT-127 when their certificates of compliance expire. Because these certificates may not expire for another five years, some appliances that the EPA certified or renewed shortly before the test methods were withdrawn could remain on the market until 2027, as shown in Figure 12. At least two of the seven retested wood heaters that were found to not meet emission standards, as shown in Table 2, will be eligible for sale until 2025. And because residential wood heaters have an expected life span of 20 or more years, these appliances could potentially be in homes for decades. Both EPA and ADEC staff agree that tests conducted using ALT-125 or ALT-127 are not necessarily invalid as long as the associated certification test reports are not deficient. Without further EPA oversight, however, the EPA risks not knowing which appliances consistently meet emission standards.

Figure 12: Certification expiration dates for wood heaters certified using cord wood testing



Source: OIG analysis of EPA wood heater certification data. (EPA OIG image)

Table 2: Emission test, certification, and expected renewal dates for the seven retested stoves

	Emission test date	Certification date	Renewal date
Stove 1	August 2018	November 2018	November 2023
Stove 2	January 2019	April 2019	April 2024
Stove 3	July 2017	December 2017	December 2022
Stove 4	October 2018	July 2019	July 2024
Stove 5	May 2019	July 2019	July 2024
Stove 6	April 2020	May 2020	May 2025
Stove 7	May 2020	August 2020	August 2025

Source: OIG analysis of EPA wood heater certification data. (EPA OIG table)

Few Test Methods Are Available

The withdrawal of ALT-125 and ALT-127 leaves limited options for wood heater certification testing using typical firewood. Manufacturers may opt to use the EPA Method 28R test method prescribed by the 2015 NSPS, which is based on crib wood instead of the conventional cord wood typically used in homes. One advantage to using crib wood for certification testing is that the test is perceived to be more repeatable because it uses dimensional lumber. But a manufacturer and a testing lab told us that

EPA Method 28R incentivizes the research and development of appliances that can pass the crib-wood-based certification test, rather than of appliances that more cleanly burn cord wood in homes.

In February 2021, the EPA approved a cord wood test method called the Integrated Duty Cycle method, or ALT-140. However, before the EPA moves to adopt the Integrated Duty Cycle test approaches as a federal test method, it is completing precision testing and holding roundtable discussions with states, wood heater manufacturers, and other stakeholders. According to an OAR manager, that process takes “years” and costs “millions.” In the interim, manufacturers that want to test using cord wood but are reluctant to use ALT-140 can request to use an alternative test method based on ASTM E3053. An OAR manager told us that the EPA is working to ensure that any alternative test method addresses the deficiencies of the ASTM E3053 test method. Until the EPA adopts a cord wood federal test method that is supported by data, however, regulators and the public do not have reasonable assurance that certified wood heaters meet emission standards under real-world conditions.

The Wood Heater Certificate-of-Compliance Process Lacks Internal Controls

The EPA’s wood heater program lacks internal controls to help achieve its goal of significantly reducing emissions that adversely affect public health. Internal controls help an organization operate effectively and efficiently, increase reliability of information, and ensure compliance with applicable laws and regulations. Both the OAR and OECA are responsible for aspects of the wood heater program; however, neither office has developed or implemented internal controls that could have detected or mitigated program deficiencies. As a result, certification test reports contained deficiencies, which would likely have been detected by the third-party certifier or by the EPA had internal controls been in place. Examples of such internal controls are policies and procedures, standardized certification test reports, use of appropriate subject-matter expertise, observation of emission tests, and compliance audit tests.

Wood Heater Program Lacks Sufficient Policies and Procedures

OECA is responsible for issuing certificates of compliance for wood heaters but does not have sufficient policies and procedures on how to evaluate certification test reports. Prior to the March 2021 NESCAUM report, OECA had one staff member who conducted cursory, administrative reviews of applications for certificates of compliance. These reviews consisted mostly of checking for completeness and signatures and were performed on an annual average of 46 applications from 2015 through 2020. In response to the issues documented by NESCAUM and ADEC, OECA temporarily shifted resources and obtained contractor support to conduct more detailed reviews of certification test reports for previously certified appliances. OECA told us that, as of October 2022, it had spent approximately \$110,000 on that contractor support and had an additional \$33,000 allotted for the task. OECA estimated that it would need to add \$50,000–\$100,000 each year to continue these detailed reviews. OECA stated that it also relied on the OAR’s technical expertise to verify the validity of these certification test reports.

The OAR continues to offer technical advice as requested but does not otherwise provide support for reviews of certification test reports. While OECA and its contractor use the corrective action checklist to evaluate certification test reports, OECA does not have detailed procedures or guidance that describes how the reports and applications should be evaluated. When we reviewed eight certification test reports that had been cleared by the EPA, we found deficiencies in each of them, which suggests that OECA’s reviews may not have been adequate.

Certification Test Reports Are Not Standardized

In addition to containing deficiencies, the eight certification test reports we reviewed varied significantly in terms of substance, format, and length. The three wood heater manufacturers we spoke to, the testing labs we visited, the EPA, and other external stakeholders all agreed that a standardized certification test report template would be beneficial. One testing lab president said that a standardized report layout could help the EPA identify and address issues all at once, rather than communicating each deficiency found in individual certification applications one at a time. The lab president also suggested that the EPA develop a spreadsheet for testing labs to use to calculate test outcomes. One manufacturer also noted that test results could be automated and streamlined.

A standardized template would establish the EPA's expectations for certification test reports and aid those reviewing the reports to determine whether the certification tests complied with the test method used and whether the wood heaters comply with the NSPS. According to an OAR manager, a standardized template should be developed, and its use should be mandatory.

OECA Lacks Expertise to Lead the Wood Heater Program

OECA asserted that it lacks the resources to ensure that those with relevant subject-matter expertise systematically review certification test reports. As noted previously, OECA's role in the wood heater program has been primarily administrative, and OECA does not believe it has staff with the expertise necessary to perform substantive reviews of certification test data or reports. OECA managers and attorney-advisors said that after the 2015 NSPS revision established the role of the third-party certifier to streamline the certification process, the responsibility of substantively reviewing certification test reports shifted from the Agency to the third-party certifier, who ensures that the tests are conducted appropriately, the reports are complete and accurate, and the wood heaters meet emission standards. In practice, however, third-party certifiers are not often independent of the testing lab. In most cases, the third-party certifier is an employee of the same testing lab that conducts the certification test. For the 134 certified wood heaters for which we have data, 74 percent of the third-party certifiers were employees of the testing lab or the same parent company as the testing lab.

Despite this lack of independence, an OECA attorney-advisor told us that OECA relied on the third-party certifiers and the OAR's oversight of the testing labs to ensure the validity of the certification tests. However, OECA management stated that this reliance was "misplaced," as the third-party certifiers were not providing strong oversight and testing labs were not consistently complying with the approved certification test methods. Moreover, according to the manufacturers we spoke to, despite the 2015 NSPS's intent that the third-party certifiers would streamline the process, the EPA is still taking up to 90 days to issue certificates of compliance, which, according to one manufacturer, is the same amount of time it took before the 2015 revisions. Manufacturers said that this delays the time it takes to get their appliances on the market.

An OECA manager stated that the future and vision of the wood heater program is uncertain. An OECA attorney-advisor said that if OECA cannot rely on third-party certifiers, then the EPA should shift the responsibility for reviewing certification test reports to the OAR because OECA does not have the necessary subject-matter expertise, while the OAR does. However, the OAR does not have a formal role in the certification process established under the 2015 NSPS. This is problematic because, according to an OAR manager, reviewing certification test reports has been the primary way that the EPA identifies

issues with submitted test reports and, thus, the only way the OAR learns about issues at testing labs and third-party certifiers.

The U.S. Government Accountability Office's *Standards for Internal Control in the Federal Government* states that as part of an internal control system, program management should assign responsibilities, identify key roles, and delegate authority to achieve the entity's objectives. Program managers should also establish expectations of competence and ensure that staff have the relevant knowledge, skills, and abilities to carry out their responsibilities. While OECA, with contractor and OAR support, did begin substantive reviews of certification test reports after NESCAUM's report, it remains unclear how the program will function in the future after these reviews are completed. The OAR's lack of an official role in the certificate-of-compliance process means that those with relevant subject-matter expertise are not providing the necessary oversight to ensure that the certification test reports are valid. Further, OECA's overreliance on third-party certifiers, who often lack independence, raises doubts that meaningful oversight is occurring.

The Agency Does Not Exercise Its Authority to Observe Certification Testing

The 2015 NSPS requires manufacturers to provide the EPA with a 30-day notice of an impending certification test and specifies that the EPA and delegated state regulatory agencies should be granted access to observe the testing. From 2015 through July 2022, however, the EPA never observed a certification test. Staff from testing labs told us that that, between 2015 and 2017, OECA management visited testing labs once to conduct document reviews but did not observe a certification test.

It is unclear which EPA office is responsible for this task. An OECA manager said that observing certification testing is an OAR responsibility. An OAR manager told us that, between 1988 and 2004, the OAR observed proficiency testing at various labs, but not certification testing. According to the OAR, it is responsible for oversight and approval of testing labs and third-party certifiers. Testing labs contract with an external party to conduct regular proficiency testing of their labs. However, an OAR manager said that the only way the OAR would know about deficiencies at the testing labs or third-party certifiers is if it reviewed the certification test reports.

If the EPA periodically observed certification testing, it would help ensure that the certification tests were conducted appropriately. Further, according to a manufacturer, the 30-day notice requirement unnecessarily delays testing if the EPA or other stakeholders do not intend to observe the testing.

The EPA Does Not Use Its Regulatory Authority to Conduct Compliance Audit Tests

According to the 2015 NSPS, the EPA has the authority to conduct compliance audit tests to verify that wood heaters comply with emission standards. The manufacturer bears the costs of the compliance audit test, and the EPA may select any EPA-approved testing lab or federal lab to conduct the test. However, Agency staff knew of only one instance from 1988 through July 2022 in which the Agency conducted a compliance audit test. Compliance audit testing could serve as an important component of the internal control system for the wood heater program and would allow the EPA to monitor testing and certification, identify deficiencies, and verify that appliances meet emission standards.

While OECA visited testing labs between 2015 and 2017 to conduct document reviews, this did not constitute a compliance audit test. According to OECA, compliance audit testing should only be done if

fraud is suspected, and OECA said that it does not have the resources to conduct such tests.⁵ However, the 2015 NSPS notes that the purpose of compliance audit tests is to determine compliance with the emission standards and specifies that the tests are to be conducted at manufacturers' expense. The NSPS does not state that the Agency must suspect fraud to conduct a compliance audit.

As discussed above, data from an EPA-approved testing lab showed that seven EPA-certified wood heaters emit significantly higher levels of PM_{2.5} than their original certification test reports indicated. Systematic compliance audit testing would strengthen the wood heater program by validating certification test results and verifying that appliances meet emission standards.

Lack of Internal Controls Resulted in Undetected Deficiencies

The absence of internal controls resulted in compliance test report deficiencies that should have been identified during the certificate-of-compliance process. Per the 2015 NSPS, certificate-of-compliance applications for wood heaters must include a valid certification test, and third-party certifiers must verify that the certification test report meets NSPS requirements.

During its review of certification test reports in response to NESCAUM's report, the EPA had, as of May 2022, cleared 81 appliances as appropriately certified. However, in November 2021 and January 2022, ADEC sent the EPA correspondence that identified an average of nine deficiencies across eight EPA-cleared test reports. We also reviewed those eight reports, verified most of the deficiencies that ADEC identified, and confirmed that either the third-party certifier or the EPA should have detected at least some of those deficiencies during the certificate-of-compliance process. Some of those deficiencies may have implications for PM_{2.5} emissions, while others were errors that would not affect emissions. For example, we found deficiencies in the testing labs' procedures for preparing the appliances for testing, documentation of equipment calibration, selection and preparation of firewood, and photographic documentation of test runs.

Test Report Deficiency: Photographic Documentation of Testing

Because the EPA does not systematically observe wood heater certification testing, it relies on complete and proper documentation by the testing lab to assess the validity of any given test. For example, ASTM E3053 requires a photo or video of the residual fuel bed. During our review of eight EPA-cleared certification test reports, we found that two of the four ASTM E3053-based reports did not include photos of the residual fuel bed. While the EPA has classified this a minor deficiency, it still is part of the corrective action list and therefore should have been detected and corrected during the certificate-of-compliance process.



Image from a submitted test report.

One manufacturer told us that the testing lab or third-party certifier could have detected the deficiencies during the certificate-of-compliance process. However, the manufacturer also told us that the way it conducted the certification tests was acceptable because the EPA had previously approved certification test reports with similar issues.

⁵ During the Agency's review of the draft report, the OAR said that they did not conduct compliance audit testing because of pending litigation. This was not cited as a reason during our evaluation fieldwork.

By implementing the internal controls discussed above, such as detailed policies and procedures and a standardized certification test report template, the EPA could help ensure that these deficiencies would be detected by a third-party certifier or the EPA during the certificate-of-compliance process.

Flawed Methods and a Lack of Controls Create Uncertainty Among Regulatory Agencies, Laboratories, Manufacturers, and the Public

Flawed test methods and a lack of EPA oversight of the wood heater program have created uncertainty for states. State regulators from Alaska and California said that they are concerned about relying on the EPA’s certification process to identify wood heaters to sell in their states or for their changeout programs. Alaska regulators further added that they had been unable to obtain the Agency’s corrective action list that outlined which types of deficiencies require retests; ADEC believed this list would help it stay consistent with the EPA’s test report determinations and minimize confusion for local stakeholders. Given this uncertainty, it is unclear whether the EPA’s wood heater program effectively mitigates PM_{2.5} pollution problems, especially in communities that rely on burning wood as a significant heat source.

The economic implications of deficiencies in the EPA’s wood heater program are wide-ranging. First, some states with high PM_{2.5} emissions from wood heaters rely on the EPA’s program to help address air quality issues. Based on the EPA’s certificates of compliance, those states may alter which appliances retailers can sell within their borders or which appliances are eligible for changeout program incentives. If the EPA’s certification process is not reliable, the EPA and states involved in changeout programs may be wasting millions of dollars by subsidizing new appliances that may not be substantially cleaner in real-world conditions compared to the older appliances. As shown in Table 3, the EPA distributed approximately \$82 million in targeted grants for residential wood heater changeout programs from fiscal years 2015 through 2021. Second, the EPA requires states with areas that are designated as in “serious” nonattainment with the PM_{2.5} NAAQS to adopt and implement best-available control measures for sources of PM_{2.5}.⁶ Even if wood heaters are the primary contributors of the excess PM_{2.5} emissions, other potential PM_{2.5} sources in that “serious” nonattainment area are still required to control their PM_{2.5} emissions. Because the EPA’s wood heater program does not effectively ensure wood heater compliance with the NSPS, these other sources may have to spend potentially millions of dollars on control measures, even if they are not the most significant contributors to PM_{2.5} emissions.

Finally, with respect to the economic impacts on the wood heater industry specifically, the addition of the third-party certifier was supposed to streamline the certification process and decrease the time the EPA spent reviewing applications. However, according to manufacturers and a research lab, the EPA takes the same amount of time to review certification test reports as it did before the 2015 NSPS became effective. The EPA review period is an important consideration for manufacturers because it impacts the time it takes for them to put their appliances on the market.

Table 3: Targeted airshed grants for wood heater changeout programs, fiscal years 2015–2021

2015	2016	2017	2018	2019	2020	2021	Total (2015–2021)
\$7,450,822	\$7,431,750	\$13,554,625	\$13,110,428	-	\$24,262,565	\$16,424,131	\$82,234,321

Source: OIG analysis of EPA grant data. (EPA OIG table)

⁶ An area is designated as being in *serious nonattainment* when it cannot attain the PM_{2.5} standards within a specified period of time.

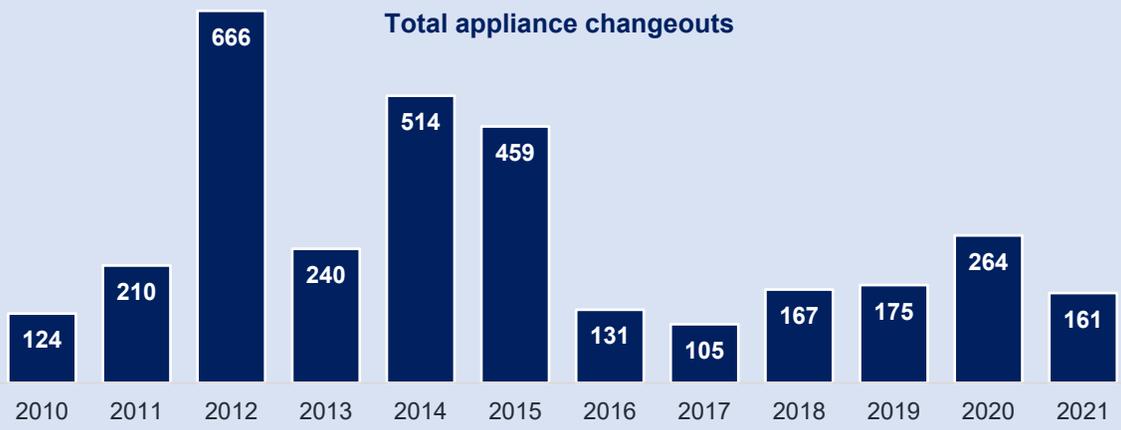
The case study presented below further details the economic ramifications of a “serious” nonattainment designation and the wide-ranging impact of wood heaters that may have been improperly certified.

Case Study: Economic Implications of Wood Combustion in the Fairbanks North Star Borough

In 2017, the EPA designated a portion of the Fairbanks North Star Borough as being in “serious” nonattainment with the 24-hour PM_{2.5} NAAQS. According to the borough’s Air Pollution Control Commission, the installation of potentially improperly certified wood heaters created cascading issues for stationary sources. Residential wood combustion is the largest contributor to PM_{2.5} pollution in the nonattainment area, and the Air Pollution Control Commission asserts that wood heaters and the EPA’s ineffective wood heater program triggered the area’s “serious” status. As a result of the serious nonattainment designation, Alaska was required to adopt and implement “best available control measures” for sources of PM_{2.5}, costing non-wood heater PM_{2.5} sources millions of dollars. At least one non-wood heater PM_{2.5} source, power plants, will likely pass these costs on to the consumer, driving up energy prices and forcing more homeowners to burn wood, which will only exacerbate the PM_{2.5} problem.

On September 24, 2021, EPA Region 10 published a final rule that included the regional administrator’s partial approval of ADEC’s state implementation plan. The plan set borough-specific emission and certification standards for solid fuel-fired heating devices like wood heaters and set requirements for wood sellers. Homes located within the nonattainment area are eligible for the borough’s Wood Stove Change Out Program. As shown in Figure 14, the program has replaced over 3,000 wood-burning appliances since 2010, while spending over \$13.5 million in federal, state, and local funding, including \$5.2 million from EPA-targeted grants. In March 2022, the EPA awarded another \$5.6 million to ADEC to improve air quality in the borough, which will support over 400 changeouts, including 125 solid-fuel-burning appliances.

Figure 13: Total changeouts of solid fuel burning appliances by year



Source: Fairbanks North Star Borough. (EPA OIG adaptation of Fairbanks North Star Borough image)

Our interviews with state and local regulators, industry stakeholders, and community members demonstrate that they have very little trust in the EPA, ADEC, and local government. Community members do not know whether wood heaters in their homes meet standards. Industry stakeholders face challenges in managing inventory. And other sources are paying for expensive control technologies, even though wood heaters are the primary contributor of the PM_{2.5} problem in the Fairbanks North Star Borough nonattainment area. In the meantime, the community still suffers from poor air quality.

Conclusions

The EPA does not have an effective wood heater program, and wood heaters sold to the public may not meet PM_{2.5} emission standards. The 2015 NSPS and the certification test methods lack specificity and allow for too much flexibility. Independent data show that at least some certified wood heaters do not meet emission standards. Although the EPA has withdrawn some flawed test methods, wood heaters certified prior to these withdrawals remain available for sale until their certifications are scheduled for renewal, which could be as late as 2027 for some appliances. Given their life spans, these wood heaters could potentially remain in homes for decades.

Further, the EPA's certificate-of-compliance process lacks internal controls, and the Agency does not exercise its authority to ensure successful program oversight. OECA conducts cursory, administrative reviews of certification test reports, and the OAR does not have an established role in reviewing certification test reports, leaving the process without the subject-matter experts who could identify deficiencies. Instead, OECA relies upon third-party certifiers who are not always independent from the testing lab that conducted the certification test. Moreover, the EPA did not exercise its authority to observe emission tests or conduct compliance audit tests. Because the EPA did not implement effective internal controls, certification test reports contained deficiencies that should have been detected during the certificate-of-compliance process.

Because of the flawed test methods and the EPA's lack of effective oversight, state regulators and the public cannot rely on the wood heater program to ensure that wood heaters reaching consumers comply with emission standards. Millions of federal, state, and local dollars are potentially wasted on changeout programs. Despite the interim measures the Agency has taken to address immediate issues, such as developing a corrective action list and reviewing certification test reports for previously certified appliances, significant improvements are needed to regain the public's trust in the wood heater program and to assure stakeholders that certified appliances comply with clean air standards.

Recommendations

We recommend that the assistant administrator for Enforcement and Compliance Assurance:

1. Develop internal controls for the residential wood heater program to improve the certification process and oversight, including but not limited to:
 - a. Issuing a standardized certification test report template.
 - b. Developing policies and procedures that detail how to conduct in-depth reviews of certification test reports.
 - c. Periodically observing certification testing.
 - d. Developing and implementing guidance for conducting systematic compliance audit tests.
2. In consultation with the Office of Air and Radiation, define roles and responsibilities within and between the Office of Enforcement and Compliance Assurance and the Office of Air and

Radiation for the residential wood heater program, so that sufficient subject-matter expertise and resources are leveraged to ensure that certification test reports are substantively reviewed.

3. Develop and implement a plan to demonstrate whether residential wood heaters certified using the test methods based on ASTM E3053 comply with the New Source Performance Standards for residential wood heaters.

We recommend that the assistant administrator for Air and Radiation:

4. Incorporate the EPA's certification test report expectations set forth in the April 2022 corrective action list into the 2023 revisions to the New Source Performance Standards for residential wood heaters.
5. Develop and adopt an EPA cord wood test method that is supported by data to provide the public reasonable assurance that certified appliances meet emission standards.
6. Establish mechanisms to promote independence between emissions testing labs and third-party certifiers.

Agency Response and OIG Assessment

The EPA did not provide a response to our draft report by the agreed-upon extension date and did not clearly indicate whether they concurred or disagreed with all of our recommendations. We include the Agency's response in Appendix B. All recommendations are unresolved. We will work with the Agency to resolve the recommendations after issuing this final report.⁷

⁷ OECA and the OAR provided separate technical comments, which we used to update the report where appropriate.

Status of Recommendations

RECOMMENDATIONS

Rec. No.	Page No.	Subject	Status ¹	Action Official	Planned Completion Date
1	25	Develop internal controls for the residential wood heater program to improve the certification process and oversight, including but not limited to: <ol style="list-style-type: none"> a. Issuing a standardized certification test report template. b. Developing policies and procedures that detail how to conduct in-depth reviews of certification test reports. c. Periodically observing certification testing. d. Developing and implementing guidance for conducting systematic compliance audit tests. 	U	Administrator for Enforcement and Compliance Assurance	
2	25	In consultation with the Office of Air and Radiation, define roles and responsibilities within and between the Office of Enforcement and Compliance Assurance and the Office of Air and Radiation for the residential wood heater program, so that sufficient subject-matter expertise and resources are leveraged to ensure that certification test reports are substantively reviewed.	U	Administrator for Enforcement and Compliance Assurance	
3	26	Develop and implement a plan to demonstrate whether residential wood heaters certified using the test methods based on ASTM E3053 comply with the New Source Performance Standards for residential wood heaters.	U	Administrator for Enforcement and Compliance Assurance	
4	26	Incorporate the EPA's certification test report expectations set forth in the April 2022 corrective action list into the 2023 revisions to the New Source Performance Standards for residential wood heaters.	U	Administrator for Air and Radiation	
5	26	Develop and adopt an EPA cord wood test method that is supported by data to provide the public reasonable assurance that certified appliances meet emission standards.	U	Administrator for Air and Radiation	
6	26	Establish mechanisms to promote independence between emissions testing labs and third-party certifiers.	U	Administrator for Air and Radiation	

¹ C = Corrective action completed.
 R = Recommendation resolved with corrective action pending.
 U = Recommendation unresolved with resolution efforts in progress.

Standard Test Methods for Wood Heaters

ASTM E2515: Standard Test Method for Determination of Particulate-Matter Emissions Collected by a Dilution Tunnel. This test method is applicable for determining particulate matter emissions from solid-fuel-burning appliances including woodstoves, pellet-burning appliances, factory-built fireplaces, masonry fireplaces, masonry heaters, indoor furnaces, and indoor and outdoor hydronic heaters within a lab environment.

ASTM E2618: Standard Test Method for Measurement of Particulate Emissions and Heating Efficiency of Solid Fuel-Fired Hydronic Heating Appliances. This test method applies to wood-fired or automatically fed-biomass-burning hydronic heating appliances. These appliances transfer heat to the indoor environment through circulation of a liquid heat exchange media, such as water or a water-antifreeze mixture. The test method simulates hand loading of seasoned cord wood or fueling with a specified biomass fuel and measures particulate emissions and delivered heating efficiency at specified heat output rates based on the appliance's rated heating capacity.

ASTM E2779: Standard Test Method for Determining Particulate-Matter Emissions from Pellet Heaters. This test method covers the fueling and operating protocol for determining particulate-matter emissions from fires in pellet or other granular or particulate-biomass-burning room heaters and fireplace inserts.

ASTM E2780: Standard Test Method for Determining Particulate-Matter Emissions from Wood Heaters. This test method covers the fueling and operating protocol for determining particulate-matter emissions from wood fires in wood-burning room heaters and fireplace inserts, as well as determining heat output and efficiency.

ASTM E3053: Standard Test Method for Determining Particulate-Matter Emissions from Wood Heaters Using Cord Wood Test Fuel. This test method covers the fueling and operating protocol for determining average particulate-matter emissions from wood fires in wood-burning room heaters and fireplace inserts, as well as options for determining heat output, efficiency, and carbon monoxide emissions.

Agency Response to Draft Report



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MEMORANDUM

SUBJECT: Response to Office of Inspector General Draft Report: *“The EPA’s Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers.”* Project No. OSRE-FY22-0026, November 21, 2022

FROM: Lawrence E. Starfield
Acting Assistant Administrator

LAWRENCE STARFIELD
Digitally signed by
LAWRENCE STARFIELD
Date: 2023.01.19
14:36:07 -05'00'

Joseph Goffman
Principal Deputy Assistant Administrator
Office of Air and Radiation

JOSEPH GOFFMAN
Digitally signed by
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Date: 2023.01.20
08:59:48 -05'00'

TO: Patrick Gilbride
Director, Implementation, Execution, and Enforcement Directorate
Office of Special Review and Evaluation
Office of Inspector General

EPA’s Office of Enforcement and Compliance Assurance (OECA) and Office of Air and Radiation (OAR) appreciate the opportunity to respond to the draft findings and recommendations presented in the Office of Inspector General (OIG) draft report, *“The EPA’s Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers.”* We share the concerns of the OIG and of our state/local regulatory partners resulting from the information that has recently come to light regarding the wood heater program and specifically the methods and manner in which new wood heaters are being tested for compliance with the 2015 New Source Performance Standards under the Clean Air Act. EPA is committed to ensuring that all wood heaters are in compliance with regulatory requirements that are intended to reduce health-harming pollution. Therefore, as discussed below, we are taking a number of actions to address the systemic problems that were identified with wood heater certification testing and in the documentation of such certification testing.

EPA agrees with the OIG on the importance of an effective wood heater regulatory program for ensuring that wood heaters that are sold for home use are clean-burning and compliant with

regulatory standards. We also agree with the OIG's conclusion that further improvements are needed to regain the public's trust in the wood heater program. As we have publicly stated, EPA continues to take all appropriate steps necessary, including engagement with our regulatory partners and other stakeholders, to ensure that certification testing is conducted in a sufficient manner for determining compliance and for assisting state/local air programs to implement meaningful wood heater change-out programs to protect human health and the environment. Thus, we appreciate the OIG report touching upon a few of the Agency's actions taken to date, such as:

- The review of test reports with additional staffing to assess the identified deficiencies;
- The corrective action list developed to clarify EPA expectations with respect to conducting certification testing;
- The withdrawal of EPA approval for two flawed test methods; and
- The continuing work to develop a new cord wood test method supported by sufficient data.

EPA is taking a comprehensive approach to addressing the testing and certification of wood heaters, deploying a number of actions to improve the program, and we will continue to take the steps necessary to further address the concerns that had been raised. In addition to the actions mentioned above, we are:

- Rigorously reviewing certification test reports, not only for wood heaters already certified but also for heaters seeking certification;
- Instituting a process for consistent reviews of test reports with the development of a report review checklist template;
- Notifying wood heater manufacturers of the need to correct deficiencies with previous certification tests or submitted test reports;
- Proceeding with the Certificate of Compliance revocation process consistent with the New Source Performance Standards (NSPS), when necessary;
- Notifying testing labs and third-party certifiers of the need to improve testing and reporting practices or risk having their EPA approval status revoked;
- Regularly communicating with our regulatory partners and other stakeholders to review technical and policy issues; and
- Engaging in enhanced coordination between OECA and OAR.

Given that we are undertaking this comprehensive suite of actions, the OIG draft report creates a mistaken impression. While briefly alluding to some of the steps being taken to improve the overall certification process, the OIG draft report improperly conveys that EPA has generally not altered how we are implementing the wood heater program. The draft report concludes that the Agency is only engaged in interim/non-comprehensive activities, conducts only cursory reviews of test reports, continues to rely on third-party certifiers, and has not implemented any internal controls, policies, and procedures to enhance the program.

Therefore, to provide sufficient context on how the wood heater program is currently being implemented, it would be beneficial for the OIG report to include a complete overview of the

various activities now being taken. To that end, we request the report be expanded to acknowledge the program enhancements and EPA's commitment to address concerns. Documenting such work in the report will enable a more comprehensive understanding of the current status of the program.

For your consideration, attached are Technical Comments that highlight the above comments and supplement this overall response.

We provide below our narrative response to the OIG's recommendations and a table with the suggested corrective actions, including estimated timeframes for completion.

OIG Recommendation 1a: Issuing a standardized certification test report template.

EPA Response

To improve the certification process and oversight, EPA currently provides the ability for wood heater manufacturers to submit a standardized certification test report as part of their wood heater application. EPA's Electronic Reporting Tool (ERT) includes a Wood Heater Application and Certification Module (<https://www.epa.gov/electronic-reporting-air-emissions/electronic-reporting-tool-ert>). This module includes a wood heater application test plan with specific report templates for each appliance type and the wood heater test methods for calculating emissions. When a manufacturer or testing lab enters the data, the ERT creates the certification application. To ensure completeness and accuracy, the ERT calculates results using the data entered and creates the test results as an electronic test report for submission to EPA. Given this module, **we believe that the recommendation has been addressed.**

Further, we believe the use of the ERT wood heater module is beneficial to manufacturers by assisting them in submitting complete and accurate reports in a time saving manner, while also helping EPA to efficiently review such submissions for identifying any potential data anomalies and missing/incomplete information. Since creating the ERT wood heater module, EPA has conducted trainings for the manufacturers/testing labs on the use of the module and has developed instructional material. However, until the NSPS is revised to require electronic reporting, the use of the ERT wood heater module continues to be voluntary.

OIG Recommendation 1b: Developing policies and procedures that detail how to conduct in- depth reviews of certification test reports.

EPA Response

As indicated above, EPA is taking a number of actions to address the concerns that have been raised regarding the certification process and oversight. To date, the agency has taken steps such as developing a test report review checklist, providing additional resources dedicated to conducting in-depth report reviews, and issuing a certification renewal policy regarding the timing for submitting a renewal application and when such application is to include a new valid certification test.

In response to the recommendation, and in consultation with OAR, OECA will continue to review the wood heater certification program and take additional action as appropriate, including the development of additional policies and procedures to further enhance the certification review process.

OIG Recommendation 1c: Periodically observing certification testing. EPA Response

The NSPS requirement for a 30-day testing notice allows EPA and delegated states to observe certification tests when we determine that such observation would be necessary to ensure that the tests are being conducted appropriately. This requirement is in addition to other tools used for ensuring valid tests, such as the in-depth reviews of certification reports, the Laboratory Proficiency Test Program, the granting and revoking of EPA approval status to testing labs, and the regular/ongoing communication with testing labs/manufacturers to address questions concerning the conduct of a test or completing a test in accordance with a test method. Given the various tools that are available for overseeing certification testing, the intent of this recommendation directing OECA to “periodically” observe a certification test is unclear.

Therefore, we disagree with the recommendation and request further discussion with the OIG before such a recommendation would be included in a final report.

OIG Recommendation 1d: Developing and implementing guidance for conducting systematic compliance audit tests.

EPA Response

To address this recommendation, **OECA will develop and implement guidance** concerning compliance audit tests.

OIG Recommendation 2: In consultation with OAR, define roles and responsibilities within and between OECA and OAR for the residential wood heater program, so that sufficient subject-matter expertise and resources are leveraged to ensure that certification test reports are substantively reviewed.

EPA Response

To ensure substantive reviews of certification test reports are being conducted, EPA has taken a number of actions since information came to light and concerns were raised regarding the methods and manner in which new wood heaters are being tested for compliance with the Wood Heater NSPS. Using additional dedicated resources and in accordance with its role in the certification review process, OECA is now conducting in-depth reviews of all test reports not only for wood heaters already certified but also for heaters seeking certification. To assist OECA, OAR provides technical expertise when the report review raises complex technical issues, and OAR also calls upon such expertise when communicating with the manufacturers/testing labs to address such issues and to review the conduct of certification tests when the validity of such tests is uncertain.

Although we believe that this recommendation has been largely addressed, as EPA continues to review the wood heater program and address stakeholder concerns, OECA, in consultation with OAR, **will further define respective roles and responsibilities, if needed.**

OIG Recommendation 3: Develop and implement a plan to demonstrate whether residential wood heaters certified using the test methods based on ASTM E3053 comply with the New Source Performance Standards for residential wood heaters.

EPA Response

Residential wood heaters certified using the now-withdrawn test methods based on ASTM E3053 continue to have valid Certificates of Compliance pursuant to the Clean Air Act and 2015

NSPS as long as the test reports had no irregularities/problems and no other testing deficiencies have been identified. These heaters therefore continue to “comply” with the NSPS. However, EPA has developed and is implementing a plan to address these heaters which can be found on the Wood Heater Compliance Monitoring webpage (<https://www.epa.gov/compliance/wood-heater-compliance-monitoring-program>) and in the Federal Register Notice announcing the withdrawal of the applicable alternative test methods (<https://www.federalregister.gov/documents/2022/01/24/2022-01298/withdrawal-of-broadly-applicable-alternative-test-methods>). If a manufacturer applies for renewal of the Certificate of Compliance for such a heater, the manufacturer will only have their renewal application processed if the manufacturer conducts a new valid certification test using an EPA-approved test method. **Thus, the corrective action for this recommendation is complete.**

OIG Recommendation 4: Incorporate the EPA’s certification test report expectations set forth in the April 2022 corrective action list into the upcoming revisions to the New Source Performance Standards for residential wood heaters.

EPA Response

OAR staff are tracking a number of issues, including the items now listed in the Third-Party Certifier’s Checklist, that will be included in the next NSPS proposal.

OIG Recommendation 5: Develop and adopt an EPA cord wood test method that is supported by data to provide the public reasonable assurance that certified appliances meet emission standards.

EPA Response

OAR is working with NYSERDA/NESCAUM to vet the Integrated Duty Cycle (IDC) fueling and operating protocols developed by those groups. The research is extensive, and we expect to know much more about the capabilities of these methods before promulgating them as EPA test methods. Subsequent to that, we will use these methods to collect data for establishment of a new emissions limit for each appliance type in the Residential Wood Heating regulations, and we will include these new methods and standards in a revised NSPS proposal.

OIG Recommendation 6: Establish mechanisms to promote independence between emissions testing labs and third-party certifiers.

EPA Response

As mentioned in the response to Recommendation 4 (above), OAR is tracking a number of issues to address in the next NSPS proposal and Recommendation 6 is near the top of that list. We will be proposing language intending to remedy this situation in the next NSPS proposal.

Table of Corrective Actions

Rec #	OIG Draft Report Recommendations	Corrective Actions	Completion Dates
1a	Issuing a standardized certification test report template.	EPA’s ERT has been updated to include a Wood Heater Application and Certification Module allowing manufacturers to use and submit a standardized certification test report.	Completed

Rec #	OIG Draft Report Recommendations	Corrective Actions	Completion Dates
1b	Developing policies and procedures that detail how to conduct in-depth reviews of certification test reports.	In consultation with OAR, OECA will continue to review the wood heater certification program and take additional action as appropriate, including the development of additional policies and procedures to further enhance the certification review process.	March 31, 2024
1c	Periodically observing certification testing.	Further discussion with the OIG is requested before report finalization as the intent of this recommendation is unclear.	Awaiting further discussion with the OIG
1d	Developing and implementing guidance for conducting systematic compliance audit tests.	OECA will develop and implement guidance concerning compliance audit tests.	March 31, 2024
2	In consultation with OAR, define roles and responsibilities within and between OECA and OAR for the residential wood heater program, so that sufficient subject-matter expertise and resources are leveraged to ensure that certification test reports are substantively reviewed.	As EPA continues to review the wood heater program and address stakeholder concerns, OECA, in consultation with OAR, will further define respective roles and responsibilities, if needed.	March 31, 2024
3	Develop and implement a plan to demonstrate whether residential wood heaters certified using the test methods based on ASTM E3053 comply with the New Source Performance Standards for residential wood heaters.	EPA has developed and is implementing a plan to address heaters certified using the test methods based on ASTM E3053. <u>Please see the Wood Heater Compliance Monitoring webpage (https://www.epa.gov/compliance/wood-heater-compliance-monitoring-program) and the Federal Register Notice announcing the withdrawal of the applicable alternative test methods (https://www.federalregister.gov/documents/2022/01/24/2022-01298/withdrawal-of-broadly-applicable-alternative-test-methods).</u>	Completed
4	Incorporate the EPA's certification test report expectations set forth in the April 2022 corrective action list into the	OAR staff are tracking a number of issues, including the items now listed in the Third-Party Certifier's Checklist, that will be included in the next NSPS proposal. As mentioned by OECA, this will involve a cross-agency	November 30, 2027 estimated final rulemaking

Rec #	OIG Draft Report Recommendations	Corrective Actions	Completion Dates
	upcoming revisions to the New Source Performance Standards for residential wood heaters.	workgroup.	
5	Develop and adopt an EPA cord wood test method that is supported by data to provide the public reasonable assurance that certified appliances meet emission standards.	OAR is working with NYSERDA/NESCAUM to vet the IDC fueling and operating protocols developed by those groups, and, if they are scientifically appropriate, we will include these new methods and new standards in a revised NSPS proposal.	November 30, 2027 estimated final rulemaking
6	Establish mechanisms to promote independence between emissions testing labs and third-party certifiers.	As mentioned in the response to Recommendation 4 (above) OAR is tracking a number of issues to address in the next NSPS proposal and Recommendation 6 is near the top of that list. We will be proposing language intending to remedy this situation in the next NSPS proposal. As mentioned by OECA, this will involve a cross-agency workgroup.	November 30, 2027 estimated final rulemaking

If you have any questions regarding this response, please contact Gwendolyn Spriggs, OECA Audit Liaison, at spriggs.gwendolyn@epa.gov or (202) 564-2439 or Grant Peacock, OAR Audit Liaison, at peacock.grant@epa.gov or 202-564-6732.

Attachment

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