Response to Comment on Proposed Rule, 'Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces, and New Residential Masonry Heaters'

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Outreach and Information Division
Research Triangle Park, NC

February 2015

This page intentionally left blank

FOREWORD

This document summarizes the public comments and provides the EPA's response to those comments regarding EPA's *Proposed Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces, and New Residential Masonry Heaters,* in addition to the subsequent *Notice of Data Availability* (NODA) issued in support of the proposed rule. The EPA published the Proposed Rule in the Federal Register on February 3, 2014 (**79 FR 6329**) and the NODA on July 1, 2014 (**79 FR 37259**). The EPA received comments on the proposed rule, including the NODA, via e-mail, mail, facsimile, and at a public hearing held in Boston, Massachusetts on February 26, 2014. Copies of all comments submitted and transcripts for the public hearings are available at the EPA Docket Center Public Reading Room and are also available electronically through *http://www.regulations.gov* by searching Docket IDs *EPA-HQ-OAR-2009-0734.*

This document contains responses to comments on the changes proposed to the existing New Residential Wood Heaters NSPS (40 CFR part 60, subpart AAA) and on the two new proposed subparts (40 CFR part 60, subparts QQQQ and RRRR). Due to the size and scope of this rulemaking, the EPA summarized a limited amount of major comments in the preamble of the final rule. This document contains a summary of all issues raised by commenters, extracted from the original letters and public hearing transcripts.

For each comment, the Document Control Number (DCN) is provided in parentheses along with the comment summary. The text within the comment summaries is provided by the commenter(s) and represents their opinion(s), regardless of whether the summary specifically indicates that the statement is from a commenter(s) (e.g., "The commenter states" or "The commenters assert"). The comment summaries do not represent the EPA's opinion unless the response to the comment specifically agrees with all or a portion of the comment. In some cases, the same comment was submitted by two or more commenters through submittal of a form letter prepared by an organization, by the commenter incorporating by reference the comments in another comment letter, or by the commenter providing identical or similar language independently. Rather than repeat these comment excerpts for each commenter, the comment summary is provided only once.

The EPA's responses to comments are provided immediately following each comment summary. In instances where several commenters raised similar or related issues, the EPA has grouped these comments together and provided a single response after the last comment summary in the group. It should be noted that the EPA does not individually identify every commenter who made a certain point in all instances, particularly in cases where multiple commenters express essentially identical arguments. Finally, in some cases, the EPA provided responses to specific comments or groups of similar comments in the preamble to the final rulemaking. Although portions of the preamble to the final rule are paraphrased in this document, to the extent any ambiguity is introduced by this paraphrasing, the preamble itself remains the definitive statement of the rationale for the final rule.

This page intentionally left blank

Table of Contents

1.0 Introduction

The U.S. Environmental Protection Agency (EPA) proposed to amend the Standards of Performance for New Residential Wood Heaters and to add two new subparts: Standards of Performance for New Residential Hydronic Heaters and Forced-Air Furnaces and Standards of Performance for New Residential Masonry Heaters. This Response to Comment (RTC) document provides summaries of public comments and the EPA's response to these comments regarding the proposed rulemaking, New Source Performance Standards (NSPS) for Residential Wood Heaters. The docket for this rule, which includes supporting documents as well as public comments, is available on Regulations.gov, docket ID number EPA-HQ-OAR-2009-0734.[1]

The Clean Air Act (CAA) requires the EPA to set NSPS for industrial categories that cause, or significantly contribute to, air pollution that may endanger public health or welfare. Wood smoke is made up of a mixture of gases and fine particles that are produced when wood and other organic matter burns. The fine particles in smoke – also called fine particle pollution or $PM_{2.5}$ (because these particles have a diameter ≤ 2.5 micrometers) – can get deep into the lungs, harming the lungs, blood vessels and heart. People with heart, vascular or lung disease, older adults and children are the most at risk. We estimate that the projected monetized health benefits of this rule are over 100 times greater than the costs.

The original NSPS for residential wood heaters was published on February 26, 1988.[2] In 1995, Washington State tightened the emission limits governing certain kinds of residential wood heaters in that state. The EPA released a draft review document with preliminary conclusions for a revised NSPS in December 2009.[3] We also conducted numerous stakeholder outreach activities and prepared the technical and economic information necessary for a draft proposal.[4] However, the Office of Management and Budget (OMB) did not accept the February 2012 draft proposal and we began to consider other options. In November 2012, state and local air pollution control agencies hosted a national forum for a broad range of stakeholders, including the EPA, to discuss

[1] The **Regulations.gov** website, part of an eRulemaking Program created in 2002, is managed by the U.S. Environmental Protection Agency with assistance of partner federal agencies. Regulations.gov is a public source of information on the development of federal regulations and other related documents issued by the U.S. government. Through this site, you can find, read, and comment on regulatory issues that are important to you.

[2] The original 1988 rule is available for download in the docket at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-0043

[3] The 2009 draft review document is available for download in the docket at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-0066

[4] In this document, the terms "we" and "our" refer to the EPA.

the issues and potential options for revising the 1988 NSPS.[5] We prepared the options proposed in this NSPS after careful consideration of the information and recommendations discussed in the national forum and in numerous follow-up discussions with stakeholders. We conducted extensive outreach as we developed the proposal, seeking input from numerous wood heater manufacturers, state, local and tribal governments, regional air quality agencies and citizen and environmental groups. We also participated in a Small Business Advocacy Review (SBAR) Panel to seek input and advice. The preamble discusses the changes made to the proposal in response to the panel's recommendations to reduce small business impacts as much possible while still meeting the legal requirements in the CAA.

The final rule will update the 1988 NSPS to reflect today's best systems of emission reduction (BSER), considering costs. Step 1 emission limits will be required when the rule is effective and tighter Step 2 limits will be required 5 years after the effective date, to allow manufacturers time to adapt emission control technologies to their particular model lines. The rule achieves several objectives for new residential wood heaters, including applying updated emission limits that reflect the current BSER; eliminating exemptions over a broad suite of residential wood combustion devices; strengthening test methods as appropriate; and streamlining the certification process. This final action does not include any requirements for heaters solely fired by gas, oil or coal. In addition, it does not include any new requirements associated with appliances that are already in use. The EPA continues to strongly encourage state, local, tribal, industry and consumer efforts to changeout (replace) older heaters with newer, cleaner, more efficient heaters. Also, we encourage state, local, and tribal authorities to develop site-specific installation and operating requirements to help ensure healthy air for all.

The public comment period ended on May 5, 2014 for the proposed rule and on July 31, 2014 for the NODA, although public comments were accepted after these dates. The EPA received 1,311 comment letters in response to the proposed rule and the Notice of Data Availability (NODA).[6] These public submissions represent over 5,000 commenters and some comment letters included extensive attachments. Included among the public submissions are also a small number of documents that are duplicates of other submissions. Appendix A, "Complete List of Commenters" lists all public submissions placed into the docket for this rulemaking. Throughout this document, we may refer to either a particular commenter (or a particular document) by reference to an ID number that corresponds to the last 4 digits of the associated Document Control Number (DCN) in the docket for this rulemaking.

The public submissions were typically comments in email or letter form, from individuals representing either their own personal views or those of a group. We counted each of the public submissions as one commenter, whether the comment was that of an individual or on behalf of a

[5] The presentations and notes from this national forum are available for download in the docket at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-0128 and at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-0131.

[6] The tally 1,311 excludes cover letters, attachments, mass mailings and one comment which was meant for another rulemaking but submitted to this docket in error.

group (such as a state air agency, trade organization, corporation, environmental/health organization or community coalition). However, it should be noted that two of the public submissions (EPA-HQ-OAR-2009-0734-1430 and EPA-HQ-OAR-2009-0734-1641) represent a mass mail campaign co-sponsored by the Alliance for Green Heat and the manufacturer Woodstock-Soapstone which collected 4,385 signatures, including many short individual comments in addition to the mass mail campaign's overall message. Other smaller mass mail campaigns were also conducted (e.g., by the American Lung Association), but the individual commenters who signed onto these campaigns were processed separately by the Federal Docket Management System (FDMS) and so are counted as separate comments in our tally.

For descriptive purposes, we categorized commenters according to the breakdown shown in Table 1:

Table 1. Breakdown of Comments by Stakeholder Group

Stakeholder Group	Number of Comments
Industry (including manufacturers, industry trade groups and laboratories)	131
Hearth Products/Woodstove Retailer	40
Federal, State & Local Government	46
Environmental/Health Organizations (EHO)	28
Academia	7
Mass Mail Campaign*	2*
Public Concern/Support for proposed or more stringent rule	717
Public Opposition to rule	286
Misc. Suggestions & Requests	31
NODA commenters (manufacturers, labs, states, EHO, individuals)	23
Total[1]	**1,311**

* These 2 public submissions represent 4,385 signatures.

In light of the large number of comments received and the overlap among the many comments, this document does not respond to each comment individually. Rather, the EPA summarizes and provides a single response to each significant argument, assertion, and question contained within the totality of comments. Within each comment summary, the EPA provides in parentheses one or more DCN to identify the commenters who raised particular issues. Additionally, where a comment letter endorses or supports another commenter we include their commenter DCN along with the DCN of the commenter that they support or endorse. For example, there are several commenters that endorsed or supported Hearth, Patio and Barbecue Association's (HPBA's) comments wholly or in part and we added endorsements/supporting DCN along with position statements associated with HPBA's DCN (1643). While the list of commenter ID numbers is not meant to be comprehensive, we have made an effort to capture every issue raised, even if every commenter attribution is not listed in connection to that issue.

In the remaining sections of this RTC document we have summarized the public comments received on the proposed NSPS for Wood Heaters, and we provide responses to those comments. A list of frequently used acronyms and abbreviations is provided in Table 1. *Section 2* contains comment summaries and responses regarding overarching issues generally applicable to the rule in its entirety. *Section 3* contains additional commentary and responses specific to subpart AAA of the rule, regarding room heaters, while *Sections 4 and 5* pertain to subparts QQQQ and RRRR regarding central heaters and masonry heaters, respectively. *Section 6* contains comment summaries and responses regarding the proposed test methods and changes to existing test methods. *Section 7* contains responses to general and miscellaneous comments, including concern regarding unintended consequences of the rule, general support and opposition to the rule, comments regarding typographical errors and suggested changes for the next revision of this NSPS. *Section 8* contains responses to comments specific to the NODA published in the *Federal Register* on July 1, 2014.

Appendix A contains a complete list of commenters, including their Document ID#, the date the comment was received by FDMS, and the name and affiliation of the commenter.

Table 2. Explanation of Acronyms and Frequently Used Abbreviations

Acronym	**Long Name**
µg/m3	Micrograms per cubic meter
ACCA	Air Conditioning Contractors of America
AFUE	Annual Fuel Utilization Efficiency
ASTM	American Society for Testing and Materials (now ASTM International)
BACT	Best Available Control Technology
BNL	Brookhaven National Laboratory
BSER	Best System of Emission Reduction
BTU	British Thermal Unit
CAA	Clean Air Act
CBI	Confidential Business Information
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CSA	Canadian Standards Association
CV	Coefficients of variation
DOE	U.S. Department of Energy
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
ERT	Electronic Reporting Tool
EJ	Environmental Justice
FR	Federal Register
g/hr	Grams per hour
GHG	Greenhouse gas

Acronym	Long Name
HHV	Higher heating value
HPBA	Hearth, Patio and Barbecue Association
HVAC	Heating, Ventilation, and Air Conditioning
IAF	International Accreditation Forum
ICR	Information Collection Request
ILAC	International Laboratory Accreditation Cooperation
ISO/IEC	International Organization for Standardization / International Electrotechnical Commission
kW	Kilowatt
lb/mmBtu	Pounds per million British thermal unit
LHV	Lower heating value
MACT	Maximum Achievable Control Technology
MHA	Masonry Heater Association
MLA	Multilateral Recognition Arrangement (under ILAC/IAF)
MRA	Mutual Recognition Agreement (under ILAC/IAF)
NAAQS	National Ambient Air Quality Standards
NERA	National Economic Research Associates
NESCAUM	Northeast States for Coordinated Air Use Management
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NSPS	New Source Performance Standards
NO_x	Nitrogen oxides
NTTAA	National Technology Transfer and Advancement Act
NYSERDA	New York State Energy Research and Development Authority
OAQPS	Office of Air Quality Planning & Standards (USEPA)
OECA	Office of Enforcement & Compliance Assurance (USEPA)
OGC	Office of General Counsel (USEPA)
OHH	Outdoor hydronic heater
OWB	Outdoor wood boiler (a.k.a. hydronic heater)
OWHH	Outdoor wood-fired hydronic heater
PAH	Polycyclic aromatic hydrocarbon
PFI	Pellet Fuels Institute
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with diameter $\leq$ 2.5 micrometers ("fine particles")
PSCAA	Puget Sound Clean Air Agency
R&D	Research and development
RIA	Regulatory Impact Analysis
SBA	U.S. Small Business Administration
SBAR	Small Business Advocacy Review
SBREFA	Small Business Regulatory Enforcement Fairness Act
SER	Small Entity Representatives
SISNOSE	Significant economic impact on a substantial number of small entities
VOC	Volatile organic compound

2.0 Response to Comments Regarding Rule in its Entirety

Chapter 2 presents overarching comments, generally applicable to all subparts of the proposed rule. Refer to Chapters 3, 4, and 5 for additional comments specifically related to room heaters (40 CFR part 60, subpart AAA), central heaters (40 CFR part 60, subpart QQQQ) and masonry heaters (40 CFR part 60, subpart RRRR). Refer to Chapter 6 for comments regarding test method procedures.

2.1 Regulatory Basis and Approach

2.1.1 Comment: Section 111 Legal Principles including demonstration of BSER

Commenter (1551) asserts that the best system of emission reduction (BSER) incorporates Congress' intent in the CAA to promote implementation and further development of technologies beyond what may currently be available. Commenter (1551) states regulatory drivers have led to technology advances that otherwise would not have occurred, noting Vermont's experience with implementing outdoor wood boiler regulations showing that industry can achieve cleaner standards when required to do so. Commenter (1551) states the EPA should ensure that BSER represents the technology development potential for the covered sources, and not break with its own previous interpretation of BSER, promulgating emission standards that reflect the technology innovation opportunity rather than the technology status quo in existence for decades.

On the contrary, commenters (1543, 1550, 1563, 1643) outline what they believe are the key legal principles that must guide the EPA decision making on the NSPS under section 111. According to commenters (1543, 1550, 1563, 1643), these principles are as follows:

- EPA must "adequately demonstrate" that its standards reflect BSER.
    - Standards should be based on data derived from the proposed reference method.
    - EPA must adhere to limit on technology transfer analysis.
    - EPA must adequately account for test method imprecision.
    - EPA must appropriately account for emission variability based on choice of fuel.
    - The standard and the method used to determine compliance with the standard must be evaluated together when determining BSER.
- EPA must rigorously consider the costs and adverse environmental impacts of any standard considered.

Commenter (1521) believes that the EPA should have followed the precedent set by the Agency in establishing numerical standards for other NSPS and NESHAP (MACT) and recommends that the EPA use the MACT method for establishing a standard under the NSPS for wood stoves. Commenter (1521) opines that the procedures that the EPA followed for the wood stoves NSPS proposal do not seem to yield a defensible conclusion on which to establish the proposed emission standards.

Commenters (1543, 1550, 1643) state that the EPA has failed to take into account the "scrappage effect." Commenters (1543, 1550, 1643) state that by limiting the aggregate emission reductions achievable, the reduced scrappage under the proposed standards affects both the cost-effectiveness of the rule and scale of its environmental impacts. According to commenters (1543, 1550, 1643) , both the proposed standards' economic and environmental costs, including the standards' "counter-productive environmental effects" in slowing changeouts, must be considered in determining whether the EPA's proposed standards have been "adequately demonstrated" under the statute and associated precedent. Commenters (1543, 1550, 1643) believe that the proposed standards' scrappage effects are not only relevant to the "adequate demonstration" question, but they strike at the heart of BSER itself. Commenters (1543, 1550, 1643) state that the best "system" of emission reduction connotes more than just technology, and here, the best "system" of emission reduction is a coupling of sorts, one in which technology is aligned with adequate price-demand incentives for homeowner changeouts, producing a performance standard that reflects both features of this "system." Commenters (1543, 1550, 1643) state that the subpart AAA proposed limits do not do so. (*See Section 3.2 for more detail on comments regarding subpart AAA's BSER*.)

Commenters (1543, 1550, 1643) state that the demonstrated imprecision of the test methods, the lack of correlation between certification scores and field performance, the demonstrated cost-ineffectiveness of the proposed standards (including the adverse impacts these standards will have on changeouts/scrappage) all show that the proposed standards exceed the bounds of reasonableness, do not reflect BSER, and have not been "adequately demonstrated." For these reasons, the commenters (1543, 1550, 1643) believe that the proposed standards conflict with section 111 and must therefore be abandoned.

Commenters (1543, 1550, 1643) add that the EPA's proposal to mandate cord wood-based compliance with the proposed Step 2 1.3 g/hr emission limit is unsupportable because the EPA has proposed standards for cord wood performance before data have even begun to be generated with the new method. Commenters (1543, 1550, 1643) state that imposing cord wood-based test methods and emission limits for the proposed Step before the relevant data from the appropriate test methods have been developed *per force* renders such standards *un*-demonstrated. Commenters (1543, 1550, 1643) add that the EPA must ensure that its standards are derived from data based on the same reference methods by which compliance will be measured, or offer a very strong justification for departing from this principle. Commenter (1521) also opines that it is unacceptable to base a proposed standard on data obtained using one set of test methods, and then require compliance be based on new test methods that have not yet been vetted. Commenters (1543, 1550, 1643) conclude that the EPA's proposal to require certification based on use of cord wood rather than crib wood at Step 2 is fundamentally incompatible with CAA section 111.

Commenter (1506) claims that the EPA provides no alternatives to its proposed BSER (referring to OMB guidance regarding Executive Order 12866), and suggests that a presentation of the incremental costs and health effects associated with achieving the EPA's proposed standard and additional alternative (more and less stringent) emission limits could be very informative.

Commenter (1506) concludes that the EPA's determination of BSER is unreliable and that sensitivity analysis of key assumptions, including those underlying health effects, consumer and manufacturer response to standards, and research and development (R&D) costs, could alter the EPA's determination of BSER.

Response:

The EPA appreciates all of the comments submitted and we have considered each of them fully. Regarding demonstration of BSER, Section V of the final rule's preamble responds to both the contention that BSER supports more stringency and the opposite contention that BSER is not demonstrated. We maintain that the final rule's stepped limits are a reasonable balance of environmental impacts and costs and are supported by our BSER database. We have determined that we have met all legal and policy obligations under section 111 of the CAA and all Executive Orders, including those noted above. We do want to highlight here that the primary authority for this rulemaking is CAA section 111, not section 112 (MACT standards). Since more detailed comments on these issues are summarized in the individual subpart sections, we will respond in more detail in these later, more specific sections. *Sections 3.2 and 3.4* provide more commentary regarding subpart AAA BSER and our detailed responses. *Sections 4.2 and 4.3* provide more commentary regarding subpart QQQQ BSER and our detailed responses.

2.1.2 Comment: Health-based concerns and approach

Numerous commenters (0654, 0944, 0946, 0963, 1192, 1355, 1395, 1397, 1414, 1427, 1447, 1462, 1477, 1502, 1503, 1508, 1511, 1513, 1538, 1570, 1581, 1585, 1587, 1640, and others) generally support the proposed rule due to concern regarding the health effects of wood smoke. Commenter (1192) believes the EPA's proposal to establish the most restrictive emission limits in the shortest timeframe will minimize the adverse health impacts on its residents. Numerous commenters (1534 plus 56 other comments) joined an American Lung Association petition urging the EPA to set the strongest standards that will help protect the public from breathing dangerous air pollutants from newly manufactured wood-burning devices, noting that national standards are long overdue and are needed to protect human health, communities and neighborhoods from toxic wood smoke. These commenters (1534 plus 56 other comments) noted that the current out-of-date standards fail to protect public health and urged the EPA Administrator to take a stand for public health.

Commenter (1548) considers the proposed EPA rule regulating wood-burning devices to be grossly inadequate because air pollution in general is increasingly recognized as a systemic health threat, impairing the functioning of virtually every organ system, and related to the same broad spectrum of disease outcomes as cigarette smoke. Commenter (1548) believes that through the CAA, the EPA has the authority and obligation to make rules more strict than the current proposal. Commenter (1548) believes if the EPA makes a weak ruling, like the current proposal, it virtually sanctifies the continued exposure of hundreds of millions of people to unnecessary, adverse health outcomes. The fact that these wood-burning devices exist, that companies make a profit manufacturing them, and that many people like to use them for reasons such as cost, convenience, or ambiance, is no excuse for the EPA not to fulfill its obligation, according to commenter (1548). Commenter (1548) asserts the EPA cannot both protect wood-burning

manufacturers and simultaneously protect public health, and it is clearly mandated to do the latter.

Likewise, commenters (1440, 1441) note that there are no safe levels of wood smoke and that wood burning should therefore be banned entirely. Approximately 500 comments suggest that the EPA should ban wood burning due to the serious health effects caused by wood smoke (*see Section 2.1.3 for examples of commentary supporting banning of wood burning*).

Commenter (1558) believes that the EPA must have one emission standard for all residential solid fuel-heating devices and that the standard must meet NAAQS health-protective levels.

Commenter (1487) strongly supports the immediate adoption of rigorous, health-protective emission standards for outdoor and indoor hydronic heaters and for forced-air furnaces. The commenter (1487) states that there is an extensive body of literature that documents the public health hazards associated with residential hydronic heaters and cites examples. Commenter (1558) believes the EPA will not fulfill its mandate of adopting health-protective standards without regulating all short-term exposures. Commenter (1558) concludes that the EPA's proposed $PM_{2.5}$ emission level standards for subpart QQQQ for hydronic heaters will not protect human health because their emission levels exceed the 24-hour national ambient air quality standards (NAAQS) for $PM_{2.5}$.

Commenters (0422, 0455, 0681, 0800, 0810, 0943, 1444, 1594) note that the true cost of wood heater emissions are externalized to neighbors and beyond in the form of health costs and other impacts. Commenter (1594) requests that the EPA hire an economic consultant to estimate the externalized costs to society of burning wood. Commenter (0800) believes that a fair "polluter-pays" tax, based on the health costs of the pollution wood heaters emit, would effectively ban the appliances. Commenter (0943) believes that the financial burdens of wood burning are being transferred from the wood-burner, who is saving some money in heating costs, to the neighbors who are losing their life savings.

Similarly, commenter (1444) believes, as a general principle, all standards should be set to ensure that the benefits of a consumer product are greater than the ill health or other costs imposed on the community from use of that product. Moreover, commenter (1444) asserts issues of equity arise if one person derives benefits (e.g. cheaper heating) from a polluting activity, but others (e.g. neighbors) incur substantial health costs. In the absence of a 'polluter-pays' mechanism to even out the costs and benefits, commenter (1444) believes the maximum cost one person should be allowed to impose on the community should be no more than $250 to $500. Commenter (1444) states that in Australia, the health costs of $PM_{2.5}$ pollution is estimated to range from $263 per kg in large capital cities to $113 in smaller cities or regional towns (e.g. population of 22,000) and believes estimated health costs in the U.S. are similar. Commenter (1444) asserts this implies that a standard of 1.3 g/hr (laboratory test results) is not adequate to protect public health as some heaters could be used for over 5,000 hours per year, resulting in emissions of 6.5 kilograms of $PM_{2.5}$, with estimated health costs of $1,700 per year, which is totally unacceptable. Commenter (1444) suggests the addition of filtration systems to emissions-reduction technology that achieves 1.3 g/hr might achieve a satisfactory health-based result for

public health, similar to the standards for diesel engines needing to couple clean-burning techniques with filtration systems to clean up the remaining pollution. If possible to retrofit filtration technology, commenter (1444) states manufacturers could be allowed to install unfiltered models, on payment of an annual "polluter-pays" tax of $1,000 per stove year until the filters have been installed.

Likewise, instead of the proposed rule, commenter (1496) suggests consideration of an implicit tax on PM emissions via a sales tax in proportion to expected emissions from the device. The commenter (1496) notes that a tax "increases the possibility of gains beyond those projected by the regulations, since a tax would reward industry and consumers for emissions reductions below those mandated by EPA's performance standards, whereas the proposed rule offers no such incentive".

On the contrary, some commenters are opposed to the EPA regulating residential wood heaters precisely because these commenters do not believe wood smoke presents a health or environmental concern. *See Sections 2.2.1 and 2.2.2, respectively, for examples of such comments.*

Response:

We appreciate commenters' concern regarding the health effects of wood smoke and have also highlighted such effects in the rule's preamble under especially section I.A. of the preamble's executive summary and section II.B. entitled "Why is Residential Wood Smoke a Concern?" However, as noted in section 2.1.1, the primary authority for this rulemaking is CAA section 111, which calls for technology-based and system-based standards rather than health-based standards (such as the NAAQS). For example, we are not banning wood burning in this rulemaking as commenters have made no attempt to explain how such a ban would constitute the best system of emission reduction, taking into account the relevant statutory factors. Similarly, commenters have provided no analysis regarding the degree of additional emission limitation that could be achieved through application of a tax. Finally, as noted in our previous response, the details of many of these comments and our responses are in the sections that discuss the specific issues in more detail, *e.g.*, *Sections 2.1.3, 2.2.1* and *2.2.2*.

2.1.3 Comment: Population density (urban / rural) approach

Some commenters (0525, 0776, 0974, 1169, 1259, 1379, 1381, 1470, 1476, 1497, 1499, 1500, 1595, 1610) contend that emissions from residential wood heaters is an urban and suburban problem, not a rural issue, and that the regulations should be geographically-targeted accordingly. Such commenters (0974, 1595, 1610) claim that a "one size fits all" approach is inappropriate for the divergent air pollution problems and heating needs in urban and suburban America versus rural America. Commenters (1470, 1476) contend that the density of the public entity (city, county, state) being forced to adhere to these regulations is a factor that should be considered because smoke inhalation logically impacts densely populated areas more than sparsely populated areas. Commenters (1470, 1500) request that the EPA consider the needs of the less densely populated areas (rural) differently than the more densely populated areas (urban and suburban).

Commenter (1497) suggests that EPA consider creating a targeted approach to dealing with the problems of wood-burning stoves in rural areas including working with local communities to install new infrastructure for heating that does not include wood-burning devices, or where that is not feasible, working to better educate consumers on the negative health impacts they are incurring as a result of continuing to use wood-burning stoves. Commenter (1497) also states that if the number of people being affected by wood PM is very small, then regardless of the health benefits, EPA should strongly consider whether adopting this rule change is really worth the benefits to such a small population.

Commenter (1565) asserts that a ban on wood-burning stoves and fireplaces for cord wood burning is being recommended by the United Nations Environment Programme (UNEP) and believes that the U.S. government is not doing enough to limit emissions from these sources.

Commenters (0396, 0398, 0492, 0499, 0508, 0549, 0554, 0557, 0567, 0572, 0622, 0627, 0636, 0643, 0673, 0690, 0703,0709, 0753, 0793, 0805, 0813, 0837, 0888, 0909, 0920, 1030, 1193, 1206, 1354, 1385, 1420 1440, 1441 plus others too numerous to list here, totaling hundreds of comments) fully support the EPA regulating wood heaters under this NSPS but also state that wood burning should be banned entirely in populated areas where other lower-emitting fuel sources are available and should only be allowed in rural areas where no neighbors are impacted.

Commenter (1385) asserts that the EPA should "ban all burning in urban areas and neighborhoods in and outside city limits!" Commenter (1354) likewise states that wood burners will "burn no matter what and continue to smoke out others until the law actually changes to outlaw burning totally in crowded areas."

Response:

As noted in *Section 2.1.1*, the primary authority for this rulemaking is CAA section 111 which calls for technology-based and system-based standards. We are not banning wood burning in this rulemaking as commenters have made no attempt to explain how such a ban would constitute the best system of emission reduction, taking into account the relevant statutory factors. Furthermore, again looking at CAA section 111, we must set national standards, not population-based standards. For example, we are not setting different emission standards for rural areas because section 111 of the CAA does not provide legal authority for differentiated standards based on the location of the source. We note however that we have worked with many tribes, states and local jurisdictions to encourage efforts tailored towards the areas with the greatest needs. We also note that this rule does not restrict tribes, states or local jurisdictions from establishing more restrictive standards.

2.1.4 Comment: U.S. EPA versus state and local government approach

Commenters (0657, 1395, 1417, 1423, 1463, 1502, 1503, 1529, 1551, 1565, 1561, 1570, 1581, 1585) support federal regulation of wood-burning devices by the EPA. Commenters (1423, 1463, 1468) note that the time and effort required for a state-by-state approach lends to the complexity of implementing requirements for manufacturers as well as for rule writers and enforcement agencies. Commenters (0947, 1487, 1551) state the need for unified standards across the nation,

noting note that it is problematic and expensive to manufacture, test and market to different region-specific regulations. Some manufacturers (0947, 0998, 0999, 1001, 1469, 1551, 1584) have requested national regulations in an effort to avoid state and local/regional bans.

Commenter (1468) notes that it would be more efficient to refer to an existing federal standard rather than to multiple state environmental and energy agency standards and guidelines for this state's renewable thermal incentive programs. The commenter (1468) notes their inability to provide advanced notice of their standards, which results in manufacturers not having a long-term efficiency and emissions goal to target. Commenter (1468) further notes that their standards for efficiency and emissions are not necessarily shared by other states or organizations, ultimately making it challenging for manufacturers to have a common target for designing residential wood heaters. Commenter (1468) opines that the NSPS provides a clear, national target for efficiency and emissions standards that would provide a common standard for both industry and state agencies.

Commenter (1423) states that it is particularly difficult without up-to-date NSPS for local governments to simultaneously address concerns that restrictions on wood burning will prevent some people from being able to economically heat their homes while assuring others that their health won't be impacted by $PM_{2.5}$ concentrations where wood burning is more prevalent; the best solution is cleaner burning appliances.

Commenters (0510, 0536, 0537, 0573, 0580, 0646, 0657, 0750, 0908, 1122, 1153, 1226, 1557, 1558, 1591, 1667, 1668) note that local and state regulations have failed to remedy or mitigate the wood smoke emissions such commenters must endure from their neighbors' wood heaters and request strong federal EPA regulations to assist their ability to find relief. Commenter (0573) notes that restrictions in their state are not being enforced. Commenter (0646) notes that the legal rights of private property owners prevents neighbors who are breathing in the wood smoke from doing much to stop the pollution. For this reason, commenter (0646) asserts, the EPA must act. Commenter (1153) furthermore notes that they have no legal way to protect themselves from their neighbor's wood smoke and contends that the NSPS must include nuisance provisions. Commenter (0657) explains that the state has attempted to regulate uncertified outdoor wood-fired boilers, but loopholes remain, and the EPA's proposed NSPS should help lower wood smoke emissions in the future.

On the other hand, commenters (0541, 0591, 0773, 0974, 1138, 1152, 1169, 1265, 1266, 1437, 1456, 1484, 1605, 1610) contend that the regulation of residential wood heaters should be left to state and/or local governments rather than regulated nationally by the EPA. Commenter (0591) believes this is a local issue that the EPA "has no business getting involved in" because many cities and states have their own restrictions. Commenters (0974, 1456) believe it is best left up to the states and local jurisdictions to regulate wood-burning appliances, including what can be burned and when. Commenter (1437) notes the history of states like Washington requiring lower emissions than the current federal regulations and suggests that state and especially local governments have a better understanding of when particulate concentrations are too high and a greater motivation to design unique and creative ways to lower emissions. Commenter (1610) suggests that in areas where people are living in close proximity and wood smoke is a problem,

the local jurisdiction should address the issue. Likewise, commenter (1138) contends that health risks to the owners are taken on by the owner and health risks to neighbors can be handled at the local level.

Commenter (0541) suggests states be allowed to manage the length of the transition since each area has different variables (availability of feedstock, stick wood, etc.) and that action could be considered a zoning action based on population density.

Commenter (1484) contends that using the ENERGY STAR program instead of a federal regulation would allow state, local and tribal governments to set standards according to local needs and also allow manufacturers to choose what types of devices to create and at what level to seek federal certification based on where the manufacturer would like to sell the device.

Response:

As noted in several of the above responses in this section, the principal authority for this rulemaking is CAA section 111. CAA section 111 requires national standards for listed source categories. The category "residential wood heaters" was listed on February 16, 1987, and the original rule was issued on February 26, 1988. The EPA has a good history of working with states. Much of the 1988 NSPS has its roots in the first efforts by the State of Oregon. Also, the State of Washington moved the industry forward by establishing tighter standards in 1995 for heaters sold in Washington that have since been met by most wood stove manufactures. In 2007, the EPA developed a voluntary program for hydronic heaters and provided financial and technical support for the northeast states to develop a model rule that 10 states have already used as the starting point for adopting state regulations. We note that we have worked with many tribes, states and local jurisdictions to encourage efforts tailored towards the areas with the greatest needs. We note that numerous state and air agencies and the National Association of Clean Air Agencies have requested that we issue a strong federal rule as soon as possible to help them with the many wood smoke pollution problems across the nation. We also note that this rule does not restrict tribes, states or local jurisdictions from establishing more restrictive standards.

2.1.5 Comment: Supplementing regulatory approach with changeout program(s)

Many commenters (0370, 0512, 0653, 0657, 0944, 0945, 1116, 1399, 1456, 1462, 1497, 1514, 1521, 1547, 1551, 1571, 1582, 1585) state that the EPA needs to find ways to encourage and incentivize more home and business owners to replace older, outdated wood-burning devices with new ones. Commenters (1399, 1547) recommend that that EPA consider, as part of the rule, implementing incentives that would encourage homeowners to remove their old stoves. Commenter (0944) stressed that it is important to reduce emissions from existing residential wood heaters in conjunction with moving forward on updating the standards for new units. Commenter (1514) contends that a true BSER "system" approach would include a plan to replace older stoves with newer, cleaner, certified units (e.g., through incentive-based programs such as the Libby, Montana Comprehensive Stove Changeout). Commenter (0653) adds that when the price of a new stove is increased beyond its current level, swap out programs are less effective. Commenter (0653) states support for new regulations that encourage stove swap out

programs and reasonable expectations for new technology stoves to address lower emissions without putting downward pressure on stove sales. Commenter (1399) suggests that the EPA consider, as part of this rule, implementing incentives that would encourage homeowners to remove their old stoves. The commenter (1399) opines that greater emission reductions would be realized with such an approach.

Commenters (1462, 1582) recommend the EPA develop a nationwide wood stove changeout program to complement the updated standards and ensure deployment of cleaner burning devices to regions suffering from wood smoke pollution. Commenters (1521, 1582) support the implementation of a swap-out program to remove older stoves with newer and cleaner stoves. Commenter (1521) opines that a instituting a swap-out program is the best way to get the most immediate air quality improvements and reductions in air emissions from residential wood burning. Commenter (1582) notes that in order for such a program to work, consumers must have access to newer wood stoves and heaters that are affordable, and updated standards must be reasonable and technologically achievable.

Commenter (1551) supports EPA's efforts to encourage the more rapid replacement of older devices with newer more efficient models via changeout programs; focusing on areas where they will have the greatest efficacy, such as in or close to non-attainment, low income households, or focusing on devices causing severe local impacts. As the EPA has no funding for changeout programs, commenter (1551) believes it will likely require Congressional action to fund this, and it would need to be funded at a high enough level to appreciably improve air quality. Commenter (1551) supports actions by the EPA to obtain and provide funding for changeout programs and will work with the EPA to determine how to best direct any available monies allocated for changeouts.

Commenter (1116) believes that the proposed NSPS will reduce PM emissions on the new appliances with little effect on those thousands of old stoves continually dumping tons of fine PM into our atmosphere. Commenter (1116) states the average consumer cannot afford the high cost of fossil fuels or to resort to more economical, green, carbon neutral and renewable resources and that it should be the responsibility of the federal, state and local governments to help constituents find and afford suitable secondary heat sources. Commenter (1116) asserts that we need to first address the harsh polluting old stoves in our communities. The commenter (1116) states that the stove buyback program worked in Colorado, Vermont, western Massachusetts and Maine, and believes federal tax incentives combined with state incentives would eliminate hundreds of old stove and replace them with appliances that meet their current standards. Commenter (1116) concludes this, rather than the NSPS, would help improve our air quality, remove old pre-EPA stoves from our communities, spur new sales, create jobs for manufacturers and stove shops, and help drive our economy.

Commenter (1514) believes that any available resources such as rebates, discounts and tax credits should be directed towards changeouts, rather than towards a stringent Step 2 standard which (in commenter's opinion) will not improve air quality but only make consumers hold onto their old stoves due to increased prices. Likewise, commenter (1479) supports the idea of offering state tax credits to consumers for low-emitting pellet heaters/stoves to encourage

manufacturers to achieve the lowest emissions they possibly can and encourage competition in the market. Commenter (1456) believes incentives are a great way for more effective impact and replacing the old dirty burning EPA exempt products as quickly as possible is the most effective approach. Commenter (1456) asserts the American people respond the most to financial incentives more so than scare tactics and mathematical formulas about various levels of air pollution particulates. Commenter (1456) suggests a shared program with manufacturers to give trade-in discounts on new products with mandated and verifiable scrapping of old stoves. Commenter (1456) believes this trade-in approach coupled with a tax credit would really kick in interest.

Commenter (1585) says many of their state members either offer, or are poised to offer, incentives, rebates, or other finance options for residential wood heaters because a strong national standard would be more advantageous to both industry development and clean air quality than the current fragmented approach. Commenter (1497) notes that changeout subsidies / tax credit programs have had success at the state level, including in Idaho (see state law I.C. § 63-3022C) and in Maine (see state law 38 M.R.S.A. § 610-D). Commenter (1497) recommends molding Idaho's and Maine's state rules into a federal program "that would incentivize the trading in and disposal of underperforming wood stoves and heaters".

Commenter (1571) strongly supports steps to reduce particulate matter and other harmful emissions which can result from burning wood heat. The commenter (1571) asserts that they have partnered with the American Lung Association in Maine to support legislation creating with Maine DEP a wood stove swap-out program, and recently provided comment to the Maine DEP which they hope will lead to implementation of the program.

Commenter (1503) asserts that the EPA should consider additional incentives to promote clean stoves, including allowing entities to obtain state implantation plan (SIP) credits for changing out old stoves with new technology; allowing states to incorporate programs in state SIPs that provide additional incentives for using clean wood stove technology and continuing to allow changeout programs to qualify as supplemental environmental projects in EPA settlements.

Commenter (0465) asks if, because of the high cost of wood boilers, there will be a tax incentive to buy EPA compliant gasification boilers, what the incentive will be if any, and what will be the start and end date for the incentives if any. Commenter (1443) notes that it would help to have some kind of phase-out or buy-out of existing boilers to help those who will continue to be subjected to the high polluting devices. Likewise, commenter (0541) states that the EPA should add a changeout requirement to the hydronic heater rule.

On the contrary, commenter (1565) opines that changeout programs take up to 20 years and are too dangerous to pursue. Regarding cost issues that may impact changeouts, commenter (1543) reports that, according to changeout program data from their member retailers, less than 10% of the participants in wood stove changeout programs are replacing an uncertified wood heater changeout to a pellet stove using the monetary incentives provided by the changeout program. According to the commenter (1543), their members state that that the primary reason for not purchasing a pellet stove is the higher cost of the heater and fuel.

Response:

As stated in several of the above responses in this section, the principal authority for this rulemaking (and the 1988 subpart AAA) is CAA section 111 and is applicable to new sources. Further, section 111 of CAA requires NSPS to be technology-based standards based on BSER, not tax incentives, discounts and rebates. We agree with the comments that replacing old uncertified wood stoves can result in very large emission reductions and be very cost-effective. However, changeouts are outside the scope of this NSPS and the monetary cost of implementation of such a program is significant. Although these technology-based standards will reduce PM emissions from new residential wood heaters, we acknowledge that local air quality concerns may exist and that local air quality would likely benefit from existing older higher-emitting heaters being replaced with the newer lower-emitting heaters being required under these technology-based rules. Where regional air quality issues are identified, state and local government agencies may establish and implement changeout and/or tax incentive or other financial incentive programs to encourage the replacement of older higher-emitting wood-burning stoves with newer lower-emitting stoves. We have conducted workshops and provided changeout education and outreach tools for many years. See EPA's *Strategies for Reducing Residential Wood Smoke* document on the EPA Burn Wise website for more details.[7]

Changeout programs can use financial incentives to encourage the replacement of older wood-burning appliances with cleaner home heating options. The Burn Wise website at http://www.epa.gov/burnwise/how-to-guide.html presents guidance on "How to Implement a Wood-burning Changeout Program." For example, as with other states that have regional concerns, Oregon has established changeout and tax incentive programs that encourage the replacement of older higher-emitting wood-burning stoves with newer lower-emitting stoves. Similarly, leveraging local, state and federal funds, the Fairbanks North Star Borough implemented a wood stove and hydronic heater changeout and removal program as part of the area's $PM_{2.5}$ reduction strategy. The Borough also developed education and outreach materials and investigated several voluntary programs, including dry kiln and utility subsidy programs. The program also provides funds for repairs and retrofits. (See www.agfairbanks.com/wood-stoves/. In another example, the Yakima Regional Air Agency partnered with local hearth retailers and others to implement a recurring woodstove changeout campaign. (see www.epa.gov/burnwise/pdfs/Yakima.pdf for a summary of this campaign.)

Other financial incentives (including tax incentives) can also be used to encourage households to replace or retrofit old wood-burning appliances. The EPA's *Strategies for Reducing Residential Wood Smoke* document (http://www.epa.gov/burnwise/strategies.html, pages 21-24) outlines financial incentives that can be used including discounts/vouchers, tax credits, property assessed clean energy and federal program incentives. State, local and tribal agencies – as well as retailers

[7] Strategies for Reducing Residential Wood Smoke. EPA-456/B-13-001, March 2013. Prepared by the Outreach and Information Division, Air Quality Planning Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. (http://www.epa.gov/burnwise/strategies.html)

and manufacturers – have the ability to establish tax incentives, discounts and rebates if they choose to. For example, as noted in the EPA's *Strategies* document, Oregon offered a Residential Energy Tax Credit Program for the highest energy efficient stoves (see www.oregon.gov/ENERGY/CONS/RES/tax/HVAC-Biomass.shtml) and Idaho offered tax payers who bought new wood stoves, pellet stoves or natural gas or propane heating units for their residences a tax deduction to replace old, uncertified wood stoves (*see* www.deq.state.id.us/air/prog_issues/burning/wood_stove_tax_deduction_brochure.pdf).

2.2 Air Quality and Health Impacts of Wood Smoke

2.2.1 Comment: Health effects of wood smoke

Commenters (0742, 0751, 0809, 0833, 0940, 0942, 0943, 0944, 0946, 0952, 0963, 1086, 1114, 1192, 1293, 1423, 1465, 1473, 1477, 1487, 1488, 1520, 1534, 1538, 1551, 1557, 1576, 1606, 1714, 1715, 1750, plus many others too numerous to list) describe the impact of fine particulate matter (PM) and other wood smoke constituents resulting from wood smoke emissions, including many personal stories of specific harm to health from their own or a neighbor's wood smoke emissions. The commenter (1557) concludes that while it is encouraging to see the EPA is finally regulating outdoor wood boilers / hydronic heaters, the regulation will not help families living near existing boilers and notes that they "have been living a real life experiment against our will, receiving concentrated dosings of wood smoke particulates and toxins on a reoccurring basis".

Commenter (1465) notes the greater evidence defining the public health risks from $PM_{2.5}$ compared to when the 1998 rule was established and states that this NSPS should reflect the health findings from the 2012 $PM_{2.5}$ NAAQS review. Commenter (1520) provides additional information that has become available since the EPA's proposal regarding the adverse effects of wood smoke particles. Commenters (0942, 0943) provide multiple statements telling of the health and financial costs of being exposed to a neighbor's wood smoke emissions. Commenter (0943) describes the results of a study (also in the docket as a Supporting Document) conducted by Environment and Human Health of the indoor air of homes that were in the vicinity of outdoor wood furnaces, which found significant indoor $PM_{2.5}$ concentrations and resulting health impacts. Commenter (1239) expects the proposed rule to lessen the adverse health effects of $PM_{2.5}$, VOCs and CO on Tribal members.

Numerous commenters (1534 plus 56 other comments) joined an American Lung Association petition which noted that wood smoke can damage the lungs and heart, trigger asthma attacks and heart attacks, cause cancer and developmental and reproductive harm, and even cut lives short. These commenters stated that children and teens, the elderly, people with asthma, lung and heart disease, or diabetes, and even healthy adults who work or exercise outdoors need more protective safeguards against wood smoke.

Commenter (1521) provides information to support the adverse health effects (especially for higher risk populations, such as children) from exposure to PM, CO, nitrogen oxides (NO_x), VOC (including hazardous air pollutants, HAP), and polycyclic aromatic hydrocarbon (PAH)

emissions. The commenter (1521) also provides information to support that smoke from wood stoves and fireplaces is a source of PM, CO, NO_x and VOC emissions.

Several commenters (0809, 0963, 1465) express specific concern regarding particle pollution health effects. Commenter (0963) states that particulate pollution is known to harm the lungs, especially children's lungs, noting that 25% of wintertime particulate pollution in parts of New Hampshire is attributable to residential wood burning. Commenter (0809) reports that "[a] study in Vancouver (Intake Fraction of Urban Wood Smoke, Ries et al. *Envir Sci Tech*, 2009) reported that wood smoke particles are 7 times more likely to be breathed into our lungs than the average $PM_{2.5}$ particle in the air."

Commenters (0751, 0833, 1192) specifically note that exposure to residential wood smoke and/or PM pollution has been linked to adverse respiratory effects and increased visits to the hospital. Commenter (1192) states exposure to fine PM pollution can cause or worsen respiratory illnesses, such as asthma and chronic obstructive pulmonary disease and cardiovascular disease, and is associated with increased hospitalization and mortality rates. Commenter (0751) notes that "[a] growing number of studies indicate that exposure to residential wood smoke is linked to adverse respiratory health impacts such as an increase in emergency room visits and respiratory symptoms in children as well as decreased lung function." Commenter (1555) reports that their "son has had his asthma return after three surrounding neighbors have purchased wood fired heaters." According to commenters (0833, 1086), new research has found that deaths from all-causes, but particularly cardiovascular and respiratory disease, could be significantly reduced with a decrease in wood-smoke.

Commenter (1473) notes that a report by the State of Alaska Division of Epidemiology found that elevated concentrations of ambient $PM_{2.5}$ levels in the Fairbanks North Star Borough were associated with increased risk of hospitalizations due to cerebrovascular disease in all persons and respiratory tract infections in persons aged <65 years during the study period. Commenter (1473) concludes that there are obvious health benefits from reducing wood smoke and health benefits translate into economic benefits, with reduced health care costs chief among them.

Commenter (0781) reports that the nation's first scientific study on the effects of wood smoke in smokers shows that wood smoke is associated with chronic obstructive pulmonary disease (COPD). The findings were recently published in the *American Journal of Respiratory Critical Care Medicine*, a publication by the American Thoracic Society."

Other commenters (0851, 0893) specifically express concern that their lymphoma could have been caused, in part, from their exposure to wood smoke.

Commenter (0684) reports that"[i]n February 2008, the Supreme Court of Ontario found that Brenda and David of Hamilton, Ontario had suffered harm "severe enough to deprive [them] of the ability to stay outdoors in their yard, or to go to the house and leave the windows open. According to the commenter (0684), it even caused them some disturbance when the windows were closed and that the judge ordered $270,000 in damages and legal costs and forbade the neighbors from using their wood-burning stove in their garage.

On the contrary, some commenters (0503, 1022, 1104, 1106, 1142, 1498, 1552, 1536) believe that wood smoke is not a health concern, claiming that wood burning is a natural process people have been engaged in for eons (1104 1106), that the EPA is using "secret science" (1536) and lacks scientific proof (0503, 1022), and that the EPA should address more pressing environmental and health issues. For example, commenter (1142) states that the EPA does not need to ban wood stoves by making pollution standards impossible to meet, because the public is not clamoring for this and wood smoke does not harm anyone. According to the commenter (1142), wood smoke is harmless, people are indoors when it is being produced, and the EPA should not give in to environmentalists who sue the Agency.

Response:

We recognize the substantial concerns of the many commenters who took the time to submit their official comments to the docket, reinforcing that the concerns they have about the health effects of emissions from residential wood heaters are numerous and substantial. We agree that particulate pollution from wood heaters is a significant national air pollution problem and human health issue. We have also highlighted the health effects of wood smoke in the rule's preamble under especially section I.A. of the preamble's executive summary and section II.B. entitled "Why is Residential Wood Smoke a Concern?"

2.2.2 Comment: Contribution to air quality including $PM_{2.5}$ NAAQS impacts

Commenters (0657, 0726, 0944, 0963, 1157, 1249, 1465, 1473, 1551, 1558, 1559, 1611, 1718) express concern regarding residential wood combustion emissions contributions to PM, $PM_{2.5}$ NAAQS and CO impacts in communities across the U.S.

Commenter (1465) notes that the 2008 National Emissions Inventory indicates that residential wood combustion is a greater source of primary $PM_{2.5}$ than either the power sector or the mobile sector in New York State and furthermore that one-third of wintertime $PM_{2.5}$ in the city of Rochester, NY was due to wood combustion despite data indicating 82.5% of county residents rely on natural gas as a home heating fuel. This commenter (1465) also notes that the U.S. Energy Information Administration (EIA) determined that the use of low-cost wood fuel as the main heating source increased by 50% from 2005 to 2012 in the Northeast.

Commenter (1473) notes that the poor air quality in the Fairbanks, Alaska non-attainment area highlights the adverse effects of wood heating devices on local air quality and underscores the need for updated emissions standards. This commenter (1473) explains that on days that violate the 24-hour $PM_{2.5}$ NAAQS, it has been estimated that more than two-thirds of the pollution is attributable to wood smoke from residential wood heaters and that outdoor wood boilers are a particular problem.

Commenter (1551) asserts that, in the Northeast States for Coordinated Air Use Management (NESCAUM) region, air pollution from residential wood combustion has a disproportionate impact due in large part to the Northeast's colder climate and relative abundance of wood, and is one of the largest sources of PM in the Northeast. Commenter (0963) states wood combustion

devices contribute 25% of wintertime particulate pollution in parts of New Hampshire. Commenter (0657) describes how the topography of the Green Mountains of Vermont traps and keeps air pollution from residential wood burning and other sources during winter stagnation events at levels that can harm public health. The commenter (0657) expressed concern with the health impacts of exceeding the 24-hour $PM_{2.5}$ standard and with short-term spikes in $PM_{2.5}$.

Commenter (1718) provides an August 2014 *Inhalation Toxicology* journal article entitled "Outdoor wood furnaces create significant indoor particulate pollution in neighboring homes." According to the commenter (1718), the $PM_{2.5}$ levels exceeded the 24-hour NAAQS levels in all homes studied, which varied in distance – ranging from 30 to 259 meters – away from the emitting hydronic heater.

Some commenters (0572, 0679, 1441) support banning wood burning altogether due to wood smoke's contribution to poor air quality. Commenter (0572) asserts that any crowded area needs to stop burning wood to improve air quality. Commenter (0679) notes that Montreal is considering banning all wood burning by 2020 due to "winter smog" air quality concerns. Commenter (1441) concludes that "it's time to ban wood burning entirely if we are serious about improving air quality for all and trying to impact the course of climate change." *Note: see Section 2.1.3 for a partial list of the numerous commenters who supporting banning wood burning in especially populated areas due to health concerns*.

On the contrary, skeptical regarding residential wood combustion's contribution to the PM NAAQS exceedance, commenter (1643, Attachment 12) provides a summary of a "Review of NYSDEC Modeling Study for NESCAUM Model Rule and NAAQS Compliance Evaluation for EPA Voluntary Phase 1 Compliant Outdoor Hydronic Heaters." The commenter (1643) finds that the NYSDEC model approach and procedures were consistent with industry practice, but the model input data pertaining to stack and building configurations deviated from expected outdoor wood-fired hydronic heater (OWHH) manufacturer installation recommendations for Phase 1 units, which state that the OWHH stack should be constructed at a height of at least two feet taller than the tallest adjacent structure. The commenter (1643) add that the modeled mass emissions were overstated for the heater sizes evaluated by the NYSDEC and were in excess of the emissions anticipated from a large OWHH. When the commenter (1643) remodeled the emissions using corrected inputs, the commenter finds that OWHHs installed according to manufacturer installation requirements for Phase 1 units are compliant with the $PM_{2.5}$ NAAQS. For more information on the modeling inputs, scenarios and results see Attachment 12 of the comment (1643).

Likewise, commenter (1643, Attachment 13) provides a summary of air dispersion modeling that was performed with the U.S. AERMOD model and following EPA guidance to determine the effect of a central boiler OWHH E-Classic Model 2300 on air quality. The commenter (1643) states that the modeling results demonstrate that maximum predicted 24-hour $PM_{2.5}$ concentrations from operation of a Central Boiler E-Classic 2300 model are in the range of 0.5 to 2.9 μg/m3, and therefore, are safely in compliance with the 24-hour (NAAQS) for $PM_{2.5}$ of 35 μg/m3. The commenter (1643) concludes that operation of a Central Boiler E-Classic 2300 OWHH with a stack height two feet above the roof peak does not adversely affect air quality or

public health, either on the homeowner's property or off-site. For more information on the modeling inputs, scenarios and results see Attachment 13 of the comment (1643).

Commenters (1543, 1550, 1643) add that given that the ambient impacts of qualified appliances fall well below the 24-hour NAAQS standard, there is no need for "real time" ambient monitoring, *e.g.*, using the method developed by NESCAUM and the New York State Energy Research and Development Authority (NYSERDA). The commenters (1543, 1550, 1643) state that HPBA commissioned an assessment of that monitoring method, which concluded that the method lacks a sound scientific basis. *See* Attachment 14 to comment (1643). The commenters (1543, 1550, 1643) conclude that the proposed rule fails to give appropriate weight to these remarkable recent accomplishments in regulations and technology and, as a result, would, if implemented, impose unreasonable burdens on manufacturers and consumers.

Commenter (1437) contends that the regulation of PM under the NAAQS makes the proposed rule an indirect and perhaps impractical way to achieve EPA's objectives.

Commenter (1140) states that any wood-burning device can produce pollution if improperly operated but that modern units are much more efficient and clean burning. Because most of these devices are used in rural settings with low population densities, commenter (1140) believes there is little chance for concentration of particulates or gases.

Commenter (1456) sympathizes with homeowners that experience excessive smoke from some wood burning neighbors and agrees that there are locales that are heavily populated and need regulation. However, commenter (1456) thinks that hysteria reigns when people merely detect the smell of wood smoke, claiming that a sampling of letters from the public comments about bad experiences with neighbors burning wood are extreme cases, anecdotal and not a true picture of the population's experience as a whole. Commenter (1456) explains that a slight smell in the air is not like holding your head over a smoke stack and inhaling and further notes that they have been burning wood for over 35 years inside the city limits of their small town without a complaint. Likewise, commenter (0448) does not think wood stoves cause that much air pollution, stating the smoke coming out of the chimney may be visible, but it usually is not that bad outside. Commenter (0448) adds that wood stoves tend to be used in rural areas, not urban and the smoke usually is not that bothersome.

Commenters (0440, 0501, 0507, 0552, 0553, 0539, 0540, 0544, 0559, 0593, 0607, 0609, 0612, 0615, 0765, 0769, 0907, 0912, 0916, 0918, 0975, 0976, 0978, 1025, 1038, 1061, 1118, 1132, 1138, 1180, 1238, 1386, 1439, 1524, 1623) generally question the significance of residential wood smoke's contribution to air quality concerns and also believe the rule will have a negligible impact on reducing air pollution. For example, commenter (0612) believes that more people need to choose wood heat, not fewer, and that the amount of pollution from residential wood heaters is very negligible. Likewise, commenter (0615) believes that emissions from wood burning are infinitesimal compared to public buses that EPA refuses to regulate and also believes fracking is a much bigger concern. Commenter (0607) doubts that residential heating systems amount to "half of a percent of pollution". Commenter (0440) believes that "emissions from home fireplaces or wood stoves cannot amount to a proverbial pea in the dish when compared to even

the pollution that is carried from other countries to us on the winds". Commenter (1623) feels that this rule would not be as effective as would one that targeted a bigger problem (i.e. factories or corporations), because the amount of wood burning as opposed to factory pollution is minimal, according to the commenter. Commenter (0610) contends that the 4,825 PM reduction per year amounts to only half of 1% of total $PM_{2.5}$ emissions from the 17 sectors and wonders "how relevant PM estimates are to the larger potential health, life, safety risks facing Americans today". Commenter (0610) also wonders how residential wood heater emission estimates compare to wildfires, prescribed burns, deserts, forests, oceans (sea spray), and volcanoes. Commenter (0976) claims that "whatever emissions [wood heaters] cause are so small as to not really matter in terms of limiting air pollution. Clean air is better attained by going after the major polluters..." Commenter (1138) concludes that "residential wood stoves collectively make up such a minute portion of today's pollution sources that virtually any effort devoted by the EPA to enforce or enhance any regulations is blatant waste of funds."

Response:

We recognize the substantial concerns of the many commenters who took the time to submit their official comments to the docket, reinforcing that the concerns they have about the air quality impacts of emissions from residential wood heaters are numerous and substantial. We agree that particulate pollution from wood heaters is a significant national air pollution problem, causing and exacerbating air quality impacts. As noted in the preamble, each year smoke from wood heaters produces hundreds of thousands of tons of fine particles throughout the country – mostly during the winter months. Nationally, residential wood combustion accounts for 44% of total stationary and mobile polycyclic organic matter (POM) emissions, which account for nearly 25% of all area source air toxics cancer risks and 15% of noncancer respiratory effects.[8] Residential wood smoke causes many counties in the U.S. to either exceed the EPA's health-based NAAQS for fine particles or places them on the cusp of exceeding those standards.

Although CAA section 111 standards are based on BSER, not health risk targets, we are very concerned about many of the commented-upon health effects, such as those regarding New York State and Fairbanks, Alaska. As stated, residential wood combustion is a greater source of primary $PM_{2.5}$ than either the power sector or the mobile sector in New York State and one-third of wintertime $PM_{2.5}$ in the city of Rochester, NY was due to wood combustion despite data indicating 82.5% of county residents rely on natural gas as a home heating fuel. As also stated, poor "air quality in the Fairbanks, Alaska non-attainment area highlights the adverse effects of wood heating devices on local air quality and underscores the need for updated emissions standards." This commenter (1473) explains that on days that violate the 24-hour $PM_{2.5}$ NAAQS, it has been estimated that more than two-thirds of the pollution is attributable to wood smoke from residential wood heaters and that outdoor wood boilers (OWB) are a particular problem." We have determined that these air quality issues are real, sufficiently demonstrated by the data

[8] *Strategies for Reducing Residential Wood Smoke*. EPA-456/B-13-001, March 2013. Prepared by the Outreach and Information Division, Air Quality Planning Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. pp. 4-5. (http://www.epa.gov/burnwise/strategies.html)

and outweigh industry modeling efforts to attempt to show that OWB are not a problem or claims that wood smoke pollution in general is not a significant problem.

2.3 Emission Reduction Estimates

2.3.1 Comment: Estimated shipment / sales forecast as proxy for projected emissions

Commenter (1551) states the EPA's analysis used the higher end of redesign costs and a 2% rate to forecast industry growth when recent industry data suggest that between 2012 and 2013, the industry grew at a rate of 12% to 15% (Attachment C of comment). Based on these data, commenter (1551) believes that EPA may be underestimating future growth in this sector. Commenter (1551) supports the use of information from the EIA forecasts as a predictor rather than anticipated GDP. Commenter (1551) asserts an analysis by EIA shows that significant growth has occurred in the Northeast, where states have experienced a 60% to 160% increase from 2005 to 2012 in the number of households that rely on wood as their main heating source even when the economy has lagged. Commenter (1551) believes this suggests that projected GDP trends will not necessarily correlate well with wood use trends. Commenter (1397) likewise states it may be reasonable to expect an upward trend toward renewable fuels and an increased need for low emission biomass devices.

On the other hand, commenters (1506, 1543, 1547, 1550, 1643) note that EPA's projection that sales of each appliance type will grow at 2% per year, despite large price increases for some models and modest price increases for others, is unlikely and inaccurate. Commenters (1543, 1550, 1643) note that the economic implications of policies affecting consumer changeout are explored in National Economic Research Associates' (NERA's) economic analysis, and NERA's modeling plainly demonstrates that any tightening of the current NSPS limit is certain to carry demand impacts, with fewer consumers willing to changeout ("scrap") their old, uncertified appliances for new, lower emitting, but less affordable ones. The commenters (1543, 1550, 1643) conclude that while aggregate emissions still would be reduced, the total reduction is considerably offset by the adverse scrappage effect. The commenters (1543, 1550, 1643) add that, as the uncertified wood stoves still in homeowner use continue to age, their emissions may only get worse. According to the commenters (1543, 1550, 1643), under an overly stringent emission limit, incremental emissions reductions are significantly neutralized due to the significantly diminished incentives for the elimination of existing uncertified wood stoves responsible for the vast majority of total emissions.

For example, regarding wood stove shipments of new units, commenters (1543, 1550, 1643) claim that in the case of the Step 1 4.5 g/hr NSPS limit, new wood stove sales would be reduced by 2,500 (a 3.4% reduction). Commenters (1543, 1550, 1643) estimate that approximately 1,007 preexisting wood stoves otherwise exchanged would remain in use, representing about 31 tons of annual emissions. The demand and scrappage impacts are even greater going to steps 2/3. Commenter (1547) cites HPBA comments based on the NERA report that imposing a 2.5 g/hr alternative Step 2 standard would cause room heater sales to drop off by nearly 20% and under the proposed Step 2 standard of 1.3 g/hr, sales would be cut by almost a third.

Likewise, commenter (1506) contends that EPA's emission reductions and associated health benefits are overstated if consumers respond to appliance price increases by keeping their old devices longer. The commenter (1506) notes that it is even possible the rule will cause emissions to increase instead of decrease, but "we cannot know unless EPA uses more realistic assumptions in its RIA". *Note: See Section 7.1.1 for more extensive summaries of commenters' concerns regarding the unintended consequence of consumers holding onto their old stoves in response to potentially increased prices of new stoves under the rule.*

Commenter (1436) notes that a certificate in place is no indication of sales volume in the field. Commenter (0953) states that the EPA has vastly overestimated the number of stoves sold per model line, which [also] means the cost impacts are much larger than estimated. Commenter (0953) provides an example of one company with five models of EPA certified stoves that only sells 700 to 800 units per year.

Commenter (1437) notes that if EPA is correct that "most stoves emit for at least 20 years and often much longer", thereby assuming a shorter lifespan than is actually the case, then the EPA is overestimating the rate of wood heater replacement (i.e., sales/shipments). The commenter (1437) reasons this overestimation of replacement would in turn cause an overestimation of emissions reduction and consequently benefits.

Response:

As discussed in the EPA's Regulatory Impact Analysis (RIA), the EPA recognizes that there may be variations in short term growth rates but we believe the GDP is the best indicator for long term growth rates. To the degree that growth rates are actually higher than GDP rates, the cost effectiveness for the NSPS will be better, not worse. Thus, we are satisfied with using the GDP rate for our decisions in this rule. Similarly, as discussed in the RIA, the actual number of new models per manufacturer may be less than our estimates and thus there would be less total cost per manufacturer for R&D and more units sold per model line. If so, our cost-effectiveness would be better, not worse. We are satisfied with using the manufacturers' stated numbers of models for our decisions in this rule. Regarding the contention that we overestimated the number of stoves sold per model line, our shipment (sales of new units) estimates were derived from market research performed by the reputable market research company, Frost & Sullivan, at proposal. For the final rule, we have updated these estimates with new wood stove and hydronic heater sales estimates provided by HPBA's economic consultant, NERA. These two industry-provided sales figures were slightly larger, not smaller, than our original sales estimates at proposal for the given years.

See *Section 7.1.1* for our response to commenters' concerns regarding the potential consequence of consumers holding onto their old stoves longer.

2.3.2 Comment: Actual emissions versus certification levels

Commenter (1643, Attachment 11) states that one of the most significant problems with the EPA's emission reduction calculations is the assumption that actual emissions are proportional to

certification levels for each model. The commenter (1643) states analyses by Houck and Curkeet-Ferguson dispute this assumption, and suggests that the EPA's emission reductions estimates are overstated.

Response:

The EPA recognizes that laboratory certification values are different than actual in-home use emissions. (This is one of the reasons that we encourage manufacturers to move to cord wood testing rather than laboratory crib testing, as cord wood is more typically used by consumers.) We have reviewed the cited analyses again and still conclude (as at proposal) that the use of actual field test values and laboratory values in AP-42 and in the Residential Wood Combustion (RWC) Tool, combined with ratios between the required emission levels, is a sound way to estimate the emission reductions and many of the differences tend to counterbalance each other.

2.3.3 Comment: Accounting for non-rule-related market changes affecting baseline emission estimates

Commenter (1437) contends that the EPA's failure to account for the consumer- and manufacturer-based innovations that would have occurred absent any regulation, results in an overestimation of the baseline emissions and, therefore, exaggerated emission reduction and benefit estimates. The commenter (1437) suggests that the EPA should generate a "smaller, more realistic emissions baseline" by using trends in nonfederally regulated emissions reductions to project future emission improvements that will take place without any new regulation.

Likewise, commenter (1497) notes that if R&D is already occurring on the part of manufacturers then the EPA's emission reduction and therefore benefit estimates may be too high. Commenter (1497) contends that any emission reductions (and therefore benefits) that would have accrued regardless of the new rule should not be included as benefits that would be caused by the new rule.

Response:

The EPA did not take any emission reduction credits for marketplace innovations that would occur in the absence of the revised NSPS. For example, the baseline emissions are already lower to incorporate the percentage of stoves that already meet the Washington State emission standard that we are using for NSPS Step 1. Specifically, we estimated that all new wood stoves meet the AP-42 emission factors for "Phase II" stoves (the current NSPS promulgated in 1988) and therefore started with the lower AP-42 Phase II emission factors for catalytic and noncatalytic stoves at baseline, rather than the higher average of all AP-42 emission factors used in the RWC Tool database. Furthermore, to avoid any potential for overstating baseline emissions, we went a step further and assumed that all new shipments will meet the current Washington State limits, which are approximately 40 percent less than the 1988 NSPS Phase II limits. We therefore used baseline emission factors which are 60 percent of the AP-42 Phase II emission factors – less than half the value used in the RWC Tool to represent the average of all AP-42 emission factors – in order to ensure a forward-looking and understated baseline. Finally, again in order not to overstate emission reductions caused by the NSPS, baseline and post-NSPS emissions were discounted by the percentage of appliances already meeting the Step 2 limit (i.e., prior to/without

this NSPS). We only take credit for new stove models that will be required to meet Step 1 or Step 2 that do not already meet those levels. We are also careful to account for the manufacturing R&D costs for updating all non-compliant model lines to meet the revised NSPS. Those efforts would not be occurring if the EPA had not announced our intentions to tighten the standards.

2.4 Benefit Estimates

2.4.1 Comment: Health outcomes considered in benefits assessment

Commenter (1465) believes the EPA should expand its assessment of health benefits to improve upon its determination of BSER. Specifically, commenter (1465) states that in its determination of BSER, the EPA should consider other health outcomes besides $PM_{2.5}$-related mortality in its monetization of health benefits associated with reducing wood smoke emissions. For example, commenter (1465) notes that $PM_{2.5}$ in wood smoke is also an asthma trigger. In New York, 1.3 million adults and 475,000 children have asthma (childhood rate is 11%), according to commenter (1465), and 165,000 Emergency Department visits per year, 39,000 hospitalizations and 255 deaths per year associated with asthma. While not all asthma cases are a result of exposure to wood smoke, commenter (1465) believes that monetization of asthma and other major non-mortality adverse wood smoke health effects would likely support the need to achieve greater reductions in emissions.

Commenter (0946) believes the human health benefits of this proposal are profound as the emissions reductions will result in up to 470 fewer lives lost every year for the next 8 years, prevent 10,000 upper and lower respiratory symptoms in children ages 7-14 and 15,000 asthma attacks in kids ages 6-18 every year. Likewise, commenter (1114) notes that the societal and financial burden of asthma and other health conditions exacerbated by wood smoke is heavy and by requiring wood stove manufacturers to adopt newer technologies, the proposed standards will save lives and prevent illness, helping to keep kids who suffer asthma attacks in school and workers on the job.

Commenters (0422, 0455, 0681, 1594) note that the true cost of wood heater emissions are externalized to neighbors and beyond in the form of health costs and other impacts. Commenter (1594) requests that the EPA hire an economic consultant to estimate the externalized costs to society of burning wood.

Commenter (0431) asks the EPA to explain how the link between current extra health issues and wood stoves was established, and how the current extra health expenses were calculated.

Response:

The RIA at proposal and for the final rule include all possible health impacts associated with exposure to wood combustion-related $PM_{2.5}$. Table 7-1 of the RIA on human health effects of ambient $PM_{2.5}$ has an extensive list of the above-mentioned health endpoints that were considered and monetized, including exacerbation of asthma among children. However, several were only assessed qualitatively due to time and resources limitations. Table 7-2 of the RIA

shows the results of the assessed health incidence reductions and related benefits from $PM_{2.5}$ reduced exposure associated with this NSPS.

2.4.2 Comment: Expand benefits assessment to cover additional pollutants and outcomes

Commenter (1484) suggest that the EPA's benefits assessment is incomplete without estimating the benefits derived from reductions in CO and VOCs.

Commenter (1496) suggests that perhaps the single most important flaw in the EPA's benefit analysis is the exclusion of certain non-human health-related benefits from the benefit-cost analysis including: environmental degradation; accelerated depreciation of capital; haze; contribution to anthropogenic climate change; and harm to pets and livestock. The commenter (1496) notes that these uncounted benefits may be equivalent to or even substantially larger than the EPA's monetized benefits.

Response:

The EPA understands that the benefits assessment reflects only a subset of the benefits attributable to the health effects reductions associated with ambient fine particles. Limitations in data, time and resources prevented the EPA from quantifying the impacts to or monetizing the benefits from several important benefits categories, including benefits associated with the potential exposure to ozone formation due to VOC emissions as a precursor, VOC emissions as a $PM_{2.5}$ precursor, CO, as well as ecosystem effects, and visibility impairment due to the absence of air quality modeling data for these pollutants among others in this analysis. However, the EPA provided an extensive qualitative assessment of those benefits. The EPA realizes that the benefits presented are an underestimate of the overall benefits resulting from this rule.

2.4.3 Comment: Accounting for greenhouse gas emissions in the benefits assessment

Commenter (1497) notes the lack of an EPA analysis regarding how greenhouse gas (GHG) emissions will be affected by the rule. The commenter (1497) believes that it is likely that a reduction in GHG emissions would increase the benefits of this rule and it would be worthwhile for the EPA to analyze and explain the quantitative impact the rule will have on GHG. According to the commenter (1497), "such an analysis could make the case for a stronger proposed rule and may even act as further incentive for the adoption of the proposed rule".

Commenter (1565) reports that Senator Boxer testified that climate costs could be 10 times the fuel cost for coal. According to the commenter (1565), this would also apply to wood. The commenter (1565) asserts that the cost saving for burning wood are about $1,000 to $2,000 per year and that the climate cost to society and the government could be on the order of $10,000/burner/year. According to the commenter (1565), health costs are about $3,000/old stove/year, so it might be around $1,000/new stove/year. The commenter (1565) opines that someone needs to calculate these costs and that cutting down trees and burning wood is

destroying our best carbon sequestration system and the cost of climate change needs to be estimated for industry and other sources (like home energy sources).

On the other hand, commenter (1437) notes that carbon dioxide is a by-product of heat and energy production that is not accounted for by the EPA in its estimation of benefits and its accounting could lower rather than raise the benefit estimates. Commenter (1437) claims that unlike traditional heating fuel such as oil, gas and coal, the trees grown for wood heating fuel sequester carbon dioxide; the commenter furthermore claims that using a full lifecycle measure wood-based fuel produces much less net carbon dioxide emissions than other traditional fuel sources (citing US EPA and Air Waste Management Association Conference. Emission Inventory: Living in a Global Environment, v. 1, pp 373–384, 1998). Commenter (1437) concludes that by not estimating the additional emissions of carbon that will take place as citizens switch from wood to other fuel sources (due to the increased price of wood heaters), EPA overestimates the net benefit. According to this commenter (1437), given the EPA's concern over carbon dioxide emissions in other RIAs, the agency should include the social costs of greater carbon emissions as customers switch from wood to other fuel sources. Commenter (1437) furthermore notes that because the 2013 interagency working group that calculated the new social cost of carbon (SCC) did not take comments from the public, the EPA should continue to use the old SCC until such time as the public has had a chance to comment sufficiently on the methodology used in the interagency working group report and the report has been subject to peer review [citing Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," (May 2013) and U.S. Department of Energy, (DOE) Office of Energy Efficiency and Renewable Energy, "Energy Conservation Program for Consumer Products: Landmark Legal Foundation; Petition for Reconsideration," 78 FR 159 (August 16, 2013)]. Commenter (1437) notes that if the proposed rule increases net carbon emissions, the net benefit of the proposed rule will be reduced by a smaller amount when using the older and lower SCC.

Response:

The EPA agrees that there will be added benefits from assessing impacts of emission reductions of CO, CO_2, methane and black carbon. While we know that these emissions will be reduced along with the reductions of PM emissions and the increases in efficiency of the affected heaters, we do not have robust emissions test data to make quantitative benefits analysis on climate change at this time. Several comments noted the lack of analysis on the GHG emissions impacts of the proposed rule. As discussed in the preamble, EPA noted the potential benefits of reduced climate effects due to reduced black carbon emissions (FR 6333) but the impacts were not quantified. The CO_2 impacts of the proposed (and final) rule were not evaluated due to the lack of reliable data on the CO_2 emissions profile of affected units.

The EPA's biogenic CO_2 assessment framework is expected to provide important information regarding the scientific and technical considerations associated with assessing biomass-derived fuels and their net atmospheric biogenic CO_2 contributions related to the growth, harvest and use of these fuels at stationary sources. The EPA is in the process of revising the assessment

framework and considering next steps, taking into account Science Advisory Board (SAB) peer review comments the SAB and feedback from stakeholders. Information on related CO_2 consideration by the SAB can be found in the official website http://yosemite.epa.gov/sab/sabpeople.nsf/WebCommittees/BOARD.

Regarding one commenter's concerns on the interagency SCC estimates, the EPA notes that the SCC represents the monetized net damages of incremental changes in the amount of CO_2 emissions in a given year. The SCC is meant to be a comprehensive estimate of the monetized value of the net effects (both negative and positive) of global climate change, including, but not limited to, changes in net agricultural productivity, energy use, human health effects, and property damages from increased flood risk. In February 2010, after considering public comments on interim values that agencies used in a number of rules, an interagency group of technical experts, coordinated by OMB and the Council of Economic Advisers (CEA), released improved SCC estimates. The interagency group estimated the improved SCC values using the most widely cited climate economic impact models. Those climate impact models, known as integrated assessment models, were developed by outside experts and published in the peer-reviewed literature. Recognizing that the models underlying the SCC estimates would evolve and improve over time as scientific and economic understanding increased, the Administration committed in 2010 to regular updates of these estimates. In May 2013, after all three of the underlying models were updated and used in peer-reviewed literature, and agencies received public comments urging them to update their estimates, the interagency group released revised SCC values.

The EPA and other agencies have sought public comment on the SCC estimates as part of various rulemakings. In addition, OMB's Office of Information and Regulatory Affairs recently sought public comment on the approach used to develop the estimates. The comment period ended on February 26, 2014, and OMB is reviewing the comments received. Given that CO_2 impacts of the proposed (and final) rule were not analyzed, the SCC estimates were not used in the regulatory impact analysis.

2.4.4 Comment: Use of cost-of-treatment rather than willingness-to-pay

Commenter (1484) notes that the willingness-to-pay derived estimates are not available for all examined health effects, resulting in the EPA using the cost of treatment for the mitigation of such an effect in its place when estimating benefits.

Response:

The EPA agrees that it quantified the economic value of avoided $PM_{2.5}$-related health impacts using both cost of illness as well as willingness to pay measures.

2.4.5 Comment: Use of "Value per Statistical Life"

Commenter (1506) notes that the EPA's use of the Value per Statistical Life (VSL) – that is, the dollar value attributable to mortality risk reduction – when monetizing benefits is a source of uncertainty. The commenter (1506) reiterates the Office of Management and Budget's (OMB's)

concern that the VSL is taken largely from studies of the willingness to accept risk in the labor market and might not necessarily apply to health status. Commenter (1506) claims that this caveat is particularly important in the case of $PM_{2.5}$ because "the median age of the beneficiaries of reductions in fine particles is around 80 years old, and the average extension in life expectancy attributable to lower $PM_{2.5}$ levels is less than six months" (citing Table 5-8 of U.S. EPA "The Benefits and Costs of the Clean Air Act, 1990-2020," March 2011. Available at: http://www.epa.gov/air/sect812/feb11/fullreport.pdf).

In keeping with OMB's general recommendations regarding the use of labor market studies in health risk analyses, commenter (1506) suggests that the EPA report benefits based on the value of statistical life-years (VSLY) extended, as well as lives saved, and also present alternative benefit-per-ton estimates derived from a VSLY (citing Circular A-4 Primer, available at: http://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/circular-a-4_regulatory-impact-analysis-a-primer.pdf).

Commenter (0667) notes that the Institute of Health Metrics and Evaluation (IHME) in Seattle has a new way of calculating health risks using Disability Adjusted Life Years (DALYs) and recommends looking into the calculation regarding ambient air pollution as compared to traffic accidents.

Response:

While the Agency is updating its guidance by incorporating the most up-to-date literature and recent recommendations from the SAB-EEAC, we have determined that a single, peer-reviewed estimate applied consistently best reflects the SAB-EEAC advice until updated guidance is available. Therefore, the EPA has decided to return to the value established in the 2000 Guidelines for all its actions until a revised estimate can be fully vetted within the Agency and by EPA's Science Advisory Board.

The EPA will continue to look into new and innovative approaches based on the best available science as appropriate. The EPA will continue to recommend the central estimate of $7.4 million ($2006), updated to the year of the analysis, be used in all benefits analyses that seek to quantify mortality risk reduction benefits regardless of the age, income, or other population characteristics of the affected population until revised guidance becomes available. This approach was vetted and endorsed by the Agency when the 2000 Guidelines for Preparing Economic Analyses were drafted. Although $7.4 million ($2006) remains the EPA's default guidance for valuing mortality risk changes, the Agency has considered and presented others and may well consider the commenter recommendation in future assessment.

Recent analyses have estimated substantial increases in life expectancy and the number of life years gained due to improved $PM_{2.5}$ air quality. For example, Hubbell (2006) estimated that reducing exposure to $PM_{2.5}$ from air pollution regulations may result in an average gain of 15 years of life for those adults prematurely dying from $PM_{2.5}$ exposure. In contrast, Pope et al. (2009) estimated changes in average life expectancy at birth over a twenty-year period, suggesting that reducing exposure to air pollution may increase average life expectancy at birth

by approximately 7 months, which was 15% of the overall increase in life expectancy at birth from 1980 through 2000.

2.4.6 Comment: Constant benefit-per-ton simplifying assumption

Commenter (1496) notes that the EPA's benefits are based fundamentally on a constant benefit-per-ton schedule which includes the following key assumptions:

- The human health impacts of one ton of emissions reduction are invariant to the initial level.
- The human health impacts of one ton of emissions reduction are invariant to the total scale of the reduction (i.e., no diminishing returns to reduction).
- The human health impacts of one ton of emissions reduction are invariant to the initial density of atmospheric PM or the population exposed to them.
- The human health impacts of emissions reductions are best quantified using a constant statistical life value.

The commenter (1496) notes that these simplifying assumptions (above) are "commensurately suspect in their reflection of the actual complex dynamics of the relationship between pollution and human health".

Regarding the initial density of atmospheric PM, commenter (0610) asserts that many assumptions need to be made to determine the benefit outcome of half of 1% of total $PM_{2.5}$ emissions (e.g.; type of wood burned, meteorological conditions, calculations) and that changes to these assumptions could lead to different "benefits." The commenter (0610) requests that the EPA look at the $PM_{2.5}$ emissions from wood stoves in the perspective of background $PM_{2.5}$ emission sources (e.g., how much $PM_{2.5}$ is the result of natural occurrences).

Commenter (1506) notes that the EPA's generic benefit-per-ton figures are likely to overstate benefits in areas that meet air quality standards, because "both theory and data suggest that thresholds exist below which further reductions in exposure to $PM_{2.5}$ do not yield changes in mortality response, and that one should expect diminishing returns as exposures are reduced to lower and lower levels" (citing Smith, Anne. "An Evaluation of the $PM_{2.5}$ Health Benefits Estimates in Regulatory Impact Analyses for Recent Air Regulations," NERA Economic Consulting, December 2011). *Note: See Section 2.4.7 regarding the dose-response relationship for further commentary.*

Noting an EPA spreadsheet in the docket (EPA-HQ-OAR-2009-0734-0176) which reportedly suggests that "the areas in which wood heaters are more prevalent are more likely to be in compliance with the $PM_{2.5}$ NAAQS than more urban areas", commenter (1506) concludes that "EPA's assumption of a constant relationship between emission reductions and health effects, regardless of baseline concentrations, may be particularly important to explore in the case of wood heaters, which tend to be used in remote areas where concentrations are often below the national ambient air quality standards (NAAQS)". *Note: See Section 2.4.8 regarding issues with the EPA's benefits transfer approach for more commentary on this subject.*

Response:

The EPA's methods for quantifying health benefits of emission reductions are based on the best available peer-reviewed science and methods that have withstood scrutiny from EPA's independent SAB, the National Academy of Sciences (NRC, 2002), and continuous interagency review.

The RIA references a peer-reviewed manuscript and technical support document (TSD) and both describe the methods EPA employed to quantify the per-ton benefit of reducing fine particle levels from various sources. The air quality modeling attributed fine particle levels to the residential wood heater, holding all other sectors constant—giving us greater confidence that we have correctly characterized the air quality and health impacts attributable to this sector.

With respect to the incidence of benefits among populations living in locations already attaining the primary NAAQS, the EPA acknowledges that primary NAAQS are set at a level deemed by the EPA Administrator to be protective of public health with an adequate margin of safety. At the same time, primary NAAQS are not set at a level of zero risk and there is no known threshold below which $PM_{2.5}$ does not cause adverse health effects. Thus, EPA recognizes that reducing emissions level in those areas could still have health benefits.

The EPA has carefully considered the epidemiological, toxicological and clinical evidence linking exposure to fine particles and the onset of adverse health outcomes. When estimating PM-related risks, we rely upon studies and conclusions considered in the Integrated Science Assessment for Particulate Matter (PM ISA)(U.S. EPA, 2009) and the Provisional Assessment (U.S. EPA, 2012). These two comprehensive documents have assessed the entire body of scientific evidence regarding particles, including thousands of new studies. The PM ISA received two rigorous rounds of peer review by the independent Clean Air Scientific Advisory Committee (CASAC) and concluded that the no-threshold model is best supported by the available data. Specifically, the PM ISA concluded that "[o]verall, the studies evaluated further support the use of a no-threshold log-linear model" (U.S. EPA, 2009). In 2010, the Health Effects Subcommittee of the EPA's independent Advisory Council on Clean Air Compliance Analysis (Council) "fully supports EPA's decision to use a no-threshold model to estimate mortality reductions. This decision is supported by the data, which are quite consistent in showing effects down to the lowest measured levels. Analyses of cohorts using data from more recent years, during which time PM concentrations have fallen, continue to report strong associations with mortality. Therefore, there is no evidence to support a truncation of the CRF [concentration-response function]" (U.S. EPA-SAB, 2010). A summary of the scientific review statements regarding the lack of a threshold in the $PM_{2.5}$-mortality relationship is documented in a technical support document (U.S. EPA, 2010b).

Our approach to estimating PM-related health impacts below the lowest measured level (LML) is consistent with this advice. In general, we are more confident in the magnitude of the risks we estimate from simulated $PM_{2.5}$ concentrations that coincide with the bulk of the observed PM concentrations in the epidemiological studies that form the basis of those estimates. Likewise, we are less confident in the risk we estimate from simulated $PM_{2.5}$ concentrations that fall below the

bulk of the observed data in these studies. For this reason, the EPA includes statistics in the final RIA (as was done in the RIA accompanying the proposed and final rule) showing the percentage of health impacts occurring above these levels for readers to understand the effect of this methodological decision. While this assessment provides some insight into the level of uncertainty in the estimated PM mortality benefits, the EPA does not view the LML as a threshold and continues to quantify the PM-related mortality impacts using the full range of modeled air quality concentrations as the best estimate of the benefits.

2.4.7 Comment: Uncertainty in dose response relationship and potential overestimation of health benefits

Commenter (1437) believes the EPA failed (in the RIA) to evaluate the high degree of uncertainty surrounding the proposed rule's benefits. According to the commenter (1437), there is a "growing" body of literature questioning the causal link between the total concentration of ambient PM and mortality estimates especially at low levels/doses. As an example of such literature, the commenter (1437) cites "Miscommunicating Risk, Uncertainty, and Causation: Fine Particulate Air Pollution and Mortality Risk as an Example" by L.A. Cox, Jr. (*Risk Analysis* 2012; 32(5): 765–767 and Fraas, A. and Lutter, R. (2013), Risk Analysis 33: 434–449. doi: 10.1111/j. 1539-6924.2012.01883.x). Likewise, commenter (1506) points to L.A. Cox as a risk assessment expert, stating that Cox' "review of EPA's methodology concludes, with a greater than 95% probability, that no association [between particulate matter concentrations and mortality] exists, and that EPA's results are a product of its choice of models and selected data rather than a real, measured correlation" (citing Cox, L.A., Jr. "Reassessing the Human Health Benefits from Cleaner Air," *Risk Analysis*, Vol. 32, No. 5, (May) 2012). Commenter (1506) also claims that the EPA has not identified a biological mechanism that explains the observed correlation.

Commenter (1437) contends that the fact that the EPA's benefit estimates "go beyond those confirmed in the epidemiological study that is the foundation of the agency's findings" means that the benefits are based entirely upon model selection and not empirical evidence. The EPA's selection of a linear does response relationship, according to the commenter (1437), produces vastly higher benefit estimates compared to the use of a threshold or hermetic dose response model at low doses. The commenter (1437) cites the same author cited above (Cox, L.A. Jr. Hormesis for Fine Particulate Matter ($PM_{2.5}$), *Dose-Response*, 2012) as a basis for reason to believe that PM exhibits a hermetic dose response relationship at low levels and that therefore the linear model used by the EPA overestimates the benefits.

Commenter (1437) notes that the EPA also fails to adequately address whether the concentration of total PM or the specific composition of that PM is the cause of the health effects found in the EPA's cited studies. The commenter (1437) points to a study (Bell, M.L., HEI Health Review Committee. Assessment of the health impacts of particulate matter characteristics. Res Rep Health Eff Inst. 2012 Jan;(161): 5–38. PubMed PMID: 22393584) that suggests it is the components of the PM (e.g., $PM_{2.5}$ nickel concentrations) that is associated with higher rates of cardiovascular or respiratory hospitalizations. EPA's defaulting to the assumption that it is the overall level of $PM_{2.5}$ causing the health risks, rather than the specific components of the total,

states commenter (1437), does not allow for the possibility that a more targeted, lower-cost and potentially higher-benefit regulation might be warranted.

Contrary to the EPA's assumption of a log-linear dose-response relationship with no threshold, the commenter (1437) concludes that the uncertainty (regarding PM composition rather than total concentration driving the health risk) implies that a benefits estimate of zero is within the realm of possibility for benefits resulting from PM reduction. Instead of a linear relationship, commenter (1437) again cites Cox (Hormesis for Fine Particulate Matter) as evidence for a hermetic or J-shaped dose response curve for PM at low levels, which implies no negative health effects and potentially even health *benefits* to PM exposure at low doses. Commenter (1437) concludes that EPA is pointing to correlations without assessing causation and suggests that the EPA run tests with the available data (using methods discussed in Cox, LA, Jr. Improving Causal Inferences in Risk Analysis. George Washington University Regulatory Studies Center Working Paper, 2012) to determine causation and present these results to the public. Likewise, commenter (1506) also claims that "if EPA's assumptions of a causal, linear, no-threshold relationship between $PM_{2.5}$ exposure and premature mortality are inaccurate (if no association exists, if the relationship is not causal, or if the concentration-response relationship is not linear at low doses), the avoided premature mortality attributable to reducing $PM_{2.5}$ would be less than estimated, and possibly as low as zero.

Commenter (1437) points to a recent study (Fraas, A. and Lutter, R. (2013), Uncertain Benefits Estimates for Reductions in Fine Particle Concentrations. *Risk Analysis*, 33: 434–449. doi:10.1111/j.1539-6924.2012.01883.x) that suggests uncertainties surrounding benefits estimates from PM reductions may greatly exceed those the EPA acknowledged in previous analyses for PM-related rules. The commenter (1437) also claims that other studies by former EPA economist Anne Smith suggest that the number of lives saved may be vastly overstated (citing Anne E. Smith (2011). "Prepared Statement of Anne E. Smith, Ph.D. at a Hearing on "Quality Science for Quality Air" by the Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology, United States House of Representatives, Washington, DC, October 4, 2011 and Smith, Anne, "An Evaluation of the $PM_{2.5}$ Health Benefits in Regulatory Impact Analysis for Recent Air Regulations," NERA Economic Consulting Report, December 2011).

The commenter's (1437) overall conclusion is that the EPA would be well advised to consider holding off on issuing the proposed rule until the benefits are more certain. Commenter (1506) also suggests that the EPA perform a sensitivity analysis on its assumptions and generate a plausible range of effects before proceeding with the rule.

Commenter (1496) shares many of the above concerns regarding uncertainty and the benefit-per-ton methodology used by the EPA, but concludes that the proposed rule must certainly lead to net social benefits and likely substantial net benefits due merely to the magnitude difference in costs versus benefits. Commenter (1496) bases this conclusion on the size of the overall market as estimated by Frost & Sullivan (~$750,000,000 annually) relative to the potential cost of regulation even if underestimated by the EPA. The commenter (1496) also bases this conclusion on the fact that EPA has uncounted benefits (*as noted in Sections 2.4.1, 2.4.2 and 2.4.3*).

Commenter (1496) concludes that "Therefore, despite the above reservations with the EPA's methodology, it is nevertheless highly likely that the benefits of the proposed rules exceed their costs, and similarly likely that the difference is one of orders of magnitude."

Response:

The EPA has carefully considered the epidemiological, toxicological and clinical evidence linking exposure to fine particles and the onset of adverse health outcomes. When estimating PM-related risks, we rely upon studies and conclusions considered in the Integrated Science Assessment for Particulate Matter (PM ISA) (U.S. EPA, 2009) and the Provisional Assessment (U.S. EPA, 2012). These two comprehensive documents have assessed the entire body of scientific evidence regarding particles, including thousands of new studies. The PM ISA received two rigorous rounds of peer review by the independent Clean Air Scientific Advisory Committee (CASAC) and concluded that the no-threshold model is best supported by the available data. Specifically, the PM ISA concluded that "[o]verall, the studies evaluated further support the use of a no-threshold log-linear model" (U.S. EPA, 2009). In 2010, the Health Effects Subcommittee of the EPA's independent Advisory Council on Clean Air Compliance Analysis (Council) "fully supports EPA's decision to use a no-threshold model to estimate mortality reductions. This decision is supported by the data, which are quite consistent in showing effects down to the lowest measured levels. Analyses of cohorts using data from more recent years, during which time PM concentrations have fallen, continue to report strong associations with mortality. Therefore, there is no evidence to support a truncation of the CRF [concentration-response function]" (U.S. EPA-SAB, 2010). A summary of the scientific review statements regarding the lack of a threshold in the $PM_{2.5}$-mortality relationship is documented in a technical support document (U.S. EPA, 2010b).

Our approach to estimating PM-related health impacts below the LML is consistent with previous consideration in the final PM NAAQS review. In general, we are more confident in the magnitude of the risks we estimate from simulated $PM_{2.5}$ concentrations that coincide with the bulk of the observed PM concentrations in the epidemiological studies that form the basis of those estimates. Likewise, we are less confident in the risk we estimate from simulated $PM_{2.5}$ concentrations that fall below the bulk of the observed data in these studies. For this reason, the EPA includes statistics in the final RIA (as was done in the RIA accompanying the proposed and final PM rule) showing the percentage of health impacts occurring above these levels for readers to understand the effect of this methodological decision. While this assessment provides some insight into the level of uncertainty in the estimated PM mortality benefits, EPA does not view the LML as a threshold and continues to quantify the PM-related mortality impacts using the full range of modeled air quality concentrations as the best estimate of the benefits.

Krewski et al. (2009) provide evidence that the concentration-response function could be steeper at lower concentrations than at higher concentrations.

For all these reasons, the EPA has determined that the approach used to estimate and present the human health benefits in the PM NAAQS RIA is appropriate.

2.4.8 Comment: Issues with EPA's "benefits transfer" approach

Commenter (1506) summarizes the potential problems inherent to the EPA's "benefits transfer" approach as follows:

> Rather than relying on air quality modeling to estimate the health effects of the proposal (as EPA has done elsewhere), EPA estimates total benefits by multiplying a benefit-per-ton value to estimated emissions reductions. This "benefits transfer" approach relies on modeling conducted for other purposes to estimate the value of human health benefits associated with reducing one ton of $PM_{2.5}$. … It is very likely that population density in the more remote areas where wood heaters are a common source of heat is significantly less than that of the cities on which the benefit-per-ton estimates are derived. If significantly fewer people are exposed to the emissions, this "benefits transfer" approach is likely to overstate benefits by a considerable amount. If EPA is unable to apply its air quality modeling to the regions affected by the proposed rule, it should, at a minimum, make adjustments to account for the differences in population exposed.

Commenter (1506) concludes that "since EPA admits to being less confident in the risk estimated from simulated $PM_{2.5}$ concentrations that fall below the bulk of the observed data in its studies, it should present these uncertainties more clearly to decision makers and the public, and adjust its benefit-per-ton estimates appropriately."

Commenter (1496) also believes that wood burning for residential heat occurs disproportionately on a small scale in sparsely populated rural areas, whereas most studies and estimates of harm to human health from PM regard densely populated cities. Commenter (1496) notes that it is not clear to what extent the human health / benefit estimates should be revised to accommodate the facts of rural life. Likewise, commenter (1497) notes that "EPA estimates for monetized health benefits from PM reduction are based on studies that were conducted in cities with highly concentrated population densities [which] means that the benefits are assumed to affect a population that may be very different than the populations that burn wood for heat in their residences". Commenter (1497) contends that "since wood-burning stoves and heaters are only used by 2% of U.S. households and most of those households are found in rural areas the benefit calculations may be too high for this rule". Commenter (1497) suggests that the EPA consider adjusting the potential benefits to reflect the rural makeup of the affected population or "conduct direct air quality monitoring in a sample of communities to provide more accurate benefit estimates from PM reduction in those areas".

Commenters (1437, 1484) underscore the EPA's admission that the national-average benefit-per-ton estimates do not match the emission reductions in the rulemaking and may not reflect local variability in population density, meteorology, exposure, baseline health incidence rates and other local factors. The commenters (1437, 1484) claims that the EPA therefore fails to account for the location-specific reductions the rule may cause and fails to account for background particulate levels when estimating health effects. According to the commenter (1437), this results in the EPA overestimating the per person health benefits (e.g., because average wood use is

twice as great in rural areas which have lower background PM levels combined with EPA's linear dose-response assumption). Commenter (1437) also notes the uncertainty caused by the differing compositions of rural particulates versus urban particulates (citing Rao, V., Frank, N., Rush, A., Dimmick, F. "Chemical Speciation of $PM_{2.5}$ in Urban and Rural Areas," In National Air Quality and Emissions Trends Report, 2003 Special Studies Edition, U.S. Environmental Protection Agency. EPA Publication No. EPA 454/R-03-005). Finally, commenter (1437) contends that the rule overestimates the total health benefits realized by averaging emission reductions across all US residents when in fact most reductions may take place in rural areas with low population densities.

Response:

The EPA disagrees with commenter regarding the alleged flaws in the methodology EPA uses to monetize benefits of $PM_{2.5}$ and the proven association of PM and mortality. The EPA's methods for quantifying health benefits of emission reductions are based on the best available peer-reviewed science and methods that have withstood scrutiny from EPA's independent Science Advisory Board, the National Academy of Sciences, and continuous interagency review. After reviewing hundreds of peer-reviewed clinical, toxicological and epidemiological studies on $PM_{2.5}$-related health effects in its 2009 Integrated Science Assessment for PM (PM ISA), EPA concluded that $PM_{2.5}$ is causally associated with a variety of health effects, including premature mortality. The PM ISA also concluded that the log-linear no-threshold model is the most appropriate model. These conclusions in the PM ISA underwent two separate rounds of peer review by the Clean Air Scientific Advisory Committee and public comment. In addition, the Health Effects Subcommittee of the Advisory Council on Clean Air Compliance Analysis specifically endorsed the application of the no-threshold model for benefits analysis. However, we do note that as we model mortality impacts among populations exposed to levels of $PM_{2.5}$ that are successively lower than the lowest measured level (LML) of each study, our confidence in the results diminishes.

2.4.9 Comment: Accounting for the seasonality of wood burning in the benefits analysis

Commenter (1496) notes that wood burning is inherently a seasonal activity but the EPA does not provide any data or estimates regarding whether or how temperature and climate interact with PM emissions, or whether or how experiencing a given annual flow of emissions as seasonally variable rather than invariantly constant might alter the relationship between the quantity of emissions and the expected [human health] costs of those emissions.

Response:

While the EPA did not employ new air quality modeling to characterize the change in fine particle levels, the Agency did rely upon a benefit per-ton approach that was derived from source apportionment modeling that specifically included this sector (Estimating the Benefit per Ton of Reducing PM2.5 Precursors from 17 Sectors - January 2013; available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-0178). For this

reason, we do not believe that the use of annual per-ton values appreciably contributes to the overall uncertainty in the analysis.

Although the EPA used annual emission estimates for the RIA, the actual emissions are seasonal and principally concentrated in the colder months when heaters are used more often. The EPA, tribes, states and local agencies have observed that often the emissions in cold months are trapped by inversions and that worsen the air quality levels and potential health effects. Thus, the seasonality will likely make health effects worse than the EPA estimates.

2.5 Cost and Economic Impact Estimates

2.5.1 Comment: Wood heater cost estimates and economic impacts in general

Commenter (1551) states that the proposed NSPS is among the most cost effective control strategies available for PM. Commenter (1551) believes this is a conservative benefit-to-cost estimate, as the EPA's cost analysis uses generous industry estimates. Likewise, commenter (1397) believes the EPA estimates of the cost to develop new model lines appear generous, despite industry claims to the contrary. Commenter (1397) notes the RIA for this rule does not include input from Woodstock Soapstone Stoves, winner of the 2013 Wood Stove Decathlon, which estimates the cost of new product development at approximately $200K compared to the $356K in the RIA. The economic analysis also failed to recognize that industry creates 2-4 additional models, according to commenter (1397), marketed under different names but functionally identical, for each "new model" certified. Commenter (1397) states these additional models do not require additional R&D, reducing the actual cost per model.

Commenter (1484) suggests the EPA clarify its divergent assumptions that manufacturers of currently regulated wood heaters have already incurred costs in anticipation of the rule while manufacturers of previously unregulated devices have not made such investments and will incur the highest of the estimated costs even though some of these devices (hydronic heaters) are part of a voluntary program.

Other commenters (0650, 0953, 0958, 0961, 1436, 1543, 1549, 1643) generally state that the cost estimates faced by manufacturers in complying with the proposed NSPS is inaccurately low, that the level of financial investment required is not feasible in such a short time frame and that the NSPS will result in significant price increases causing sales to decrease.

The commenter (1643, Attachment 11) notes that the cost estimates are deficient because they do not reflect specific emission rates or emission performances. The commenter (1643) furthermore states that the EPA has vastly overestimated model life, which significantly affects EPA cost estimates (*discussed in Section 2.5.7*). The commenter (1643) also cites failure to address the possibility of variable costs per unit and other cost categories such as training programs on the new models and product obsolescence (e.g., discounts for manufacturers to clear inventory.

Commenter (0953) points to one company with five models of EPA-certified stoves, that sells only 700 to 800 units per year, noting that this company could not afford the capital to meet a Step 2 deadline for all of their models at once. Certifying only one model would not be a viable

business model, according to the commenter (0953). The commenter (0953) adds that the massive changes suggested for Step 2 -- the combination of a different fuel, many different changes in test parameters, and a new algorithm -- all on a single date, with no carryover of previous certificates, is simply overwhelming. Even if they could afford to make such changes, the commenter (0953) believes that companies would have to significantly raise prices, which would affect sales.

Commenter (1549) states that they have 51 separate products (with different skus) that were previously exempt from subpart AAA: 15 pellet heaters ($15,000), 19 single burn rate or utility heaters ($356,250), 17 forced-air furnaces ($356,250). The commenter (1549) adds that they also have an additional 2 adjustable burn rate wood heaters ($356,250) that are not Step 1 compliant. Although the commenter (1549) believes that the EPA's estimate of $356,250 for compliant unit development is too low, they used the EPA's estimate in their impacts analysis for their single burn rate heater, forced-air furnaces and adjustable burn rate heaters. The commenter (1549) reports that their pellet heaters can meet Step 1 of the proposed NSPS in most cases so they have assumed $15,000 as testing, shipping and administrative costs associated with becoming EPA certified for these heaters. The commenter (1549) reports that, based on their analyses, combining all the costs in all categories, the capital investment due upon promulgation under the proposed compliance timelines to continue business as usual would be in excess of $13.5 million. According to the commenter (1549), this level of investment is not financially viable in a short time frame. The commenter (1545) states that, as a small business they do not have the liquid capital and cannot borrow enough money for R&D to meet those financial demands. Additionally, the commenter (1549) states they cannot estimate the costs to comply with Step 2 limits because the limits and testing methodologies for all categories of their products make Step 2 unachievable.

Commenter (1506) notes the lack of a range of estimates for the elements in the EPA's R&D cost estimate and also notes that EPA's total average annualized estimated cost (of $15,688,471 between 2014 and 2022) presents misleading precision.

Certification testing cost concerns:

Regarding the EPA certification testing, commenter (1632) reports that it takes one week per model and $15,000 per model (not per model line), and that requiring a crib and cord wood run for reporting purposes will cost manufacturers another $15,000 per model. Commenter (1632) notes that if there are 3 models in a model line, which includes 3 different sizes, certification testing is $45,000, not the $10,000 assumed in the R&D estimates.

Commenter (1435) states the EPA's Information Collection Requests (ICRs) fail to inform manufacturers, labs, and the Office of Management and Budget (OMB) of substantial additional costs. For example, commenter (1435) asserts the EPA estimated costs per respondent for certification testing required under proposed subpart AAA cannot possibly take into account a second round of testing with an additional fuel, which would add at least another $10,000 per model line (in other words, another $27,727 per respondent, for a total cost of at least $55,454 per respondent).

Commenter (1435) states the EPA's estimate of certification costs per model line does not appear to account for the fact that many times a model line will not meet certification requirements the first time around, and the manufacturer must go back and refine its product design and begin the certification process anew. Thus, commenter (1435) states, the true costs of certification testing under the proposed rule – including the costs of more than one round of testing under the proposed rule, plus the costs of testing with an additional fuel – are likely to be at least $30,000 to $40,000 per respondent, meaning that even at the low end EPA's estimate of $27,727 per respondent is off by some $55,000 (i.e., at $30,000 in certification costs per model line, with 183 model lines and 66 respondents, total costs per respondent would equal approximately $83,181). Commenter (1435) believes the EPA is obligated under the Paperwork Reduction Act to account for and justify all of these costs. *Note: See Section 2.19.3 for additional commentary regarding cost estimates required under the Paperwork Reduction Act.*

Response:

We agree that these wood stove standards are among the most cost-effective options available for PM. (We note that replacing old wood stoves is also very cost-effective.)

The EPA used the best information available at the time of proposal. For the final rule RIA, we have updated our estimates, based on data provided in the comments. Our final rule RIA has incorporated much of the relevant cost data submitted by HPBA and manufacturers (other than Woodstock Soapstone) and our estimated costs are higher than at proposal. To the degree that typical manufacturer costs are closer to the much lower costs submitted by Woodstock Soapstone rather than HPBA's estimated costs, the revised NSPS cost would be much lower. We did not incorporate the HPBA cost elements that we deemed were not attributable to the NSPS revisions (*i.e,* costs which would have been incurred even in the absence of a revised NSPS). Details of our changes and the revised cost estimates are in the RIA and in the background technical memoranda for the final rule, available in the docket.

To the degree that the number of manufacturers' distinct models are less than the manufacturers indicated (e.g., through model consolidation), the actual NSPS costs will be lower. For clarity, the proposal RIA (and the final rule RIA) included full R&D costs for all models that do not currently meet the revised NSPS levels. We recognize that a significant number of manufacturers have invested resources to meet more stringent levels and are well into R&D already. However, not all new appliances achieve those levels. Thus, we based our cost assumption on the current percentages of models that need to finish their R&D, regardless of when they started and assuming no model consolidation.

Numerous communications with manufacturers and labs over the last 5 years have indicated that R&D for cleaner stoves is primarily a product of more time in the lab and more iterative trial and error. The cost for each round of R&D is more related to time than the emission target.
We recognize that some companies have multiple types of heaters that will need R&D at the same time and that 5 years after the effective date will be tight for those that are not well down the path. However, we note that other companies have produced cleaner models already; and all

manufacturers were on notice as of November 2009 that this NSPS was being developed and that new emission standards would be required.

Model design lifetimes are discussed in *Section 2.5.7*. Based on comments submitted by HPBA and manufacturers, we have reduced the typical model design lifetime from 20 years to 10 years. Multiple, iterative research and development tests are included in our R&D cost estimates, in preparation for the final certification cost of the model line.

Our responses to comments on the ICRs and the Paperwork Reduction Act are in *Section 2.19.3*. Note that the final rule does not include a requirement for testing with both crib wood and cord wood. For adjustable burn rate stoves, single-burn rate stoves, pellet stoves and hydronic heaters, the final standards require that they be tested and certified when burning crib wood, while allowing manufacturers to comply with an alternative compliance option for cord wood testing. For forced-air furnaces, we already specify the use of only cord wood for the certification tests. (Note that forced-air furnace certification tests are conducted according to CSA B415.1-10 which has specified cord wood as the test fuel since 2010). We have updated our ICRs in accordance with the final rule's requirements and have ensured that all reporting and recordkeeping costs are accounted for in the final ICRs.

2.5.2 Comment: Adjustable burn rate stove cost estimates

Commenter (1430), representing over 4,385 petitioners, believes the lower emission standards can be achieved affordably, noting that catalytic stoves, hybrid stoves, advanced secondary combustion stoves and pellet stoves are already meeting the standard. Commenter (1430) notes that these new technologies are not necessarily expensive or difficult to incorporate in new stove designs. Commenter (1430) contends that new wood and pellet room heaters can be cleaner, more efficient and still be affordable.

On the contrary, commenters (1436, 1521, 1547, 1554, 1632) claim that the costs the EPA used to estimate the R&D required for room heaters to come into compliance with the proposed rule are low and, according to some of the commenters, not feasible. Commenter (1436) states the $24 incremental cost increase estimate for certified wood heaters is unfounded and that the $859 baseline is equally so. Commenter (1436) asserts they were never asked about R&D costs and that $356k is appropriate for a steel stove meeting 1988 standards. Commenter (1436) believes there is no benchmark for testing to the new standard, thus, this number cannot be calculated. The commenter (1436) states that if the EPA's number were correct and assuming cost is spread over 5 years, for their firm, this number would represent 8% of sales, exceeding profitability. Commenter (1436) believes that even in the 2-step approach this investment would be obsolete in 5 years.

Commenter (1554) estimates that it will cost over $1 million to reengineer, retool and manufacture one stove line to go from an average of about 3.5 g/hr to 1.3 g/hr, mostly because of the cost of foundry tooling as a manufacturer of cast iron stoves. Commenter (1554) claims the EPA's cost analysis ignored information in the Residential Heater Manufacturers Cost Impacts memo that referenced such costs for cast iron stove, which comprised 35% of shipments in 2013

per HPBA data. Likewise, commenter (1456) states it may be financially easier for steel stove manufacturers to comply but cast iron manufacturers would be much more impacted by having to retool expensive castings. Commenter (1554) states that the EPA must assess the costs and impacts of retooling on this important market segment.

Commenter (1547) estimates that complying with the proposed NSPS changes will require 2 years of R&D minimum and no less than 3-4 weeks in the very expensive certified labs. Commenter (1547) describes the impacts that changes in test methods (burn rate algorithm and test fuel) would have on their R&D budget, including adsorbing the costs of invalid test runs from changes to Method 28, several days to weeks of study and adjustments on the part of the R&D team and emergency manufacturing of affected stove parts, which can (and has) shut down a large part of the production line, resulting in tens of thousands of dollars of lost production and labor in a very short time. Commenter (1547) estimates they would have to hire additional lab technicians and a consultant to develop complying models. Commenter (1547) said there is very little room for error and any failure to comply and deliver appliances on time could lose them major customers and put them out of business.

Cost of catalyst replacement:

Commenter (1521) asserts that the EPA's baseline unit cost for certified wood heaters ($859) does not acknowledge cost differences between catalytic and noncatalytic stoves. According to the commenter (1521), several dealers throughout the State of Maine have provided estimates for replacement costs of $350 and $500 for the catalyst alone, and an additional $150 to $200 for the service call. The commenter (1521) estimates that, in aggregate, costs are between $500 and $700 at today's prices, whereby catalyst replacement will likely be required several times during the life of the wood stove. The commenter (1521) reports that the significant added expense for catalyst-equipped stove owners is a substantive economic deterrent to those in the market for a new wood burning, home heating appliance. Commenter (1521) states that, because of the cost of replacing the catalyst, it is common for homeowners to bypass the catalyst and continue to heat their homes whereby the stove becomes much less efficient. (*See Section 3.3.6 for commentary regarding catalytic stove technology concerns.*)

Response:

We used industry suggested prices for both catalytic and noncatalytic stoves. The EPA agrees that the new standards can be met affordably with the cleanest devices on the market today, including non-catalytic, catalytic, hybrid, and pellet stove technologies. We updated our cost estimates between proposal and final, using many of the costs estimated by HPBA in their comments on the proposed rule.[9] For example, we accepted HPBA assumptions and logic related to evaluating the tooling cost differences between steel stoves and cast iron stoves. We used

[9] Comment on the proposed rule to Docket EPA-HQ-OAR-2009-0734 from the Hearth, Patio and Barbecue Association available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1643

HPBA's average tooling costs to reflect product differences, even though we believe this may overestimate the number of cast iron stoves in the marketplace. While we recognize the range in capital cost estimates provided both prior to and after proposal of the draft standards leaves room for additional cost scenarios, we determined that the HPBA-supplied costs[10] represent the best documented cost ranges and cost categories available at this time. Thus, for the purposes of our cost analysis for the final rule, we used HPBA estimates, modified to reflect the deletion of cost categories that EPA deemed were inappropriate or not applicable for the NSPS analysis (e.g., costs that would occur with or without the revised NSPS). Our cost analysis assumptions are documented in our background documentation available in the docket.[11]

Regarding the 2-years of intensive R&D time one commenter estimates will be required to comply with the NSPS, the EPA used a more conservative estimate of 6 years of intensive R&D in our cost and emission estimates. We also note that the Step 1 limits were designed by the EPA to be achievable now without intensive R&D efforts for approximately 90% of the certified wood stoves on the market today, which allows intensive R&D to occur between now and the 2020 Step 2 compliance date. Finally, currently certified wood stove models which meet the Step 1 limit will be deemed automatically compliant to the Step 1 standard (as explained in the final rule preamble and in Section 3.4.2). These models will incur neither R&D costs nor certification testing costs until Step 2. Regarding the expensive laboratory costs for certification testing, iterative R&D tests are built into our R&D costs and it is assumed that manufacturers will have designed their models using this iterative approach prior to paying for the more expensive certification tests in the certified laboratory.

Regarding catalyst replacement costs, it should be noted that all technologies require maintenance and repair. For example, all stoves require door seal replacements and noncatalytic stoves often require secondary air tube replacements. Catalysts today usually last over 10 years. We used 20 years for the emitting lifespan of the stove. Thus, the catalyst will likely need to be replaced only once. This catalyst replacement cost is counterbalanced by the fact that catalytic stoves tend to have greater heating efficiencies and thus lower fuel costs than noncatalytic stoves.

2.5.3 Comment: Single burn rate stove cost estimates

Commenter (1549) reports that they have the largest market share of single burn rate wood stoves. The commenter (1549) expresses concern regarding the impact of the proposed standards for single burn rate stoves and offers to work with the EPA to achieve improved air quality through the reduction of wood burning emissions in such a way that will not decimate the appliance category within a short period of time. Commenter (1549) reports that single burn rate heaters are referred to as "utility heaters" and are used as a source of heat for those that would

[10] Ferguson, Robert (Ferguson, Andors & Company), prepared for the Hearth, Patio & Barbecue Association. Proposed Wood Heater NSPS Incremental Cost Effectiveness Analyses, Appendix A: Woodstove Cost Modeling. May 2014.

[11] Memo to USEPA from EC/R, Inc. Residential Heater Manufacturer Cost Impacts. January 2015.

otherwise be unable to afford a heater in their home. The commenter (1549) expresses concern that the elimination of the "utility heater" category would place an additional cost burden on the consumer.

The commenter (1549) reports that the cost of producing a lower emitting single burn rate heater far exceeds the cost of materials. The commenter (1549) estimates that the additional costs associated with bringing single burn rate heaters into compliance would be $250 of manufacturing cost (which translates into a higher cost at the retail price level).

Response:

As noted in response to previous comments, we have updated our cost estimate to reflect industry-provided cost components of R&D. Regarding single burn rate stoves – a previously unregulated stove – we have taken extra precautions to ensure that we have not underestimated costs. For example, we note in our background documentation that we estimate, as we did at proposal, additional R&D may be required to bring these stoves to qualifying levels. We therefore doubled the R&D/Engineering cost portion of the total design costs during the first 2 years of the 6-year amortization period used to pay for R&D. (See footnote in *Section 2.5.2* to Manufacturer Cost Impacts Memo.)

While single burn rate stove manufacturers will need to invest in R&D to bring their products into compliance with the final NSPS, we note that the higher efficiencies resulting from the improved technology will often offset higher retail prices faced by the consumer in 1 or 2 heating seasons.[12] Thus the overall price to the consumer of these improved heaters will decline with time. Finally, it should be noted that most wood stoves are purchased by the middle class, not the poor. According to an industry-funded survey submitted in response to the proposed rule, approximately 80% of the families who purchase wood stoves are in the middle class or higher.[13] Furthermore, many single burn rate utility heaters are used to heat garages, vacation homes, hunting cabins, etc., not for primary residence heat.

2.5.4 Comment: Hydronic heater cost estimates

Commenter (1572) states that the EPA cost estimates for hydronic heater R&D, testing to the new method, new units costs to meet Step 2 and 3 levels, projected sales in the future, and lifespan of units are grossly miscalculated. The commenter (1572) estimates sales would drop by about 90% in the wood hydronic heater industry for at least 2 years (using trends from states who took on EPA's Phase 2 standards) causing companies to try to spread R&D costs as well as

[12] Comment on the proposed rule to Docket EPA-HQ-OAR-2009-0734 from the Northeast States for Coordinated Air Use Management available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1551.

[13] Comment on the proposed rule to Docket EPA-HQ-OAR-2009-0734 from HearthStone Quality Home Heating Products available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1436.

testing costs to only 10% of current sales. The commenter (1572) concludes that R&D cost estimates done by the EPA are roughly half of real world numbers, if not less.

Commenter (1382) states testing with cord wood and crib wood is an unnecessary burden being placed upon the manufacturers during an already unstable economic environment. Commenter (1382) notes all the test data acquired to date under the wood-fired hydronic heater voluntary program has been with crib wood and adding a requirement to test with two fuels would double the cost of certification, which currently runs close to $20,000, not to mention double the time involved in testing. Commenter (1382) further states that the EPA has failed to adequately explain any justification for imposing this financial burden on the small businesses participating in the hydronic heater market.

Response:

As noted in response to previous comments, we have updated our cost estimate to reflect industry-provided cost components of R&D. The costs we used for the final rule are considerably higher for hydronic heaters than we used at proposal, based on comments supplied by HPBA. (See footnote in *Section 2.5.2* to Manufacturer Cost Impacts Memo.)

While hydronic heater manufacturers will need to invest in R&D to bring their products into compliance with the final Step 2 NSPS, we note that the higher efficiencies resulting from the improved technology will often offset higher retail prices faced by the consumer in 1 or 2 heating seasons. (See footnote in *Section 2.5.3* to NESCAUM comment.) Thus the overall price to the consumer of these improved heaters will decline with time.

The EPA used an estimate of $20,000 for hydronic heater certification testing, as suggested by the commenter above. We note that the final rule will no longer require testing with both crib and cord wood. Thus only one final certification test for each Step is required, not two. Furthermore, a portion of hydronic heater models (as explained in the final rule preamble and in *Section 4.3.2*) will be deemed automatically compliant to the Step 1 standard; these models will incur neither R&D costs nor certification testing costs until Step 2.

2.5.5 Comment: Forced-air furnace cost estimates

Commenter (1448) states that the EPA does not take into account the duplicated cost impact on companies that offer products that have been safety tested and are listed by Underwriter's Laboratories (UL) or other safety testing laboratories. The commenter (1448) states that any changes to construction or modification to components or features will require additional review by UL. Commenter (1448) provides a list of estimated costs likely required to certify a model under the proposed rule and concludes that EPA's proposal does not adequately reflect actual costs, nor does it support the required transition period that will really be needed by the commenter's company and other manufacturing companies that solely sell products that have a UL Safety Listing already in place.

Response:

We note that safety testing and emissions testing are not the same; duplicative certification testing is not required. We have estimated the costs associated with iterative R&D testing as well as estimated the final certification testing by a certified lab, once the iterative design testing has produced a certifiable model.

As noted in response to previous comments, we have updated our cost estimates to reflect industry-provided cost components of R&D. The costs we used for the final rule are considerably higher for forced air furnaces than we used at proposal, based on comments supplied by HPBA. Furthermore, for forced air furnaces – a previously unregulated heater – we have taken extra precautions to ensure that we have not underestimated costs. For example, we note in our background documentation that we estimate, as we did at proposal, additional R&D may be required to bring these heaters to qualifying levels. We therefore doubled the R&D/Engineering cost portion of the total design costs during the first 2 years of the 6-year amortization period used to pay for R&D. (See footnote in *Section 2.5.2* to Manufacturer Cost Impacts Memo.) Finally, a portion of forced-air furnace models will be deemed automatically compliant to the Step 1 standard (as explained in the final rule preamble and in *Section 4.3.5*). These models will incur neither R&D costs nor certification testing costs until Step 2.

2.5.6 Comment: Sales volume and recovery of R&D costs

Commenter (1514) notes that the there is a great inequality in EPA's baseline cost calculations (Table 10 of Preamble) in that the EPA fails to consider the disparity in sales volume for manufacturers of different sizes. Commenter (1514) notes that the recapture cost built into the product's wholesale price would automatically be 10 times higher for a manufacturer that sells 1,000 units annually versus another manufacturer selling 10,000 units annually. The cost per unit increase (in Table 10 of Preamble) appears to be based on industry-wide shipments, according to commenter (1514), but is almost impossible to recover for a small manufacturer.

Response:

While there is some disparity in costs between manufacturers of different sizes related to sales volume, the EPA notes that approximately 90% of wood stove manufacturers are small businesses. Therefore the averages we used are fairly typical/representative for the industry. Furthermore, the individual cost components which comprise these averages are based on industry-supplied estimates.

2.5.7 Comment: Model design lifespan and appliance lifespan

Commenter (1643, Attachment 2 [Appendix E][14]) disagrees with EPA's presumption that a 20-year model design life span and 20-year use/emitting appliance life span are typical. The

[14] The same appendix regarding design life also appears in Comment 1643, Attachment 3, Appendix E.

commenter (1643) notes that many of the models that were offered for sale 20 years ago are no longer in production and many manufacturers on EPA's certified wood stove list are no longer in business (or at least not in the wood stove business). The commenter (1643) points to the effort undertaken by HPBA to conduct the Enhanced EPA Certified Wood Heater Database Project in 2010 to identify the number of wood stove models actually in production. The commenter (1643) states that the total number of certified models identified as being produced in 2010 (125) is less than 15% of the total certified during the life of the program (790). The commenter (1643) states that the surviving manufacturers have continued to add new models, upgrade models and retire models, with the majority being certified/recertified to address technology upgrades and/or modifications involving emission-critical components (the "k-list" tolerances). The commenter (1643) adds that many models were redesigned and recertified when Washington State imposed their lower emission limits.

Commenter (1643, Attachment 2) adds that manufacturers are constantly assessing ways to minimize costs and risks and enhance profitability which can result in retirement or significant modification of a model to reduce costs of production, improve warranty performance and/or improve performance. The commenter (1643) surveyed a small number of key manufacturers, including the largest wood stove producer in the industry, to obtain historical information showing the evolution of a number of stove models that have been sold for many years, especially the average "design life" span across full ranges of models from the responding manufacturers and the specific reasons for changes. These results are presented in Table 1A, Appendix E of the commenter's (1643) letter.

According to the commenter (1643, Attachment 2), for the surveyed manufacturers, the number of years that models remain in production without "k-list" revisions ranged from less than 1 to 25 years, with the average for the 53 models at 8.3 years. The commenter (1643) states that for the largest manufacturer, the average design life was 7 years and for the other manufacturers, the range was from just over 7 years to just under 10 years. The commenter (1643) states that reasons for the combustion technology ranked as follows, ordered according to the survey results with counts in parentheses:

- Improve Emissions (44)
- Market Demand Requirement (40)
- Improve Performance (29)
- Improve Reliability (14)
- Improve Manufacturability (14)
- Warranty Reduction (3)
- Cost Savings (1)

Commenter (1643, Attachment 2) concludes that the survey of "design life" shows that the combustion technology that manufacturers employ in their products has not been static for the past 25 years as asserted by the EPA in the NSPS proposal. While some manufacturers have left some models unchanged through several EPA certificate renewal cycles, the commenter (1643) states that technology has continued to evolve and many other models have been through multiple revision cycles including new certifications as technological improvements have been

implemented. According to the commenter (1643), customers and competitors help drive the need to keep products fresh in the marketplace including showing improvements in performance. The commenter (1643) adds that, while emissions performance may not be a factor that heavily influences all consumer purchasing decisions, some manufacturers use emission performance in their marketing as a point of differentiation between their products and those from their competitors because product differentiation is an important factor when trying to gain market share and retailer floor space. Commenter (1643) states that this motivation has driven the largest manufacturer to a commitment to constant improvement in emission performance as well as overall performance and that has resulted in regular model line upgrades.

Commenter (1643, Attachment 11) also states that the EPA has vastly overestimated model life and adds that although a few of the models in the Ferguson survey did indeed have a design lifetime near the length that the EPA assumed, the survey results suggest that EPA's assumption is inaccurate as an industry average. Commenter (1547) describes how a life cycle of 4 to 5 years is more typical to keep up with market demand and competition.

Commenter (1436) asserts the stated annualized cost of $4,212,303 for wood heaters vs. $15,688,471 for all categories based upon a 20-year life is wrong. Commenter (1436) claims it should be 8 years as the standard is to be reviewed every 8. Commenter (1436) adds they have never had a stove run for 20 years, thus, this badly skews the cost as their average certificate is <10 years old. Commenter (1436) is not aware of any data supporting EPA's asserted 20-year lifetime.

Commenter (1632) disagrees with the EPA's 20-year design life assumption, claiming that although it is true that model names have been re-used for many years, this does not mean that the technology inside has not been improved or changed.

On the other hand, in response to the NODA, commenter (1722) notes that many of the certified appliances currently on the market are old designs.

Response:

For proposal, we used a 20-year model design lifespan in our analysis. We chose this value because many models developed for the 1988 NSPS are still being sold after more than 25 years. Many "new" models still have the same internal working parts with merely exterior cosmetic changes. However, respectful of comments on the proposed rule, in which some industry representatives commented that a shorter model lifespan is more accurate, we reduced our assumed model design lifespan to 10 years for this analysis. This revised 10 year model lifespan is used for all of our cost and emission estimates for the final rule.

Regarding the emitting lifespan of the appliance, most wood heaters in consumer homes emit for at least 20 years and often much longer. No information was presented in the comments which suggested that wood heaters are typically replaced in residences in less than 20 years. Therefore, as at proposal, we continue to use a 20-year in-home appliance emitting lifespan as an estimate in our cost and emission estimates for the final rule.

2.5.8 Comment: Cost effectiveness analysis overall

Commenter (1551) states that the proposed NSPS is among the most cost effective control strategies available for PM. Commenter (1551) believes this is a conservative benefit-to-cost estimate, as EPA's cost analysis uses industry estimates that are generous.

On the contrary, commenter (0958) believes that the emission reduction costs to meet the future standards could be many times higher than the cost effectiveness guidelines used to evaluate most other sources of similar air pollutants.

Commenters (1543, 1550, 1643) point to and provide separate cost effectiveness analyses: The NERA report, 1643 Attachment 2 (Woodstoves); The NERA report, 1643 Attachment 3 (Hydronic Heaters); and a critique of EPA's economic analysis (NERA Assessment, 1643 Attachment 11). Commenters (1543, 1550, 1554, 1643) describe how the EPA analysis departed from EPA Guidelines for Preparing Economic Analyses in several ways, with the result that the EPA analysis is flawed. The commenters (1543, 1550, 1643) were particularly concerned that the EPA appears to ignore the impacts of the high cost-to-sales ratio and the impacts resulting from the Step 2 and 3 standards.

Commenter (1643, Attachment 11) provides the analysis cited by commenter (1643), above. In this analysis, the commenter (1643, Attachment 11) states that the EPA analysis failed to evaluate a broad range of regulatory options with various degrees of stringency (both less stringent and more stringent than the proposed approach).

Commenter (164, Attachment 11) cites analyses by Houck and Curkeet-Ferguson that dispute EPA's assumption that actual emissions are proportional to certification levels for each model. According to the commenter (1643), reliance on this assumption suggests not only that EPA's emission reductions estimates are overstated, but that the dollars per ton cost of emission reduction are understated and potential monetized benefits are overstated.

Commenter (1643, Attachment 11) states that the EPA analysis ignores several critical elements in its cost analysis such as potential changes in product prices, sales quantities, appliance scrappage rates, consumer surplus, producer surplus, deadweight loss, or any other type of market impact. The commenter (1643) describes the implications of these deficiencies on pp. 12-13.

The commenter (1643, Attachment 11) states that the EPA also failed to conduct a proper incremental cost analysis, but simply sums the cumulative costs for each regulatory option, sums up the cumulative emission reductions and divides the cumulative cost by the cumulative emission reductions to calculate the cost-effectiveness of the proposed approach and the alternative approach for each category of wood-burning appliance. The commenter (1643) states that it is essential to clarify the differences between regulatory options and different levels of the standard. The commenter (1643) states that by only reporting average emission reductions, the EPA conflates the various steps together.

Commenter (1506) also suggests that a presentation of the incremental costs and health effects associated with achieving EPA's proposed standard and alternatives (more and less stringent alternatives) could be informative. Commenter (1506) notes that "without some incremental analysis at different emission limits, decision makers and the public cannot judge the marginal cost-effectiveness of the different standards in the rule."

Commenter (0902) would like to know if the cost versus benefits are estimated with specifics to location and amount of wood burning in a region.

Response:

The EPA's economic impact analysis provides estimates of increases in costs as a percent of sales across the industries identified as impacted by the proposed (and final) rule and also provides these estimates for particular sized firms (or establishments, places of business) based on their employee size. Increases in costs as a percent of sales can be interpreted as a proxy for the maximum price increases needed for a firm to recover its costs associated with the rule. These costs to sales estimates were up to about 17% for firms in affected industries, but the Agency's estimates for particular sized firms showed much higher impacts, especially for establishments with 20 employees or fewer. These results are one reason that EPA could not certify there was not a SISNOSE (significant economic impact on a substantial number of small entities) for this rule. We also note that insufficient information was available on each affected business to allow EPA to conduct an analysis at that level that would include estimates of business closures. Clearly, some very small businesses could experience some substantial stress based on the results shown in our economic analysis.

The Agency prepared the economic impact analysis that was appropriate for the data that was available on producers and consumers of affected appliances. We do not have credible data nor any firm basis for an estimate of appliance scrappage rates, and thus we did not include in our analysis considerations of such rates. We have revised the analysis based on additional data received from commenters and have included the revised analysis in the RIA for the final NSPS. We note that the estimate of impacts provided by the commenter reflect an inelastic (or flat) supply curve, which means the supply curve included in the commenter's analysis does not reflect the typical occurrence of an upward sloping supply curve for producers.

As to adherence to the EPA Guidelines for economic analysis, EPA attempted to follow the guidelines to the extent possible with existing data and in line with best practices for such analyses. Also, the Guidelines do not prescribe a set of requirements for analysis that must be followed in lockstep for each analysis, as noted on pp.1-2 of the Guidelines themselves: "These *Guidelines* are designed to provide assistance to analysts in the economic analysis of environmental policies, but they do not provide a rigid blueprint or a "cookbook" for all policy assessments. The most productive and illuminating approaches for particular situations will depend on a variety of case-specific factors and will require professional judgment. The *Guidelines* should be viewed as a summary of analytical methodologies, empirical techniques, and data sources that can assist in performing economic analysis of environmental policies.

Furthermore, regarding comments that EPA Guidelines were not adhered to, that the emission reduction costs under this NSPS are much higher than for other rules and are not cost effective, the EPA notes that considering the emitting lifespan of the appliance – an important and altogether appropriate consideration – is in keeping with other EPA approaches and demonstrates the cost effectiveness of this NSPS. EPA's Office of Transportation and Air Quality (OTAQ) used a similar approach when it used the median engine life for nonroad engine emission modeling.[15] In response to concerns that EPA ignored the cost-to-sales ratio for Step 2, we did consider this ratio and also considered that the reduced cost of fuel often offsets the price increase in 1 or 2 heating seasons. (See citation in *Section 2.5.3* to NESCAUM comment.)

Regarding comments seeking an incremental cost analysis at different emission levels, as discussed in the proposal, cleaner stoves tend to have improved combustion based on confidential blends of improved time, temperature and turbulence. Emission performance primarily depends on time for R&D trial and error. Robust cost data for specific blends are not available. Furthermore, it should be noted that the prices of some lower-emitting stoves are less than some higher-emitting stoves. Finally, while cost versus benefits are not estimated with specifics to location and amount of wood burning in a region, the EPA notes that costs, emissions, emission reductions and benefits are all proportional. That is, if more wood heaters are in a region, then more emissions are present and hence there is more potential for emission reductions and associated benefits.

2.5.9 Comment: Cost effectiveness of room heater standards

Commenters (1543, 1549, 1550, 1643) describe the NERA wood stove cost effectiveness analysis results which conclude that the alternative Step 2 and proposed Step 2 standards are much less cost-effective than the Step 1 standard of 4.5 g/hr. The commenters (1543, 1549, 1550, 1643) state that the cost per ton for the Step 1 standard of 4.5 g/hr is $29,700 per ton, compared to $151,900 per ton for the interim Step 2 standard of 2.5 g/hr or $195,300 per ton for a final Step 2 standard of 1.3 g/hr. Then, the commenters (1543, 1549, 1550, 1643) compare the Step 2 options, concluding that a standard of 1.3 g/hr is particularly costly relative to emission gains over a 2.5 g/hr standard, resulting in an incremental cost per ton of $321,800 per ton. Commenter (1554) adds that such cost-effectiveness values are several times higher than thresholds recently determined by EPA to be too high for other industries [Kraft Pulp Mill NSPS proposal (78 FR 31316 at 31325, 05/23/13) and NSPS for Boilers (79 FR 9706 at 9718, 02/28/05)].

Commenters (1543, 1549, 1550, 1643) present data that show the effect of higher wood stove prices on demand, the costs of complying with more stringent standards and the "scrappage" effect, where reduced scrappage would increase emissions. Commenters (1543, 1550, 1643, Attachment 2) add that the NERA analysis considered the implications of uncertainties related to the price elasticity of demand. Although the specific estimates change under alternative

[15] USEPA, Office of Transportation and Air Quality, Assessment and Standards Division, *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling*. EPA-420-R-10-016. NR-005d. July 2010

parameters, the commenters (1543, 1549, 1550, 1643, Attachment 2) conclude that none of the sensitivity cases modified their basic conclusion that the Step 1 standard of 4.5 g/h is much more cost effective than either of the Step 2 standards.

Commenter (1436) asserts wood stoves are being penalized as 47% of the cost of improvement goes to cord wood stoves and 8% to pellet stoves while wood heaters reduce 163 tons vs 4825 tons for all other categories. Commenter (1554) adds that this 163 tons of reduction equates to approximately 0.003% of total $PM_{2.5}$ emitted and common sense dictates that this small change will not have a detectable impact on health levels.

Response:

The Step 1 standard, although more stringent than the current 1988 NSPS standard, will not be difficult for most manufacturers to meet. Over 90% of EPA certified wood stoves already meet Step 1, partly because it is the same as the Washington State 1995 limit. As noted in both the proposal and final Preambles, the EPA designed the standards in a stepped fashion to reduce the burden on manufacturers – who need to be able to sell appliances while performing R&D to meet the more stringent Step 2 standard – and in order to minimize testing laboratory logjams. Thus, while the Step 1 standard is less costly for manufacturers than the Step 2 standard, the emission reductions under the Step 1 standard alone are not significant for certified wood stoves. Both cost and emission reduction are important when estimating cost effectiveness. Furthermore, the commenters do not consider the fact that most wood stoves emit PM pollution for over 20 years. Taking this into consideration, the cost effectiveness ($/ton) is approximately $1/20^{th}$ of the estimates the commenters present.

Regarding the scrappage effect, EPA notes that this effect is hard to quantify and is too uncertain an effect to impact the conclusions of this rule. We also note that some lower-emitting stoves on the market today cost less than higher-emitting stoves; affordable lower-emitting wood stoves are available to consumers, making the scrappage effect speculative at best.

We agree that the percentage of the total cost does vary with appliance type. This has been considered in our analyses. We note that a significant factor in the percentages of total costs per appliance is that the percentages of appliances manufactured are much greater for cord wood stoves than pellet stoves. The cost effectiveness is very good for cord wood stoves and is outstanding for the room heater category overall.

2.5.10 Comment: Cost effectiveness of hydronic heater standards

Commenters (1543, 1550, 1643) present the NERA analysis of the hydronic heater proposed rule. Following the same basic procedure as outlined above, the commenters (1543, 1550, 1643) note that the EPA failed to follow EPA guidelines for preparing economic analysis, given inadequate attention to high annualized cost-to-sales ratios and significantly underestimated the cost per ton to comply with subpart QQQQ. According to the commenters (1543, 1550, 1643), the cost per ton for the Step 1 standard of 0.32 lb/mmBtu is $27,100 per ton, compared to an incremental cost of $317,900 per ton for an interim Step 2 standard of 0.15 lb/mmBtu or

$266,100 per ton for a final Step 2 standard of 0.06 lb/mmBtu (relative to the Step 1 standard). The commenters (1543, 1550, 1643) state that the incremental cost per ton for the final Step 2 standard of 0.06 lb/mmBtu relative to the interim Step 2 standard of 0.15 lb/mmBtu is particularly costly, at $587,400 per ton. Based on the NERA analysis, the commenters (1543, 1550, 1643) believe that the proposal does not adequately consider costs as required under section 111 of the CAA. The commenters (1543, 1550, 1643) believe that each incremental reduction from the 0.32 lb/mmBtu level becomes even less cost-effective, unreasonable and ultimately untenable from the standpoint of cost effectiveness.

In addition, commenter (1643, Attachment 3) notes the large price increases for hydronic heaters and severe contractions in hydronic heater sales quantities as well as reductions in the scrappage of older higher-emitting heaters which would result from the proposed rule. The commenter (1643) claims to have considered the implications related to compliance costs and price elasticity of demand, and none of the sensitivity cases modified their basic conclusions.

Commenter (1563) states that the economic costs of achieving compliance with the Step 2 hydronic heater emissions limits, expressed in dollars per ton of particulate emissions reduction, are subject to significant under-estimation—because the actual cost of developing, testing and marketing Step 2 compliant hydronic heaters cannot be accurately determined since no compliant technology has yet to be developed, much less "demonstrated." The commenter (1563) states that the costs that have been estimated clearly show that the substantial costs cannot be justified for the simple reason that most of the potential emission reductions have already been achieved through the Phase 2 voluntary program at costs that have already been incurred.

Response:

As noted in response to previous responses, we have updated our cost estimates to reflect industry-provided cost components of R&D. The costs we used for the final rule are considerably higher for hydronic heaters than we used at proposal, based on comments supplied by HPBA. The details of the revised cost estimates are provided in the supporting documentation for the final rule (see citation in *Section 2.5.2* to Manufacturer Cost Impacts Memo). Increasing our estimated costs did not make the rule cost ineffective, especially for hydronic heaters, for which we also have updated emissions at baseline based on an updated emissions factor. Furthermore, we note that the commenters did not consider the fact that most hydronic heaters will emit PM pollution for over 20 years, so the cost effectiveness ($/ton) is approximately 1/20th of the estimates the commenters present. We agree that the price increases are not trivial. However, we also note that the newer models will be not only much lower-emitting but also more efficient, and the decrease in costs for fuel will often offset the hydronic heater price increases in 1 or 2 heating seasons. (See citation in *Section 2.5.3* to NESCAUM comment.)

Finally, the EPA agrees that substantial percentage emission reductions have been achieved for Phase 2 qualified voluntary program models versus circa 2004 generation models. However, the Phase 2 qualified models represent only 20% of current sales and do not represent best current technology as required by section 111 of the CAA. Also, the technology has been clearly demonstrated by models that have achieved the Step 2 levels already. For a list of Phase 2

qualified hydronic heaters and their emission levels, see the following webpage on EPA's Burn Wise website: http://www.epa.gov/burnwise/owhhlist.html.

2.5.11 Comment: Potential effects on appliance prices generally

Commenter (1473) notes that the Alaska Department of Environmental Conservation, in assessing the potential costs of tightened emissions standards for wood stoves to be sold in Fairbanks, found that lower-polluting models were not more expensive because cost largely was a function of capacity. Commenter (1473) contends that this confirms that manufacturers can produce cleaner stoves at competitive prices and that manufacturers and consumers are not likely to face undue economic hardship from lower emission standards.

On the other hand, commenters (0432, 0650, 0953, 0958, 0961, 1543, 1546, 1562) believe the substantial reduction proposed for emissions will cause a major increase in the cost of the wood-burning equipment. Commenters (1546, 1562) assert the additional cost (e.g., to test with both crib and cord wood) will be passed on to the customer, who may opt to stay with a non-renewable fuel (oil, coal or gas) or an old, uncertified wood stove. Commenter (953) asserts that manufacturers cannot afford the design and testing costs to meet the proposed requirements and notes that, even if they could afford to make such changes, companies would have to significantly raise prices, which would affect sales. Commenters (0650, 0953, 0958, 0961) generally state that the breakdown of cost estimates faced by manufacturers in complying with the proposed NSPS is inaccurately low and the NSPS will result in significant price increases which will cause new stove sales to decrease. Commenters (0401, 0402, 0438, 0443, 0444, 0447, 0449, 0450, 0453, 0457, 0458, 0460, 0468, 0519, 0527, 0533, 0551, 0558, 0766, 0768, 0928, 0929, 0951, 0989, 1003, 1010, 1024, 1036, 1039, 1108, 1123, 1124, 1126, 1128, 1129, 1139, 1141, 1373, 1374, 1388, 1401, 1432, 1464, 1603, 1607, 1614, 1617, plus others) also assert the price of new stoves will increase as result of the rule and this fear appears to drive a substantial portion of the public's opposition to the rule.

Commenter (1543) states that the Northwest Hearth, Patio, and Barbecue Association (NWHPBA) (whose member retailers are small businesses with fewer than 20 employees) surveyed its member retailers regarding the elasticity of demand relative to cost increases. According to the commenter (1543), based on information obtained from their member retailers, the projected impact of residential heater prices increasing 50% will destroy over 50% of the residential wood heat retailers The commenter (1543) reports that their member retailers believe that, if they were only allowed to sell pellet stoves or adjustable burn rate wood heaters, their sales would drop by over 50% and make their businesses non-viable. The commenter (1543) states that this is consistent with the results of the changeout programs that many of these retailers have participated in, which resulted in less than 10% of the changeout program participants selecting to replace their old, high-emission uncertified wood heaters with a wood pellet fueled heater.

Response:

We agree with Commenter 1473 that lower-polluting models are not necessarily more expensive than higher-polluting models. Nonetheless, as noted in response to previous comments, we have

updated our cost estimate to reflect industry-provided cost components of R&D. The details of the revised cost estimates are provided in the supporting documentation for the final rule (see citation in *Section 2.5.2* to Manufacturer Cost Impacts Memo).

We also agree with other commenters that some manufacturers may temporarily increase their suggested prices. However, competitive market pressures will temper those increases since, as we have stated in previous responses and as stated by Commenter 1473, some lower-emitting models currently sell for less than some higher-emitting models.

The EPA's economic impact analysis provides estimates of increases in costs as a percent of sales across the industries identified as impacted by the proposed rule and also provides these estimates for particular sized firms (or establishments, places of business) based on their employee size. Increases in costs as a percent of sales can be interpreted as a proxy for the maximum price increases needed for a firm to recover its costs associated with the rule. These costs to sales estimates were up to about 6% for firms in affected industries, but the Agency's estimates for particular sized firms showed much higher impacts, especially for establishments with 20 employees or fewer. This analysis accounts for the unit costs (or prices) of affected appliances. These results are one reason that EPA could not certify there was not a SISNOSE for this rule. We also note that insufficient information was available on each affected business to allow EPA to conduct an analysis at that level that would include estimates of business closures. Clearly, some very small businesses could experience some substantial stress based on the results shown in our economic analysis.

The Agency prepared the economic impact analysis that was appropriate nationally given the data that was available on producers and consumers of affected appliances. We have revised the analysis based on additional data received from commenters and have included the revised analysis in the RIA for the final NSPS.

Finally, we note that wood stove changeout statistics vary from campaign to campaign. It is true that it often takes significant discounts or rebates to persuade current stove owners to give up their currently operating wood stoves if the owners were not already intending to do so anyway. However, the statistic provided by Commenter 1543 is not for owners who were planning to replace their stoves and does not equate to similar reductions in those potential sales.

2.5.12 Comment: Potential effects on room heater prices

Commenters (0934, 0961, 1543, 1547, 1550, 1643) claim that the proposed rule will cause consumer price increases in room heaters to various degrees. According to commenter (1543), based on input from their manufacturers and other industry experts, they project that the cost of the new conventional residential wood heating appliances produced under the proposed Step 2 (Steps 2 and 3 of the alternative approach) would increase by 50% to 120% as compared to residential wood heaters that are currently available to consumers. Commenter (1543) notes that this equals or exceeds the current cost difference between an adjustable burn rate conventional residential wood heater and a pellet residential wood heater.

Commenter (0934) notes concern about the uncertainty regarding the final cord wood test method, the need to test as soon as next summer, and the potential to double the testing and development costs of even a 4.5 g/h stove. Commenter (0934) states that these costs could add more than $100 per stove and may not improve air quality at all. Commenter (0961) states that the cost of his company's stoves will increase at least $700.

Commenter (1547) states that they have no idea how they could meet the Step 2/3 emission limits and still have a marketable stove. Commenter (1547) states that the "newer technology" products the EPA references do not translate into their wood stove designs and their products will need complete re-design, process changes to factory tooling, etc.

Commenter (1543) notes that the only existing device technology that can meet the proposed Step 2 emission limits are pellet heaters and the commenter further claims that the EPA acknowledges the average cost of these devices to be approximately 51% more than the price of currently available adjustable burn rate conventional wood heaters. According to the commenter (1543), the EPA inexplicably also states that the cost increase for the Step 2 proposed approach (Step 3 of the alternative approach) for the adjustable burn rate wood heaters will be [merely] 2.8% higher than the current cost of such a device. The commenter (1543) believes that the EPA's proposal costs are inconsistent and therefore flawed and unreliable, and that the Step 2 proposed approach (Steps 2 and 3 of the alternative approach) should not be adopted.

Commenter (1522) notes that the burden that appliance manufacturers will carry to certify their stoves will add upwards of 50% to the cost of wood pellet industry stoves, which, according to the commenter, ruins the return on investment for consumers.

Response:

The EPA's economic impact analysis provides estimates of increases in costs as a percent of sales across the industries identified as impacted by the proposed (and final) rule and also provides these estimates for particular sized firms (or establishments, places of business) based on their employee size. Increases in costs as a percent of sales can be interpreted as a proxy for the maximum price increases needed for a firm to recover its costs associated with the rule. These costs to sales estimates were up to about 6% for firms in affected industries, but the Agency's estimates for particular sized firms showed much higher impacts, especially for establishments with 20 employees or fewer. These results are one reason that EPA could not certify there was not a SISNOSE for this rule. We also note that insufficient information was available on each affected business to allow EPA to conduct an analysis at that level that would include estimates of business closures. Clearly, some very small businesses could experience some substantial stress based on the results shown in our economic analysis.

The Agency prepared the economic impact analysis that was appropriate nationally for the data that was available on producers and consumers of affected appliances. We have revised the analysis based on additional data received from commenters and have included the revised analysis in the RIA for the final NSPS.

Furthermore, as noted in response to previous comments, we have adjusted our cost estimates and potential price impacts upwards after considering comments from HPBA and manufacturers. The details of the revised cost estimates are provided in the supporting documentation for the final rule (see citation in *Section 2.5.2* to Manufacturer Cost Impacts Memo). The price increases are not trivial. However, our estimates are still lower than what the commenters suggest (e.g., up to 120% increase).

Regarding concerns about the cord wood test method and the cost of testing with cord wood, we note that the final rule does not require cord wood testing. The proposal required cord wood testing, but the proposal has been revised respectful of comments and respectful of where we are in the process of developing a cord wood-based emissions database.

Regarding concerns that the Step 2 emissions limits preclude a marketable stove, cord wood stoves – in addition to pellet stoves – that meet Step 2 are already on the market and doing well.

Regarding concerns that certification costs will dramatically drive up the price of pellet stoves, the amortized cost to certify each pellet stove, based on certifying one representative model for each model line, is a small fraction of the typical price of each pellet stove. Additional information on costs and potential price imapcts is in the RIA.

2.5.13 Comment: Potential effects on central heater prices

Commenters (0941, 1387, 1442, 1507, 1572, 1643) claim that the proposed rule will cause consumer price increases in central heaters to various degrees. Commenter (1507) states the price of the new EPA compliant stove is cost prohibitive, that compatible systems will cost $3,000 to $4,000 more and, because of this, they will not be able to sell them. Commenter (1507) asserts EPA compliant stoves are more complicated, harder to burn, require more costly maintenance, and customers will not consider buying them. Commenter (1507) concludes this regulation will close them down. Commenter (1572) adds that when the Step 2/3 emissions levels would take effect, the cost of the units being made to pass this level (if it is even possible) would be significantly higher than estimated because the cost of technology that would have to be incorporated into the design of the appliance would negatively affect sales.

Hydronic heater price increases:

Commenter (1633) notes that the market for hydronic heaters has a very steep demand curve so that when prices rise, consumer demand drops off significantly. By proposing emissions limits below the Phase 2 voluntary level, commenter (1387) believes the additional testing and development costs will result in price increases for the newer hydronic heaters. Commenter (1387) asserts that models currently qualified under the EPA Phase 2 program are already more expensive than conventional model hydronic heaters and that with even more development costs, hydronic heaters could become unaffordable for those low income customers who need and rely upon them.

Commenter (1643, Attachment 3) notes the large price increases for hydronic heaters and severe contractions in hydronic heater sales which would result from the proposed rule.

Forced-air furnace price increases:

Commenter (0941) cites a 400% cost increase in the forced-air wood furnace category, which is a category that was previously unaffected by the current NSPS, and that this increase poses the threat of pricing appliances out of existence, thereby losing the opportunity to offset fossil fuel consumption.

Commenter (1657) states that the short implementation timeline for forced-air furnaces will result in new EPA-compliant models with a 30 to 40% higher retail price.

Commenter (1643, Attachment 4) notes that the few warm air furnace models that have been certified by third-party labs as meeting the CSA B415.1-10 emission limits are around twice the price of many of uncontrolled models in their category and three-times the price of some very basic models.

Response:

The EPA's economic impact analysis provides estimates of increases in costs as a percent of sales across the industries identified as impacted by the proposed (and final) rule and also provides these estimates for particular sized firms (or establishments, places of business) based on their employee size. Increases in costs as a percent of sales can be interpreted as a proxy for the maximum price increases needed for a firm to recover its costs associated with the rule. These costs to sales estimates were up to about 6% for firms in affected industries, but the Agency's estimates for particular sized firms showed much higher impacts, especially for establishments with 20 employees or fewer. We have accounted for changes in unit costs (or prices) of hydronic heaters and other affected appliances in our analysis. These results are one reason that EPA could not certify there was not a SISNOSE for this rule. We also note that insufficient information was available on each affected business to allow EPA to conduct an analysis at that level that would include estimates of business closures. Clearly, some very small businesses could experience some substantial stress based on the results shown in our economic analysis.

The Agency prepared the economic impact analysis that was appropriate nationally for the data that was available on producers and consumers of affected appliances. We have revised the analysis based on additional data received from commenters and have included the revised analysis in the RIA for the final NSPS. We note that we have received an estimate of the price elasticity of demand for hydronic heaters from one commenter, but have not received a price elasticity of supply for that appliance. Thus, estimates of impacts provided by the commenter reflect an inelastic (or flat) supply curve, which means the supply curve included in the commenter's analysis does not reflect the typical occurrence of an upward sloping supply curve for producers.

As stated at proposal, we do expect that most NSPS-compliant hydronic heaters and forced-air furnaces will likely cost more than non-compliant models. Also, as noted in responses to previous comments in this section, after considering comments from HPBA and their member manufacturers, we have increased our estimates of costs and potential prices increases. The revised estimates of costs and potential price increases are presented in the RIA for the final rule and in technical memoranda, all of which are in the public docket for the rulemaking (e.g., see citation in Section 2.5.2 to Manufacturer Cost Impacts Memo). Hydronic heaters have historically been marketed on the basis of saving fuel costs versus other heaters. We note that old hydronic heaters were often marketed as "good for the environment", "free heat" or "100% efficient" even though their actual emissions were very high and their actual efficiencies were very low (e.g., actual efficiencies were often less than 30%). Many commenters strongly believe that consumers need to know the actual emissions and efficiencies and fuel costs in order to make better informed choices. We note that NSPS Step 2 compliant hydronic heaters and forced-air furnaces are often over 80% actual efficiency and often the potential reduced fuel costs can offset the price increases in 1 or 2 heating seasons. (See citation in Section 2.5.3 to NESCAUM comment.)

2.5.14 Comment: Economic impact analysis

Commenters (1261, 1522, 1538, 1539, 1543, 1547, 1554, 1573, 1643, 1651) contend that the economic impact from the proposed rule on the wood heating industry in general, including manufacturing and retail job losses, will be significant and has not been captured by the EPA. Commenter (1547) states that the extra R&D and associated costs would push end prices to the consumer much higher, which would lead to reduced yearly sales revenue and layoffs. Commenter (1522) states that, as proposed, the burden that appliance manufacturers will carry to certify their stoves will add upwards of 50% to the cost of this technology, whereby the return on investment for consumers would be reduced. Commenter (1261) states that the businesses will suffer because of increased upfront costs to comply with the proposed rules and that with increase appliance costs, demand for heaters will drop. Commenter (1261) notes that many consumers purchase wood heaters because they are more affordable than other heaters or buy them as a supplementary heat sources to reduce the use of other heating sources. If consumers stay with their older, less efficient heaters, commenter (1261) is concerned that manufacturers will be forced to reduce capacity in the form of lost jobs or other reductions. Commenter (1573) echoes these concerns. Commenter (1543) object to EPA's RIA because most of the manufacturers and retailers of residential wood heaters are small entities (more than 90%) and the EPA concludes that there would not be a significant economic impact on small entities.

Commenter (1543) reports that Washington State has 119 residential wood heat retailers with an average employment of 6 FTE employees. The commenter (1543) asserts that the Step 2 proposed approach (Steps 2 and 3 of the alternative approach) will devastate the retail wood industry, eliminate 60 residential wood heat retailers in Washington State and could destroy 360 family-wage jobs.

Commenters (1522, 1539, 1651) requests that the EPA conduct a thorough analysis of the economic impact of the rule. Likewise, commenter (1521) requests that the EPA investigate and

quantify costs associated with the potential for consumers to choose other types of fuels and associated appliances (including the level that would drive consumer choice), health cost savings, and increases in manufacturing and selling of units. Commenters (1522, 1539, 1651) assert that such an analysis would better inform the regulation and its effect on both affected manufacturers and affected owners/operators. Commenter (1554) states that to conduct a proper economic impact analysis of its proposal, the EPA must evaluate the potential impact of Frost & Sullivan's conclusion (2010 Residential Wood Heating Market Study, p. 12), i.e., the potential that some and perhaps many wood stove manufacturers will go out of business instead of investing the capital necessary to meet the proposed standard.

Commenter (1538) notes that it is imperative that EPA's rulemaking provide a balance that allows for the continued economic use of wood heat while making gains to reduce air pollutant emissions.

Commenter (1643, Attachment 11) summarizes prescribed methodologies for industry impact analysis and economic impact analysis from the EPA *Guidelines* and compares EPA's analyses for the wood heater NSPS to the prescribed methodologies. The commenter (1643) states that EPA only performs a qualitative analysis and does not present full empirical modeling results for impacts on prices, production, profitability, jobs, closures, competitiveness, or other metrics for the directly affected industries. Also, the commenter (1643) states that the analysis of small business impacts and mitigation strategies is deficient because it lacks a thorough empirical analysis based on changes in product prices, production levels, etc., to evaluate potential impacts on small businesses. The commenter (1643) states that the EPA simply calculates cost-to-receipts ratios and similar information to draw rough conclusions regarding impacts. The commenter (1643) states that these simple calculations do not meet the standards for proper industry impact analyses in the EPA *Guidelines*. The commenter (1643) describes problems associated with using a cost-to-receipts ratio to approximate the maximum price increase including the fact that it does not directly relate to product prices, and that the calculations do not account for demand effects and changes in production levels that a real market analysis would reveal. The commenter (1643) adds that the timing of costs for the cost-to-receipt calculations seems inappropriate for approximating the maximum price impacts because of the front-loaded R&D costs with subsequent much lower testing and certification costs in later years. The commenter (1643) states that if prices in the first few years reflect costs in those years, using calculations based on average costs from 2014 to 2022 would understate price increases.

Regarding the requirement to prepare a national economic impact analysis, the commenter (1643, Attachment 11) notes that the EPA did not estimate the regulation's impacts on jobs, GDP, or other metrics for the national economy. The commenter (1643) states that the EPA summarizes scholarly articles on the employment impacts of other environmental regulations, but these articles do not directly relate to wood heater industries. The commenter (1643) adds that the EPA concludes that "it is inappropriate to utilize their quantitative estimates to estimate the employment impacts from this proposed regulation". The commenter (1643) states that the EPA did not use the "Economic Model for Environmental Policy Analysis" or any other computable general equilibrium model to estimate national economic impacts for the proposed wood heater NSPS.

Regarding potential economic impacts on hydronic heater manufacturers, commenters (0465, 0776, 0960, 1382, 1420, 1431, 1442, 1572) state that the proposed rules for hydronic heaters will have a huge effect on their business and likely put them out of business. This rule will also affect suppliers and result in a loss of sales tax, according to commenter (0776). Commenter (1442) asserts that if the burden of cost for R&D causes a dramatic price increase for hydronic heaters, it could cause some manufacturers to close their doors.

Response:

The EPA's economic impact analysis provides estimates of increases in costs as a percent of sales across the industries identified as impacted by the proposed (and final) rule and also provides these estimates for particular sized firms (or establishments, places of business) based on their employee size. Increases in costs as a percent of sales can be interpreted as a proxy for the maximum price increases needed for a firm to recover its costs associated with the rule. These costs to sales estimates were up to about 6% for firms in affected industries, but the Agency's estimates for particular sized firms showed much higher impacts, especially for establishments with 20 employees or fewer. These results are one reason that EPA could not certify there was not a SISNOSE for this rule. We also note that insufficient information was available on each affected business to allow EPA to conduct an analysis at that level that would include estimates of business closures. Clearly, some very small businesses could experience some substantial stress based on the results shown in our economic analysis.

The Agency prepared the economic impact analysis that was appropriate nationally for the data that was available on producers and consumers of affected appliances. We have revised the analysis based on additional data received from commenters and have included the revised analysis in the RIA for the final NSPS. As to adherence to the EPA Guidelines for economic analysis, EPA attempted to follow the guidelines to the extent possible with existing data and in line with best practices for such analyses. Also, the Guidelines do not prescribe a set of requirements for analysis that must be followed in lockstep for each analysis, as noted on p.1-2 of the Guidelines themselves: "These *Guidelines* are designed to provide assistance to analysts in the economic analysis of environmental policies, but they do not provide a rigid blueprint or a "cookbook" for all policy assessments. The most productive and illuminating approaches for particular situations will depend on a variety of case-specific factors and will require professional judgment. The *Guidelines* should be viewed as a summary of analytical methodologies, empirical techniques, and data sources that can assist in performing economic analysis of environmental policies." Regarding employment impacts, the Agency is currently evaluating its approaches to estimating such impacts for its rulemakings. The Agency recognizes that most of the employment impact analyses it can provide at this time are qualitative in nature, not quantitative, as the relevant material in the NSPS RIA points out in Section 5. As to general equilibrium impacts, the Agency has formed a Science Advisory Board (SAB) panel to review and offer guidance to on how general equilibrium impacts should be estimated for rulemakings. At this time, there is no guidance available from this panel to inform the economic analysis for this NSPS. We include a discussion of this matter in the RIA.

The Agency is sensitive to the potential for significant economic impacts to hydronic heater manufacturers. We have estimated economic impacts from the requirements for hydronic heaters in the proposal, and we have revised those estimates based on information provided by commenters regarding model lifespan and R&D costs for model development. There will be significant impact to small businesses, including those that manufacture hydronic heaters, as a result of our NSPS, a result we note in our RIA and preamble. These significant impacts include price changes that are high enough to merit concerns, and these are discussed in the RIA for the NSPS. For this purpose, EPA worked with SBA and OMB on a SBREFA panel to examine ways to mitigate the impacts of the rule on small business. We included many of the Panel recommendations in our proposal NSPS. The Panel report is available in the docket for this rulemaking, and the report is summarized in the preamble and RIA for this rule.

While available empirical data are insufficient to conduct the types of analyses requested in the HPBA comment, as noted above we used the best data available in our economic impact analysis. Considering all of the above, we maintain that EPA's rulemaking does provide a balance that allows for the continued economic use of wood heat while making gains to reduce air pollutant emissions.

2.5.15 Comment: Regional concentration of costs and potential hardship

Regarding the distribution of costs to industry, commenter (1496) claims that the EPA is insufficiently sensitive to the potential that costs may be distributed unevenly among businesses and that concentration of costs could prove institutionally disruptive. Commenter (1496) notes that if the regulatory burden falls disproportionately on smaller businesses, the costs and disruption of regulation could prove substantially higher than EPA projects.

Commenter (1496) notes that the use of wood for residential heating is a regionally concentrated phenomenon occurring mostly in communities that are both rural and susceptible to prolonged cold weather (e.g., in New England, the rural Rust Belt, the Great Plains, and the rural Pacific Northwest). The commenter (1496) contends that if the costs are regionally concentrated they could cumulatively have a larger impact than their *prima facie* small magnitude would imply, but the EPA does not model any unanticipated costs from regional concentration of projected costs.

Regarding the distribution of costs to consumers, commenter (1496) explains further that even assuming EPA's relatively small estimated appliance cost increase, if this cost increase falls on consumers and is not distributed as evenly as an arithmetic mean may imply, it is not wholly inconceivable that these costs could impose some hardship on a family in need of a new wood heater. The commenter (1496) claims that the EPA should have at least addressed this potential distributional issue even though the commenter himself notes that the hardship [to consumers] is actually unlikely.

Response:

EPA conducted an analysis of impacts of this rule to small businesses. In doing so, the Agency found that more than 90 percent of affected businesses are small. Thus, there are few "large" businesses that will bear compliance costs from this rule. Also, the Agency conducted an

analysis of impacts that provided impact results for businesses as small as 20 employees per establishment (place of business) or fewer. These impacts are substantial, as pointed out in Section 6 of the RIA. The Agency has no information on the regional concentration of costs, though the Agency recognizes that wood heater appliances are primarily found in those communities that are susceptible to prolonged cold weather.

As for impacts to consumers, EPA presents some estimates of elasticity of demand in Section 5 of the RIA. The elasticity of demand has a magnitude close to that of a potential price increase in affected appliances, though the magnitude may be higher for wood stoves compared to other appliances. We do not have any information on the impact of higher prices on household income, though the estimated price increases do not suggest a significant impact on the income of wood heater appliance users interested in a new appliance.

2.5.16 Comment: Lack of sensitivity analysis regarding cost effects on emissions and benefits estimates

Commenter (1484) suggests including a sensitivity analysis on the estimated benefits to see how factors such as declining sales of devices, new source bias, and local factors where devices are in use could affect emissions reductions estimates. Likewise, commenter (1497) notes that the EPA should strongly consider whether or not they accurately accounted for new source bias on the part of consumers. Explaining new source bias, commenter (1497) claims that a more expensive product may encourage a consumer to hold onto their old and underperforming wood heater for longer than they would have if the new product was more affordable, which could lead to a reduction in [emission reductions and therefore] benefits relative to what EPA has estimated in the RIA as poorer performing wood stoves would remain in a person's home for longer due to a consumer's desire to save money.

Commenter (1506) notes that EPA's shipment estimates and estimated emission reductions are based on the assumption that higher wood heater prices will not affect demand, nor lead consumers to keep their old units longer. The commenter (1506) contends that it is unrealistic to assume that a doubling or tripling of the price of these units (e.g., in the case of forced-air furnaces and hydronic heaters) will not affect consumer demand, and some sensitivity analysis is warranted. Noting that EPA's shipment estimates "all rely on a single projection (growth rate in units sold of 2% per year)", commenter (1506) echoes OMB's recommendation that the EPA should conduct a sensitivity analysis on the assumptions underpinning the R&D cost estimates and projected shipments of different heater types, presenting a range of plausible estimates.

Commenter (1484) notes that the EPA benefit calculations only present two types of variance to determine sensitivity: a monetized estimate of benefit-per-ton emission reductions and a differing interest rate. The commenter (1484) suggests that other major assumptions should be varied (e.g., the number of devices sold and local geographic factors where the devices are in use) and the net present values and other outcomes recomputed to determine how sensitive the outcomes are to changes in the assumptions. Commenter (1484) concludes that without such a recalculation it is unclear if the proposal currently provides the tangible benefits when consumers and manufacturers are faced with tangible costs.

Commenter (1496) also notes that the EPA does little sensitivity analysis in its cost analysis, but should have considered the outcome of the following on emissions and benefits:

- changes in the volume or demand for wood heaters (e.g., deference of purchase of new unit) due to increased cost and the effect on projected emissions;
- regulatory impact on industry structure and potential exacerbation of costs (e.g., uneven distribution of costs to industry with potential for disproportionate effects on smaller businesses);
- variance in the cost assumptions comprising the nature and magnitude of the assumed R&D costs; and
- changes in consumer choice regarding fuel source (i.e., choosing oil or gas instead of wood) and the effect on projected emissions, health, and the environment

Similarly, commenter (1437) notes that since wood is a substitute for natural gas, electricity, and other heating sources, the EPA should also include a detailed analysis of how the availability of these substitutes might alter the response of consumers and result in more or less overall emissions. Commenters (1437, 1497) note that the EPA fails to use the relationship of increased oil and gas prices leading to increased sales of wood heaters to estimate the cross-price elasticity – that is, to determine how sensitive consumers may be to an increase in the price of wood heaters. Commenters (1437, 1497) claim that without this price elasticity/sensitivity accounted for, the EPA is unable to determine what fraction of households will switch from wood to other fuel sources (due to an increase in the price of wood heaters as a result of the rule).

Response:

For the final rule, we have conducted additional sensitivity analyses where warranted and where we have credible data. These sensitivity analyses are described in the final RIA. For example, we conducted sensitivity analyses on shipment growth rates and on the R&D amortization period. The benefits estimates are directly proportional to the emission reductions so there is no need to conduct separate benefits sensitivity analyses where we conduct emissions sensitivity analyses. Furthermore, as noted above in response to a previous comment, to the degree that emissions may be concentrated regionally, the benefits (and costs) will likewise be concentrated regionally; therefore there is no need to conduct such a sensitivity analysis.

While we did not have sufficient information at the time of proposal to examine the possibility of substitution to gas-fired, electric, and other heating sources as a result of this NSPS, we did receive data on an elasticity of substitution estimate from wood firing to non-wood firing devices, a measure that is a composite of substitution away from wood to other fueled sources. That estimate from a peer-reviewed journal article is 1.82, or a 1% increase in a wood fired devices price will lead to a 1.82% increase in demand for other fueled substitutes. This relationship does not provide a specific estimate of the potential for switching from wood to another fuel, but does offer insight on how significant the substitution possibility is if the price of wood-firing appliances or sources increase. The estimate is included in the final NSPS RIA.

2.6 Appliances Subject to Rule

2.6.1 Comment: Appliances regulated under rule

Commenters (1395, 1417, 1463, 1502, 1503, 1529, 1551, 1561, 1570, 1581, 1585) support the expansion in this proposal of the 1988 rule to regulate additional wood-burning appliances such as pellet stoves, single burn rate stoves, hydronic heaters, forced-air furnaces and masonry heaters. Commenters (1468, 1478) strongly support the proposed strengthening and expansion of efficiency and emission standards to a broader group of residential home heaters to help protect residents from installing a poor-performing relatively inefficient system that will ultimately be cost-burdensome. Commenter (1538) generally supports the EPA's efforts to update the emission certification requirements for newly manufactured wood heaters so that all types of wood-burning devices are covered with standards appropriate to the various technologies. Commenter (1538) believes this will enable consumers to make choices that meet their economic needs with the benefit of reducing air pollution. Commenter (1551) supports the EPA's efforts to harmonize and unify standards, specifically in creating standards based on device use (central vs. space/room heating) and for catalytic and noncatalytic units.

Over 4,385 people (1430) signed an on-line petition supporting the proposed single low emissions limit for all wood and pellet stoves (i.e., room heaters) and supporting strict and mandatory emission limits for indoor and outdoor furnaces (i.e., central heaters).

Commenter (1521) supports the EPA in the inclusion of new residential hydronic heaters and forced-air furnaces in the proposed NSPS. The commenter (1521) reports that ME has regulated outdoor hydronic heaters (OHH), recognizing that these units potentially pose an air quality problem if not properly operated. Commenters (0541, 1062, 1114, 1580) specifically support the addition of the new subpart QQQQ and/or RRRR.

Response:

We recognize the concerns of the many commenters who took the time to submit their official comments to the docket, reinforcing that concerns about the air quality impacts and health effects of emissions from residential wood heaters are numerous and substantial. The Agency thanks the commenters for their support of expanding the current NSPS to regulate particulate pollution from all types of wood heaters.

Note: See Section 5.3 for a discussion regarding the inclusion or exclusion of masonry heaters under proposed subpart RRRR in the rule.

2.6.2 Comment: Addressing remaining exemptions and loopholes

Commenter (1551) supports efforts to create inclusive requirements for residential heating equipment and to develop source category definitions that eliminate source category loopholes, ensuring that all residential wood heating devices are required to meet an emission standard when built and used. Commenter (1283) states that the EPA should eliminate the loopholes that allow the sale of single burn rate stoves, coal stoves with wood capability and outdoor wood

boilers. Commenter (1640) urges wording in the rule to preclude blanket exemptions, such as what happened as a result of the 1988 rules, which allowed the manufacture and sale of stoves specifically designed to circumvent the intent of EPA's certification program. Commenter (1640) states any residential wood heating device that does not fit any of the current categories in EPA's proposed rule should require EPA approval to be exempted.

Commenter (0943) is concerned about the emissions and impacts from a broad range of wood-burning devices not addressed by the proposed rule, including outdoor fireplaces, pizza ovens, barbecues and chimineas. Commenter (1544) suggests including cook stoves in the NSPS as these are clearly used as heaters; exempted products create distortions in the marketplace and lead to increased emissions. Commenter (0461) believes wood-burning cook stoves should be exempted for that small portion of the population that depends on wood stoves for cooking food, such as the Amish community.

Commenter (1581) believes it is most important to bring the currently exempted residential wood heaters under emission limits ASAP, by implementing those components of the proposed rule on schedule. Commenter (1581) states no residential cord wood heaters should continue to be exempted from emission standards beyond the effective date of the new rule. Commenter (1594) asserts that all loopholes to market nonconforming devices must be closed, including duel fuel boilers than can burn a combination of wood, coal, or oil. Commenter (1594) would also like the EPA to ban all cord wood heaters that rely on a damper to restrict combustion air.

Some commenters (0541, 0933) state that the NSPS should include light commercial and agricultural furnaces up to 1 to 1.5 MMBtu. Commenter (0933) states that their product line is above the 350,000 BTU but below the 1.5 MMBtu, and there are no standards for such furnaces, which leaves them in regulatory limbo. The commenter (0933) suggests that the EPA not regulate based on residential or commercial but rather on grams per BTU of fuel input and that the rule be expanded to include all forced-air and hydronic units regardless of use.

Commenter (0541) asks if a home-based business is exempt from this rule. Commenter (0432) believes a clause should be added that exempts non-commercial individuals who construct their own wood-burning equipment without fear of government fines or prosecution. Commenter (0432) adds this should be dependent on the local zoning laws to ensure no harm is done to neighbors.

Response:

We appreciate the suggestions of those commenters who expressed their concern for the exemptions and loopholes resulting from the 1988 NSPS. The final rule does broaden the applicability of wood heaters subject to the 1988 NSPS beyond adjustable burn rate wood heaters, which were the focus of the 1988 regulation. This final rule specifically includes single burn rate wood heaters/stoves and pellet heaters/stoves. Note that some pellet heaters/stoves were exempt from the 1988 NSPS due to air-to-fuel ratios greater than 35:1. We are tightening the definition for ‘‘cook stoves’’ and adding definitions for ‘‘camp stoves’’ and ‘‘traditional Native American bake ovens’’ to clarify that they would not be subject to the standard other than

appropriate labeling for cook stoves and camp stoves. We are eliminating exemptions over a broad suite of residential wood combustion devices. Our intent is that this rule be stated in broad enough terms to regulate any future residential wood-burning heaters that may come into the U.S. market, including all wood-burning room heaters and central heaters.

Regarding commercial furnaces and other fuels such as oil, gas and coal, we note that this NSPS is specific to residential wood-burning devices. We are not setting emission standards for coal stoves at this time because we do not have good fine particle emission performance data for coal stoves. Coal stoves will need to be labeled that they are not approved under the wood heater standard and that it is illegal to operate them with wood. This rule does apply to appliances that have been designed and approved to burn both coal and wood; such dual-fuel stoves would be required to be certified by passing the particulate limit when burning wood. While the rule does not apply to coal-only appliances, this exemption does not mean coal-only stoves have low fine particle pollution, particularly if they are burning low-quality coal or something other than coal, such as wet wood, trash or debris.

This NSPS applies to "new sources." As such, any new residential wood heater, including those from which a home business is operated and those constructed at the residence, would be subject to the requirements of subparts AAA and QQQQ, as appropriate, in addition to any state/local regulations.

2.6.3 Comment: Addressing technological advances in appliances

Commenters (0541, 1463, 1503) requests that the EPA establish test methods to allow for new and cleaner technologies to be developed, noting that it is important not to restrict the opportunity for new designs because of limits in the testing protocol. Commenter (0541) states that the EPA should support the use of updated digital and analog technology (e.g., improved sensors, variable controls, wireless operation) to strengthen the test methods and monitoring and collection of data. Commenter (1503) describes emerging technology related to automated stoves that significantly reduce or eliminate the possibility that some users would not properly operate their stoves. For example, commenter (1503) adds, the EPA could clarify that automated stoves (which cannot be manually adjusted by the user) may be tested and certified according to the single burn rate heater testing procedure, adjusted as the EPA believes appropriate. The commenter (1503) states that the EPA should consult with stakeholders and issue a supplemental notice of data availability that explains how the Agency would test and certify an automated stove under the final rule.

Commenter (0541) believes the rules do not sufficiently look ahead to address current developments with regards to hybrid units, feedstock expansion and technology advances. Commenter (1551) notes there are hybrid units that employ noncatalytic secondary combustion with catalytic technology and that some European units utilize electrostatic precipitators (ESPs) or variable air flow technologies to meet emission standards; thus highlighting the need for a standard that does not direct emission control strategies.

Commenter (0541) notes that the proposed rule considers heat output but not integrated electric generation (e.g., to self-sustainably power the unit and to charge cell phones, radios, lights). Commenter (1397) also believes clear guidelines need to be added regarding the testing of stoves that incorporate the use of fans, sensors and other advanced technology.

Commenter (1479) supports the use of devices such as catalysts, cyclones, electrostatic precipitators, and bag houses to reduce organic and inorganic particulate emissions, and CO, and suggests that innovative manufacturers that integrate these devices should not be discouraged by having to meet higher standards than manufacturers that choose not to use a pollution control device. The commenter (1479) believes the long-term goal of the rule should be to encourage innovation, which the commenter anticipates will be needed to pass future limits.

Response:

Regarding comments concerning test methods and newer, cleaner devices, this rule does make a number of changes to the test methods (compared to the 1988 rule) designed to improve their precision and to capture emissions over the range of burn rates typical in home use. The final rule also contains new test methods, including additional test methods for hydronic heaters. Further, as with all NSPS, manufacturers may request EPA approval of alternative test methods on a case-by-case basis. For example, as commenter (1503) suggested, the EPA could approve manufacturer's request for an automated stove (which cannot be manually adjusted by the user) to be tested and certified according to the single burn rate heater testing procedure, provided that the manufacturer submits adequate justification and documentation that the burn rate truly cannot be adjusted by the user. We encourage manufacturers to design wood heaters that best represent in-home performance on cord wood that consumers use (although certification may be based on crib wood or cord wood). We also encourage manufacturers to certify with cord wood as soon as possible to provide consumers with better information for their in-home performance. We further encourage changeouts with new, more efficient wood heaters.

Regarding looking ahead to address technological innovations, we grouped appliances into "room heaters" and "central heaters" in order to simplify the rule and compliance with the rule, while also allowing flexibility for current and future technological innovations. Our goal is to reduce emissions across any-and-all technologies used for wood-based heating, rather than to tailor regulations to a myriad of individual technologies, thereby creating an uneven playing field and potentially creating inadvertent loopholes. This approach keeps EPA out of the business of favoring/choosing one technological solution over another (which is a manufacturer's purview), while enabling maximum flexibility in the rule to regulate emerging and future technologies that also seek to serve as residential wood heaters. Hybrid technology, for example, does not fall neatly into catalytic or non-catalytic categories but is nonetheless a "room heater" technology. Furthermore, a far-reaching effect of NSPS and environmental regulations in general is that they spur innovation and foster competition. Grouping wood heating technologies by function has a technology-spurring effect that ultimately benefits the environment and the industry. Nonetheless, we appreciate the many comments received and will take these comments addressing technological advances into consideration in future wood heater BSER

determinations, in order to ensure that no wood heater technology is excluded from the regulation.

2.6.4 Comment: Addressing a broader range of fuel types

Commenter (1521) believes that an unintended consequence of the EPA's requirement that wood stove manufacturers certify fuel use for an appliance is that, because stove manufacturers would not have an incentive to test a wide variety of fuels unless there was a business arrangement (for cost reasons), the rule could close out of the market smaller, innovative yet no more environmentally detrimental manufacturers of bio-bricks and other hybrid fuels. For this reason, the commenter (1521) recommends that the EPA recommend and not mandate the use of manufacturer-identified appropriate fuels. Commenter (0948) suggests reviewing European literature to expand the test method to include wood chips.

Commenter (0575) supports reconsideration for the elimination of use of a wide variety of recycled fibers and plastics in wood fuels because this shifts the burden to virgin wood. The commenter (0575) presents information showing the benefits of fiber and plastic re-use to produce a clean burning and environmentally conscious fuel product. According to the commenter (0575), the environmental cost is significantly higher if waste stream fibers and plastics are not allowed to be used in residential pellet heating fuels.

Commenters (0541, 1505, 1520) state that they would support the EPA developing additional NSPS to regulate heating devices that burn fuels other than, or in addition to, stick wood or wood pellets, e.g., wood chips, coal, corn or grass pellets. Commenter (0541) suggests the EPA add an emission ceiling that will provide a foundation for testing and approving the expansion of feedstock. Commenter (1465) notes that stoves, furnaces, or hydronic heaters could be sold as non-wood-fired (e.g., coal, corn, etc.) appliances, but owners might instead fuel them with wood, effectively bypassing the NSPS. This commenter (1465) urges EPA to consider including all solid fuels – wood, coal, and various non-woody biomass or other agricultural or wood waste materials – and not limit the NSPS to just wood fuels; testing of the appliance should be required for any fuel the owner's manual states that it is capable of burning. Likewise, commenters (1397, 1551) believe devices should be tested with all the allowable fuels they can burn, for example: a device labeled as a "coal stove" should not be exempt from certification requirements if it is capable of burning wood. Commenters (1397, 1551) recommend that a manufacturer must either test to the appropriate standard or provide data and supporting evidence that its units cannot be used to burn wood, thus eliminating a potential applicability loophole.

Commenter (1591) believes the EPA is creating another loophole for stationary devices by not including heaters other than wood burning – coal, corn, grass, etc. Commenter (1591) states that ignoring these other sources of fuel for residential appliances will potentially again leave families to suffer for decades, as occurred with the 25-year gap in regulations allowing hydronic heaters to impact thousands of family's lives. Commenter (1591) concludes that EPA's rule needs to include dual and single fuel heaters and those heaters fueled with whatever people and manufacturers dream up.

Commenter (1505) recommends that the EPA recognize in the proposed standards that there are multi-fuel heaters and that certain heaters may also burn other biomass pellets and includes specific regulation language change suggestions to meet their recommendations. Commenter (1505) requests that the EPA add that there is no restriction to burning alternative fuels in section 60.530(b)(3), (4), (5), (6), and anywhere else that lists exempt appliances.

Burning corn as fuel:

Commenter (1505) reports that the Renewable Fuel Standard Act links the agricultural markets with the energy markets and that the NSPS creates a barrier to meeting the goals of the Act by requiring that:

- Only wood pellets that are manufactured under license from the PFI, a private entity, can be burn heaters that are able to burn them. According to the commenter (1505), this ignores the fact that heaters that can burn other fuels, e.g. corn, can also burn wood pellets and would be thereby prohibited from burning the alternative fuels.
- The standards that would be used to meet and demonstrate compliance with the new regulations are the private intellectual property of the ASTM, a private entity or the CSA, a foreign entity; have not been published in the Federal Register, and are being incorporated only by reference.

Commenter (1505) suggests that the EPA declares it does not intend to regulate heaters that burn fuels in addition to wood or wood pellets and then states that the EPA restricts that exclusion to only those heaters that cannot burn wood or wood pellets. The commenter (1505) asserts that multi-fuel appliances can also burn (in addition to wood) corn, fruit pits and other natural products (and specifies design differences that allow them to burn differing fuels). The commenter (1505) asserts that this will result in alternative fuel heaters burning wood pellets and that burning alternative fuels to wood would be prohibited in these appliances. The commenter (1505) cites preamble and regulation language that causes confusion and concern. Commenter (1505) opines that, by not allowing persons to use an alternative fuel in a low emission heater that, there will be a growth in backyard built heaters that will not have the latest and best technology for emission control. The commenter (1505) asserts that, in order for the EPA to avoid this unintended consequence, the EPA should allow burning of alternative biomass like corn and other grains, fruit pits, nut hull, etc., in tested and certified heating appliances so that they can be safely burned.

Commenter (1505) provides extensive background information on the history and use of shelled corn as a source of fuel, corn and the economy, corn and the markets, corn and the energy markets, and corn and retail energy markets. The commenter (1505) asserts that a stable economy depends on a stable currency which in turn requires a steady supply of corn and that the demand for corn is fairly consistent and that production and supply of corn is subject to excessive swings resulting in price volatility. According to the commenter (1505), this is why Congress exercised its authority under the Commerce Clause to control the production and use of all feed grain, corn, from the moment that the seed is put in the ground to its ultimate use. The commenter (1505) asserts that, because the petroleum energy market is erratic and the supply

and demand curves are the opposite as those for corn, the two different energy markets were linked in order to limit petroleum prices while supporting the agricultural markets thereby creating more stability in both markets.

Commenter (1505) provides a table comparing the cost of various heating fuels whereby the commenter reports that corn sells for approximately the same price per MMBtu as wood pellets. The commenter (1505) asserts that burning corn can meet the EPA's proposed emissions standards for pellet type heaters and has several other advantages as a fuel. The commenter (1505) presents results of the emissions from five pellet type room burners capable of burning corn (conducted by Omni-Test Laboratories) where the test results showed that the particulate emissions ranged from 1.4 g/kg to 4.8 g/kg with an average of 2.4 g/hr (with all heaters passing the current emission standard of 7.5 g/hr when burning corn). The commenter (1505) reports that there was one outlier in the test of 4.8 g/kg, slightly above the proposed Step 1 standard for pellet burning appliances of 4.5 g/hr, but that the remaining four heaters passed the proposed Step 1 standard with an average of 1.8 g/kg less than half or the Step 1 limits. The commenter (1505) compares the results conducted by Omni Test Laboratories to emissions from burning wood in other appliances as reported in revisions to the 5th edition to the EPA's AP-42 Section 1.10 Residential Wood Stoves and concludes that the PM emissions rate from a "certified" stove is 2.1 g/kg, which is greater than the average emissions for the 4 stoves burning corn in the Omni study. The commenter (1505) further states that, based on the Omni Labs study, comparing the results for particle emissions for hardwood and softwood pellets to the emissions shown in the Omni corn burning results, corn falls between the two and presents the data to support their statement.

Commenter (1505) requests that the EPA not facilitate the development or implementation of any state restriction on the burning of corn. Commenter (1505) complains that Vermont is requiring emissions tests for which the EPA has not established a standard. The commenter (1505) reports that Vermont requires (APCR §-204(e)(2)(ii)) an emission test on each type of biomass. The commenter (1505) compares Vermont's policies regarding pellet-fueled heaters with the EPA Burn-Wise web page, the policies of California's Southern Counties around Los Angeles and Oregon. The commenter (1505) asserts that Vermont's policies differ than elsewhere in the country and create an "insurmountable barrier" to the use of biomass fuels other than wood. The commenter (1505) presents an extensive discussion regarding why they believe Vermont's requirements violate the federal preemption over corn under the commerce clause of the Constitution.

Commenter (1479) asks why corn-only pellet stoves are exempt from the applicable emission limits. Commenter (1503) states that the EPA should clarify whether multi-fuel stoves can or must be certified using corn as well as wood pellet fuel. The commenter (1503) adds that if these stoves must be certified using corn, the EPA should allow manufacturers to use the Method 28 test with corn to demonstrate compliance with the NSPS.

Response:

This final rule does not include any requirements on alternatively fueled devices, such as those fired solely by coal, gas, corn or oil. This NSPS is specific to wood-fueled devices, including certified pellet-fuel fired devices. We are not setting emission standards for coal-only or corn-only stoves at this time because we do not have good fine particle emission performance data for these stoves. Such stoves will need to be labeled that they are not approved under the wood heater standard and that it is illegal to operate them with wood. This rule does apply to dual-fuel appliances that have been designed and approved to burn both wood and another fuel (e.g., coal, corn, gas, oil), however. Dual-fuel stoves would be required to be certified under this rule by passing the particulate limit when burning wood. For example, if a manufacturer wants to label a stove capable of burning both wood and corn pellets, the stove would have to be tested using each fuel type. Both results would have to be reported, but it would only be subject to the PM standard for the wood fuel. It should also be noted that, while the rule does not apply to non-wood burning appliances, this exemption does not mean these stoves (e.g., coal-only) have low fine particle pollution, particularly if they are burning low-quality coal or something other than coal, such as wet wood, trash or debris.

As regulated in the current 1988 subpart AAA standards, operation according to the owner's manual requires operation with the appropriate fuels because the choice of fuels to burn in any appliance can have a major impact on emissions and efficient operation of the appliance. For clarity, we are requiring the owner's manuals to include a list of prohibited fuel types (e.g., trash, plastics, yard waste) to emphasize the responsibility of owners and operators to use appropriate fuels that will result in the performance of the unit as certified and avoid the creation of possibly hazardous fumes from burning inappropriate materials.

Regarding one commenter's concern that Vermont's requirements violate the federal preemption over corn under the commerce clause of the Constitution, this is incorrect. There is no federal preemption; states can be more stringent than NSPS, just not less. While current test methods do allow testing with alternative fuels, (e.g., corn, walnut hulls or cherry pits), this NSPS pertains to wood-fueled heaters. As such, testing with crib wood or cord wood is necessary in determining compliance with the emissions standards of this rule.

We disagree with the suggestion that this rule conflicts with the Renewable Fuel Standard (RFS). The RFS program regulations were established to ensure that transportation fuel sold in the U.S. contains a minimum volume of renewable fuel. Regarding the overall ASTM process, including the intellectual property provisions, we appreciate the commenter's concerns. We continue our discussion with ASTM regarding concerns about states' ability to fully participate in the ASTM process and the implications that raises for accepting the resulting test methods.

2.6.5 Comment: Regulating refurbished devices, replacement parts, and aftermarket kits

Commenters (1551, 1591) suggest the EPA utilize the reconstruction provisions under the NSPS to require that all refurbished devices be tested to meet current applicable emission standards and prohibit the sale of replacement parts that would exceed the reconstruction threshold.

Commenter (1462) asserts there needs to be a requirement to address replacement parts so that stoves can be maintained to stay at their fullest emission reduction potential. Commenter (1551) asserts many manufacturers supply parts for pre-NSPS stoves and retailers can refurbish pre-NSPS stoves and legally sell these units. Commenter (1591) asserts all other NSPS contain reconstruction provisions and is concerned that replacement parts could extend the life of the unit significantly or indefinitely. Likewise, commenters (1488, 1558) request that the EPA use the reconstruction provision, as defined in § 60.15, so that manufacturers cannot sell replacement parts that would extend the life of the unit significantly or indefinitely. Commenter (1558) believes this provision is necessary to provide health-protective standards.

Commenter (1665) believes that the EPA can ban the sale of essential components for pre-EPA wood heaters where the costs of those parts exceed more than 50% of the original retail cost of the affected facility (wood stove) (based on definitions for "affected facilities" and "new source" in the 1988 NSPS). If costs are greater than 50%, the affected facility would be subject to the updated new source requirements and standards.

Commenters (1192, 1462, 1513) support certification of aftermarket kits. Commenters (1192, 1462) request the EPA require certification for all wood-burning device aftermarket kits such that, when installed on any wood-burning device, the modified device meets the NSPS. The commenters (1192, 1513) believe this will prevent modifications which change the firing characteristics of a device, potentially causing it to emit more than established emission standards. Commenter (1513) states the EPA should prohibit the sale of uncertified "after-market modification kits" and that if the EPA does not develop a certification process, the EPA should prohibit the sale and installation of such kits. Commenters (0650, 1554) already see an increase in their non-compliance spare parts business combined with a trend toward increased wood burning. Commenters (0650, 1283) state that the EPA should forbid manufacturers from supplying repair parts for early smudge burning stoves.

Response:

We are not requiring certification of replacement parts and aftermarket kits in this NSPS. We do however require that users operate and maintain the wood heater in a manner consistent with the user's manual (or the warranty is voided) and not modify the heater to increase emissions. We also require that the user's manual provide step-by-step instructions on the inspection and replacement of parts including gaskets and catalysts and other parts that are critical to the emissions performance of the unit. We believe this is an appropriate balance of environmental impacts, costs to the consumer and user practicality.

We do acknowledge that § 60.15 *Reconstruction* (of Title 40 in the CFR), in general, specifies that if the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, then that facility would be considered to be an affected facility and would be subject to the relevant NSPS. However, as in 1988 and as proposed, we are exempting this NSPS from § 60.15. As above, we believe this is an appropriate balance of environmental impacts, costs to the consumer and user practicality.

2.6.6 Comment: Regulating fireplaces

Support for not regulating fireplaces

Commenter (1192) supports the EPA's decision not to propose standards for fireplaces as their district prohibits the installation of fireplaces and uncertified wood stoves. Commenter (1192) explains that fireplaces may not be used on any no burn day and is concerned that adding "certified fireplaces" in subpart AAA would allow them to be installed and operated on Stage 1 no burn days, undermining their efforts to reduce wood smoke emissions because even low emitting fireplaces emit more than EPA-certified wood stoves. Even though opposed to regulating all wood heaters including fireplaces, commenter (1490) requests EPA's reasoning for not regulating fireplaces, noting a fireplace's high emissions and low efficiency relative to wood stoves.

Opposition to not regulating fireplaces

Commenters (0502, 0940, 0947, 1156, 1378, 1520, 1544) generally support fireplace standards. Commenter (0940) states fireplaces emit unlimited pollutants for the lifetime of the house. Commenters (0940, 1520) believe the EPA should consider the impact on indoor air quality in the decision on fireplaces, pointing to the results of the Yale Childhood Asthma Study. Commenter (0502) states fireplaces burn very inefficiently and product negligible heat. Commenters (0502, 1156) believe the EPA should be addressing fireplaces rather than wood stoves because they are the low hanging fruit here.

Commenters (0947, 1378) state that with the adoption of the new wood heater standard, wood-burning fireplaces will become the largest unregulated source of fine PM in the U.S. and believes the EPA should mandate creation of a new source category and develop an NSPS for wood-burning fireplaces. Commenter (1378) adds that an EPA regulation to reduce PM emissions, CO and VOCs from wood-burning fireplaces would meet any rational cost-benefit analysis, as the incremental cost of adding clean-burning technologies to wood-burning fireplaces is very low, especially when compared to some of the incremental costs per model that the EPA has estimated for manufacturing new forced-air furnaces, masonry heaters, and hydronic heating systems that will conform to the proposed NSPS.

Commenters (0448, 1378) takes exception to the statement in the Preamble to the proposed rule that "fireplaces are typically used for ambience ... " because it appears to minimize the critical nature of wood-burning fireplaces for millions of Americans who depend on access to this plentiful fuel source to heat their homes, particularly in rural and lower income regions of our country. Commenter (0448) notes that a fireplace has practical value and like a wood stove, can be used in the event of a disaster (e.g., a blackout, loss of oil due to war). In support of regulating wood-burning fireplaces, commenter (1378) notes:
• A University of California survey indicated that there would be one aesthetic for every 5 or 6 primary heating households and that average wood fuel consumption from fireplaces is 1.5 tons for primary heating and 0.35 ton for aesthetic heating.

• A 2004 Mid-Atlantic/Northeast Visibility Union study documented a total of 1.5 million wood-burning fireplaces in 11 states and DC, with a 51-49% split regarding primary heat vs. aesthetics. The study shows that over 90% of wood burned in fireplaces in the Northeastern & Mid-Atlantic States is burned for heat – dramatically different from the usage data EPA received from one association.
• King County, WA had 132,690 open-hearth wood-burning fireplaces that burned an average of 1.23 tons of wood annually.

Commenters (0998, 0999, 1001) state that jurisdictions are only recognizing wood heater standards of g/hr for particulate emissions and, thus, refusing even the EPA Phase 2 Qualified fireplaces. Commenters (0999, 1001) request that the EPA require Phase 2 qualified cleaner burning performance for all future installations of wood-burning fireplaces.

Commenter (0998) reports that, with the inception of the EPA's Burn Wise program and incorporation of ASTM E-2558 standard for particulate emissions, the fireplace industry should have the recognized guidelines and standards that allow wood stoves and heaters the ability to be used. Commenters (0998, 1001) report that often fireplaces are being shut out of the new housing/building development industry, and the fireplace industry needs the EPA's support of the NSPS to initiate a standard that recognizes the ASTM E-2558 standard.

Commenter (1378) asserts the use of wood-burning appliances as a source of heat is not declining across the country and notes the DOE issued a study on March 17, 2014 indicating that there has been a national increase in homes using wood as a heating source, particularly in the Northeast but with the highest increases also being seen in Delaware, Alaska, Michigan, Nevada, Ohio and South Dakota. In addition, commenter (1378) mentions a recent article in USA Today claiming that the number of U.S. households heating with wood rose nationwide from 1.8 million in 2000 to 2.4 million in 2010 - faster than any other heating fuel; another projection indicates that the number of households heating with wood could increase to 3 million over the next five years. If this trend continues, commenter (1378) concludes it places an even greater importance on the regulatory efforts of EPA to ensure that all wood-burning sources, including fireplaces, are the subject of an NSPS.

Commenter (1378) adds that through the Voluntary Fireplace Program, manufacturers have invested millions of dollars to deliver clean-burning fireplaces that meet or exceed the EPA recommended test standard and, thus, the impact on industry has already occurred. However, commenter (1378) claims EPA Phase 2 qualified clean-burning fireplaces have not been widely accepted by state and local air quality regulators across the country, as most are focused on the current NSPS for wood heaters and refuse to officially acknowledge EPA's voluntary program or accept the outstanding performance that the industry has achieved with these fireplaces. Commenters (0947, 1378) state regulators simply will not allow the installation of these fireplaces in new homes and renovated homes in the absence of an NSPS. Commenter (0947) describes the success of the voluntary program in providing an affordable clean burning fireplace technology and believes that EPA should take immediate steps to incorporate the voluntary standard into its mandatory regulatory scheme.

Commenter (1002) urges the EPA to propose a health-protecting NSPS for residential wood-burning fireplaces. The commenter (1002) recommends that the EPA develop this new standard around the EPA's current Voluntary Fireplace Program.

Support for voluntary certification program and technological progress

Commenter (1403) encourages the EPA to create a voluntary certification program for new fireplaces. Utilizing an "EPA certified" label on fireplaces, as used on wood stoves, according to commenter (1403), will help consumers make educated purchases that are better for their health and wallets. Commenter (1403) believes the EPA's current voluntary partnership program provides a good basis for expansion.

Commenter (1397) notes that fireplace use is highly variable, with elevated use in areas of moderate climate such as coastal regions of west coast states. Fireplace emissions account for approximately 18% of the statewide $PM_{2.5}$ emissions from wood-burning devices in Washington State, according to commenter (1397), with localized and coastal areas (such as the Tacoma nonattainment area) having values even higher. Commenter (1397) suggests that work should continue to develop both cleaner new devices and economical retrofit devices, with emphasis placed on increasing societal adoption of clean technology rather than mere emphasis on health effects. Commenter (1397) also believes that outreach to builders and architects is also needed, featuring the options provided by new devices and technology.

Response:

As in the 1988 NSPS for residential wood heaters, the EPA did not include new indoor fireplaces for regulation in the proposal to this rule, based on the Agency's review of data indicating that typical fireplaces are not effective heaters. Most of the heat content from the wood burned in a typical fireplace is lost out the chimney rather than used in room heating. As we noted at proposal, for effective heating, some homeowners have inserted a new EPA certified wood stove into an otherwise open masonry fireplace. In those cases, new wood heaters/stoves are regulated under the current 1988 rule and would continue to be regulated by this final rule.

Although we are not regulating open fireplaces under this rule, the Agency sought additional data and comments that could help determine whether standards for new fireplaces would be appropriate in the future. We have considered all the comments and data received. The comments ranged from adamant opposition to regulation of fireplaces to strong support for developing a future rulemaking. Only a few comments suggested that fireplaces are heaters and should be covered in this NSPS. The more persuasive comments included data that reaffirmed our rationale in the proposaql that fireplaces are far more likely to be used for ambience and that almost all fireplaces waste more heat out the chimney than useful heat to the house. Thus, this rulemaking does not include open fireplaces. We note that, like in 1988, closed combustion fireplace systems are included in the NSPS and that several fireplaces are certified under the 1988 NSPS. We also note that open fireplaces continue to be included in an EPA voluntary program that encourages manufacturers to make cleaner-burning new fireplaces, and retrofits for existing fireplaces available for consumers. More information on this program is available on the

Burn Wise website (at http://www.epa.gov/burnwise/participation.html#fireplace). Also note that State, tribal and local jurisdictions may have other, additional regulations and restrictions on the installation and use of fireplaces used primarily for aesthetic rather than heating purposes.

2.6.7 Comment: Addressing existing wood heaters

Some commenters (0418, 1432, 1582) support the rule not affecting existing wood heaters in homes. For example, commenter (1582) states that she is "grateful that the rules will not apply to existing wood burning stoves [in Missouri]."

On the other hand, commenters (0368, 0389, 0436, 0445, 0482, 0529, 0510, 0538, 0541, 0573, 0943, 0944, 1011, 1116, 1132, 1153, 1433, 1436, 1477, 1557, 1581, 1668) contend that the EPA should address existing wood heaters either in addition to or instead of newly manufactured wood heaters. Commenter (0368) states that this is a better use of resources and will avoid clamping down unnecessarily on small businesses. According to commenter (0650), this could include requiring or at least encouraging wood stove rebate programs. Commenter (1436) believes the best return on investment is to look at the old inventory and those that have skirted the 1988 rule until now. Many commenters (0389, 1557, 1668, plus numerous others) recount serious and ongoing health effects suffered due to a neighbor's wood smoke and seek government regulation (including banning) of such existing wood heaters for what they describe as crisis situations destroying both their health and financial stability. (*See sections 2.1.2, 2.2.1 and 4.5.1 for additional commentary regarding personal stories of adverse health effects suffered due to emissions from existing wood heaters*.)

Commenter (1551) notes that because the EPA did not include residential wood heating devices as source categories under section 112 (HAP), it has the authority to regulate HAPs from existing wood-burning devices under section 111(d). To do so, commenter (1551) asserts the existing source would have to be subject to a standard of performance for the regulated pollutant if it were a new source. Given that this source category accounts for 44% of all total stationary and mobile polycyclic organic matter pollution and 62% of the PAH, commenter (1551) urges the EPA to explore the establishment HAP emission limits in the NSPS under section 111(b) for a new sources and under section 111(d) for existing sources. Commenter (1551) adds that regulations for existing sources could address resale of uncertified devices and sale of replacement parts for uncertified devices.

Note: See section 2.1.5 for additional commentary regarding changeouts of existing wood heaters.

Response:

We appreciate the many commenters' concerns regarding the health impact of existing wood-burning devices. However, this final rule was developed following CAA section 111(b)(1)(B) review of the existing residential wood heater NSPS. This NSPS does not establish standards of performance for existing sources. Section 111(b) provides authority for EPA to promulgate NSPS that apply to new, modified, or reconstructed sources (which may be referred to together as new sources) and section 111(h)(2)(B) allows the EPA to establish work practices and

operational standards or combinations of standards in certain cases (e.g., when testing is impractical due to technological or economic limitations). Once EPA has elected to set an NSPS for new sources in a given source category, section 111(d) may pertain to future regulation of existing sources, with certain exceptions. Specifically, where EPA establishes a NSPS for new sources in a source category, a section 111(d) standard is required for existing sources in the regulated source category (except, in general, for pollutants regulated under the CAA section 109 requirements for NAAQS or regulated under the CAA section 112 requirements for HAP). The regulated pollutant under this NSPS is particulate matter, which is regulated under section 109 requirements for NAAQS. Section 111(d) also uses a different regulatory mechanism to regulate existing sources than section 111(b) uses for new sources in a source category. Rather than giving EPA direct authority to set national standards, section 111(d) provides that EPA establish a procedure for states to issue performance standards for existing sources in that source category.

Under the section 111(d) mechanism, EPA first develops regulations known as "emission guidelines" that may be issued at the same time or after an NSPS for the source category is promulgated. These "guidelines" establish binding requirements that states are required to address when they develop plans to regulate the existing sources in their jurisdictions. These state plans are similar to SIPs under CAA section 110 and must be submitted to EPA for approval. Numerous states have acted independent of this rule to address new and existing sources as part of SIP measures necessary to ensure attainment and maintenance of the NAAQS. Nothing precludes tribes, states and local agencies for establishing requirements beyond those that are required by the NSPS in order to address the air quality in areas under their jurisdiction.

2.7 Definitions

2.7.1 Comment: Excluded appliance definitions, including fireplaces

Commenters (1543, 1550, 1643) ask the EPA to consider definitions of excluded appliances provided by HPBA prior to publication of the proposed rule (see docket EPA-HQ-OAR-2009-0734-0271), especially for fireplaces. The commenters (1543, 1550, 1643) state that it is important to better differentiate fireplaces from heaters and proposed a detailed definition of a fireplace that is a "wood-burning appliance intended to be used primarily for aesthetic enjoyment and not as a room heater." The commenters (1543, 1550, 1643) list four detailed criteria that further define a fireplace.

Commenter (1239) agrees with the EPA's definition of "traditional Native American bake ovens" and their exclusion from the proposed emission limits.

Response:

Regarding one commenter's suggestion that the Agency add a definition of "excluded appliances," particularly for fireplaces, the Agency has determined that the definitions provided in the final rule regarding affected and excluded wood heating devices are sufficient as this rule has been in place since the 1988 NSPS. The final rule does maintain the added definition of "traditional Native American bake oven," as noted by a second commenter.

2.7.2 Comment: Adjustable burn rate heater definition

Commenter (1397) states the definition of "adjustable burn rate heaters" should not exclude automatic stoves.

Response:

The definition of "adjustable burn rate wood heater" makes no distinction regarding "automatic stoves" and therefore automatic stoves are not excluded by the rule.

2.7.3 Comment: "At retail" definition

Commenter (0541) suggests that the phrase "at retail" be deleted from the Step 1 emission limit.

Response:

The intent is to denote sale to the ultimate purchaser/user. Thus, we are retaining the definition of "sold at retail" (also used in the 1988 NSPS) as meaning the sale by a commercial owner of a wood heater to the ultimate purchaser/user or noncommercial purchaser. That is, the sale to the ultimate purchaser/user must occur before the sell-through deadline, not just to a wholesaler, distributor or importer.

2.7.4 Comment: Catalytic combustor definition

Commenter (1479) suggests changing the definition to read: "a device, ceramic or stainless steel, coated with noble metals used in the wood heater to lower the temperature required for combustion."

Response:

We have determined that the "catalytic combustor" definition as written is sufficiently prescriptive without being exclusive of technological advances. The rule's definition of catalytic combustor is "a device coated with a noble metal used in a wood heater to lower the temperature required for combustion."

2.7.5 Comment: Hydronic heater definition

Commenter (0541) suggests that it will be difficult for the EPA and states to determine units sold to a residence vs. non-residence. Commenter (1062) suggests that rather than defining hydronic heaters as residential or commercial based on use, that the EPA define hydronic heaters as being regulated by the residential NSPS if they are rated at 500,000 BTU output or lower to avoid a potential loophole with manufacturer's defining their hydronic heaters as commercial units to avoid a need to comply. Other commenters (1543, 1550, 1643) state that the definition of "residential hydronic heater" should include a size cutoff (i.e., 350,000 BTU/hr) similar to the definition in the NESCAUM model rule and the Phase 2 voluntary program partnership agreement. The commenters (1543, 1550, 1643) state that including a size cutoff will provide

much needed clarity to regulated manufacturers. Commenter (0464) opposes an upper size cutoff.

Response:

The intent of this NSPS is regulate to all new residential hydronic heaters regardless of size. There may be instances where one hydronic heater serves to heat both a home and a commercial operation, such as a greenhouse located on the same property as a residence. In this instance, the hydronic heater would be covered by subpart QQQQ, regardless of its rated output. In such an instance, this determination of residential application will preclude any hydronic heater from being exempt from the rule. We disagree that a size cutoff is needed to provide clarity to manufacturers.

2.7.6 Comment: Model line definition

Commenter (1479) suggests clarifying "are similar in all material respects" in the definition of model line.

Response:

As in the proposal, the Agency has provided in the final rule the definition of "similar in all material respects" as meaning that the construction materials, exhaust and inlet air system, and other design features are within the allowed tolerances for components identified in § 60.533(k) for subpart AAA and identified in § 60. 5475(k) for subpart QQQQ.

2.7.7 Comment: Pellet stove definition

Commenter (1397) suggests modifying the definition of pellet stove to include nonelectric pellet stoves since at least one is currently EPA certified.

Response:

The definition for "pellet stove" in the final rule does not exclude nonelectric pellet stoves. An affected pellet stove may be electric or nonelectric and is merely defined as "an enclosed, pellet or chip fuel-burning device capable of and intended for residential space heating or space heating and domestic water heating."

2.7.8 Comment: Prohibited fuel definition

Commenter (1465) suggests the EPA should define prohibited fuels in the NSPS as any fuel that was not tested in the heater. Commenter (1465) believes this should include but not be limited to refuse, painted wood, pressure treated wood, construction and demolition materials, plastics, non-woody biomass such as grasses, and animal carcasses.

Response:

We appreciate the suggestion and note that the list of prohibited fuels provided in the final rule for subparts AAA and QQQQ includes all of these examples as well as "any materials that are not included in the warranty and owner's manual for the subject heater or furnace" and "any materials that were not included in the certification tests for the subject heater or furnace".

2.7.9 Comment: Seasoned wood definition

Commenter (1563) notes that the rule's definition of "seasoned wood" specifies a moisture content of 20% or less, but the emission testing requirements specify an average moisture content range between 19 and 25%. The commenter (1563) states that the EPA offers no reason why one would expect that the moisture content of "seasoned wood" at a user's home should not be more than 20% nor does it cite emissions data showing that wood with specific moisture content above 20% would cause a certified residential wood heater to not meet the proposed emission limits for any category wood heater. At minimum, the same range of moisture content in wood used as fuel for emissions testing should be permissible at a user's home.

Commenter (1479) challenges the proposed definition of seasoned wood and notes that the moisture content can range from 15 to 30%, depending on the geographic location and climate.

Response:

While some test methods do allow testing of wood with a moisture content that can vary between 19 and 25%, for purposes of this final rule, we are defining "unseasoned wood" as having an *average* moisture content of 20% or more. This is consistent with our Burn Wise website (within tips for building a fire at http://www.epa.gov/burnwise/bestburn.html) and regions where it is illegal to burn sell, advertise or supply wood unless the wood moisture content is 20 percent or less. For example, in the State of Washington it is illegal to burn wood with a moisture content of greater than 20%.

2.8 Particulate Standards – Overarching Concerns

2.8.1 Comment: Step 1 and Step 2 nomenclature

Commenters (1192, 1395, 1513) encourage the EPA to use the terms "Phase III" and "Phase IV" instead of "Step 1" and "Step 2", stating that, as the 1988 and 1990 standards are commonly known as "Phase 1" and "Phase 2", this change would reduce potential confusion and convey the message that subsequent phases are progressively cleaner.

Response:

Before proposal, we considered the use of the nomenclature "Phase III" and "Phase IV" but decided to use "Step 1" and "Step 2". We will retain the Step 1/Step 2 nomenclature because the term "Phase" was used both in the old NSPS and in the hydronic heater voluntary program. We think it will be confusing to use the same term in the updated NSPS; and we intend to avoid conflation of the regulatory program with the voluntary program.

2.8.2 Comment: Transitioning from crib to cord wood-based standards

Note: See also "Crib wood versus cord wood test method issues" comment in Section 6.1.10

Numerous commenters (0944, 0958, 1062, 1176, 1417, 1423, 1427, 1462, 1479, 1486, 1503, 1508, 1514, 1538, 1543, 1550, 1551, 1561, 1587, 1591, 1633, 1643) support the transition of fuel tests from crib wood to cord wood because it is more representative of how consumers use the equipment.

To ease the transition, commenters (1633, 1647) suggests an "election" approach, to allow manufacturers to choose whether to test with crib wood or cord wood (e.g., for the hydronic heater standards). Another commenter (1463) suggests that the EPA allow small manufacturers to test with only cord wood for Step 1, instead of requiring testing with both crib and cord wood, to help reduce the testing cost. Commenter (1479) suggests allowing a certification of 8 years to manufacturers to sell units that undergo testing with cord wood and crib wood as an incentive to them for having to pay for both forms of testing. This would give manufacturers an additional amount of time to recoup the additional testing cost.

Commenter (1423) agrees that the EPA should move towards a cord wood test method and encourages EPA to establish a more stringent Step 2 emission level based on crib wood test and, once sufficient cord wood test data becomes available, apply a conversion factor for an equivalent cord wood emission level. Likewise, commenter (1640) believes the current database of cord wood test results is insufficient to establish a Step 2 emission standard based on a cord wood test. Commenter (1640) recommends the EPA include a provision that retains the proposed Step 2 standards based on a crib wood test and then apply a correction factor for the standard based on cord wood test data. Additionally, if the cord wood testing is delayed or if manufacturers do not submit data in a timely fashion, commenter (1640) recommends the EPA undertake testing of devices in order to build the cord wood test database by the time Step 2 standards to go into effect.

Similarly, commenter (1397) believes Step 1 testing must include testing with both cord wood and crib wood if an adequate database is to be acquired to fully inform the level of the Step 2 standard. Commenter (1397) suggests setting the proposed Step 2 standards based on the existing database of crib test results, with the option of revising the level of that standard once a cord wood test method is completed and corresponding test data obtained. Commenter (1397) suggests correcting the Step 2 crib results as cord wood data is acquired. Specifically, given the current dearth of cord wood test data, commenter (1397) suggests setting the Step 2 standard based on available 5G data and using Method 301 to provide a correction factor in time for Step 2 implementation; requiring adjustment/correction to a cord wood equivalent when sufficient cord wood test data has been acquired.

Commenter (1551) also recommends that the EPA promulgate Step 2 standards based on crib tests and states any move to an alternative test method needs to provide a clear correlation to the standards based on the crib fuel data set (e.g., use of Method 301 to correlate new test methods to Method 28). As an alternative to Method 301, commenter (1551) states the EPA could exercise

its Section 114 authority to fully inform the Step 2 standard. Commenter (1551) states that although manufacturers claim a cord wood test will yield higher emission results, data show that results could move in either direction.

Commenter (1396) strongly supports an eventual transition from crib-based standards to cord wood-based standards. However, commenter (1396) does not believe that 5 years is anywhere near adequate for the transition from the crib-based standard of 4.5 g/hr to a cord wood-based standard of 1.3 g/hr. Commenter (1396) asserts more time is needed to finalize the testing methodology, generate useful data to determine the correlation between crib wood and cord wood emissions using an agreed upon methodology, and use the gathered data to set a realistic cord wood standard.

Commenter (1396) asks that the EPA explain what rationale was used in support of proposing the Step 2 (and 3) limits using cord wood only and what data was used to determine the feasibility of proposing cord wood testing at this time. Commenter (1547) is concerned about the impacts on R&D costs to transition to cord wood testing as well as the EPA's assumption that when they test with cord wood they are expected to achieve the same emission levels as produced by the current EPA method.

Commenters (0934, 1382,1396, 1509, 1514, 1543, 1546, 1550, 1562, 1572, 1632, 1633, 1643, 1647) do not support the requirement that manufacturers must test using both crib wood and cord wood, essentially doubling the cost of in-house testing during product development, as well as "official lab" testing to have a model certified. Commenters (1546, 1572) add that the industry (including small businesses) should not be forced to wholly subsidize the creation of a cord wood testing database. Commenter (1572) adds that if the EPA feels that it is imperative to generate this type of data for comparison, it should have been done before proposing the new method and the EPA should administer this additional research at their own expense of time and money. Commenter (1514) claims that "the proposed crib wood / cord wood dual testing requirement only serves to pour salt in the wound" and suggests that the EPA require testing with cord wood only, if the move to cord wood in step 2 is a given.

Commenter (1479) believes that the 3 step emission limits outlined in the proposal are achievable with cord wood, but believes that requiring manufacturers to test both with crib and cord wood places a large financial burden on the manufacturers solely at the benefit of the EPA, regarding data, which needs to be accounted for. Commenter (1479) suggests allowing a certification of 8 years to manufacturers to sell units that undergo testing with cord wood and crib wood as an incentive to them for having to pay for both forms of testing. This would give manufacturers an additional amount of time to recoup the additional testing cost.

It should be noted that some of the same commenters (1543, 1550, 1643) who support the eventual transition to cord wood based limits, add that the EPA's proposal to mandate cord wood-based compliance with the proposed Step 2/3 room heater emission limit is completely unsupportable as a matter of law before data have even begun to be generated with the new method, because it is un-demonstrated under CAA Section 111. (S*ee section 2.1.1 for additional commentary*).

Commenter (1643, Attachment 1) notes that the proposed transition from crib fuel to cord wood fuel for emission testing for all product categories for determining compliance with Step 2/3 emission limits adds uncertainty, and therefore risk. Commenter (1643) states that there are simply no data to inform the impacts on emission outcomes or test method precision of changing test fuel from cribs to cord wood, especially since efforts are still underway to create a new cord wood test method for wood stoves that better reflects homeowner use patterns. Commenter (1643) believes that it is reasonable to assume that the variability when burning cord wood will not be better than when burning cribs, and it is therefore also a reasonable assumption that using the test method precision, standard deviations about a mean emission value and coefficients of variation determined using available crib data provides what can only be considered an absolute best case prediction of what might be expected with cord wood test results with the anticipated new test method. Commenter (1643) also notes that the same or even greater concerns apply to applying this analysis to predict the risks associated with the proposed new compliance algorithm for other appliance categories beyond wood stoves (e.g., pellet stoves, hydronic heaters, and warm air furnaces). Commenter (1643) states that the test methods for these categories are new or relatively new, and no comprehensive evaluation of their precision has been performed or is even possible. Beyond that, some of these methods involve additional measurements beyond PM measurements, which are likely to raise their own significant precision issues (e.g., heat output measurements in air plenums for warm air furnaces), according to the commenter.

Response:

We continue to agree with comments that cord wood testing is more representative of in-home use. In fact, for forced-air furnaces, we specify the use of cord wood for the certification tests (because forced-air furnace certification tests will be conducted according to CSA B415.1-10 which has specified cord wood as the test fuel since 2010). Based on the existence of a viable draft cord wood method, the expectation at proposal that the ASTM test methods for cord wood (which better represent in-home use) for adjustable burn rate stoves, pellet stoves, and hydronic heaters would be complete soon after the NSPS proposal, and the related expectation that significant testing of these wood heater models re-tuned to perform well on cord wood would occur before promulgation of this final rule, we proposed to require testing only with cord wood for compliance with Step 2 emissions limits for all appliances. However, the ASTM cord wood test methods are not complete and only limited testing using the draft methods has occurred so far. We received numerous comments from noncatalytic stove manufacturers, laboratories and some states with concerns about when the cord wood test methods would be ready. These concerns included how quickly noncatalytic stoves could be redesigned to perform well under cord wood certification testing, that we proposed to be required for Step 2, i.e., 5 years after the effective date. Considering all of the above, we have determined that we do not have sufficient data at this time to adequately support a regulatory requirement for cord wood testing (except for forced-air furnaces).

Nonetheless, we still encourage manufacturers to design wood heaters that best represent in-home performance using cord wood and we still believe cord wood test data better represent in-

home use and provide better information for consumers to choose the cleanest and most efficient heaters. Some stoves already perform very well on cord wood (as discussed in the NODA, as of May 2014, we had test data for three catalytic or hybrid wood heaters/stoves that performed very well on cord wood) and we hope that many more manufacturers will chose to conduct cord wood testing to provide more valuable consumer information as soon as possible, and well before the Step 2 limits in 2020.

We are not requiring testing with both crib and cord wood for adjustable burn rate stoves, single-burn rate stoves, pellet stoves or hydronic heaters, but we are allowing manufacturers (of adjustable burn rate stoves, single-burn rate stoves, pellet stoves or hydronic heaters) the choice to test with cord wood. Under the final rule, we are providing an alternative compliance option for manufacturers of these heaters who choose to demonstrate compliance with Step 2 standards based on cord wood testing. This option will allow manufacturers (of adjustable burn rate stoves, single-burn rate stoves, pellet stoves or hydronic heaters) to test and certify with cord wood to meet alternative emission limits. We expect that many manufacturers will choose the alternative cord wood compliance testing option so that consumers will have more opportunities to purchase stoves that are tuned for in-home use. Each of these models would be equipped with both a permanent label and, at the discretion of the manufacturer, a special voluntary temporary label (hangtag) informing consumers that these wood heaters were tested and certified by EPA to perform similarly to how their appliances would operate in their homes when burning cord wood. This alternative compliance option will provide important data for future revisions to the NSPS and inform future cord wood-based standards.

We provide more specific responses to cord wood test method concerns in *Section 6.1.10*.

2.8.3 Comment: Proposed compliance algorithm and burn rates

Support for moving from weighted average certification to individual burn rate certification:

Commenters (1503, 1587) support elimination of the "weighted average" and change to a two burn rate category certification to make the certification values more in line with real world performance and help ensure that low emissions during the optimal stove operational mode do not hide the potentially higher emissions occurring during very low or high burn rates. Likewise, commenter (1558) states the annual weighted average must be removed from the rule immediately and not in a later Step 2 requirement.

Commenter (1551) states the use of weighted averages for an emission standard creates issues and supports the EPA move to require replicate tests to improve method precision and to ensure that results are reproducible. If the EPA determines that units must test at all four burn rates for efficiency testing, then commenter (1551) strongly recommends that the EPA require replicate testing in the category that achieves the highest emission rate to ensure that testing is representative rather than an outlier result.

Commenters (1488, 1591) support dropping the weighting from the subpart QQQQ Step 2 standard immediately in Step 1. Commenters (1488, 1591) assert that the EPA's proposed annual

weighted average as the Step 1 emission limit rather that an actual emissions rate hides hourly emission spikes. According to the commenters (1488, 1591), given that the EPA's method is weighted to represent an average heat load for (unidentified) northern U.S. cities, the EPA's method is an even worse predictor for emission rates from hydronic heaters operated in colder areas such as Fairbanks, Alaska. Commenters (1488, 1591) state that weighting adds bias and misleads consumers, and should be removed from the proposed rule and hangtags.

Commenter (1640) supports the EPA's proposed changes to the crib wood test method regarding the burn rate categories, stating that requiring manufacturers to show compliance for Cat 1 and Cat 4 separately ensures no emission peaks are averaged out as is the case with the current system.

Opposition to individual burn rate certification:

Commenter (1514) opposes the change in test method away from the weighted average of four burn rates because the weighted average better represents real world operation, especially since stoves burn at various burn rates and some are cleaner than others at either a high or low burn rate.

Commenter (1544) states that if the intent of the proposed NSPS is to test appliances for burn rate conditions intended to reveal worst-case emissions conditions of a wood-burning appliance, the four burn rate categories should be retained. Commenter (1544) adds that the proposed changes to test methods (including addition of cord wood testing and startup procedures) should not be incorporated since they have not been completely tested and they do not have proven, valid test concepts.

Commenter (1521) does not support the proposal to require appliances to meet a 2020 Step 2 standard in Burn Category 1 and Burn Category 4 when the standard proposed is based on an average of performance in Burn Categories 1, 2, 3 and 4. Commenter (1521) reports that there is no analysis provided that supports the requirement for a unit's emissions from the lowest burn rate and from the maximum burn rate (not a weighted average) to comply with the average burn rate value of the top 12% for which data has been collected. Commenter (1521) opines that the average of the four burn categories with statistically supported upper values for any one burn category would be a much more appropriate and justifiable proposal.

Commenter (1396) opposes the requirement that any given burn rate PM emissions not exceed 1.3 g/hr [for room heaters]. Commenter (1396) asserts that using a weighted average and higher cap for lower burn rates, as has been the norm since 1988, is crucial for certification of wood heaters due to the variability of emissions at each burn rate.

Commenter (1665) has concerns that a 1.3 g/hr cap on a worst-case scenario testing basis will eliminate their company from the market place. The commenter (1665) suggests that, in lieu of meeting a 1.3 g/hr cap on a worst case scenario testing basis, that weighted averaging of four burn rates (with a weighting of 40/30/20/10) in line with real would usage, would be a better predictor of real world performance. The commenter (1665) asserts that the elimination of

weighted testing could mean an end to overall efficiency and supports the four burn rates as recommended in Method 28K (but do not agree with the elimination of the 5 minute start up). The commenter (1665) also endorses the use of B415.1-10 for the method by which to derive efficiency. Lastly, the commenter (1665) suggests that the EPA carefully consider the implications of taking what would be the best burn rate and averaging it with a lesser performing burn rate in terms of emissions results and suggests that the EPA select several models of all technologies and review them for before and after grams per hour results if four burn categories were reduced to three (as proposed by industry, 40/40/20).

Commenters (1543, 1547, 1550, 1643) state that the EPA has not justified its departure from the compliance algorithm and weighted averages set forth in the various consensus-based methods, which it is required to do under the National Technology Transfer and Advancement Act (NTTAA). Commenters' (1543, 1547, 1550, 1643) first concern is that requiring compliance to be determined with a method that is significantly different from the methods used to generate the data used for standard-setting is unlawful under the CAA. The commenters (1543, 1547, 1550, 1643) second concern is that requiring more runs using tests methods with poor precision would place an extraordinary degree of risk on manufacturers and may render compliance with EPA's proposed standards nearly impossible on any reliable basis. The commenters (1543, 1547, 1550, 1643) reference Attachment 1 (to 1643), MCA Report, as the basis for this concern. That study, based on a Monte Carlo analysis of wood stove data, also would apply to other appliance categories, according to the commenters (1543, 1550, 1643). The commenters (1543, 1547, 1550, 1643) state that the impact of the new compliance algorithm would be devastating and drive most manufacturers out of the market. The commenters (1543, 1550, 1643) conclude that the EPA must address the risks associated with test method variability and balance potential emissions measurement impacts with economic impacts to manufacturers.

Commenter (1643, Attachment 1) describes how subpart AAA currently uses a burn rate based probability distribution data weighting methodology where test runs are conducted in each of four burn rate categories spanning the full range of burn rate capabilities of the heater from lowest to highest. A similar weighting concept is applied within the current EPA hydronic heater voluntary program, according to the commenter (1643). The commenter (1643) states that in EPA's proposal, the Step 2/3 standards are based on a new compliance algorithm that relies on data from only the lowest and highest burn rate (or heat output) categories for the appliance, i.e., Category 1 and Category 4. The commenter (1643) adds that it appears the EPA intends that the average of the three worst case test runs as well as the single "best" screening run must meet the emission limit in order for compliance to be achieved.

The commenter (1643, Attachment 1) uses the HPBA Enhanced EPA Certified Woodstove Database to examine the impacts of this change for a large group of currently certified products. The commenter (1643) also uses data from the EPA Laboratory Proficiency Round Robin Test Program Category 1 and Category 4 data to determine the inter- and intralaboratory variability for those run categories which are used in the proposed compliance algorithm. The commenter (1643) notes that the variability can be expressed in terms of standard deviations or, because of the wide range of mean emission values in the round robin data, coefficients of variation (CVs) which expresses the variability for each burn rate category as a percentage of mean emission

rate. The commenter (1643) uses these data to create two-stage log-normal distributions so that a large number of randomly generated probable outcomes can be sampled from the modeled distributions. The purpose of this probabilistic analysis is to overcome the shortcomings of available data given that the certification database only includes one test run in each burn rate category and the proficiency test data is limited and includes only two runs in each category, but the commenter (1643) is trying to assess the impact of conducting three test runs in the worst case burn category as well as the issues presented by the single run. The commenter (1643) describes how this type of analysis using Monte Carlo methods is employed to model the probability of achieving compliance with EPA's proposed new compliance determination methodology which includes both the sampling plan (compliance algorithm) and the acceptance criteria (passing grades). The analyses model the effect of inter- and intra-laboratory variability using a two-stage Monte Carlo analysis, according to the commenter (1643). The commenter (1643) also models the provisions to address additional test runs, as contemplated by the proposed test method.

According to the commenter (1643, Attachment 1), the results of the Monte Carlo analysis show that the proposed compliance algorithm for Step 2/3 present several issues. The commenter (1643) states that many EPA certified models have emission performance profiles that are not flat, with better performance generally focused in the range of primary concern under the current compliance algorithms —the lower burn rates. The commenter (1643) notes that sacrificing the performance at the highest burn rates has often been the necessary trade-off that stove designers have needed to make to ensure the best performance at the heavily-weighted low burn rates while still meeting maximum heat output expectations from consumers. The commenter (1643) states that, while homeowners most often operate their heating appliances at lower burn rates (heat outputs) to match the typical heating demands of their homes, there are times when high heat output is needed on a short duration basis and manufacturers have found that maximum heating capacity is an important specification for stove purchasers. The proposed change in EPA's algorithm, which equalizes the importance of the highest burn rate or heat output emission results to those from the lowest burn rate or heat output, while ignoring the emission performance in between, as the EPA is now proposing, is a radical change with many product design implications according to the commenter. The commenter (1643) adds that it also penalizes manufacturers for making the design choices clearly implicated by the current compliance algorithms.

The commenter (1643, Attachment 1) states that the conclusions that can be drawn from the Monte Carlo simulations show that for manufacturers to have a high (95%) confidence level that their stove models will meet the either of the proposed emission limits using the new compliance determination algorithm, true means of PM emission performance of that model in both the Category 1 and Category 4 burn rates (or heat output) must be less than 50% of the emission limit, even if the conservative CV values were to actually be achievable by the test methods. The commenter (1643) continues that if the variability of the test methods is higher than predicted based on assuming that the average CV value determined from the EPA proficiency test data can be applied over all emission rates, the probability of failure increases at the proposed emission limits.

The commenter (1643, Attachment 1) states that, as with all testing procedures, the various solid-fuel heater emission test methods each have a lower threshold below which there is no ability to reliably discriminate differences between emission test results, and this is the case when using CV value results in predicted standard deviations at low emission rates that are well below the test method discrimination threshold. For example, the commenter (1643) states, they would be skeptical of the ±0.3 g/h standard deviation predicted by using an intra- or inter-lab CV value of 30% for a model with an assumed true mean emission rate of 1.0 g/hr at a given burn rate because there is simply no evidence to support that this level of precision is achievable under any circumstances. To the contrary, the commenter (1643) states, there is significant evidence to dispute this possible level of precision. The commenter (1643) explains that additional simulations have been conducted using the mean CVs value plus one standard deviation above the means and this shows the impact of higher variability at low emission rates. The commenter (1643) states that it is likely that even this adjustment to the CV value does not adequately address the concerns about the discrimination threshold for the method since the resultant standard deviations are still lower than have ever been demonstrated, and therefore, would still result- in under-estimations of the risk of failing compliance with Step 2/3 emission limits based on the proposed new compliance algorithm.

The commenter's (1643, Attachment 1) core concern is that a process that makes the determination of compliance primarily a matter of random chance is of no regulatory value and will impose unwarranted risk on manufacturers as they attempt to certify new products. In other words, the commenter (1643) believes that passing grades and the compliance algorithm must account for the precision of the measurement and fueling methods. The commenter (1643) explains that manufacturers most certainly want a 95% or better confidence that truly compliant products will pass, but regulators want a process that ensures a 95% chance that noncompliant products will fail, and both cannot be achieved when the precision is poor. The commenter (1643) states that the risks associated with both types of error – acceptance of an unqualified product and rejection of a qualified one must be considered. The commenter (1643) would argue that the first error type is of small consequence to the environment since the appliance will still have to be far cleaner than previously required while the second error type can be financially devastating to a manufacturer given the large investment involved and the inability to make a return on that investment that a failed test represents. The commenter (1643) states that there has to be a sharing of the risk presented by the test method uncertainty and a balancing of the impacts to the environment (relatively low) versus the financial impacts on the manufacturers (relatively high). [For more information on the detailed descriptions of the analysis and results in the "MCA" report see comment 1643, Attachment 1]

Response:

We are maintaining the Step 1 PM emission limits to be as consistent as possible with the BSER database. Our short-term approach (i.e., the Step 1 PM emission limit) is to maximize the use of currently available test methods to construct a robust BSER database and allow for automatic certification of a significant number of models. This will alleviate logjam concerns and provide market conditions that allow manufacturers and test labs to focus on developing models and test methods that better conform to in-home or residential use. Retaining the weighted average

approach for Step 1 supports the goal of reducing potential logjams at laboratories and at the EPA in that it allows heaters to pre-qualify at Step 1. That is, room heaters that already meet Step 1 under the current AAA requirements are deemed automatically certified and do not have to submit applications for Step 1.

Likewise, we are adding automatic Step 1 PM emission limit EPA certification for hydronic heater models if they are already qualified as meeting the Phase 2 emissions level of the EPA's voluntary program (tested with M28 WHH). To further reduce potential certification delays and unnecessary costs for small businesses, we are also adding automatic Step 1 EPA certification for hydronic heater models certified by NYSDEC that demonstrate the models achieve the Step 1 levels and RHNY-qualified pellet hydronic heaters. Similarly, we are adding automatic Step 1 EPA certification for new forced-air furnaces that are independently certified (i.e., not self-tested) under CSA B415.1-10 to meet the Step 1 emission level or that are certified by NYSDEC and meet the Step 1 emission level. Note that for forced-air furnaces for Step 1, we deleted the 7.5 g/hr particulate emission limit per individual burn rate because the CSA B415.1-10 certifications are based on lbs/mmBTU heat output limits at the higher burn rates, not the g/hr limits, and the manufacturers do not have experience with meeting g/hr limits for these furnaces at the higher burn rates. This approach reduces the near-term burden on manufacturers by increasing the number of heaters that can be sold on the effective date of the rule.

For Step 2 emission standards, we proposed to require certification compliance at the lowest burn rate (Category 1) and the maximum burn rate (Category 4) rather than the weighted average of the four burn rates, which was required in the 1988 rule. Based on the data and comments submitted, we have determined that the final rule will require weighted averages for Step 2 wood stove/room heater standards in subpart AAA, while requiring compliance at individual burn rates for Step 2 in subpart QQQQ.

Regarding subpart AAA, the emissions by burn rate excerpted from EPA certification test reports (for heaters certified between 2010 and 2014, as provided in the NODA) showed similar results to the HPBA database for pre-2010 certification test reports discussed in the proposal. Furthermore, the data show that for weighted averages, 18 percent of noncatalytic stoves (that represent over 80 percent of the market) achieve 2.0 g/hr. However, on an individual burn rate basis, only 6 percent (7 of 110 stoves) achieve 2.0 g/hr, a relatively small percentage of wood stoves manufactured today. This supports our decision that a Step 2 limit of 2.0 g/hr, based on a weighted average of the multiple burn rates, better represents BSER for wood stoves/heaters, compared to a Step 2 limit based on individual burn rates. This information was considered in our decision to use weighted averages for both Step 1 and Step 2 of the final rule under subpart AAA.

For hydronic heaters and forced-air furnaces regulated under subpart QQQQ, we are changing the proposed Step 2 PM emissions limit of 0.06 lb/mmBtu heat output at the lowest and highest burn rate (tested on cord wood) to 0.10 lb/mmBtu heat output for each test run (tested on crib wood) for hydronic heaters and to 0.15 lb/mmBtu for each test run for forced-air furnaces. We are requiring compliance at each test run (individual burn rates) in Step 2 PM emission limits for central heaters in order to address well-established concerns regarding excessive emissions from these devices at different burn rates, as summarized by commenters above and in numerous other

comments summarized in this document. However, it should be noted that the Step 2 PM emission final limits for hydronic heaters are based on crib wood and are less stringent than proposed, which should ameliorate some of the concerns that manufacturers cannot meet the (originally proposed) Step 2 PM emission limit at lower burn rates.

Regarding commenters' precision and round-robin proficiency concerns based on their Monte Carlo analysis of wood stove data, we disagree that that the current methods are incapable of detecting emissions at the level of the standards. We note that the State of Washington Department of Ecology has successfully required a 2.5 g/hr emission limit for catalytic stoves since 1995 and several stoves have been EPA-certified at 1.0 g/hr, which is well under the final Step 2 emission limit of 2.0 g/hr. Even if the commenters' claims were correct that the precision is no better than 1.0 g/hr, the final emission limit of 2.0 g/hr would still cover these stoves, i.e., 1.0 g/hr plus 1.0 g/hr equals 2.0 g/hr, the Step 2 emission limit. Further, we note that the final rule takes away the upward adjustment for Method 5G to 5H which is sometimes over a 30 percent increase for certification values that use Method 5G. As noted by a commenter (1427) in *Section 6.1.3*, Washington State is "living proof" that industry can and does flourish and innovate with stricter emission standards.

Thus, we maintain that it is false and misleading to conclude that the random nature of wood burning creates variability enough to render test results non-reproducible and not repeatable. As summarized in *Section 8.2.1* and in more detail by one manufacturer in response to the NODA[16], unlike the proficiency test database, the results of this manufacturer's hybrid stove tests are usually clustered around the original certification results. Furthermore, for some stoves repeatability is good even between crib and cord wood. The emissions test data presented in the NODA for three stoves from two catalytic/hybrid wood stove manufacturers show that their EPA-certified wood stoves tested using cord wood – and making no design changes to adjust for crib wood versus cord wood in the tests – have similar emissions as stoves tested using crib wood. The BNL cord wood testing for the NODA showed that repeatability of the cord wood test method results can sometimes be very good (i.e., within 15 percent). We also note that a number of improvements to the test methods are in this final rule and we expect the changes will also improve the reliability and precision (repeatability, reproducibility). We are satisfied that the reliability and precision of test results is sufficient to undergird the final standards, although we will continue to support revisions to the test methods (e.g., the cord wood test method) which improve these parameters for future rulemakings.

Finally, we respond to commenters' claims regarding NTTAA requirements in *Sections 6.1.1 and 6.3.2*.

2.8.4 Comment: Proposed compliance algorithm and minimum burn rate

Commenter (0654) explained why testing with cribs is a false predictor of real world in-home performance, primarily because the testing regime results in primary and secondary combustion

[16] Comment on the NODA to Docket EPA-HQ-OAR-2009-0734 from T. Morrissey of Woodstock Soapstone Company; available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1711

air-to-fuel ratios engineered to meet EPA testing requirements at the expense of a real world secondary combustion needs when using cord wood. Commenter (0654) states that a better goal would be to increase the minimum burn rate by 15% in a noncat stove, which would improve real world performance and would help to overcome the use of wetter or greener wood. Commenter (0654) states that this regulatory approach would create a sustainable secondary combustion in early ignition to reduce emissions.

On the other hand, commenter (1436) states that no consideration is included for larger fireboxes that have been discriminated against due to their low burn rate of 1 kg/hr. Commenter (1436) believes no data for correlation exists and that it will take years of collection to be useful. Commenter (1436) adds that there is no data available relevant to the category 1 and 4 proposal. Commenter (1436) states the current g/hr stove is not relevant to the actual "power per hour" and believes there should be a lower burn rate and g/hr result appropriate for the firebox. Commenter (1436) adds that the current rule discourages manufacture of larger, more appropriate stoves.

Note: See Section 6.1.6 for commentary regarding replicating in-home burning and emissions, including at the lowest burn rate.

Response:

We agree that moving towards a cord wood based standard is a better predictor of in-home performance. In the final rule we are providing manufacturers the option of certifying their stove using the cord wood alternative compliance option. This alternative compliance option is currently based on the ASTM E2780-10 cord wood test method with modified burn rates. As we move to a cord wood standard in the future, the certification test should better align with in-home performance. However, we disagree with the commenter's suggestion to increase the minimum burn rate. State and local agencies are concerned about high emissions at low burn rates and it is important to keep these conditions as part of the certification test to ensure good in-home performance. Thus, the final rule retains the low burn rate specifications in Method 28 and we are not increasing the minimum burn rate by 15%. While we agree that combustion air settings differ between crib wood tests and cord wood tests, the burden is on the manufacturer to design stoves that function well at low burn rates to accommodate their customers' needs.

Regarding using "power per hour" instead of g/hr in the standard, we are maintaining the g/hr units of the standard. This form of the standard addresses particulate pollution directly and the states use this form of the standard for their State Implementation Plans (SIPs).

2.8.5 Comment: Proposed compliance algorithm and number of test runs

Commenter (1397) states the requirement should be modified to include six test runs, i.e. a complete run through category 1-4 burns plus an additional two runs where the device performs most poorly. The commenter (1397) believes a complete set is required for proper calculation of accurate efficiency and the two additional runs are necessary to reduce test result variability.

Commenter (1521) suggests that Step 1 compliance certification performance testing be based on the average of multiple tests (a minimum of three tests).

Response:

We appreciate these suggestions and considered the appropriate number of test runs. Regarding increasing the number of test runs (e.g., to six) in order to reduce test variability, we will revisit this suggestion in the future, as we work towards finalizing a cord wood test method which will also address variability and repeatability.

Regarding requiring a minimum of three certification test runs at Step 1, we think the current protocol is adequate when considering the quality of the data and the additional cost to perform more test runs. The EPA must balance cost to stakeholders and to the taxpayer with value of any additional data considered.

2.8.6 Comment: Form of the standards

Note: This section contains general comments pertaining to all standards. Appliance-specific comments are provided in Sections 3.0, 4.0, and 5.0.

Commenter (0541) supports emission limits for all devices based on input in MMBtu. According to the commenter (0541), the input measurement would be similar to the automotive miles per gallon (MPG) rating and measures combustion efficiency, while the output heat transfer rating is similar to a performance time from 0 to 60, which in heaters, is similar to thermal efficiency. The commenter (0541) adds that NSPS for other industries and fuels are based on input. Also, the commenter (0541) states that as manufacturers combine other technologies such as solar thermal and power generation into heaters it will be harder to continue to combine these metrics without a large chart of heat loss credits and allowances. The commenter (0541) concludes that in the long term input MMBtu and output MMBtu should be separated to assist consumers and architects to more easily size and better estimate operating expense.

Commenter (0541) states that the EPA should strengthen the test method[s] by measuring emissions as a percent of feedstock input (in g/kg) to prepare for the ultimate development of hybrid devices which generate electricity to power the device and which use surplus generated electricity to power other devices (e.g., charge cell phones, operate emergency radios, and provide light). According to the commenter (0541), this change would also support the thermal energy production benefits of biochar and the use of waste heat.

Response:

As noted in a previous response, we are maintaining the g/hr (output) format of the room heater standard under subpart AAA and the lb/mmBtu (output) format of the central heater standard under subpart QQQQ because the EPA is concerned with reducing emissions and this form of the standard addresses particulate pollution directly. Furthermore, the states use this form of the standard for their State Implementation Plans (SIPs). Finally, the consumer is concerned about the level of warmth provided by the heater and is therefore concerned more about output than input.

We agree that the efficiency of the heater is an important consideration and for that reason are requiring manufacturers to report their efficiency. The final rule uses our authority under section 114 to require manufacturers to submit third-party efficiency test data, submit the test data report to the EPA and post the efficiency test data on the manufacturer's website for each of their models. We will also include this information on the EPA Burn Wise website. The reported efficiency test data will provide additional information for consumers to consider (i.e., input versus output) when purchasing a wood heater. We also provide educational materials for consumers regarding efficiency on EPA's Burn Wise website (e.g., at http://www.epa.gov/burnwise/energyefficiency.html). Furthermore, to minimize both wood fuel input and particulate emissions, on our Burn Wise website we encourage consumers to contact professionals including hearth product retailers to determine the right size and model for a given residence. Such professionals can appropriately size units to match the theoretical heat demand of the residence (using, for example, HVAC Manual J residential load calculations available at http://www.acca.org/technical-manual/manual-j/). Sizing costs should be calculated as part of the installation process for a specific heating appliance and residence, and heat demand analyses would be model- and site-specific.

2.8.7 Comment: Level of the standards

Note: This section contains general comments pertaining to all standards.. Appliance-specific comments are provided in Sections 3.0, 4.0, and 5.0.

Support for proposed and stricter limits:

Commenter (1465) notes the large contribution of residential wood smoke to $PM_{2.5}$ levels in New York and also notes the health findings associated with the 2012 $PM_{2.5}$ NAAQS review and argues for stricter standards based on the population of devices already meeting Step 1. The commenter (1465) notes, for example, that all hydronic heaters that qualified for EPA's 2010 (Phase 2) voluntary emission reduction program already meet the proposed Step 1 emission standard for weighted-average emissions and most (approximately 90%) room heaters meet the proposed Step 1 weighted-average emission limit. The commenter (1465) concludes therefore that the proposal and the slow phase-in of stricter emission limits prolongs the existing market and does not encourage the development and use of more efficient, less polluting wood-burning appliances. Having wood-burning appliances that comply with stricter emission standards in a shorter time frame is especially important, according to the commenter (1465), given that emissions from wood-burning appliances exceed emissions from displaced systems that burn ultra-low sulfur heating oil, natural gas or propane.

Commenter (1576) recommends the EPA make the final Phase 1 standards more stringent for room/space heaters and central heaters. Commenter notes that the emissions requirements set in the Massachusetts changeout program are more stringent than the proposed NSPS (3.5 g/hr PM for noncatalytic and 2.0 g/hr PM for catalytic).

Commenter (1551) finds that EPA's Step 2 emission limits represent emission standards that are achievable today. In addition, commenter (1551) asserts all units can utilize new technologies

now available in Europe to further reduce emissions, such as oxygen sensors to vary air to fuel ratios, thermal storage, "smart control" technologies, and add-on control technologies such as residential electrostatic precipitators.

Commenter (1427) believes EPA must focus its energy on clarifying and achieving the Step 2 wood stove emission standard through a new test method. Commenter (1427) states the Step 1 standard is grossly insufficient to protect numerous cities and communities and a second and significantly lower step that reflects real world emissions is critical. Commenter (1427) adds that refinement of the test method will more accurately reflect real world emissions and effectively strengthen the Step 2 standard.

Commenter (1444) suggests the emissions limit from 1 January 2015 should be no more than 0.3 g/hr (presumably for all appliances; comment unclear) and require filters similar to the standards for diesel engines which need to couple clean-burning techniques with filtration systems to clean up the remaining pollution as well as clean-burning technology. Commenter (1444) states the filters should be contained in a tamper-proof housing and include technology to check their capacity, advise the owner when they need to be replaced, and shut down the heater if the filters are not performing satisfactorily.

Commenter (1558) believes that the EPA must have one emission standard for all residential solid fuel-heating devices and that the standard must meet NAAQS health-protective levels.

Support for less strict limits:

Commenter (1436) contends that the EPA's assertion that the top performing models for each product type are already achieving the proposed emission levels is wrong, because no stove has been tested to the proposed protocol. Commenter (1436) believes the burn rate testing categories represent a new test protocol which no product can meet and that existing data becomes irrelevant. Likewise, commenter (1514) notes that the proposed rule changes from crib to cord wood fuel without any supporting data and as such is merely a "stab in the dark". Commenter (1514) contends that the EPA must provide cord wood testing data before considering a passing grade number in g/hr. Commenter (1514) also contends that changing the test method without supporting data is also indefensible.

Commenters (1543, 1550, 1643) summarize concerns related to EPA's failure to address many of the issues raised by members of the Small Business Advocacy Review (SBAR) Panel. Commenters (1543, 1550, 1643) state that the Panel as a whole specifically called for the EPA to "consider reviewing . . . the intra- and inter-lab precision, and the importance of this variability in determining emission standards," Likewise, commenter (1554) states that failure to consider the margin of error of compliance testing methods when establishing an NSPS limit would establish for the wood stove industry a basis of compliance versus noncompliance determinations on a per-chance basis and run afoul of *Portland Cement* and *National Lime*. Commenter (1554) adds that small business should not live or die based on such potentially unreliable emission results that are out of their control. Furthermore, commenter (1554) states, the EPA cannot adopt a new NSPS limit based on an evaluation of test data collected using the current test methods

and, at the same time, adopt a new test method because this would not meet the requirements for the EPA emissions regulations established by the Courts in *Portland Cement* and *National Lime*.

Commenter (1581) urges that new standards be implemented in a way that is achievable by the many U.S. makers of EPA certified residential wood heaters, while also protecting public health. Commenter (1581) asks the EPA to work closely with U.S. companies now making high quality certified residential cord wood heaters, to listen closely to their concerns, and ensure that the final emission standard and implementation schedule are achievable.

Commenter (0432) believes the proposed decreases in PM g/hr limits appears to be much too aggressive. Commenter (0432) suggests a decrease of perhaps 100% as opposed to 500% or more would be much more sensible and would likely garner more overall general public support (environmental political action groups aside).

Commenter (1521) recommend that the EPA promulgate 2015 Step 1 standards (and not 2020 Step 2 standards). Commenter (1521) argues that it is inappropriate to promulgate 2020 Step 2 standards, considering the imprecision and uncertainty of the test methods and resulting data from which the proposed Step 2 standards were derived. The commenter (1521) recommends that, using the new testing approach that they propose to be used for 2015 Step 1 standards, sufficient data should be gathered in the proposed 5 years of Step 1 standards whereby the EPA could decisively conclude what emission level would represent an appropriate Step 2 standard.

Commenters (1543, 1550, 1643) believe that the proposed Step 2 / Alternative Step 3 standards conflict with Section 111 and must therefore be abandoned.

Response:

We agree that residential wood smoke is a large contributor to $PM_{2.5}$ levels and presents serious health risks. However, we maintain that the final Step 2 limits are as stringent as they can be for a technology-based standard that must rely on BSER. We agree that the Step 1 limits are already being met by many appliances (e.g., approximately 90% of currently certified wood stoves and the all of the Phase 2-qualified hydronic heaters) but maintain that the less stringent Step 1 limits allow manufacturers time and resources to develop models able to meet the more stringent Step 2 limits. The stepped limits are practical because they balance small business cost considerations and implementation difficulties (e.g., testing logjams) with emission reductions, allowing manufacturers to continue production and sell appliances on the market while developing cleaner technologies.

We note that these are technology-based standards under section 111 of the CAA, not health-based standards. Thus it may be necessary for some locations to institute more stringent health-based standards appropriate to the specific scope of a local or regional residential wood smoke problem. This is the purview of state, local and tribal governments.

Regarding concerns about a new burn rate compliance algorithm, as noted previously, the final rule will be based on the existing weighted average compliance algorithm for both Step 1 and

Step 2 under subpart AAA and for Step 1 under subpart QQQQ. See our response in *Section 2.8.2* for more details on the rationale for this change from proposal. Regarding concerns about a cord wood-based standard, as noted in numerous other responses (e.g., in *Section 2.8.2*), the final rule does not require compliance with a cord wood-based standard (except for forced-air furnaces, consistent with its test method), but rather provides an alternative compliance option based on cord wood certification testing. This choice reduces risk to manufacturers while moving the industry towards cord wood-based standards (more representative of in-home performance) in the future by encouraging and better establishing cord wood-based BSER.

We note that Step 1 is the same as the 1995 Washington State limits and these standards have been working for nearly 20 years, notwithstanding commenters' concerns regarding precision issues. Furthermore, as noted in *Section 2.8.3*, we disagree with the conclusion that the "random nature of wood burning" creates variability enough to render test results non-reproducible and not repeatable within a certain standard of deviation.

Regarding concerns about new test methods (i.e., for hydronic heaters), we note that we are offering several test methods for certification of hydronic heaters at Step 1 in order to allow more clean devices to successfully certify and to minimize testing logjams. In addition to the proposed use of EPA Method 28WHH and EPA Method 28WHH-PTS, the final rule allows manufacturers to use ASTM 2618-13 and EN 303-05 with specified conditions/adjustments (e.g., burn rate categories to better match EPA Method 28WHH and use of thermal storage) for determining compliance with the Step 1 emission limits. As with all NSPS, manufacturers may request EPA approval of alternative test methods on a case-by-case basis, as provided for by 40 CFR 60.8. This approach allows manufacturers flexibility while ensuring the cleanest devices are brought to market.

Finally, as noted in *Sections 2.1.1, 3.2 and 4.2*, we have determined that we have met all legal and policy obligations under section 111 of the CAA.

For additional critique regarding the proposed level of the emission limits, see also BSER sections 2.1.1, 3.2.1, 3.2.2, 3.2.4, 4.2.1 and 4.2.2.

2.8.8 Comment: Phase-in period for stepped standards

Note: This section contains general comments pertaining to all standards.. Appliance-specific comments are provided in Sections 3.0, 4.0, and 5.0.

Support for proposed and shorter phase-in period:

Commenter (1355) believes that the two-step compliance approach gives manufacturers, big and small, the time necessary to redesign their wood heaters to meet the emissions limits and certification process required by the proposed rule while spreading the cost for doing so over a 5-year period. Commenter (1355) believes this will be better for consumers also and help to avoid testing lab logjams. Commenters (1503, 1529) likewise support the proposed 2-step implementation period of 5 years.

Many commenters (0657, 0908, 0937, 0938, 0940, 0946, 0952, 1114, 1293, 1395, 1414, 1417, 1442, 1502, 1503, 1551, 1561, 1585, 1593) believe that the updated standards are long overdue and are needed to address updated wood-burning devices and our improved understanding of the harm from the emissions of those devices. Commenters (0940, 0958, 1395, 1502, 1570, 1580) feel that 5 years is too long to wait for a compliance date with Step 2 standards for wood stoves, pellet stoves, and hydronic heaters. Commenter (1580) questions why 5 years is necessary and believes that if this is not shortened, then step 2 be accelerated. Likewise, commenter (1551) believes that the EPA has been generous in allotting 5 years to meet the BSER requirement and urges the EPA to examine the possibility of a shorter timeframe to a Step 2 standard.

Commenters (1355, 1477) state the health benefits of the new emission limits far exceed the costs. Commenter (1477) add that the benefits would be even greater if the EPA adopted more stringent emission limits and shortened the phase-in period to less than 5 years.

Several commenters (0940, 1395, 1462) believe that the EPA should reduce the phase-in time from 5 years to 3 years because of the need for stronger standards to protect health. The commenter (0940) points to the available technology to meet stronger standards in Europe. Commenter (1395) states 5 years is too long to effectively reduce emissions in time for regions to attain federal NAAQS. Commenter (1570) supports either an acceleration of the proposed 5-year phase-in of the second, more stringent standard, or a lower emission rate than the 1.3 g/hr proposed if implemented on the 5-year timeframe. Commenters (1417, 1561) urge the EPA to accelerate the phase-in of Step 2.

Commenter (1591) supports a single emission standard of 1.3 g/hr for all new residential wood, pellet, and biomass heaters including wood stoves, pellet stoves, wood and pellet-fired hydronic heaters, forced-air furnaces, and masonry stoves, regardless of whether the heater is catalytic or noncatalytic. According to commenter (1591), this 1.3 g/hr rate should take effect no later than 2 years after the effective date of the final rule. Commenter (1591) proposes that an interim standard of 2.5 g/hr should take effect on the effective date of the final rule or at least by the first of the year. According to commenter (1591), the intent of the interim rate is to swiftly transition manufacturers and dealers away from the unnecessary harm and waste of high emission heaters.

Commenter (1506) contends that the EPA does not consider the effect of this 2-step schedule on consumer and manufacturer behavior and suggests that – particularly for the devices projected to become much more expensive upon full compliance – the phase-in period may encourage consumers to purchase wood heaters during the first five years, before prices increase.

Support for a longer phase-in period:

Commenters (1261, 1586) state that the EPA could increase flexibility by lengthening the two-step phase-in period to be consistent with the Small Business Advocacy Review panel recommendation for a 7-year window at a minimum to reach the second step and make the second step in 2022 at the earliest. Commenter (1586) asserts this would allow these small

businesses a more realistic and flexible timeline to adjust and plan for these changed requirements contained in this rulemaking.

Commenter (0657) is concerned about the potential impacts on small businesses that manufacture wood stoves, which are important contributors to their state's economy. Commenter (0657) urges that the rule be implemented in a manner that ensures clean, healthy air, and allows sufficient opportunity for these businesses to adopt and implement the new requirements.

Another commenter (1463) supports balancing the need for the standards to take effect quickly with the impact on manufacturers and retailers. Commenter (1463) is concerned that the timeframe for compliance with Step 1 would disadvantage some manufacturers and therefore suggests that the EPA establish a transition that allows for appropriate time but still moves ahead as expeditiously as possible. The commenter (1463) understands the hesitancy for small businesses to move forward on testing before the testing protocol is finalized.

Response:

Regarding comments supporting a shorter phase-in time, as noted in previous responses, NSPS determinations of BSER must consider costs. The fact that this source category is for consumer products manufactured for residential sale results in cost considerations that are different from those for industrial process source categories that are typical for most NSPS. Specifically, if production and sales were to be suspended while designing, testing, field evaluating and certifying cleaner models, the cost of potential lost revenues could be significant, which necessitates reasonable lead times for compliance with emission limitations. This was a concern in 1988 and is still true today. Thus, in this final rule we are giving automatic approval to Step 1-compliant heaters/stoves until the Step 2 effective date, as explained in *Section 2.8.3*. While our top priorities are to ensure that emission reductions occur in a timely manner and that there is no backsliding from the improvements that many manufacturers have already made, it is also important to avoid unreasonable economic impacts on those manufacturers (mostly small businesses) who need additional time to develop a full range of cleaner models. This should also help avoid potential "logjams" at laboratories conducting certification testing.

Regarding comments supporting a longer phase-in time, we note that the 5 years between the effective date of the final rule and the Step 2 PM emission limits matches the window of time many manufacturers noted they would require to conduct R&D and bring a new model to market – and in fact is longer than the time period some manufacturers indicated they needed for R&D. We also again note that the automatic approval of many appliances at Step 1 PM emission limit levels will reduce costs and risks to manufacturers while they work on developing cleaner models to meet Step 2 PM emission limits. Finally, the EPA is well aware that the vast majority of this industry is composed of small businesses. Consequently, our phase-in period considerations were designed specifically with small businesses in mind.

2.8.9 Comment: Proposed versus alternative approach

Several commenters (1355, 1397, 1487, 1508, 1538, 1551, 1570, 1576, 1593) generally support the proposed approach. Commenter (1551) supports the proposed approach, stating that the

alternative approach is problematic for two reasons: (1) ensuring installation of compliant devices becomes exponentially more difficult as the number of steps increases, and (2) the 3-step approach pushes compliance to the date when the next NSPS review is due.

Commenter (1570) strongly supports the preferred two-step, five-year compliance approach and significantly more stringent emission standards than those currently proposed.

Commenter (1397) supports EPA's preferred option of a two-step compliance approach, adding that care should be taken to avoid compliance dates that might extend as far as or overlap with the next update of this rule scheduled for 8 years from promulgation. Commenter (1397) urges the EPA to move as quickly as possible to the Step 2 standards.

Commenter (1529) specifically prefers the 5-year implementation approach over the alternative 8-year period. Although the commenter (1503) supports some aspects of the 3-step alternative approach (e.g., interim targets show progress and technical feasibility and reduce emissions), commenter (1503) does not support the proposed 8-year deadline for meeting emission limits. Commenter (1503) notes that many commercial models already meet the final target, and delaying implementation of the more technology-forcing final performance standards in the manner proposed for the alternative approach would allow existing, less efficient technologies to remain in use for longer while failing to provide manufacturers and retailers with a near-term incentive to offer better, cleaner, more sustainable options for wood stove users. The commenter (1503) adds that the 8-year window would effectively require manufacturers to meet the most stringent performance standard just as the EPA would be initiating its 8-year NSPS review (during which the agency could decide to revise the standards further).

Commenter (0541) supports the alternative approach (for at least room heaters).

Response:

We agree with the majority of commenters that the 3-step alternative approach is an inferior option compared to the final 2-step approach, both from a cost perspective and from an environmental (emission reduction) perspective.

2.8.10 Comment: Single standard for all wood heating appliances

Commenters (1485, 1488, 1558, 1591, 1593) recommend that the EPA adopt a single standard, rather than 6 standards. Commenters (1488, 1591) opine that this would reduce consumer non-compliance and better protect human health. The commenters (1488, 1591) suggest a single emission rate standard of 1.3 g/hr for all new residential wood, pellet, and biomass heaters (including wood stoves, pellet stoves, wood and pellet-fired hydronic heaters, wood-fired forced-air furnaces and masonry stoves, regardless of whether the heater is catalytic or noncatalytic). Commenters (1488, 1591) recommend that the 1.3 g/hr single overall standard take effect no longer than two years after the effective date of the final rule. The commenters (1488, 1591) suggest that an interim standard of 2.5 g/hr take effect on the effective date of the final rule (or within 61-12 months of the effective date). Commenters (1488, 1591) assert justification for the 2.5 g/hr rate has been prepared by the State of Alaska, whose peer-reviewed justification report

found no significant technological barriers preventing the adoption of the 2.5 g/hr $PM_{2.5}$ emission standard and economical choices available to consumers.

Commenter (1488) reports that the State of Washington has used a 2.5 g/hr standard for catalytic wood heaters since 1995 and that 13 listed hydronic heaters meet a 2.5 g/hr standard and five of the hydronic heaters listed by the EPA for Phase 2 meet a 1.3 g/hr standard.

Commenter (1593) questions why the EPA has decided the device that has caused the most harm, OHH, should get special exception and be measured in lb/mmBtu vs. g/hr as with all other residential heating devices.

Commenter (1558) notes that the EPA has one health-protective standard for exposure levels to air toxins under the NAAQS (40 CFR part 50) but that EPA's proposed rule allows numerous emission levels for different devices. This device-specific regulation, according to commenter (1558), is what allowed hydronic heaters to be exempt from the 1988 NSPS rule. Commenter (1558) urges the EPA to have one emission standard that meets the NAAQS health-protective levels for all residential solid fuel heating devices, which will avoid consumer confusion and better protects public health.

Response:

A single standard may be a goal for the future and we can consider this suggestion in a future NSPS revision. For the current rule, we note that the BSER and economic impacts differ by appliance type and we tailored the limits to reflect this.

2.9 Carbon Monoxide, Efficiency and Air Toxics

2.9.1 Comment: Reporting or regulating of carbon monoxide

Reporting CO emissions:

Commenters (0541, 0948, 1397, 1430, 1487, 1503, 1520, 1543, 1550, 1551, 1591, 1640, 1643) support the requirement for the collection and reporting of CO emissions. Commenters (1521, 1543, 1550, 1642, 1643) agree with the EPA's determination that the promulgation of carbon monoxide (CO) standards would be inappropriate at this time.

Commenter (1591) states CO data should be forwarded to the EPA within six months of promulgation. Some commenters (1397, 1487, 1503) recommend that test labs and manufacturers be required to forward existing CO data to the EPA within 6 months of promulgation rather than a slow trickle of CO data prior to Step 2. Commenter (1487) expresses concern that if the EPA finalizes its proposed 5-year certification extension, all heaters that certify or recertify in advance of the final rule will not be required to submit their CO emissions data for up to 5 years.

Commenter (1551) adds that because CO standards are based on 1-hr testing, the EPA should adopt reporting on 1-hr values rather than averages over the entire test period utilizing EPA's Federally Reference Method 10.

Commenter (1430), representing over 4,385 petitioners, supports full disclosure of tested CO emissions for each appliance, listed on a consumer hangtag.

On the contrary, commenter (1632) opposes the collection of CO emissions data and asserts that this data is already being reported and that collecting it would not be beneficial. The commenter (1632) opines that if it is required that appliances be lower-emitting (with regards to particulate), it can only be reasoned that CO emission levels would also drop as it would be part of complete combustion to burn off particulate and other combustible gases. Likewise, commenter (1550) specifically opposes CO measurements.

Regulating CO emissions:

Commenters (1249, 1397, 1465, 1503, 1551, 1558, 1559, 1591) generally support regulating CO emissions. Commenter (1559) opines that CO emission limits would ensure that the appliance was designed to burn the fuel efficiently and provide an additional measure of public health protection. The commenter (1559) reports that properly operating staged combustion systems can minimize CO emissions and suggests that CO regulations be established to improve combustion efficiency. Commenter (1249) suggests restricting the emission of CO from all wood-fired heaters to protect human health. Commenter (1249) states the toxic properties of CO have been known for a very long time and the adverse health impacts due to CO exposure are mentioned at 79 FR 6337, showing that EPA staff realize the health impacts caused by CO exposure. Commenter (1520) asserts that, if the EPA establishes a standard for CO for these devices, the standard should be based on protecting human health. Commenter (1397) recommends setting a minimum CO standard based on the data, believing this is particularly important for hydronic heaters and forced-air furnaces as many have a large capacity for CO production. Likewise, commenter (1591) states that the EPA must ensure that CO emissions are set to protect families who may have indoor wood boilers or locate their outdoor wood boiler (OWB) in a structure.

Commenter (1465) states that the EPA should establish CO emission standards for solid fuel stoves, hydronic heaters, and furnaces. Commenter (1465) adds that the EPA should encourage continued improvement in consumer safety by requiring emissions testing for appliances that report CO levels in flue gas in a highly time resolved manner for the duration of the test, including cold start, steady-state and burn-out phases of the burn cycle. Commenter (1465) believes reporting flue gas CO data will assist manufacturers in improving products as well as helping heating trade associations and state/local governments select appropriate appliance and building benchmarks.

Commenters (1503, 1551) support the EPA's efforts to gather information on CO emissions and urges the EPA to move beyond reporting to developing a CO standard for these devices. Furthermore, commenter (1551) believes that because CO standards are based on 1-hr testing, EPA should adopt reporting on 1-hr values rather than averages over the entire test period

utilizing EPA's Federally Reference Method 10.

Commenter (1558) states the EPA must itself collect the CO emission data immediately for any hydronic heaters that meet the final NSPS requirements and set a CO standard for all hydronic heaters within 3 years after the effective date of the final rule. Three years, according to commenter (1558), is sufficient time for the EPA to collect its own CO emissions data from all hydronic heaters that meet the requirements of the final NSPS. Commenter (1558) believes it would be irresponsible for the EPA to ignore the immediate health hazard associated with exposure to CO emissions from hydronic heaters.

Response:

We appreciate the commenters' concerns regarding the air and concomitant health impact of CO and other air toxics. As we noted at proposal, we considered developing CO emission limits for all new residential wood heaters. However, our current data for CO emissions performance and methods of control are not sufficiently robust to support strong CO emission limits, and it would delay the NSPS if we were to seek additional data elsewhere at this time to support strong CO emission limits. We expect the CO emissions to be reduced as a result of the control of PM, because meeting the PM standards will be achieved primarily by BSER based on good combustion (and in some cases catalysts and hybrids) which will also result in good CO reductions without additional standards for CO.

However, we proposed and are requiring in the final rule that manufacturers measure (during compliance tests, which is typically already done) and report CO, as well as publish the CO emissions of each model on their websites. We will also include context and consumer-friendly summaries of the submitted CO emissions data on the EPA Burn Wise website. As a result, this data will be available to consumers and to the EPA and states for consideration on CO NAAQS compliance implementation plans and future wood heater rulemakings. This will help better inform consumers so they can choose the best-performing heaters that have less CO emissions and less health concerns for themselves and their neighbors.

2.9.2 Comment: Requiring CO monitors

Support:

Commenters (0541, 1239, 1355, 1397, 1465, 1520, 1558) support the requirement for CO monitors. Commenters (0541, 1520) state that CO monitors are a critical safety component for consumers, especially for enclosed/indoor units. Commenters (1239, 1355) add that these monitors are particularly necessary because excessive CO concentrations within the home can cause adverse health effects and even death. Commenter (1465) believes the EPA should require installation of a CO alarm when installing any wood heater to provide improved health and safety for consumers and complement existing health initiatives and laws such as Amanda's Law in New York State. Commenter (1397) states CO monitors are already required for rental properties in their state and will continue to be a topic of importance for harmonizing U.S. test methods with international test methods.

Commenter (1558) states the EPA must require indoor CO monitors as a critical safety component for hydronic heaters installed in occupied buildings or other buildings or enclosures in which the operator would enter to add fuel to the heater or conduct other normal operation and maintenance of the heater. Because many consumers place OHH in shelters and buildings, commenter (1558) believes CO monitors should be mandatory on all hydronic heaters.

Regarding pellets, commenters (1465, 1559) believe that the EPA should require warnings of CO off-gassing from wood pellets via labelling, hangtags and in appliance owner's manuals, encourage the installation of CO alarms capable of sounding at low CO levels (9 ppm, 8-hr avg) and require separate pellet storage outside of the building until active ventilation protocols are developed. According to the commenters (1465, 1559), the explicit requirement for CO monitors in accessible pellet storage areas is a critical safety component and an important health and safety measure that the EPA should include in the NSPS. Commenter (1559) includes an attachment (Appendix E) to their comment letter that presents the results of "Monitoring of Carbon Monoxide Off-Gassing in Wood Pellet Storage in the Northeastern U.S." (Prepared by Clarkson University for NYSERDA) to support their position.

Opposition:

Commenters (1521, 1543, 1547, 1550, 1632, 1643) state that the EPA should not require the provisions or sale of ancillary products such as CO monitors in this rulemaking. Commenters (1543, 1547, 1550, 1643) state that a CO requirement is unnecessary from either an air quality or safety standpoint and explain that CO monitors are often required under building safety codes because of concerns about gas-burning appliances, which can silently produce CO without any visible or other signal. These commenters (1543, 1547, 1550, 1632, 1643) assert that any CO spillage from a solid fuel heater will also include smoke, which would be visible in living spaces and also would trigger smoke detectors that are almost universally required in residential buildings. Commenters (1543, 1547, 1550, 1643) conclude that requiring a CO monitor to be provided in conjunction with the sale of any solid fuel heater results in an unnecessary expense for manufacturers and consumers alike. Likewise, commenter (1632) reports that building codes have changed for new construction and existing home remodeling to require CO detectors in homes where combustion appliances exist. The commenter (1632) opines that, the use of building codes, and not the NSPS, is the best venue for requiring indoor CO monitors.

Commenter (1521) considers a requirement of CO monitors for appliances that are installed in occupied areas to be neither appropriate nor enforceable. The commenter (1521) further believes that such a requirement would be outside the jurisdiction of NSPS authorization (and a misuse of the NSPS authority to mandate requirements for private residences).

Response:

In the proposal, we asked for comments on whether we should require CO monitors to help ensure proper operation of the heater and to reduce health and safety concerns for appliances that are installed in occupied areas. We are not requiring the use of CO monitors in this rulemaking. We agree with the commenters' concerns regarding CO in homes, and, as noted above, we are

requiring that all Owner's Manuals recommend the use of both smoke detectors and CO monitors for areas that are expected to generate CO (e.g., heater fueling areas, pellet fuel bulk storage areas, sheds containing hydronic heaters).

2.9.3 Comment: Reporting or regulating of efficiency

Reporting efficiency:

Commenters (1543, 1550, 1632, 1642, 1643) agree with EPA's determination that the promulgation of efficiency standards would be inappropriate at this time, and further supports EPA's proposal to require testing and reporting of efficiency test data instead. The commenters (1543, 1550, 1643) notes that under EPA's proposed approach, consumers will have access to efficiency data through EPA's compliance monitoring website, or this information may be made available on EPA's Burn Wise website. The commenters (1543, 1550, 1643) add that such reporting and disclosure of this information appropriately serves the goal of facilitating informed purchasing decisions, and fostering continued technological advancement. In lieu of new regulations, commenter (0966) prefers better labeling and education so consumers are aware of a stove's efficiency.

Commenters (0952, 1239, 1355, 1397, 1487, 1503, 1529, 1551, 1591) support the proposed requirements to conduct efficiency testing and reporting. Commenters (0952, 1551) contend this will encourage improvements in efficiency and might provide an incentive to owners of old polluting units to change out the cleaner new models. Commenters (1529, 1591) recommend requiring manufacturers to disclose efficiency of their heaters within 6 months of finalizing the rule. Commenter (1430), representing over 4,385 petitioners, supports full disclosure of tested efficiency ratings listed on a consumer hangtag.

Commenters (1397, 1487, 1503) recommend that test labs and manufacturers be required to forward existing efficiency data to the EPA within 6 months of promulgation rather than a slow trickle of efficiency data prior to Step 2. According to commenter (1503), any stoves certified under the new NSPS should likewise be required to post their efficiency numbers no later than 6 months after receiving their certification. Commenter (1397) believes this would benefit industry by placing all devices on an equal footing regarding efficiency, and consumers by enabling them to more quickly select higher efficiency products. Commenter (1397) believes it could benefit the environment through reduced wood use from higher efficiency devices. Commenter (1487) expresses concern that if the EPA finalizes its proposed 5-year certification extension, all heaters that certify or recertify in advance of the final rule will not be required to submit their efficiency data for up to 5 years.

On the contrary, regarding the proposed requirements of § 60.534(d), commenter (1436) states that these efficiency numbers are always tied to emissions and are unnecessary. Excessive efficiency in a lab, according to commenter (1436), will result in poor field performance. Likewise, commenter (1550) specifically opposes efficiency measurements.

Regulating efficiency:

Commenter (1397) recommends setting a minimum efficiency standard for pellet stoves effective upon promulgation and for other room heaters and space heaters as soon as possible. Commenter (1397) recommends a level that compares with the minimum efficiency standards for residential heating established by the DOE.

Commenter (1585) encourages the EPA to implement minimum efficiency standards for residential wood heating technologies and making these efficiency numbers public, ideally on hangtags or similar labels.

Commenter (1558) states the EPA must set a date for when it will establish with the DOE minimum thermal efficiency standards for residential wood heating devices.

Commenter (1640) states that the EPA should continue regular publication of EPA's wood stove list, along with actual values for efficiency (rather than default) and listings that offer clarity and consistency for consumers. Commenter (1640) also recommends that the EPA set an aspirational efficiency standard for room heaters and hydronic heaters to encourage highly efficient devices, and at the very least consider establishing a minimum efficiency for all devices. Commenter (1640) asserts that Oregon and other state energy efficiency programs rely on EPA's testing protocol as the basis for incentivizing highly efficient devices.

Response:

As discussed at proposal, we considered requiring efficiency standards (heat output divided by fuel input) to ensure that stoves are efficient and burn no more wood than necessary for the heat demand, so that consumers can save money on fuel and so that emissions are lower. We did not propose or finalize an efficiency standard because we did not have sufficient data. However, the final rule uses our authority under section 114 to require manufacturers to submit third-party efficiency test data, submit the test data report to the EPA and post the efficiency test data on the manufacturer's website for each of their models. We will also include this information on the EPA Burn Wise website.

We are relying on efficiency test methods that have been developed by the CSA. The current version of CSA B415.1-10 was published in March 2010. Each manufacturer or approved test laboratory or certifying entity must submit performance test data including results of efficiency testing. Robust data are not available for us to precisely quantify the degree to which better information on the energy efficiency of the NSPS appliances will affect consumer decisions. However, efficiency data will assist some consumers now in their purchasing decisions and provide data for us to consider for a future rulemaking.

We are not retroactively requiring submittal and publication of efficiencies for heaters that were certified under the 1988 NSPS because many of those heaters relied upon the negotiated default efficiencies in the 1988 NSPS rather than actual independent testing and we prefer that the manufacturers (and consumers) focus on the new heaters that comply with this final rulemaking.

2.9.4 Comment: Efficiency rating metric

Commenter (1463) encourages the EPA to work with the DOE to establish consumer product efficiency standards for residential wood central heaters, as are already established for central heating appliances and water heaters in 10 CFR Part 430. Likewise, commenter (1488) opines that efficiency ratings for hydronic heaters should be based on thermal efficiency and not combustion efficiency and should be rated by the DOE like any other residential furnace (including efficiency measured by the Annual Fuel Utilization Efficiency (AFUE), and mandatory sizing requirements to match BTU with square footage). With biomass-fired equipment, commenter (1465) likewise states measuring efficiency for the entire burn cycle to enable the development of an AFUE equivalent is critical to provide for a technology forcing mechanism and allow for competition based on informed consumer selection. Commenter (1465) also suggests the EPA require the measurement and reporting of thermal efficiency for solid fuel stoves, hydronic heaters, and furnaces for continued technology improvement through market forces. Commenter (1465) asserts the AFUE metric is well established for gas- and liquid- fuel-fired central boilers and furnaces.

Likewise, commenter (1558) states any efficiency ratings must be based on thermal efficiency and not combustion efficiency. Hydronic heaters should be rated by the DOE for thermal efficiency, according to commenter (1558), like any other residential furnace, including efficiency measured by the AFUE, and mandatory sizing requirements to match BTU with square footage. Furthermore, commenter (1591) contends that efficiency information for hydronic heaters should include calculations to account for pipeline loss in outdoor units, which may use 10–20 cords of wood in a season; a significant factor in operational costs that should not be ignored.

Commenter (1479) states that data from Earth Outdoor Wood Furnaces Klear Sky 400 demonstrate that it is possible to have low emissions, high combustion efficiency and lower thermal efficiency as tested by the method. Because the method does not account for thermal loss over time, the commenter (1479) states that longer burns are penalized and appear to have lower efficiency. The commenter (1479) suggests that the EPA continue to post the hydronic heater manufacturers' thermal efficiency numbers on the Burn Wise website and add the B415 combustion efficiency numbers as well.

Commenter (1436) urges the EPA to require that if a manufacturer wishes to claim efficiency anywhere, that CSA B415 data should be the only data allowed to be published; if a single number is to be published, also define what it will be (high, low, average).

Commenter (0541) does not believe that a sufficient inclusive method exists for the calculation of efficiency across the various designs of indoor and outdoor central heaters. The commenter (0541) adds that expected growth of micro combined heat and power (mCHP), combined heat and biochar (CHaB) and condensing technology will make the current methods obsolete.

Commenter (0541) suggests that a stoichiometric calculator could be added to EPA's Burn Wise web site to help measure theoretical efficiency and that the suggested BTU rating should disclose

how many times the unit would need to be refueled to deliver the suggested output in 24 hours. The commenter (0541) adds that a consumer-sizing tool would also be helpful to determine the impact of wood species and density on firebox size and frequency of loading as the rule moves to cord wood. On the other hand, commenter (1632) asserts that specific language regarding the benefits of high performance heaters already exists in product manufacturing brochures and that requiring manufacturers to run and submit efficiency percentages, with no minimum requirements, will drive consumers to make decisions on performance and aesthetic trade-offs.

Response:

We agree that thermal efficiency testing is a better indicator of energy that may be available to heat a home. Combustion efficiency only tells how much of the wood has burned and has no relationship to how much heat is transferred to a home. The rule requires the use of thermal efficiency and also requires that the owner's manuals include a description of how the efficiency was determined (e.g., use higher heating value of the fuel instead of lower heating value of the fuel, discuss sweet spot versus annual average versus annual fuel usage efficiency [AFUE]). Furthermore, as noted in a previous response, we are requiring submittal of independent laboratory efficiency tests and this information will be available on the manufacturer's website and EPA's Burn Wise website.

2.9.5 Comment: Conversion of efficiency data to higher heating values

Commenter (1397) asserts that OMNI and HPBA have provided Washington State with data sets of wood stove and pellet stove efficiency numbers and this existing efficiency data should be examined and converted to higher heating values to determine a reasonable minimum for each device type.

Response:

We appreciate the commenter's suggestion regarding determining a minimum efficiency value and will take this into consideration for a future rulemaking.

2.9.6 Comment: Regulating air toxics

Some commenters (1365, 1488, 1558, 1587, 1591, 1593) believe the proposed rule is flawed in that it addresses particulates but ignores toxins. Commenters (1365, 1488-A2, 1558, 1587, 1591) state there is an unqualified assumption in the proposed rule that presumes toxins will decrease in parallel with particulates, however, some available evidence contradicts this assumption for some toxins. Commenters (1365, 1587) cite a small 2009 study comparing the emissions of pollutants from an EPA-certified wood stove and a conventional wood stove. While the particulate emissions from the certified stove were lower than from the conventional stove, according to commenters (1365, 1587), the combined dioxin/furan emissions were much higher from the certified stove (2–3 times higher, depending on whether maple or spruce was burned). Commenters (1365, 1587) cite a second EPA-funded study found that at a medium burn rate, a certified stove emitted higher levels (not lower levels) of organic compounds, including PAHs, than a non-certified stove. Commenters (1365, 1587) also cite a third technical report prepared

for the EPA looking at the long-term performance of phase-2 certified wood stoves and concluding, "The data demonstrate that particulate emissions cannot be used as a surrogate measurement for POM [polycyclic organic matter] emissions of woodstoves."

Commenter (0463) asks why the EPA did not consider dioxins in the smoke and ash from burning of wood. Commenter (1593) would like to see limits on PAH, VOC and chlorinated dioxins. The very nature of an OHH's design indicates more than normal PAH and VOC due to the devices incomplete combustion from its cyclic operation. Although the makers of OHH claim their newest models are clean and have secondary burn cycles, commenter (1593) asserts these are similar to the claims they have stated for years regarding efficiencies and misinterpretations of data.

Commenters (1365, 1488-A2, 1558, 1587) state that while it may not now be feasible to certify wood heaters for emissions of toxics and carcinogens and more research is needed to determine the best way to reduce toxics and particulates to protect public health, a timeline for certification of emissions levels for toxic compounds, including formaldehyde, PAHs, benzene, and dioxin, should be explicitly stated in the rule so that the public and the environment will be adequately protected from all of the pollutants produced by wood heaters. Commenter (1591) also requested that a timeline for certification of emissions levels for these toxic compounds be stated in the rule, specifically with regard to the air toxins produced by hydronic heaters.

Response:

We appreciate the many commenters' concerns and agree that there are significant health impacts from PM and air toxics in general and from both PM and PAH from old high-emitting wood heaters. In fact, the 1988 NSPS was developed after litigation on the emissions of PAH from wood heaters. As discussed in the 1987 proposal, we and the litigants and the regulatory negotiation committee agreed that the 1987 proposal was the best way to respond to those concerns. We also agree with commenters that we do not currently have enough data to develop air toxics standards and to certify wood heaters for emissions of toxics and carcinogens. More research is indeed needed to determine the best way to reduce and regulate toxics from wood heaters. We welcome robust air toxics emission data, especially for actual use conditions, that will help us, other regulators, manufacturers and consumers ensure that air toxics emissions from new heaters are mitigated to the degree necessary.

2.10 Pellet Fuel Requirements

2.10.1 Comment: Regulating pellet quality in general

Support:

Commenter (1529) supports the requirement that pellet appliances be tested with pellet fuels that meet PFI (or equivalent) certification requirements and that consumers be advised to purchase certified fuel to ensure that their appliance will perform as stated by the manufacturer.

Commenter (1465) states that the EPA should require certification testing of all pellet fuels of all feedstock types – wood, grass, or other materials and include trace metals analysis of heavy metals and market elements for contaminated feedstocks in a fuel standard. Commenter (1465) believes all certification should be performed by a third party and results should be reported in an easily accessible location in the public domain and subject to regular audit. Commenter (1465) adds that the EPA should also require pellet appliance manufacturers to clearly state which grades of pellet fuels are compatible with and have been tested on the appliance and that all other pellet grades or fuel types void the warranty.

Commenter (1479) is concerned about how a PFI standard would be enforced and has found that fuel quality varies greatly even between bags of pellets from different manufacturer's labeled premium; the commenter (1479) supports retail audits of pellets for determining quality.

Commenter (1505) suggests that the EPA make a distinction between its efforts to regulate wood pellet fuel and heating appliances in the proposed standards. The commenter (1505) recommends that the EPA first adopt separate testing protocols for wood pellets and others and the different types of heaters.

Opposition:

Commenter (1621) requests that the EPA not require third-party certification on pellet fuel, which they believe would increase costs for manufacturers and consumers. Commenter (1621) generally disagrees with EPA's efforts to regulate the pellet industry and require an expensive standards certification program, claiming such a program will drive up costs of producing the pellet fuel and unnecessarily increase the cost to consumers. The commenter (1621) further asserts that a certification program is easier for the larger pellet manufacturers to absorb than the smaller pellet manufacturers, resulting in an unfair disadvantage to smaller pellet manufacturers. Commenter (1621) reports that they provide quality pellet fuel that they test for fines and ash content every 5th ton produced at their lab. The commenter (1621) opines that their testing process is more accurate and economical than requiring testing of pellet fuel every 1,000 tons produced where you need to pay several companies to confirm testing. Commenter (1632) asserts that declaring ash and moisture content, the current grading of pellets, is sufficient.

Response:

Data show that pellet fuel quality assurance is necessary to ensure that the appliances operate properly and meet the certified emission limits. For pellet-fueled appliances, this final rule makes it clear that operation according to the owner's manual includes operation only with pellet fuels that are specified in the owner's manual, have been used in the certification test and have been graded and marked under a licensing agreement with the PFI, ENplus, CANplus or equivalent (after request and subsequent approval by the EPA), to meet certain minimum requirements and procedures for a quality assurance process. Details of the PFI program are available at http://pelletheat.org/pfi-standards/pfi-standards-program/. Details of the ENplus program are at http://www.enplus-pellets.eu/wp-content/uploads/2012/01/ENplus-Handbook-2.0.pdf. Details of the CANplus program are at

http://controlunion.ca/fileupload/CA/Certifications/ENplusCANplus/CANplus_handbook_v2-0.pdf.

Regarding testing pellet fuels of non-wood feedstock types, the pellets produced under a licensing agreement with PFI, ENplus, CANplus or an equivalent organization approved by the EPA must be composed of wood only, as is currently required by their licensing agreements. Inclusion of other feedstocks (such as grass) in the pellets should be raised as an issue with such licensing organizations. In the final rule we are mandating minimum pellet requirements including density, dimensions, inorganic fines content, chloride content, ash content, and that a quality assurance process be in place and licensed by PFI, ENplus, CANplus or an equivalent organization approved by the EPA. Because PFI, ENplus and CANplus already have quality assurance and auditing processes, and to reduce extra costs, EPA is not requiring audits by EPA for pellet fuel quality, other than assuring that the pellets are licensed by an EPA-approved organization and are listed in the owner's manual.

In response to commenter (1505), in the final rule we do make a distinction between regulating pellet stove emissions and requirements on the quality of the pellet fuel (through a licensing organization). Furthermore, the rule includes an emission test method specific to pellet stoves, ASTM E2779-10.

2.10.2 Comment: PFI standards program versus other pellet standards programs

Support for PFI:

Commenters (0629, 0948, 0959, 1465 1503, 1522, 1529, 1539, 1551, 1648 [PFI], 1651) support inclusion of the PFI Standards Program in the NSPS. Commenters (0629, 0959) state this demonstrates that it is not simply the fuel or the stove, but the synergies of both components that contribute to optimal heating performance and a clean burning, efficient and enjoyable product for consumers. Commenter (1529) opines that the PFI standards program is credible and rigorous and that it is essential that industry embrace a single nationwide or international comprehensive and enforceable standards program if pellet fuel is to become a mainstream heating choice for more Americans.

Commenter (1648 [PFI]) suggests that the EPA rely on PFI's QA program as the only domestic high quality program. The commenter (1648) believes that no other current program is equivalent to PFI's program. The commenter (1648) asserts that an existing European quality assurance program (ENplus) is based on tree species not commonly found in the U.S. and should not be compared or considered to be "an equivalent" to the PFI's existing program domestically. The commenter (1648) reports that the European residential pellet market has historically been based on spruce, which is not commonly available in the U.S. for the purpose of fuel production and has a lower ash content than many hardwood species in the U.S. The commenter (1648) asserts that the grade criteria specified in EN 14961-2 and subsequently ISO 17225-2 does not reflect quality criteria that are reasonably accepted within the U.S. The commenter (1648) also argues that the qualification to produce to the PFI standard is more rigorous, developed with U.S. biomass species, and includes requirements for auditing and routine inspections that exceed those required by the European standard. The commenter (1648) includes their PFI

Specifications and Residential/Commercial Densified Fuel QA/QC Handbook as attachments to their comment letter.

Commenter (1503) does not believe that using fuel certified under the PFI program will substantially affect the emissions of these devices in a way that would affect the BSER database used to set the emission limits.

Opposition to PFI:

Commenters (1479, 1505, 1521, 1563, 1571) do not support the EPA's proposed requirement of only burning units with PFI certified fuels that have been produced under a licensing agreement with the PFI. Commenter (1571) believes that quality standards in the manufacture and labeling of wood pellets are best set and enforced at the national level and that the PFI and their bagged product clearly state adherence to the national standard; however commenter (1571) reports they would support the use of the PFI certification program only if other alternatives are designated and proposed by the EPA. According to commenter (1571), the PFI does not meet the standard of independence required of an organization that would be determining which pellet manufacturers are able to access the marketplace and which are not, and they do not want to be required to participate in the PFI program. Furthermore, commenter (1571) opines that, from a practical standpoint, the PFI certification program is not a good one and although most pellet manufacturers support the PFI pellet standards, fewer than 10 manufacturers nationally participate in the program. Commenter (1571) believes in product testing and reports that they have their pellets tested by the University of Maine and Twin Ports Testing in Wisconsin. Commenter (1571) reports that pellet quality is not an issue in northern New England with regard to air quality but admits that pellet degradation due to improper handling at the distribution and retail level has been an issue expressed to the Maine Pellet Fuels Association.

Commenter (1505) asserts that the EPA does not have the authority to require that all pellet fuels meet the standard of the PFI, a private industry trade organization and that only Congress has the authority to make law. The commenter (1505) states that Congress delegated to the EPA qualified and limited authority to make rules for enforcement of the CAA. The commenter (1505) opines that the EPA does not have the authority to grant a private enterprise the power to control the legal standard for fuel pellets and that to do so violates the Constitution for the following reasons:

- This action would constitute the delegation of legislative power of the Congress to a private entity. The PFI would have the power to write and change its standards at any time and the new standards would have the power of law.
- Under this scheme, the PFI would have a monopoly over fuel pellets. All pellet fuels would have to be made under license from the PFI. This requirement would be nationwide and is a violation of Congress's power to regulate interstate commerce.
- The requirement that all pellet fuels be produced under a PFI license, for which they charge, constitutes a grant of taxing authority to a private entity; the power to institute a tax on pellet fuel. This is a power reserved by the U.S. Constitution to

the U.S. House of Representatives with concurrence of the Senate and Presidential signature.

- This action is a re-delegation of the rule making power that Congress gave the EPA. This is a power that the EPA does not possess.
- The PFI would, under this scheme, have the power to circumvent the requirements of public input such as publication in the Federal Register, public hearings, and a comment period. This would circumvent the people's First Amendment right to petition regarding the development of laws that will govern them.
- The PFI would have the power to "maintain the enforcement regulations" without oversight. “One person may not be entrusted with the power to regulate the business of another, and especially of a competitor.” 298 U.S. at 31
- The PFI is a private entity that charges for membership. Its membership fees should be considered a preemptive tax imposed on anyone seeking to exercise their First Amendment right to petition prior to the promulgation of laws governing them.
- PFI membership fees should also be considered as a prior restraint upon the right to representation especially with regard to taxation.

Likewise, commenter (1521) believes that the PFI certification program should not be the only certification option proposed by the EPA (with the only other “equivalent” option left as uncertain and undefined when written). The commenter (1521) states that the pellet industry has been self-regulating and, though not opposed to a fuel specification, they want flexibility in how a fuel specification should be met. The commenter (1521) recommends that all requirements that pellet fuel meet the standards and be licensed by the PFI be stricken out and suggests specific regulation language to use in its place (pgs. 6 and 7 of their comment letter) that would allow each manufacturer the option to develop their own quality assurance program. The commenter (1521) suggests that the EPA require semi-annual, third-party certification (such as fuel pellets being tested in a reputable laboratory).

Support for alternative standards programs:

Commenters (0948, 1465, 1576, 1585) support the PFI standard program but believe it does not go far enough. The commenter (0948) states that the robust European standards for pellets and chips would serve as a strong foundation for improvement. Commenters (1468, 1551, 1576, 1585) support certification to the ENplus standard to ensure real world exposures to emissions of air toxics are reduced. Commenter (1468) notes that the existing voluntary PFI standard does not cover some important aspects of a comprehensive pellet fuel standard, whereas the European pellet quality standard ENplus is a good example of a robust pellet fuel standard. Commenters (1468, 1576) note that ENplus provides high pellet quality standards, a carbon balance calculation, pellet sourcing information, and trace element contamination specifications, Commenter (1468) further explains that understanding this information is critical to gain a more comprehensive picture of the emissions, pollutants, sustainability, and clean energy attributes of heating with pellet fuels.

Likewise, commenter (1576) supports proposed improvements to the certification test procedures and requirements for using certified pellet fuel and notes the recently cold to hot test method recently develop by the Brookhaven National Laboratory (BNL). Commenter (1576) suggests the EPA adopt test procedures based on this methodology. Commenter (1576) states that an important advantage of the ENplus certification is that it covers the complete supply chain, and includes sustainability criteria as well as standardized carbon balance calculations. The commenter (1576) states that European support for renewable energy generation with biomass to meet their 2020 renewable energy targets led to significant demand and export of wood pellets to the EU, mostly from the U.S. South. A growing number of U.S. pellet producers are seeking EU quality standard certification, according to commenter (1576), demonstrating the feasibility of implementing a pellet fuel quality certification in the U.S. that goes beyond the minimum requirements of the PFI standard.

Commenters (1397, 1436, 1551, 1634) also support the European pellet standards. Commenter (1551) recommends that the EPA adopt the ENplus standards in use by many European nations rather than the proposed PFI standards because it institutes quality standards both on the pellet production process and the elemental composition of the pellet. In addition, commenter (1551) states the ENplus standard requires that wood pellets utilize materials that ensure a low carbon footprint of the raw materials used in manufacturing the wood pellet and fulfils the requirements of EN 14961-2 provisions with additional QC and sustainability criteria. Commenter (1551) notes the current PFI standards do not identify pellets that contain contaminated wood (such as pressure treated and painted wood) and lack the rigor of the European pellet standard, which have a proven track record of protecting the consumer from substandard pellets and ensuring proper equipment operation. Commenter (1397) believes harmonization with the European standards will aid in the export/import of improved technology. Commenter (1436) urges that this be mandatory, asserting that bad pellets flood the market and cause combustion problems. Commenter (1436) adds that the carbon footprint of pellet production should be considered, as wood stoves have a significantly smaller one.

Commenter (1634) asserts that the ENplus certification scheme is used by producers in 23 countries and has a proven track record. The commenter (1634) asserts that a major benefit of the ENplus certification scheme is that it is based on the international standard EN-14961-2 (and will transfer to the new upcoming ISO 17225-2 standard) and establishes stringent requirements for pellet trade and bulk delivery, which is not included in the PFI standard. The commenter (1634) explains that, as bulk delivery increases in the U.S., certification of trade ensures pellets are not damaged by poor storage or delivery practices.

Commenter (1638) requests that the EPA recognize CANplus fuel pellet certification as an eligible pellet certification scheme within the proposed NSPS. The commenter (1638) reports that the fuel grade specifications for each grade are identical to those given in the respective EN and PFI standards. According to the commenter (1638), the certification program is modeled off the established ENplus system but includes increased frequency for the auditing and testing of fuels graded to the North American “Premium” pellet fuel grade. The commenter (1638) refers the EPA to the CANplus handbook for details and lists some of the positive features of CANplus as follows:

- Independent ISO recognized third party program oversight and regular external auditing/testing of pellet production and pellet quality during the year.
- Internationally recognized testing and quality management standards and procedures (ISO).
- Mandatory in-house quality control and quality management procedures.
- Use of recognized pellet quality grades (North American and EU).
- Strict control of permissible pellet feedstock, sustainability criteria and chain of custody procedures.
- Certification of the entire pellet supply chain, producer, trader, distributors are included.
- Exceeds PFI certification program by requiring testing for trace minerals. This ensures levels of undesirable components are kept to a minimum and thus minimizes potential emission and ash disposal hazards.
- Includes Mandatory ash melting temperature specifications to reduce appliance clinker issues.
- Use of internationally recognized ISO accredited certification body, auditing and testing service providers.

Commenter (1171) suggests PFI develop an accredited certification program to ISO/IEC 17065 for pellet fuel verification.

Response:

The final rule requires that pellets for the certification tests of a pellet wood heater be only those that have been graded under a licensing agreement with an EPA-approved third-party organization and thereby meet certain minimum requirements. Furthermore, operators of wood heaters that are certified to burn pellet fuels must only burn pellets that have been specified in the owner's manual and graded under a licensing agreement with this third-party organization approved by the EPA. The Pellet Fuels Institute, ENplus and CANplus are initially deemed to be approved third-party organizations for this purpose, and additional organizations may apply to the Administrator for approval. Upon evaluation and consideration of comments received on the proposal, we have agreed to include ENplus and CANplus as EPA-approved pellet fuel certification organizations in the final rule (in addition to PFI). As noted by several commenters (and we agree), ENplus and CANplus include all of the accrediting and QA/QC elements that we support as demonstrating that pellet fuel production complies with the intended grade specifications.

In response to comments that oppose the use of PFI as an EPA-approved pellet fuel certification organization, we disagree. Note that the PFI Standards Program includes all of the accrediting and QA/QC elements that we support as demonstrating that pellet fuel production complies with the intended grade specifications. The final rule requires that the pellet fuel must meet certain requirements, which PFI's, ENplus' and CANplus' quality assurance programs address, including specifications on: density; dimension; inorganic fines; chlorides; ash content; demolition or construction waste content; and trace metals content. Details of the PFI program are available at http://pelletheat.org/pfi-standards/pfi-standards-program/. Details of the ENplus

program are at http://www.enplus-pellets.eu/wp-content/uploads/2012/01/ENplus-Handbook-2.0.pdf**.** Details of the CANplus program are at http://controlunion.ca/fileupload/CA/Certifications/ENplusCANplus/CANplus_handbook_v2-0.pdf

2.10.3 Comment: Pellet grade and composition requirements

Commenter (1563) agrees that PFI certified wood pellets should be used in emissions testing under the NSPS, however, they do not believe that the EPA should require users of pellet fuel heating appliances to burn only PFI certified wood pellets as fuel. Instead, the commenter (1563) states, if the EPA is concerned about potential features of wood pellets, it should include in the proposed NSPS what the specifications must be for wood pellets used as a fuel in a NSPS certification testing for the heating appliance and permit the consumer to make appropriate choices in the market based on the required specifications, price and availability.

Commenter (1521) states that, as proposed, once certified, owners and operators of pellet burning appliances would only be allowed to burn in their appliance the grade of fuel that the appliance manufacturer chose for the appliance certification test and as the manufacturer specifies in the owner's manual. According to the commenter (1521), if manufacturers want to allow for the widest range of grades of fuel in their appliances, they would need to test multiple times using a wide range of pellet grades. The commenter (1521) questions whether the EPA considered this in their costing estimates. To relieve what they believe would be a potential economic burden, they provide revised preamble language that states that the EPA would allow the use of higher grade fuels and other grades of fuels specified by the manufacturer in the owner's manual than what the manufacturer chose for the certification test.

Commenter (1521) requests that, in lieu of requiring owners and operators use only the grade of licensed pellet fuels that are included in the heater/stove certification test or better, that such statements be included as recommendations in the owner's manual (due to is unenforceability). The commenter (1521) recommends that the EPA could suggest that owner's manuals include a statement of the grade of pellets used in compliance testing and that the manufacturer recommends the use of the same or higher grade of pellets in the appliance for optimum performance.

Another commenter (0541) notes the variation in pellet grades and quality can affect the fuel/air mixture and pounds per hour of fuel auger feeding and BTU output. The commenter (0541) asks whether the manufacturer will be required to specify the grade of pellet to be used in their appliance and if the warranty will be void if a lower grade is chosen.

Commenter (1551) states that with increasing use of pellet fuels for residential home heating, the composition of those pellets and the potential impact from their use is increasing in importance. Commenter (1551) claims a recent study on pellet fuel composition found these products can contain significant levels of metals and other harmful contaminants, which can significantly increase health-damaging emissions and potentially damage high efficiency equipment. Additionally, commenter (1551) asserts a recent presentation at an industry conference indicates

that substandard pellets result in equipment malfunction issues due to the formation of materials that clog components, also known as slag, sinters, or clinkers.

Commenter (1465) notes research sponsored by the NYSERDA with NESCAUM and Clarkson University which showed trace metal concentrations in wood pellets gathered from throughout New York and New England with trace metals analysis showing chromium (Cr), nickel (Ni), copper (Cu), zinc (Zn), arsenic (As), cadmium (Cd), lead (Pb) and mercury (Hg). Commenter (1465) states there are multiple sources of these elements including construction and demolition (C&D) debris, painted wood (Pb), wood preservatives in pressure-treated wood (Cr, Cu, As), and more. Commenter (1465) asserts the industry standard does not include analysis of important metals that are both health-relevant and indicators of contaminated feedstock. Using this standard in its current form, according to commenter (1465), will not prevent C&D debris or other sources of contaminated wood from ending up in wood pellet supplies. Commenter (1465) believes the standard could be a starting platform to be built upon for a regulatory test method.

Commenter (1465) states trace metal testing and limits should be added to the evaluation of pellets for certification, and only unadulterated wood should be used for the wood pellet supply. Based on the pellets for sale across New York State and New England from 100 manufacturers that were tested, commenter (1465) asserts the majority of suppliers provided unadulterated pellets, demonstrating that it is feasible for wood pellet suppliers to obtain clean feedstocks. Currently, commenter (1465) notes that the European standard CEN/TS 14961 includes Cd, Cr, Cu and Zn in their wood pellet analysis, and the German standard includes As, Cd, Cr, Cu, Hg, Pb, and Zn.

Commenter (1465) also states the EPA should adopt pellet characterization standards to facilitate appliance performance because optimizing wood-fired heater performance requires matching the fuel-type with the appliance design. Commenter (1465) asserts that existing voluntary industry standards evaluate pellet density, diameter, durability, percent fines (sawdust-like materials), percent inorganic ash, length, percent moisture, and chloride (ppm) – important characteristics for optimizing combustion and preventing corrosion of appliance materials. Commenter (1479) likewise proposes establishing a minimum length for wood pellets, as short pellets smoke.

Commenter (1559) states that, in the U.S. there are only voluntary pellet quality standards that apply to the combustion properties of the fuel (heat content, moisture, and ash content). The commenter attaches a report (Chandrasekaran, et al) to their comment letter that characterizes 132 different samples of pellets and 100 different brands collected from New York and New England over the winter of 2010 and 2011 (Appendix B of the comment letter). According to the commenter (1559), although all of the bags were labelled as “premium” pellets, some of the pellets were clearly made from waste woods including pressure treated and painted wood, as there were high concentrations of chromium, copper and arsenic, as well as lead. The commenter (1559) states that there are statistically sound methods of sampling large scale particulate samples such as wood pellets that must be applied to ensure the combustion properties of pellets in order to prevent the emission of significant quantities of toxic heavy metals.

Commenter (1576) believes a robust federal pellet (and chip) standard should incorporate

requirements about the resources used to manufacture the fuel, since that directly influences criteria pollutant and GHG emissions, as well as the sustainability of forest management practices. Commenter (1576) asserts that sustainable forest management is of particular importance to states and consumers are looking for high quality standards.

Commenter (1576) also believes pellet fuel quality needs to be certified and is a central issue for the further development of pellet markets. Specifically, commenter (1576) asserts the residential heating sector depends on reliable fuel quality since it is crucial for a reliable and economic use of small-scale pellet heating systems. Contamination in the fuel lead to immediate problems with combustion systems caused by the slagging of ash, according to commenter (1576), and low durability and high content of fines can lead to significant handling problems, higher emissions and system failure. Likewise, commenter (1585) believes that a more ambitious standard should be adopted that includes ash content specifications, and metal and trace element specifications.

Commenter (1559) furthermore requests that the EPA restrict the use of grass pellets. The commenter (1559) states that there are problems burning grass pellets because of their higher ash content as well as the additional chlorine that is typically present. The commenter (1559) reports that an extensive study of 6 appliances burning switchgrass pellets was published by Chandrasekeran et al (see Appendix C of the commenter's letter for this document). According to the commenter (1559), chlorine can lead to corrosion in conventional appliances and lead to the formation of dioxins in the emitted PM (see Appendix D to the commenter's letter for the source document). The commenter (1559) opines that, for grass pellets to be a significant source of domestic or commercial heat, combustion appliances must be designed to specifically burn grass pellets that can handle the higher ash content. Thus, the commenter (1559) recommends that the use of grass pellets be restricted until such time that appliances are available to effectively burn them without damage to the device or excessive emissions of PM and toxic dioxins.

Commenter (1505) notes that, although the EPA lists prohibited fuels, there are no restrictions in the PFI standards as to content e.g., there is no prohibition to adding any of the prohibited fuels and there is no standard heating value.

If EPA moves forward with the PFI standards, then commenter (1551) believes it should require additional analysis for arsenic, copper, cadmium, lead, mercury, and chrome. Commenter (1397) believes, if PFI is selected, it should be expanded to comply with the parameters of ENplus.

Commenter (1465) believes that the EPA should adopt stronger standard specifications for wood pellets. Commenter (1465) notes that PFI allows for "de minimis" quantities of construction and demolition (C&D) materials, with "de minimis" being too vaguely defined. Commenter (1465) believes PFI should develop a quantitative standard to define "de minimis," or prohibit specific materials from use as raw materials (with the list of prohibited raw materials mirroring the wood types listed in Prohibited Fuel Types in the proposed rule). Alternatively, commenter (14645) urges EPA to supplement the PFI standard with requirements in the rule that no pellet fuels may contain any raw materials derived from Prohibited Fuel Types (wood or non-wood). Thus commenter (1465) supports EPA's proposed prohibition on C&D debris, believing C&D-derived

wood should generally be prohibited as an ingredient in pellets for residential heaters, but would support a waiver from this prohibition only for individual pellet manufacturers demonstrating complete separation of unadulterated C&D wood (primarily clean, unpainted and untreated lumber) prior to wood grinding and formation into pellets.

Commenter (1648 [PFI]) states that they do not believe an alternative program that addresses construction and demolition waste exists or is practically available in the U.S. According to the commenter (1648), their Handbook requires managers to document raw materials receiving information and inspection/audit status, and therefore addresses construction and demolition waste from the front end of the fuel production process, and as such is an effective mechanism to keep such waste streams out of pellet fuels (the commenter elaborates on these procedures). The commenter (1648) asserts that the EPA should rely on existing programs to ensure that construction and demolition waste do not enter the pellet fuel stream in significant amounts and suggests that the EPA not pursue such a program within the context of the NSPS or other subsequent proposals.

Commenter (1648 [PFI]) requests that the EPA not adopt any specific criteria for pellet fuels, as proposed in 40 CFR 60.532(e). The commenter (1648-A2) asserts that such requirements are contrary to the CAA, unsupported in the record, and unnecessary. Commenter (1648) opines that the EPA lacks the authority to finalize the proposed pellet fuel criteria. The commenter (1648-A2) asserts that it is not feasible to prescribe or enforce a standard of performance under CAA section 111(h), and CAA section 111 (a)-(b) do not explicitly grant the EPA the authority to impose regulations on fuel or fuel quality. The commenter (1648) also opines that the EPA has not demonstrated that such standards reflect BSER for the source category and therefore the standards are arbitrary and capricious. The commenter (1648) states that, if the EPA is exercising its authority under CAA section 111(a), (b) or (h), the EPA must include several statute considerations (e.g., cost and energy requirements).

The commenter (1648) opines that adopting specific criteria for pellet fuels is unnecessary because the proposed criteria for pellet fuel requirements would be in addition to (1) the emission standards for wood heaters and pellet stoves, (2) the owner's manual list of prohibited fuel types, and (3) the owner's manual requirement that the appliance be operated only with the grades of pellet fuels that are included in the certification tests (or better). Lastly, the commenter (1648) believes that adopting the proposed standards for pellet fuels would discourage the development of more innovative fuels. The commenter (1648) also expresses that they are against codifying their program into the NSPS

Commenter (1648) opines that the standards proposed in 40 CFR 60.532(e)(1)-(6) are flawed:

- EPA should revise proposed regulatory text regarding pellet fuel requirements to reference both current PFI standards.
- Current specifications allow for minimal variance with the maximum length of pellet fuel of 1% and paragraph (e)(2) specifies a fixed maximum length of 1.5 inches.
- Paragraph (e)(3) references "inorganic fines" which implies that standards are related to non-carbon based material such as ash, and should be referred to as "fines."
- EPA should not set a numeric standard for ash content in residential appliances, but

should incorporate standards based on the fuels for which and appliance is tested and listed. The commenter (1648) explains that while ash content can impact emissions from a wood heater, boiler or furnace, setting a specific standard limiting ash content may inhibit future innovation in pellet central heaters. The commenter (1648) believes that if an appliance can meet proposed limits using fuel with an ash content greater than 2%, then that fuel should be able to be listed as a fuel that can be used for that appliance.

Likewise, commenter (1472) contends that the NSPS should not rule out the use of higher (than 2%) ash fuels burned in less traditional pellet burn systems that can achieve the standard. This commenter (1472) recommends that EPA let the stove designers meet the NSPS and not artificially rule out higher ash fuels. Commenter (1472) further contends that promulgating particular parameters inside of the fuel standard and will cause confusion in the marketplace.

Commenter (1648) recommends that, if the EPA must proceed with restrictions regarding fuel specifications, the following language could replace the proposed language of 40 CFR 60.532(e):

> (e) Pellet Fuel Requirements.
> Operators of wood heaters that are certified to burn pellet fuels may only burn pellets that have been produced and marked under a program incorporating a Quality Mark developed by the Pellet Fuels Institute or an equivalent organization approved by the EPA.

Commenters (1522, 1539, 1651) request that the EPA revise the text of the regulation so that it matches the specifications outlined in the PFI Standards Program in order to encourage the development of innovative fuels. Commenter (1522) includes copies of a certificate of qualification for their company (as compliant with the PFI & ALSC program), the Pellet Fuels Institute Residential/Commercial Densified Fuel QA/QC Handbook (Status June 1, 2011) and the PFI Standard Specification for Residential/Commercial Densified Fuel (June 1, 2011) documents as attachments to their comment letter.

As also noted earlier in section 2.10, commenter (1563) suggests that if the EPA is concerned about potential features of wood pellets, it should include in the proposed NSPS what the specifications must be for wood pellets used as a fuel in a NSPS certification testing for the heating appliance, and permit the consumer to make appropriate choices in the market based on the required specifications, price and availability (as opposed to requiring PFI-certified pellets).

Response:

As stated in our previous responses to comments in section 2.10, pellet heater manufacturer data show that pellet fuel quality assurance is necessary to ensure that their appliances operate properly and meet the certified emission limits. Therefore, for pellet-fueled appliances (as discussed in the *Section 2.10.2* response), the final rule requires that operation according to the owner's manual includes operation only with the minimum grade or better pellet fuels that have been used in the certification test and have been graded and marked under a licensing agreement

with PFI, ENplus, CANplus or equivalent (after request and subsequent approval by the EPA), to meet the minimum requirements and procedures for quality assurance.

In response to comments requesting more stringent/higher quality pellet fuel standards, we maintain that the pellet requirements which are part of the PFI, ENplus and CANplus systems (or equivalent systems) safeguard pellet quality and emissions from pellets. We note that PFI, ENplus and CANplus use different procedures to ensure the absence of metals and construction and demolition waste. We welcome information that will help us determine if each of these different procedures work equally well. We also note that PFI, ENplus and CANplus have different requirements for forest sustainability and impacts on GHG. We agree with commenters that more stringent and higher quality pellet fuel standards should be considered in future reviews and rulemakings. We appreciate the provided comments and welcome future suggestions and supporting data.

2.10.4 Comment: Pellet storage and CO safety concerns

Commenters (1465, 1559) believe that the EPA should require warnings of CO off-gassing from wood pellets via labelling, hangtags and in appliance owner's manuals, encourage the installation of CO alarms capable of sounding at low CO levels (9 ppm, 8-hr avg) and require separate pellet storage outside of the building until active ventilation protocols are developed. According to the commenters (1465, 1559), the explicit requirement for CO monitors in accessible pellet storage areas is a critical safety component and an important health and safety measure that the EPA should include in the NSPS. Commenter (1559) includes an attachment (Appendix E) to their comment letter that presents the results of "Monitoring of Carbon Monoxide Off-Gassing in Wood Pellet Storage in the Northeastern U.S." (Prepared by Clarkson University for NYSERDA) to support their position.

Response:

We appreciate and share the commenters' concerns regarding CO safety. In the proposal, we asked for comments on whether we should require CO monitors to help ensure proper operation of the heater and to reduce health and safety concerns for appliances that are installed in occupied areas. We have decided not to require use of a CO monitor at this time. However, we are requiring that the owner's manual address use of CO monitors and we encourage the use of such monitors in accessible pellet storage areas.

2.10.5 Comment: Tax incentives for locally grown pellets

Commenter (0433) supports limiting the fuel used by pellet stoves. Commenter (0433) suggests creating a tax incentive or tax reimbursement for locally grown and burned pellets (within 100 miles). Commenter (0433) asserts this would better address pollution than modifying the burner, stating millions of pellets are shipped around the globe and effectively have long over-exceeded the energy they actually contain. Commenter (0433) concludes that by combining pellet stoves with combined heat and power and local fuel would be the greenest solution.

Response:

While we appreciate the commenter's suggestion, tax incentives are outside the scope of this NSPS. Nothing in this rule however precludes state and local governments from offering such tax incentives. See also our response in *Section 2.1.5*.

2.11 Prohibited Fuels, Visible Emission Limits, Moisture Meters

2.11.1 Comment: Prohibited fuels list

Commenters (1239, 1355, 1397, 1521) support inclusion of the list of prohibited fuels, as found in § 60.532. Commenters (1239, 1355, 1397) state that the list is needed because the fuels included on the list can prevent heaters from operating as designed and even cause hazardous fumes. Commenter (1397) recommends that the following be added to the list of prohibited fuels: "Fuels other than properly seasoned cord wood, approved pellet fuels or other fuels approved by EPA."

Commenter (1465) recommends that the EPA define prohibited fuels in the NSPS as any fuel that was not tested in the heater. Commenter (1465) believes this should include but not be limited to refuse, painted wood, pressure treated wood, construction and demolition materials, plastics, non-woody biomass such as grasses, and animal carcasses. For heaters that claim the ability to burn multiple biomass fuels, commenter (1465) asserts EPA should require emissions testing for each respective fuel.

Commenter (1505) contends that, although the EPA lists prohibited fuels, there are no restrictions in the Pellet Fuels Institute (PFI) standards as to content e.g., there is no prohibition to adding any of the prohibited fuels and there is no standard heating value.

Commenter (1479) asks whether pallets fall under the definition of pressure-treated wood listed under prohibited fuel types, as pallets are a common fuel source and central heaters have been developed specifically with the intent of burning pallets.

Commenter (1513) recommends the EPA consider restrictions on the sale of combustion materials for use in certified appliances (including, for example, specifications for wood moisture content), and provide clearer enforcement and penalty authority for state and local agencies in this area. Commenter (0526) adds that if the intent is reducing PM, then dealers selling "dry" firewood should be held to some type of moisture content regulation. Commenter (1137) states wood sellers should be required to provide wood at 20% moisture content as measured on freshly exposed grain in order for the product to be certified as "seasoned" wood.

Commenter (1521) believes that an unintended consequence of the EPA's requirement that wood stove manufacturers certify fuel use for an appliance is that, because stove manufacturers would not have an incentive to test a wide variety of fuels unless there was a business arrangement (for cost reasons), the rule could close out of the market smaller, innovative yet no more environmentally detrimental manufacturers of bio-bricks and other hybrid fuels. For this reason,

the commenter (1521) recommends that the EPA recommend and not mandate the use of manufacturer-identified appropriate fuels.

Commenter (0575) supports reconsideration for the elimination of use of a wide variety of recycled fibers and plastics in wood fuels because this shifts the burden to virgin wood. The commenter (0575) presents information showing the benefits of fiber and plastic re-use to produce a clean burning and environmentally conscious fuel product. According to the commenter (0575), the environmental cost is significantly higher if waste stream fibers and plastics are not allowed to be used in residential pellet heating fuels.

Response:

We agree with commenters for the need to specify prohibited fuels as well as the need to specify that wood that is not properly seasoned should not be an allowed fuel. We have added "unseasoned" wood to the list of prohibited fuels and also added a definition for "unseasoned wood" (which is defined as wood with an average moisture content of 20 percent or more). One commenter's suggestion to require adding that use of any fuel that was not tested in the heater is a "prohibited fuel" may be confusing to users and we choose to rely on the list itself to inform the user, which explicitly states a list of materials which should not be burned in the heater (including unseasoned wood). This prohibited fuels list is required to be in each user's manual, as well as instructions regarding how to determine seasoned wood compared to unseasoned wood and the importance of burning only seasoned wood.

Regarding the comment that stoves burning multiple fuels, including nonwood biomass fuels must be tested and certified to burn those fuels specifically, we note that any manufacturer seeking certification to burn wood, must also test and certify any other fuels for which the manufacturer claims the heater is capable of burning (although the PM emission limit applies to wood burning only). Further, the manufacturer must not label a heater as "nonwood" and then market it as wood-burning.

Commenters' suggestions to consider allowing use of recycled fibers and plastics or other innovative fuels such as bio-bricks can be considered on a case-by-case basis through a request using § 60.8 of the General Provisions. Similarly, such topics are reasonable to raise with the Pellet Fuels Institute, ENplus, CANplus or other equivalent organization to adjust their pellet fuel licensing agreements.

2.11.2 Comment: Visible emission limits

Support:

Commenters (0541, 1397, 1423, 1463, 1487, 1488, 1551, 1558, 1591) support inclusion of visible emission standards. Commenter (1487) encourages the EPA to consider certain states' inclusion of in-use opacity standards as a means to protect public health, ensure proper operation, and provide effective relief for complaints regarding excessive smoke and PM pollution. Specifically, the commenter (1487) suggests that the EPA look at regulations in states such as Utah, Washington, Maine and New Jersey as models. Likewise, commenter (1551) supports a

limit, similar to those currently in place in New Jersey and Maine, to ensure units are operated properly in the field, and which defines a wood smoke nuisance as visible smoke passing onto a neighboring property for a period greater than 6 minutes in any rolling 60-minute period.

Commenter (1423) recommends the EPA establish in-use visible emission limits to address poorly performing or maintained NSPS certified appliances. Commenter (1551) notes that in states where opacity regulations do apply to residential units, enforcement has been difficult due to resource constraints and limitations in conducting credible Method 9 tests (Method 9 test cannot be conducted on a unit's emissions at dusk or when it is dark). Some commenters (1423, 1551, 1558, 1591) suggest using Method 22, which requires only the determination of whether visible emissions occur and does not require the determination of opacity levels (therefore observer certification according to the procedures of Method 9 is not required). Commenter (1551) adds this would allow affected neighbors to gather data to support wood smoke nuisance cases. Commenters (1558, 1591) assert that Maine and New Jersey currently use Method 22 to regulate hydronic heaters and believes these requirements must be included to ensure that health-protective standards are met.

Likewise, commenter (1591) states the EPA must include visible emission limits in the NSPS that hydronic heaters produce no smoke, except for 3 minutes in any 30-minute period, based on Method 22. Commenter (1591) believes it is the only practical and affordable tool for determining a nuisance and a health hazard by local and state governments, and for individuals that must provide the burden of proof for civil litigation. Commenter (1591) adds that any violation of Method 22 rules would be the result of the operator improperly operating or maintaining the hydronic heater and anyone with no certification requirements should be allowed to take a time- and date-stamped video of smoke for a period of at least 6 minutes as evidence of a violation.

Commenter (1488) requests that the EPA include a visible emissions prohibition (no visible smoke, except for 3 minutes in any 30-minute period) and a wet wood prohibition (> 20% moisture content), and a nuisance smoke prohibition (operator is responsible for operation in a manner that does not create a public or private nuisance condition).

Opposition:

Commenters (1521, 1543, 1550, 1643) do not support the inclusion of best burn practices or adjustments to help ensure proper operation (e.g., chimney height and draft specifications, moisture content limits or visible emission limits) in the NSPS. First, the commenters (1543, 1550, 1643) state, such specific work practice requirements are not authorized under section 111, in light of EPA's issuance of numeric performance standards applicable to all appliances covered under this rulemaking. Second, the commenters (1543, 1550, 1643) state, the federal enforceability of manufacturers' appliance-specific installation and operation instructions [in the owner's manual] is really the best and only way of ensuring proper use, taking into account inevitable appliance-specific variation in product design and operating issues. Likewise, commenter (1521) asserts that these requirements would be difficult to enforce, and would

require a dramatic increase in compliance resources. The commenter (1521) recommends that such information be supplied at time of purchase but that inclusion in the NSPS is inappropriate.

Commenter (1563) opposes incorporating visible emissions standards and "field methods" of measuring compliance into the proposed NSPS. Commenter (1563) finds that Method 9 opacity measurements are unreliable for a number of reasons, but primarily because it is typically impossible to take a Method 9 reading of emissions from a hydronic heater that do not include emissions of water vapor. Commenter (1563) states that water vapor (steam) is an inherent by-product of wood combustion because the cord wood used as fuel in hydronic heaters has variable amounts of moisture ranging up to 25% by weight. Where the fuel is as much as 25% water, the commenter (1563) states that it is certain that moisture in the form of water droplets or water vapor will be present in emissions from a hydronic heater. Commenter (1563) states that the Method 9 provisions to differentiate between the PM and water vapor plume are difficult to implement in practice because it is typically very difficult to define that part of the plume which does not include condensed water vapor—making Method 9 opacity readings potentially impossible, in many situations, if the strict requirements of the Method are followed.

Commenter (1563) states that their experience with so-called "field methods" of measuring emissions from hydronic heaters is that these methods have all been completely unreliable in producing useful data. The commenter (1563) states that if there were reliable "field methods" for measuring particulate emissions from hydronic heaters, these methods would be a substitute for the extremely detailed, technically challenging and expensive methods used to determine qualification or certification of hydronic heaters under voluntary and regulatory programs. Also, the commenter (1563) states that use of these "field methods" involves the technical challenge of assessing meteorological data and background ambient particulate levels, properly calibrating and using the "field method", and converting all that data into some useful measure of emissions. Given these circumstances, it is not surprising that the commenter (1563) is not aware of any history of useful field data having been generated.

Response:

We agree that a visible emissions standard could be a valuable enforcement tool and we note that states have successful enforcement experience with both EPA Method 9 and EPA Method 22. As discussed earlier in this document, Section 111 does allow EPA to establish work practice and operational standards separately or in combination with emission standards to ensure BSER is achieved in actual use. However, we lack residential wood heater visible emission data to establish specific limits reflective of BSER at this time. Therefore, in this final rule, we are not setting specific limits on visible emissions. The NSPS requires the owner to install, maintain and operate the wood heater properly and follow the instructions in the owner's manuals. The owner's manuals are required to instruct the user on proper operation (including proper draft and prohibited fuels) and follow all state, local and tribal requirements (such as stack heights, location and proper operation to avoid nuisance conditions). We encourage state, local and tribal jurisdictions to use observation of visible emissions as an indicator of potential improper operation. In addition, we emphasize that operators should note that some state, local and tribal jurisdictions have limits, prohibitions and other requirements beyond the NSPS that must also be

followed. This final rule allows the EPA to approve state requests for delegation of enforcement authority for most NSPS requirements. In addition, we expect many state, local and tribal authorities will adopt some of the important and very successful strategies in *Strategies for Reducing Residential Wood Smoke* (http://www.epa.gov/burnwise/strategies.html) including developing site-specific installation and operating requirements to ensure heaters are not over-sized, avoid nuisance conditions, and ensure proper operation (*e.g.*, using EPA Method 22 observations of visible emissions as an indicator of potential poor or improper operation) to help ensure healthy air for all.

2.11.3 Comment: Requiring moisture meters

Support:

Commenters (1355, 1395, 1397) support the moisture meter requirement noting that wood with too high a moisture content boils when it burns, making a smoky fire with little heat because heat energy vaporizes the moisture instead of burning the log and counteracts the effectiveness of burning in an EPA certified device. Commenter (1395) states the meter will ensure that consumers are able to guarantee the wood used in clean burning devices is "seasoned wood" as defined by the 40 CFR part 60, subpart AAA.

Commenters (1239, 1665) agree with the EPA's proposed requirement that direct distribution manufacturers and retailers of wood heaters provide a moisture meter at the time of sale because the moistness of wood can adversely affect wood heater efficiency. Commenter (1665) includes an attachment to their comment letter that summarizes a voluntary review of consumer grade moisture meters that they performed in 2013 (under Supportive Documentation For Moisture Meter Inclusion, entitled Voluntary Review of Consumer Grade Moisture Meters).

Opposition:

Commenters (1436, 1521, 1543, 1545, 1547, 1549, 1550, 1572, 1643) oppose requiring commercial owners to provide a moisture meter at the time of sale. Commenter (1521) disagrees with the EPA's proposal to require direct distribution manufacturers and retailers to provide a moisture meter with the wood heaters at the time of sale (§ 60.538) because it is unnecessary and adds to cost of sale) and it is not practically enforceable. Commenters (1543, 1550, 1643) believe there are better means to ensure the use of dry wood without having to burden manufacturers or others with providing a moisture meter, a tool of limited assistance to the average consumer. Commenters (1543, 1547, 1550, 1643) note that consumer-grade moisture meters have very short probe lengths, rendering them capable of only measuring surface moisture, which is an inadequate basis for characterizing the moisture content of the piece of firewood being evaluated. Because all they can really do is deal with extreme cases (*e.g.*, very wet wood), existing consumer education programs (such as EPA's Burn Wise website), coupled with sound owner's manual instructions, together are more than capable of providing needed guidance to consumers on buying seasoned wood and storing it properly, according to the commenters (1543, 1547, 1549, 1550, 1643). Commenters (1543, 1549, 1550, 1643) believe that under these circumstances, the additional costs associated with requiring a moisture meter simply are not

warranted. Commenter (1572) adds that it up to the business owners to decide what comes with a product and what does not.

Commenter (1549) believes that (1) the retail consumer will not use this piece of equipment, (2) it's easy to break the pin on this type of gauge, (3) the consumer would likely not fix or replace a broken gauge, and (4) a broken gauge would pose a risk of harm to the user. The commenter (1549) reports that they surveyed the top hearth manufacturers and HPBA and they could not document one manufacturer supplying a moisture meter with their product.

Commenter (1436) adds that a moisture meter will not change consumers' burning habits, will not last the life of the stove and there is no intrinsic reason to use one. Commenter (1545) states that manufacturers of hydronic heaters would be under cost-based pressure to comply with the moisture tester requirement by providing the cheapest available moisture testers, and these are inaccurate and unreliable, and would thus not contribute effectively to cleaner operating practices. Likewise, commenter (1062) does not support a requirement for supplying wood moisture meters with appliances based on their experience with selling them for about 3 years. The commenter (1062) found that cheaper meters (i.e., $50.00) were poor quality, and very few customers opt to purchase a good quality digital moisture meter for $135.00. The commenter (1062) thinks that it is reasonable for the EPA to encourage consumers to consider the purchase of a moisture meter, but to require a moisture meter be included with each appliance would be government overreach and add another cost to the boilers, which is of consequence.

One commenter (1546) states that including a moisture meter is not a bad idea in theory, but it will increase the cost barrier for changeouts and meters will likely see limited use in the longer term. The commenter (1546) adds that the greatest barrier to improving air quality is the behavior of end-users.

Response:

We agree that encouraging operator best practices, such as use of seasoned wood (less than 20% moisture) is very important for best heater performance and improved air quality to reduce health effects and nuisance to neighbors. This final rule and EPA's Burn Wise educational efforts encourage such best practices. We appreciate the comments that indicate that suitable moisture meters are available and the voluntary study by one commenter (1665), but also acknowledge other comments that indicate that some cheap meters are of poor quality and durability. The final rule does not include performance specifications for consumer-grade moisture meters, but we expect the marketplace to quickly respond to the demand for adequate quality. Further, we recognize that not every piece of wood would need to be tested if the consumer follows best practice to season the wood outdoors through the summer for at least 6 months before burning it. With practice, the consumer should notice that properly seasoned wood is darker, has cracks in the end grain, and sounds hollow when smacked against another piece of wood.

Because of the smaller quantities of wood consumed in most room heaters regulated under subpart AAA and the greater likelihood that the operator will inspect each piece of wood closely,

especially as the operator hand carries each piece into the home, subpart AAA of the final rule encourages but does not require consumer moisture meters at the time of sale.

Because of the much greater quantities of wood consumed in most central heaters regulated under subpart QQQQ, the much greater emissions per heater and the likelihood that the operator will not closely inspect each piece of wood (especially for outdoor hydronic heaters that are most often in very cold locations), subpart QQQQ of the final rule requires consumer moisture meters at the time of sale.

2.12 Compliance Certification and Quality Assurance Requirements

2.12.1 Comment: Requirements imposed prior to final rule effective date

Commenters (1543, 1550, 1643) state that the proposed rule includes requirements that the EPA proposes to impose prior to the issuance of a final rule. For example, the commenters (1543, 1550, 1643) note that § 60.533(a)(1) of the proposed rule requires that prior to the effective date of the final rule, the manufacturer must submit to the EPA the information required in paragraph (b) of that section and follow either the certification process in paragraphs (b) through (e) of that section or the certifying entity based application process specified in paragraph (f) of that section. Similarly, the commenters (1543, 1550, 1643) note that § 60.533(d) also purports to require that prior to the effective date of the final rule the Administrator will issue the certificate for the most stringent PM emission standard that the unit meets under § 60.532(a) or (b) of the proposed rule, as applicable. Finally, the commenters (1543, 1550, 1643) state that in § 60.534(b), the proposed rule provides that "Method 5H is no longer allowed for certification testing," and it appears that the EPA intends to prohibit Method 5H upon issuance of the proposed rule, rather than on the effective date of the final rule. The commenters (1543, 1550, 1643) believe that nothing in the Administrative Procedure Act or well-settled precedent gives the EPA the authority to do so.

Response:

In the final rule, we use the language "on or after" the effective date of the final rule, clarifying that we never intended that requirements take effect before the effective date of the rule. Rather, we were just notifying sources of upcoming requirements.

2.12.2 Comment: Applicability determinations

Commenters (1397, 1551) state the EPA, not manufacturers, should decide whether a device qualifies for any exemption from the requirements of this rule.

Commenter (1546) notes that there are currently 142 determinations under the "Woodstoves" category in the EPA applicability determination index (ADI). The commenter (1546) inquires what the EPA plans on doing with the determinations made under the prior revisions to the NSPS. The commenter (1546) states that determinations made by the EPA regarding catalyst

equivalency and small fireboxes are of particular interest to the commenter (1546) and their clients.

Response:

We have clarified in the final rule that the EPA, not manufacturers, has the authority to grant or reject exemptions after manufacturers request exemptions. We have reviewed the current body of determinations in the ADI to determine if any changes are needed to the determinations or in the final rule for consistency. Most determinations are still valid and the rule is consistent in those regards. Several determinations have been deleted because they are no longer applicable, *e.g*., grandfathering of wood heaters certified in Oregon prior to the 1988 NSPS. The updated ADI is at http://cfpub.epa.gov/adi/.

2.12.3 Comment: Certification testing notification

Commenter (1551) states the EPA must continue to require the 30-day notice provisions in the rule to ensure state and federal agencies are provided with adequate notification of testing to allow for witnessing of those tests. Commenter (1397) states schedules of emission testing should be posted online for easy access by state/local regulators.

Commenters (1543, 1550, 1643), on the other hand, believe there is no rational justification for requiring 30 days advance notification of certification testing in the proposed rule all because the EPA suddenly claims it lacks the authority to issue waivers from notification when it had routinely done so in the more than the 20-year history of the subpart AAA program. Commenters (1543, 1550, 1643, 1647) assert that without a waiver provision, valuable laboratory time will be underutilized or unused, and this will have significant financial impacts for both laboratories and manufacturers. Commenters (1543, 1550, 1643, 1647) add that this will add significantly to the "logjam" problems. Commenter (1647) describes the scheduling issues that laboratories contend with and the impact that a failure to be able to manage changes in the test schedule pose to their financial bottom line. For example, commenter (1647) notes that manufacturers who fail the first run or two of a test may shift to research testing, then want to immediately start the certification test series once the problem is fixed.

Commenters (1171, 1633) state the 30-day advance notice of testing may be very difficult for testing laboratories and manufacturers to meet and that, often, laboratories may have a wide range of testing dates (e.g. language like "testing will begin in 20-40 days" is often included in commercial contracts) which might lead to unintentionally missing the 30-day deadline. While the intent of this notification is clear and valuable (allowing for the EPA and other interested parties to schedule an observation of the testing), commenter (1171) recommends that the timeline be reconsidered with input from testing laboratories in this industry.

Commenter (1397) states notification of 7 to 10 days is acceptable and provides sufficient notification to interested regulators and gives additional flexibility to test labs, thus avoiding unnecessary delays. Commenter (1397) also believes language should be included in § 60.534 to clarify the process for obtaining test method alterations that facilitate the testing of very large, very small, hybrid, automatic or other unique designs or designs utilizing new technology.

Commenter (1633) states that the EPA should not require any advance notification of certification testing because the EPA has never attended any tests to the commenter's knowledge. Likewise, commenter (1632) requests that the EPA drop the advance notification as they believe it does not serve a useful purpose.

Response:

We are keeping the requirement for a 30-day notice of certification testing because it is a useful tool that allows the EPA and the states to observe tests. However, we are adding flexibility for the lab to substitute a different certification test if circumstances arrive that preclude conducting the announced test on the announced schedule. This change will help the lab maintain orderly operations.

2.12.4 Comment: Model line testing of representative units

Support for testing of one representative unit:

As for the retention of the model line certification scheme, some commenters (1543, 1546, 1550, 1643) oppose the suggestion in the preamble that the EPA might require testing of more than one representative appliance within a model line prior to certification. The commenters (1543, 1550, 1643) believe that the proposed quality assurance/control system is preferred as it avoids the additional cost of testing another unit given the relative lack of precision of the applicable test methods.

Commenter (1171) agrees with the proposed single, representative product per model line testing, as this reduces costs will ensuring confidence in the certification. The commenter (1171) further recommends the EPA consider testing the "worst case scenario" model, as the EPA chooses to define this, to ensure all products with a model line meet emissions requirements.

Commenter (1436) supports use of one representative sample for testing certification, stating that variability from test to test is not caused by the representative sample but by fuel variations. Commenter (1436) is concerned that adding tests will result in huge cost testing increases. Commenter (1436) adds that modern manufacturing does not allow for physical variation.

Commenter (1632) opposes testing more than one unit per model line. According to the commenter (1632), testing a model takes one week and testing multiple models would only add to those costs. The commenter (1632) adds that the issue of emission variability has more to do with the test method and inherent variability of burning wood and not production stove variability.

Commenter (1572) states that to bring R&D and testing costs down to more manageable levels, EPA should mandate that only one model to be tested for an entire series of furnaces (all sizes) provided that all models in the series are built the same way. The commenter (1572) states that this is currently done in safety testing and has been proven to work well.

Support for testing of more than one representative unit:

Commenter (1570) believes the EPA should require more than one representative device be tested prior to certification of the model line due to large variations in emission measurements caused by the many variables in testing and operation of the equipment. Commenter (1570) asserts that testing on more than one representative device will provide data on the magnitude of this variability, help direct future test method improvements, and help to better define deviations in emissions due to changes in operational conditions.

Commenters (1192, 1397, 1513) state the EPA should require manufacturers to test multiple representative units (3 minimum) prior to receiving model line certification, to ensure devices meet the proposed standard and assess variability of test data. Commenter (1513) recommends EPA also establish limits on variability – at a minimum, requiring testing of additional units if the variability between the three units tested falls outside of reasonable confidence intervals. Commenter (1397) believes the current system is minimally optimal and that requiring the testing of three representative units would be optimal.

Response:

As with the 1988 NSPS, because of concern regarding potential negative impacts on small businesses and potential certification delays, both subparts of this final rule require manufacturers to participate in a certification program that tests a representative heater per model line rather than testing every heater. If the representative heater meets the applicable emission limits, the entire model line may be certified. Individual heaters within the model line are still subject to all other requirements, including labeling and operational requirements. Manufacturers are required to have quality assurance programs to ensure that all heaters within the model line conform to the certified design and meet the applicable emission limits. The EPA will continue to have the authority to conduct audits to ensure compliance.

Under the NSPS program, we review the costs of implementing the program as part of the BSER determination. Given the successful history of subpart AAA and the current voluntary hydronic heater program, the one-unit model approach is working and is needed to avoid excessive costs. We will consider revisions to this approach at the next periodic review, as part of overall future test method development to better represent in-home use, and as we transition to an ISO-based quality assurance program, both of which should improve overall quality assurance.

2.12.5 Comment: Timing of EPA review of certification applications

Commenter (1546) states that it has been suggested by various parties at the EPA that the relevant deadline for heaters tested to the current NSPS will be the date the EPA reviews the applications and not the date those applications were submitted. The commenter (1546) is concerned that, for example, a product tested winter 2014 – to the sole test methods and regulations applicable and available at that time – will be denied certification because the EPA may not look at the report until after the revised 2015 NSPS goes into effect. The commenter (1546) notes that, given the current timeline on which the review process is operating (some sources reporting up to 6 months between submittal and approval), it is unfair for applications

submitted in good faith long in advance of the effective date of the final rule to be rejected because the EPA elected not to review those applications until after the effective date.

Commenter (1554) cites similar concerns related to model lines due for re-certification and suggests that the EPA add language similar to that promulgated by the EPA for Title V air permits: *Provided a request for recertification is filed with EPA not less than 30 days before expiration of the current certification, the current certification shall remain in effect until EPA acts on the recertification request*.

Response:

We are revising the certification process to include third-party certifiers in order to reduce the potential for certification delays that could result from insufficient capacity. However, we share the concern noted by commenters that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA, especially in the first year. Therefore, to avoid unfairly restricting the production and sales of manufacturers who do all the things they should do and then potentially have to wait on the EPA approval that may be delayed due to the volume of applications in the first year, we have added a conditional, temporary approval by the EPA for room heaters subject to revised subpart AAA, as well as forced-air furnaces subject to subpart QQQQ, based on the manufacturer's submittal of a complete certification application. The application must include the full test report by an EPA-accredited laboratory and all required compliance statements by the manufacturer. The conditional approval would allow manufacture and sales for 1 year or until EPA review of the application, whichever is earlier. Within that year, the manufacturer must submit a certificate of conformity by a third-party certifier. As noted in the final preamble, the 1-year conditional, temporary approval by the EPA does not apply to hydronic heaters because they are currently required to submit third-party certifications for the voluntary program and will continue to do so under the NSPS.

Furthermore, we have revised the final rule to allow automatic certification of wood heaters that already meet the Step 1 limits, as explained in detail in the final preamble and in other responses in the document (e.g., *Section 2.8.3*). For these Step 1-compliant models, no separate certification will be required. This change will ensure a ready supply of models for sale at Step 1 and prevent delays in conducting certification testing and processing applications for other heaters newly meeting the Step 1 or Step 2 limits. As the new lab QA program is implemented, this should also improve the quality of submittals, reduce errors and result in timely approvals.

2.12.6 Comment: Sharing and publishing of test data with states and public

Commenter (1397) states the EPA must identify what test data remains outside the CBI classification and include directions for accrediting/certifying bodies to promptly provide such data to any regulatory bodies who request it. Commenter (1397) states schedules of emission testing and audit compliance should be posted online for easy access by state/local regulators. Likewise, commenter (1541) states that the EPA should not allow any test results to be listed as "confidential business information" if accepted by the EPA for certification. Commenter (1593) requests that emissions data and efficiency data not be considered CBI, and supports the EPA in prohibiting sale of any device until all data is submitted.

Commenter (1423) states the EPA needs to establish an effective oversight program and an electronic means of sharing compliance information with interested states. Commenter (1503) believes that all decisions to revoke the EPA certificates should be posted online for easy access by state and local regulators as well as the general public.

Commenters (1488, 1503, 1541) request that the EPA publish all certified test data online, including information from all burn rates tested for each device. Another commenter (1463) notes the importance of ensuring that all raw and summary test data is accessible electronically to states and to members of the public, as this will help ensure the use of valid certification test data and not exaggerated claims. Commenter (1503) believes that posting such data would not compromise any manufacturer's trade secrets. Commenter (1503) suggests that the European Josephinum website provides a good example for how this can be accomplished.

Another commenter (1171) states to keep in mind that, in most cases, the manufacturer will need to grant explicit permission to an accredited testing laboratory and/or accredited certification body for them to release full details of the testing, as those accreditations require that customer information and data be kept confidential.

Response:

We agree there is value in creating transparency in the certification program, especially in providing online access to test data and compliance status. We have clarified the test data submittal process, including requiring clear separation of CBI information from non-CBI, and the final rule requires manufacturers to post complete non-CBI test reports on their websites within 30 days of receiving a certification of compliance for a model line. We have also clarified that emission data may not be considered CBI under section 114 of the CAA by stating in the final rule that "emission data, including all information necessary to determine compliance, except sensitive engineering drawings and sensitive detailed material specifications, may not be claimed as CBI".

2.12.7 Comment: Application for certificate of compliance, § 60.533(b) and § 60.5475(b)

Warranties of the Model Line

Commenter (1521) opines that requiring the application for certificate of compliance to include a statement that warranties are void if the unit is used to burn materials for which the unit is not certified by the EPA is inappropriate for an NSPS. The commenter (1521) believes that the requirement is unenforceable and interferes with a private contract between the owner and the manufacturer.

Response:

Manufacturers have used techniques to monitor warranty claims for years, and burning inappropriate materials is an obvious circumstance to result in a voided warranty.

Model name:

Commenter (1397) states each device should be required to include a unique product name because some manufacturers have certified multiple versions with the same name, distinguished only by the year of manufacture, making regulatory supervision nearly impossible. Commenter (1397) suggests adding this requirement to the accreditation scheme to ensure compliance within the certification process.

Response:

We agree that this practice has been confusing in the past and we have clarified the final rule to require that products be clearly labeled for this reason with the following information: month and year of manufacture of the individual unit; model name or number; certification test emission value, test method and standard met; and the unit's serial number. The permanent label must clearly state what standard the unit is certified to comply with (e.g., "Certified to comply with the 2015 particulate emission standards. Not approved for sale after [5 years after effective date of final rule]").

Engineering drawings and specifications:

Commenter (1436) believes the proposed requirement to submit engineering drawings is infeasible because these are subjective and hard to regulate.

Response:

Submittal of engineering drawings has been required since the 1988 NSPS and is also required under the hydronic heater voluntary program. Review of engineering drawings is necessary to discern one model from another and is also normal practice for required safety inspections. We are retaining this requirement in the final rule.

Evidence of Quality Assurance Program:

Commenter (1546) refers to § 60.533(b)(7) which requires that the application for a certificate of compliance must contain a statement that the manufacturer or certifying entity will conduct a QA program for the model line, and notes that ISO/IEC 17065 expressly forbids a certifying entity/certification body from providing "management system consultancy or internal auditing to its clients where the certification scheme requires the evaluation of the client's management system." (Sec. 4.2.6(e)). The commenter (1546) states that it is inappropriate to require that the certifying entity/certification body conduct a QA program for a client, because the certifying body is already requiring the client to do so, and is auditing that same quality management system as an essential part of the certification scheme. This would be an impermissible breach of

impartiality for the certifying entity; the manufacturer must exclusively retain this responsibility. Likewise, commenter (1171) strongly recommends that the mention of "or certifying entity" be removed from this portion of the rule because certifying entities [or "Product Certification Bodies" (PCBs), as the commenter recommends] are permitted, under accreditation standards, to perform audits of the quality program for the manufacturer, but are not permitted to operate the QA program on behalf of the manufacturers (see clause 4.2.6e of ISO/IEC 17065); their auditing is only permitted in support of scheme requirements for evaluation and/or surveillance of products being certified.

Commenter (1171) recommends that instead of a statement of promise, manufacturers submit the actual results of their most recent, full QA program audit to provide evidence that these programs are in place and operating smoothly, rather than a potential "empty promise" being made.

Response:

Commenter (1546) points out some inconsistencies in our description of the ISO/IEC 17065 process, and we have revised the final rule to clarify these distinctions. Regarding the request to require submittal of full QA program audits or plans, this will generate additional paperwork without clear benefit, when things are going well. The ISO process should serve to notify the EPA when and if there are problems, at which time these documents would be made available upon request.

Evidence of Contract with Accredited Laboratory:

One commenter (1171) recommends requiring submittal of a copy of the actual contract as evidence of the contract being in place, rather than simply a statement that a contract exists.

Response:

As described above, considering reporting and recordkeeping impacts, it is not necessary to require submittal of the actual contract on a routine basis and it is only necessary if cause is identified. It must be made available upon request.

2.12.8 Comment: Administrative approval process, § 60.533(c) and § 60.5475(c)

Commenter (1591) believes the EPA must review the test data and ensure it complies with the standards set. Commenter (1591) asserts the NYSERDA study found that for hydronic heater testing for the voluntary program the data was 90% missing or incomplete. The commenter (1591) states the public needs to have faith that the consultants that are paid by industry are in fact complying with the standards.

On the other hand, commenter (1171) states the proposed process for issuing final certification documents appears to overlap the activities that the accredited certifying entity ("PCB") would normally perform. Instead of requiring the EPA to actively review the information submitted by each manufacturer (or PCB on behalf of the manufacturer), commenter (1171) recommends that the EPA consider a "grant" program similar to that in place in the Federal Communications

Commission's Telecommunications Certification Body program. Commenter (1171) states this would give the EPA final authority to review and revoke certifications issued to a manufacturer, while placing trust in the certification process without duplicating the work performed by the accredited PCB. Commenter (1171) believes the added review time for the EPA to conduct a redundant review of the certification data will also likely increase the time-to-market for new products being released by manufacturers.

Commenter (1397) further supports those comments of commenter (1171) above.

Response:

The final rule retains final EPA oversight and approval of certification applications in order to ensure the validity of this critical program. We have clarified the roles and responsibilities of the various actors in this process in the final rule, including that EPA retains final approval. As the ISO-accredited laboratory and ISO-accredited certifying entity processes are implemented, the overall quality of submissions should improve, which will shorten our review. In the future we will evaluate whether additional reliance on the ISO process, with the EPA in a more limited oversight role, might be appropriate.

2.12.9 Comment: Third-party certifier-based application process, § 60.533(f) and § 60.5475(f)

Certificate of Conformity:

Commenter (1171) states the requirement in § 60.533(f)(1)(iii) is a prime example of the redundancy which would exist if the Administrator of the program is also required to grant a second certification document and recommends that the certification of conformity actions be the responsibility of the participating "certifying entity" with oversight of these actions, not duplication as called for in § 60.533(c)(1), by the EPA.

Application for EPA certification:

Commenter (1397) is concerned about the ability of OECA to perform the duties mentioned in § 60.533(f)(1)(iv) in a timely manner. Commenter (1397) is generally concerned that the demands inherent with implementing this amended rule will not be reasonably achievable without additional staffing and resources.

EPA-issued certificate:

Commenter (1171) notes that the EPA-issued certificate referred to in § 60.533(f)(2) seems unnecessary in light of the work accredited certifying entities ("PCBs") perform and recommends following a program similar to the Federal Communications Commission's Telecommunications Certification Body in which the EPA would issue a "grant" affirming the certification of the product, rather than issuing a second certificate of conformance (a task which the PCB is already required to perform).

Evidence of proper instrumentation calibration:

Commenter (1171) recommends requiring the testing laboratory to submit evidence of accredited, traceable calibrations (e.g. calibration certificates with an accreditation body endorsement) as part of the overall test report to meet the requirement in § 60.533(f)(1)(iii)(B). Commenter (1171) states all accredited laboratories are required to have these traceable calibrations as part of meeting accreditation requirements (see ILAC Policy Document P10 - https://www.ilac.org/documents/ILAC_P10_01_2013.pdf).

Response:

As noted above in response to *comment 2.12.8,* the final rule retains EPA final oversight, including approval of certification applications. Other changes we have made to the rule, such as automatic certification of wood heaters meeting Step 1 limits using approved test methods and the incorporation of the ISO process to improve the overall quality of submissions should shorten our review. In the future, we will evaluate whether additional reliance on the ISO process, with the EPA in a more limited oversight role might be appropriate.

We note that information on instrument calibration is already required as part of test reports.

2.12.10 Comment: Certification period, § 60.533(h) and § 60.5475(h)

Commenter (1171) recommends that § 60.533(h) & (h)(1) be reduced to simply state "Unless revoked sooner by the Administrator [or Certification Body], a certificate of compliance will be valid for 5 years from the date of issuance." Commenter (1171) believes this will reduce the complexity and length of this rule without altering the content of the requirements since all specified certification time periods proposed are the same. Commenter (1171) explains that the recommended addition of "or Certification Body" is included for consideration, as there may be information made known to the Certification Body (certifying entity) about the wood heater or manufacturer that requires more immediate action than the EPA may be able to take to affect the certification status of the product (e.g. to remove its certification status).

Commenter (1397) states that certification dates noted in § 60.533(h)(1) need to be posted online and or otherwise readily accessible by state and local regulators.

Response:

Regarding the certification period, the final rule clarifies that "unless revoked sooner by the Administrator or the accredited certifying entity, a certificate of compliance will be valid for 5 years from the date of issuance or until a more stringent standard comes into effect, whichever is sooner." The final rule also clarifies that the accredited certifying entity must also notify EPA. The final rule further clarifies that "the manufacturer must renew a model line's certificate of

compliance or recertify the model line every 5 years, or the manufacturer may choose to no longer manufacture or sell that model line."

The final rule also clarifies that models meeting the Step 1 PM emission limits using an approved test method, will be automatically deemed to have a certification of compliance until the effective date for the 2020 standards.

The resulting certification dates will be posted with other compliance information as part of the EPA OECA website.

2.12.11 Comment: Renewal of certification, § 60.533(i) and § 60.5475(i)

Commenter (1171) recommends the language under subpart § 60.533 (i)(1) be reinforced to require the manufacturer to notify their certifying entity ("PCB") as well as the EPA within 30 days of ending the manufacturing and/or sale of the model in question. Commenter (1171) recommends that the renewal of certification process be operated by the PCB rather than the EPA as leaving the PCB out-of-the-loop may lead to unintended cancellations of certifications granted by the PCB, which may also lead to confusion in the marketplace as to whether or not the product is certified.

Commenters (1543, 1550, 1643) state that if a manufacturer decided to retire a model with an expiring certification, no notice to EPA should be required because this just generates unnecessary paperwork and expense.

Commenter (1171) also recommends that the option of a waiver from certification testing as a condition of renewing a product's certification be omitted (e.g. always requiring a passing test before renewing the certification) to ensure that products which hold an ongoing certification continue to meet all required emissions levels and quality levels in an objective manner, taking into account any differences in manufacturing processes from the original date of certification.

Response:

The final rule clarifies that "the manufacturer must renew a model line's certificate of compliance or recertify the model line every 5 years, or the manufacturer may choose to no longer manufacture or sell that model line. If the manufacturer chooses to no longer manufacture or sell that model line, then the manufacturer must submit a statement to the Administrator to that effect." The EPA is retaining ultimate approval for certifications, but we agree that the certifying body should be included in the information loop and have clarified the final rule to state this. However, we disagree with the comment that no notice be required if a manufacturer decides to discontinue a model. Knowing what models are currently certified among the existing stove population in a given area is very important in designing product changeout programs and other steps to address wood smoke emissions by state and local agencies.

Due to the potential cost implications on mostly small manufacturers, the final rule retains the option for a waiver of re-testing if the model has not changed.

2.12.12 Comment: Recertification and "K-list" changes, § 60.533(k) and § 60.5475(k)

Commenter (0948) supports retention of the model line recertification requirements, but adds that it should be as clear as possible what changes require recertification. Commenter (1562) believes it is very important to allow recertification without retesting if the model has not changed except cosmetically (i.e. paint color, exterior surface finish, graphics, etc.) because disallowing this increases cost, decreases market and prevents people from utilizing a renewable energy source.

Commenter (1397) asserts that labs are already well prepared to carefully evaluate which changes should trigger a retest requirement. The EPA should conduct a periodic review of the lab recommendations and retain the right to require testing.

Commenter (1171) recommends that the option for waivers from certification testing be omitted if a currently certified product is changed in a manner "presumed to affect particulate matter" as defined in §60.533(k)(2) or (k)(3). At a minimum, commenter (1171) states the certifying entity ("PCB") must be made aware of any changes to the products (see ISO/IEC 17065 clause 4.1.2k), and then decide if retesting of the product is required to maintain the original certification, or to potentially grant a new certification to the product in question (see ISO/IEC 17065, clauses 7.10.2 and 7.10.3). Commenter (1171) believes omission of the PCB from the decision process for addressing changes to the certified process is in violation of the requirements of ISO/IEC 17065, thus jeopardizing the value of the accreditation process.

Specific suggestions for revisions to the "k-list":

Commenter (1486) states the EPA should consider revising the "k-list" to facilitate the field performance of the ever more sophisticated units that are certified and brought to market, as some of these units may require some sort of adjustment to their controls when they are installed. For example, commenter (1486) notes that units installed with tall chimneys tend to overdraft and a new control could be adjusted for that; similarly, units installed at higher elevations may also need their controls adjusted so the appliance performs properly. Likewise, commenter (1397) states the EPA should not limit the addition of technology that reduces emissions and increases efficiency, noting, for example, that the addition of wireless technology should not automatically trigger retesting for devices in this proposal.

Commenter (1562) believes "flue gas exit" is too broad of a term when applied to design because it could include how a unit is connected to a chimney. Most manufacturers, according to commenter (1562), make provision for a chimney to be attached either vertically or horizontally to accommodate specific field conditions; with orientation of the chimney connection having no effect on the performance of the unit. Commenter (1562) recommends changing "flue gas exit" to "internal flue gas path."

Commenter (1562) believes "outer shielding and covering" is extremely broad and is unsure what it includes, such as the color or material (aluminum, steel, plastic, etc.) that covers any

insulation; the R value of insulation may have an effect on standby losses, but the color or material chosen to cover the insulation is unimportant. Commenter (1562) suggests defining "outer shielding and covering."

Commenter (1396) opposes changes to the "K" list specifically pertaining to outer shielding and coverings. Commenter (1396) states they frequently certify a basic stove design and then, after requesting and receiving approval from the EPA for a design change, add different styles of outer shielding and coverings to create additional models within an existing model line. Commenter (1396) asserts the EPA has routinely approved such shielding and/or covering additions, which has proven over the last ~25 years not to have a significant detrimental effect on overall emissions. Commenter (1396) believes continuing this practice is paramount to manufacturers' success and that the proposed changes would be unduly burdensome and costly.

Commenter (1479) suggests adding the following language to paragraph (k)(2)(xi): "For wood heaters so equipped, the location and horsepower of blower motors and the fan blade size *and/or angle*."

Response:

The final rule clarifies that "the manufacturer must recertify a model line whenever any change is made in the design submitted … that affects or is presumed to affect the particulate matter emission rate for that model line. … The Administrator may waive this requirement upon written request by the manufacturer, if the manufacturer presents adequate rationale and the Administrator determines that the change may not reasonably be anticipated to cause … heaters in the model line to exceed the applicable emission limits." We agree with commenter (0948) that cosmetic changes alone or certain technology changes that do not affect emissions such as the addition of wireless technology should not trigger recertification and have clarified the final rule. See § 60.533(k) for the final clarifications.

Regarding the responsibility to determine the need for recertification testing, this is primarily the manufacturer's responsibility, although it may also be determined through interaction with their contracted certifying body/entity, once that process is in place. We anticipate that a manufacturer would vet model changes with the certifying body and submit a waiver request through that body/entity. Ultimate approval or disapproval of the waiver request rests with EPA.

2.12.13 Comment: Criteria for revocation of certification, § 60.533(l) and § 60.5475(l)

Commenter (1397) recommends that revocations noted in § 60.533(l)(1) be posted online for easy access by state/local regulators.

Response:

The EPA will post such important information on line. We hope there are few to no revocations, given the improved quality assurance system required in the final rule.

2.12.14 Comment: Manufacturer's quality assurance program, § 60.533(m) and § 60.5475(m)

QA plan for each model line:

Commenter (1171) states the wording of § 60.533(m)(1)(i) is confusing and asks if a unique quality program plan is necessary for each individual model line. The commenter (1171) believes this may be overbearing and onerous to the manufacturers participating in this program. Commenter (1171) suggests requiring the manufacturer to have only a single, overarching QA program per product type (e.g. Hydronic Heaters one product type, forced-air furnaces a different product type, etc.), with one QA program per product type instead of multiple programs for model variances within those categories.

Commenter (1448) states that any product that is UL listed must have a defined quality assurance plan in place and a follow-up service contract with the Testing Laboratory.

Commenter (1171) asks what requirements are in place for the certifying entity ("PCB") to judge the plan against (i.e., what objective or subjective criteria do these plans have to meet?).

Response:

While each model must have an approved plan, it is up to the manufacturer and certifying body/entity to decide the extent to which unique provisions are required and to which overarching provisions are adequate. The intent of the ISO certification process is to ensure that the certifying body/entity has the expertise to judge a manufacturer's plan and make recommendations, similar to what is done on the safety testing side of certification.

Approval of Manufacturer's QA Plan:

Regarding § 60.533(m)(1)(ii), commenter (1171) asks whether the QA plan must be approved within 30 days of submittal of the plan, regardless of when that submittal occurs during the certification process or if the approval is needed within 30 days of the certification being granted. Commenter (1171) also sought clarification whether certification could be granted prior to approval of the plan, if it is verified as submitted but not yet scrutinized.

Commenter (1171) asks for clarification regarding § 60.533(m)(1)(iii) as to whether the EPA will simply have to be furnished a copy of the PCB-approved plan for review within 30 days of certifier approval or if the EPA will be under any restrictions to review and approve the plan within those 30 days.

Commenter (1521) recommends that the EPA include regulation language in § 60.533(m)(1)(iii) that requires that the EPA provide manufacturers a timely response (within 30 days of submittal of the quality control plan) on whether the submitted report has been approved, and if not approved, the reasons why it was not approved. The commenter's (1521) suggested language follows:

> EPA shall respond within 30 days of submittal of the quality control plan, either that the plan is approved or that the plan is not approved. If a plan is not approved, EPA shall include the reasons for not approving the plan as part of the response. The manufacturer shall have 30 days from the date of receipt of non-approval notification to submit a new version of the quality control plan incorporating corrections for each deficiency as identified by the EPA.

Commenters (1543, 1550, 1643) urge the EPA to rely on certifying entities for final approvals of manufacturers' quality assurance/control plans rather than having to review and approve each plan itself. As with the process for issuing certificates of compliance, the commenters (1543, 1550, 1643) believe that certifying entities have ample experience with such plans and EPA plan approval would only act as a potential bottleneck and be redundant as well.

Response:

We have revised the final rule to clarify that the bulk of interaction is between the manufacturer and the certifying body/entity to develop an accepted quality assurance plan. As described above, the EPA will retain oversight, but we would expect to review such plans only upon the identification of problems in the regularly conducted audits. The final rule does not require direct approval by us for the plans to be implemented by the manufacturer.

2.12.15 Comment: Manufacturer's quality assurance plans for grandfathered units

Commenters (1543, 1550, 1643) state that the EPA wrongly assumes that certifying bodies/entities can approve and oversee quality assurance/control plans for models for which certifications or product clearances were granted based on testing by other laboratories because these services are closely linked. The commenters (1543, 1550, 1643) note that what makes quality assurance/control programs work is the very threat that the certifying body/entity will withdraw the certification listing, and for many grandfathered models that threat is absent because the testing that supported certification was performed by laboratories that do not offer the services necessary to meet the quality assurance/control requirements in proposed § 60.533(m). Commenters (1543, 1550, 1643) propose that the EPA address this disconnect by allowing manufacturers of grandfathered models to choose between two quality assurance/control options: (i) to be governed by the requirements in existing § 60.533(o) until the expiration of the grandfathered certification; or (ii) arrange for the independent third-party certifying body/entity that is responsible for overseeing quality assurance/control plan requirements for safety standards to begin submitting inspection reports to the EPA for the duration of the grandfathered certification. Commenters (1543, 1550, 1643) believe that the second option is feasible given that safety-critical and emissions-critical components of appliances are identical, but it would depend upon whether the manufacturer can reach an agreement with the laboratory to modify their existing contract (for safety standard listings) to

add a requirement that the EPA receive all inspection reports and manufacturer responses to any identified deficiencies.

Commenters (1543, 1550, 1643) also believe that the EPA should provide manufacturers of grandfathered models with more than 60 days to develop and submit a plan and that it is unrealistic to afford certifying entities only 30 days to approve a plan. Commenters (1543, 1550, 1643) ask what happens when that deadline is not met. Furthermore, commenters (1543, 1550, 1643) believe that 30 days also is not enough time for the EPA to review and approve the plan, assuming that EPA approval is even necessary. In addition, commenters (1543, 1550, 1643) state that the EPA should make it clear that manufacturers may continue to operate under their existing quality assurance plans until a new plan is approved so long as they have submitted the plan to the certification body and it has not been disapproved.

Response:

We have clarified the provisions related to quality assurance plans for the grandfathered units in the final rule. The rule allows manufacturers who obtain automatic certification to the Step 1 emission limits, based on an approved test method, 1 year until they must follow the third-party administered quality assurance program required in § 60.533(m), prior to which they may operate according to their existing quality assurance plan for the applicable model. This provision will extend until 1 year after the effective date of the Step 1 standard. This timeframe is designed to allow an additional 6-month window after the 6-month delayed requirement for certifying bodies/entities to obtain accreditation under subpart AAA to oversee manufacturers' quality assurance plans. This additional window allows time for manufacturers and certifying bodies/entities to enter into contractual agreements related to the required quality assurance plans.

We have removed the requirement that the EPA shall review and approve the quality assurance plan. As described elsewhere, we are moving to implement a quality assurance system that is focused on reporting of results and solutions. Therefore, we are requiring that the certifying body/entity (third-party certifier) must submit the results of required audits to the EPA and that the manufacturer must report to the certifying body/entity and the EPA, their responses to any deficiencies identified in the audit report. Of course, we retain the right to request to review the underlying quality assurance plan at any point.

We have removed the EPA oversight provisions in § 60.533(o) of the 1988 rule because we want to move toward obtaining the efficiency and cost savings resulting from having the same certifying body/entity that performs the emission testing oversee quality assurance. Because manufacturers will be working under previously approved quality assurance plans, and because the transition period is relatively short to the certifying body/entity process, this allows manufacturers, the certifying bodies/entities and the EPA to focus resources on implementing the new process rather than revisiting the old process.

We recognize that there may be a few instances where the original certification test was performed by a laboratory that is no longer an approved laboratory and/or when the testing

laboratory opts to not seek accreditation to serve as a certifying body/entity. In this case, we would expect the manufacturer to contract with an independent third-party certifying body/entity that is responsible for overseeing quality assurance/control plan requirements for safety standards to begin submitting inspection reports to the EPA 1 year after the final rule's (Step 1) effective date for the duration of the grandfathered certification (i.e., until Step 2), as suggested by commenters.

2.12.16 Comment: Audits by third-party certifier, § 60.533(m) and § 60.5475(m)

Regarding manufacturer quality assurance program compliance audits, commenter (1171) recommends that the EPA lean more on the framework of the accredited third-party certifying bodies/entities. Commenter (1171) supports periodic audits of manufacturer sites in support of "Surveillance" of certified products, noting that ISO/IEC 17065 generally discusses these activities as part of the certifying body's/entity's duties. However, commenter (1171) claims it is unclear what these audits will need to encompass and achieve (i.e., is the overall management system of the manufacturer to be analyzed per ISO/IEC 17021, is only the system related to manufacturing of these products to be reviewed per ISO 9001, or is the intent to have the certifying body/entity actually analyze the products coming off the line as a formal inspection under ISO/IEC 17020 or test under ISO/IEC 17025?).

Commenter (1465) is in favor of third parties accredited under ISO-IEC 17020 and 17065 conducting audits of manufacturers' QA programs. Even though such entities would be under contract with manufacturers, commenter (1465) believes this would give the EPA additional eyes in the field to uncover problems as early as possible.

Commenter (1397) states schedules of audit compliance should be posted online for easy access by state/local regulators.

Commenter (1546) states that the requirement for the certifying body/entity to conduct regular, unannounced audits presents difficulty in an industry where many manufacturers build low quantities of units, or build seasonally for a seasonal market. Commenter (1546) states that the requirement will result in wasted inspection trips when there is no new inventory, which will increase the manufacturer's costs. Commenter (1546) adds that the apparent presumption by the EPA that all safety certification audits take place quarterly is false. The commenter (1546) states that several factors influence the inspection frequency; these factors may include, among others, product type, manufacturing methods, production rates, design maturity, and compliance history of a given manufacturer. Commenter (1546) states that the inspection frequency is determined by the certification scheme owner, and it is not dictated in the ISO/IEC 17000 series standards. Where a manufacturer may currently be on an annual inspection cycle, commenter (1546) adds that the requirement for a quarterly inspection will quadruple annual expenses. However, commenter (1546) adds, this may not improve enforcement, for example where production quantities are very small, or where production runs are strictly seasonal (as they frequently are in the hearth industry) and three of four inspections per year will find no new production to inspect.

Commenter (1436) opposes the requirement for quarterly audits, stating these will add cost without increasing quality, as variability does not exist in the products.

Response:

We agree that the requirement that all audits take place on a quarterly basis was overly prescriptive and fails to take into account differing production situations of the many manufacturers covered by this source category. We have changed the final rule to clarify that "regular" audits, as defined in the quality assurance plan, shall be required. The final rule states that "the third-party certifier must conduct regular (at least annual) unannounced audits under ISO-IEC Standard 17065 and ISO-IEC Standard 17020 to ensure that the manufacturer's quality assurance plan is being implemented."

In general, our approach to EPA oversight regarding quality assurance is to rely on the ISO process and to require reporting of problems resulting from audits and the subsequent solutions. As such, we are not adding requirements to require reporting of audit compliance schedules. However, this information would be available upon request by the EPA or state or local enforcement agency.

2.12.17 Comment: Compliance audit frequency and triggering events

Commenter (1513) states the EPA should establish a process to audit manufacturer compliance on a periodic basis with the frequency of the audits tied to the number of units sold, with a minimum frequency for all manufacturers to ensure basic ongoing compliance. Likewise, commenter (1192) supports the EPA establishing an auditing process and believes auditing frequency should depend on the production level of the manufacturer; manufacturer with higher production levels should be audited more frequently. At minimum, commenter (1192) states each manufacturer should be audited at least once per year.

On the other hand, commenter (1640) supports requiring manufacturers to conduct QA when manufacturer-specific QA criteria or exceeded, as opposed to basing it on the number of units sold.

Commenters (1543, 1546, 1550, 1643) agree with the proposal to eliminate the automatic emissions testing triggers currently found at § 60.533(o)(3)(i) and a reliance on the quality assurance plans to define relevant triggering events. Commenters (1543, 1550, 1643) find that, in general, the proposed quality assurance/control plan provisions are superior to requirements set forth in the existing subpart AAA regulations. In particular, commenters (1543, 1550, 1643) believe that existing regulations rely far too heavily on emissions testing as a quality assurance/control tool considering how poor the precision of the relevant test methods is. Commenters (1543, 1550, 1643) believe that the requirements for using emission testing as a quality assurance/control tool should be abandoned because emission testing imprecision and uncertainties make it a hopelessly blunt tool for quality control. Commenters (1543, 1550, 1643) believe that the other components of the EPA's proposed quality assurance/control framework provide ample tools that are more than adequate for ensuring consistency across the emission-

critical components of a model line and for identifying and addressing any potential quality control issues.

Response:

The final rule recognizes the impact that implementation of the ISO-based process will have on manufacturer quality assurance, while still maintaining a role for audit testing. Rather than rule-specific triggers suggested by commenters, we find that the actual triggers are best established by the manufacturer working with the certifying body/entity to reflect manufacturing conditions for a specific model. For example, we found that the previously defined audit testing trigger based on number of units sold was rarely exceeded. This is because manufacturers were more likely to recertify a model and incorporate other desired features and changes, than merely conduct audit testing. Instead, the new quality assurance plans should address facility- and model-specific variables that have the potential to adversely affect the ability of units produced to perform at or below certification levels.

2.12.18 Comment: EPA compliance audit testing, § 60.533(n) and § 60.5475(n)

Support:

Commenter (1593) would like annual testing done directly by the EPA to eliminate the chance of falsified testing or "misinterpretations."

Commenter (1591) believes the EPA must review the test data and ensure it complies with the standards set. Commenter (1591) asserts the NYSERDA study found that for hydronic heater testing for the voluntary program the data was 90% missing or incomplete. Commenter (1591) states the public needs to have faith that the consultants that are paid by industry are in fact complying with the standards. Commenter (1591) recommends the EPA do periodic testing by their own consultants (NYSERDA, NESCAUM, BNL, etc.) to ensure data is not being manipulated. Commenter (1591) adds that any company found to have data that cannot be replicated must be banned from further participation.

Commenter (1511) states the EPA should ensure that the compliance assurance performance testing is accurate and as representative of in-field performance as possible, considering operation parameters such as fuel species, fuel shape (e.g., crib wood vs. cord wood) and burn categories. Likewise, commenter (0948) supports in-field audits as a means of ensuring that the laboratory testing is representative of actual performance. The commenter (0948) notes that the intent is not for every boiler to be evaluated in the field, but a manageable sample.

Opposition and Recommendations:

Commenter (1171) recommends that the EPA, instead of having the authority to conduct audits, periodically observe audits completed by the certifying bodies/entities recognized to certify heaters under this program. Commenter (1171) believes this would reduce overhead and workload on EPA staff, and allows for more use of private sector entities in ensuring conformance to federal requirements. Commenter (1171) supports the compliance audit testing

concept under ISO/IEC 17065, as part of the overall "Surveillance" activity that certifying bodies/entities may need to follow, but requests clarification on the proposed tasks (i.e., how often and/or under what circumstances, will products be selected and is there a percentage of all certified products to be tested every year or every two years?) Commenter (1171) recommends that the EPA revise § 60.533(n)(2)(i) to state "The administrator may direct the manufacturer to have tested…" in order to remove any possible responsibility from the program Administrator to conduct the testing, which is what the language currently proposed appears to indicate.

Regarding the audit report, commenter (1171) asks for clarification as to the intended activities of the certifying entity/body in proposed § 60.533(m)(1)(v). Commenter (1171) also recommends revising the requirement related to submission of audit reports to the EPA to include this requirement as a stipulation for the EPA to recognize the certifying body/entity, not for the certifying body/entity to do business with the manufacturer.

Commenter (1665) requests that the EPA agree to a minimum of a 1 g/hr (+/-) allowance during emissions tests associated with random compliance audits. The commenter (1665) asserts that, due to variability that exists in wood stove testing, a degree of leniency in test results should be permitted. The commenter (1665) explains that, for a clean burning stove of .97 g/hr, only a very small margin of .097 over or under (+/- 10%) would be allowed and the cleanest burning appliances could have their certificates revoked under such a tight factor.

Likewise, commenter (1514) notes that the proposed "50% audit parameter" is unacceptable, pointing to HPBA's analysis that an EPA certified wood stove can vary ± 2.9 to 6.4 g/hr. The commenter (1514) concludes that this degree of variance coupled with an interpretation of the "50% audit parameter" meaning 0.65 g/hr based on the 1.3 g/hr limit would result in a 100% audit failure rate.

Commenters (1435, 1543, 1550, 1643) believe that the EPA should not finalize the audit testing program as proposed because audit testing is not an effective quality assurance/control tool and thus, revise the audit testing provisions to allow for such testing only in limited, defined circumstances, *e.g.*, if the EPA has a reasonable suspicion of fraudulent test results. According to the commenters (1543, 1550, 1643), the proposed audit testing provisions have the following flaws:

- The emissions test methods used in audit testing could illegally increase the stringency of the emissions standards if the audit procedures do not properly account for variability attributable to the inter-lab and intra-lab precision of the test methods.
- Audit testing is duplicative of the independent third-party certification system which is far better placed to take quick action to remedy the problem or revoke the certification mark if necessary.
- The funding mechanism for the audits poses a variety of financial issues, and has proven to be unsound over the 20-plus year history of the subpart AAA program.
- The proposed audit testing provision would be costly for EPA to implement and would not provide significant benefits justifying these costs.
- EPA cannot require audit testing with a test method other than that which was used for the underlying certification.

- EPA has improperly eliminated the altitude adjustment provision in the existing regulations.

The commenters (1543, 1550, 1643) add that EPA should eliminate audit testing altogether for subpart QQQQ until it has rigorously assessed the precision of the test methods used to determine compliance. Once EPA has the proper data, the commenters (1543, 1550, 1643) state that it must include a sufficient compliance margin.

Commenter (1435) states that once a model line has been certified as being in compliance with EPA's NSPS limits, there is no need for or utility in additional emissions testing, particularly given the significant test method imprecision in measuring wood heater emissions performance, which allows for little confidence that a given test result is indeed indicative of any compliance problem with the appliance, much less the whole model line, rather than simply reflective of the inherent variability of wood burning. According to commenter (1435), the EPA expressly considered the imprecision of wood stove test methods in developing the current NSPS, assuming at the time that variability in an appliance's emissions performance after repeated testing in the same lab was +/- 1 g/h. Commenter (1435) asserts EPA recognized the need to conduct future study to determine variability in test results observed from lab to lab, also assumed to be +/- 1 g/h during the regulatory negotiations, but the EPA never performed that study. Commenter (1435) asserts that the EPA should abandon its proposal to continue emissions testing as a QA/QC tool, noting that the costs cannot be justified as either beneficial or necessary.

The only meaningful use for compliance audit testing, according to commenter (1435), is under the rare circumstance where the EPA reasonably suspects fraudulent or otherwise invalid certification testing. Outside of this, commenter (1435) asserts compliance audit tests serve no legitimate purpose, rendering their costs needless, unduly burdensome, and ultimately unwarranted.

Response:

We agree that it is important for us to maintain oversight and review capacity of compliance audit tests and results. However, adding requirements for the EPA to conduct annual testing as suggested by commenter (1593) would be costly and fail to recognize the progress made in laboratory performance since the beginning of the program and the impact that the addition of the ISO process will have on overall quality assurance.

Like commenter (1511) we support the need for development of improved test methods that yield results that are more representative of in-home use, including possibly, in-field testing in the future.

We continue to believe there is a role for audit testing, as such testing is a well-established feature in the previous NSPS (although used infrequently) and in quality assurance historically. We have revised the final rule to clarify that the EPA selects a model for compliance testing and directs the manufacturer to send that unit to an approved laboratory for compliance audit testing.

As in the past, we expect such a provision to be used infrequently, perhaps in the case where there are concerns that there have been changes to the model since certification that should have triggered recertification, or in the case of concerns regarding fraudulent activity. Finally, we note that we have eliminated the old "escrow account" process and note that it would be the manufacturer's responsibility to pay for the cost of the tested unit, shipping and testing.

The test method variability concerns raised by commenters are not an issue for the Step 1 standards, but nonetheless, we do not anticipate requiring any compliance audit tests during the Step 1 period. This is because the attention of all parties (manufacturers, test laboratories and EPA) is best focused on taking steps to ensure compliance with the Step 2 standards and developing improved cord wood test methods. As part of this evolving process, test method variability is one of the issues to be addressed as is improving the performance of appliances to reduce the variability inherent in burning wood and other operational concerns.

We see this EPA-directed audit testing as a bridge between the original Subpart AAA quality assurance program, based solely on EPA oversight and approval, to the ISO-based process that relies on a system where the manufacturer enters into a contractual agreement with an accredited certifying body/entity to design and operate according to a quality assurance plan. As we have noted regarding other aspects of the ISO-based process, we are still retaining final oversight and approval authority, but anticipate this system will require fewer EPA resources and will result in more timely approvals. We plan to re-assess our approval role as well as the need for EPA-directed audit testing provisions[17] in the next NSPS review. Under the ISO-based process, the certifying entity might help inform the manufacturer when it is prudent to obtain a new certificate because production specifications have changed and thus the emissions have likely changed. However, regardless of the advice from the certifying body/entity, the responsibility is always on the manufacturer to apply for a new certification when there are any changes that may affect the emissions. Also, we agree with commenter (1171) that there is value in the EPA participating in some compliance audits conducted by the certifying body/entity.

The final rule clarifies that the requirement related to submission of audit reports to the EPA is a stipulation for the EPA to recognize the certifying body/entity, in addition for the certifying body/entity to do business with the manufacturer.

We agree with commenter (1665) who requests that we agree to a minimum of a 1 g/hr (+/-) allowance during emissions tests associated with compliance audits because the proposed requirement of a 10 percent compliance allowance becomes unreasonably stringent as we move to the Step 2 standards and beyond. However, we disagree with commenter (1514) who states that the "50% audit parameter" is unacceptable, based on HPBA's analysis of wood stove test method variability. The final rule requires that if emissions from the EPA compliance audit testing exceed the applicable emission standard by more than 50 percent using the same test method used to obtain certification, the Administrator will notify the manufacturer that certification for that model line is suspended (pending further action, as detailed in the rule).

[17] Note that the EPA always has the authority to request emission testing under section 114 of the Clean Air Act, whatever the nature of audit testing provisions.

Several commenters suggest eliminating the audit system altogether, with exception of suspicious or fraudulent results, and cite several deficiencies of the proposed program. We have addressed several of these, such as elimination of the previous funding ("escrow") mechanism, clarified that audit tests must be performed using the same test method as the certification test and taken steps to address variability. That said, we will review the audit information available at the new NSPS review and determine if the ISO-based quality assurance program does make the audit compliance program an unnecessary feature of the NSPS.

We disagree that elimination of the altitude adjustment variable (which occurred several years ago) is a problem. A 1990 report by EPA entitled *Woodheater Test Method and Fuel Comparison Study at Higher Elevations - Emissions Test Report*, which is provided in the docket for the final rule, concluded that "while a higher elevation decreases the maximum burn rate, higher elevation does not significantly change the emission rate for a given burn rate."[18]

2.12.19 Comment: EPA compliance audit testing expense – § 60.533(n) and § 60.5475(n)

Commenter (1171) states the proposed requirements placed on a testing laboratory here seem to be overbearing and questioned how the testing laboratory would be compensated for their work and time if selected to operate a verification test. Commenter (1171) asserts that § 60.533(n)(2)(ii) seems to give potentially conflicting information as to whom is responsible for absorbing the costs of testing. Commenter (1171) states the EPA should consult currently participating testing laboratories for input on this proposed rule and recommends that the manufacturer bear the cost of these tests as part of the process of maintaining certification for their product. Commenter (1171) asserts that most other certification schemes which require retesting of a product do so at the manufacturer's expense and not at the expense of the testing labs. Regarding § 60.533(n)(2)(ii), commenter (1171) recommends that manufacturers be fully responsible for the cost of compliance audit tests of their products. Commenter (1171) states that while the initial manufacturer/laboratory contract might stipulate an agreed-upon price for any subsequent compliance audit tests that occur after the product is certified, that possibility leads directly back to the manufacturer still being responsible for paying for the costs for test after the fact. Commenter (1171) states it seems unreasonable that a testing lab would be willing to enter into a contract for a set price, with an unknown amount of follow-up work after the initial scope of work is completed. Commenter (1171) states that revising this requirement as suggested will reduce the length and complexity of this requirement while still meeting the intent of the compliance audit testing process.

Commenter (1435) asserts that the EPA understates the cost of the first series of audit tests, assuming that most of the costs for that test will be paid for by the "escrow" accounts maintained by accredited labs under the current subpart AAA. First, commenter (1435) states the sums in

[18] Wood Heater Test Method and Fuel Comparison at Higher Altitudes Emission Test Report, RTP, NC and Crested Butte, Colorado. EPA Emission Measurement Technical Information Center Document P-91-01.4. May 1990.

question are not "escrow" accounts and are earmarked for wood stove testing, not for testing other appliance categories. In the future, commenter (1435) states any attempt to rely on the audit test prepayment scheme in the proposal is hopelessly flawed. Commenter (1435) says this is a modification of the funding scheme for first tests in the Random Compliance Audit program in current subpart AAA, an approach has never worked and, therefore, must be abandoned. According to commenter (1435), if the costs of that first test are estimated without that scheme, they would be significantly higher. Commenter (1435) asserts audit testing costs for a single round of testing are likely to approximate the costs of a single round of certification testing, and if four more tests need to be conducted, the costs for those tests would be four times this amount, for a total of (at least) $40,000 (other costs not accounted for would be for travel expenses and the time of manufacturer personnel).

Regarding the proposed mechanism to fund audit testing, the commenters (1543, 1550, 1643) believe the rule is hopelessly flawed. The commenters (1543, 1550, 1643) support comments by the EPA Accredited Wood Burning Appliance Emissions Testing Laboratory Coalition, including the fact that laboratories will no longer have a means of accurately assessing the financial liability associated with conducting certification tests. The commenters (1543, 1550, 1643) add that the funds to be collected by laboratories pursuant to the proposed rule pose complicated accounting and tax issues, which the proposed rule fails to recognize, much less clarify. Finally, the commenters (1543, 1550, 1643) state, the proposed rule contemplates that audit testing could be conducted by laboratories that did not conduct the original certification test—a complication that could trigger unfair competitive practices given the lack of transparency with respect to lab testing fees. According to the commenters (1543, 1550, 1643), there are the issues of what to do when a lab goes bankrupt or leaves the certification business and similar complications when manufacturers leave the business for any of number of reasons. The commenters (1543, 1550, 1643) note that, to the extent that the proposed audit testing is limited to what amounts to selective enforcement audits, the EPA can use its authority under CAA Section 114 to require the manufacturer to pay for such testing, alleviating the need for a funding mechanism.

Commenter (1435) asserts that the EPA should abandon its proposal to continue emissions testing as a QA/QC tool, noting that the costs cannot be justified as either beneficial or necessary.

Commenter (1513) suggests the auditing process could be funded with a nominal surcharge on the sale of new units and EPA could delegate the auditing authority to state and local agencies.

Response:

The cost burden of audit testing has always been on the manufacturer, and this has been clarified in the final rule, which explicitly states that the expense of the compliance audit test is the responsibility of the manufacturer. In this final rule, we deleted all mention of the old "escrow" account system whereby the manufacturer "prepaid" the cost of audit testing into an escrow account held by the laboratory. We have replaced this cumbersome system with one where the manufacturer pays the test laboratory directly for any audit testing that might be requested. We

have also streamlined the compliance audit process, doing away with the old distinction of "random audit compliance process" and "selective enforcement compliance audits." Finally, the compliance audit testing process is retained as a component of the overall quality assurance program, but it is expected to be used infrequently, and its continued use will be reviewed as we gain more experience with the ISO-based process.

Regarding the comment that we have underestimated the cost of audit testing if additional tests are needed, we have estimated costs for what we assume is a typical occurrence, which is that the first test is sufficient to demonstrate compliance.

2.12.20 Comment: EPA compliance audit test method and laboratory, § 60.533(n) and § 60.5475(n)

One commenter (1436) believes the requirements in § 60.533(n)(2)(iii) & (3) will only increase variability and that more data would need to be collected before becoming part of the rule.

Commenters (1521, 1543, 1550, 1643-A2) oppose the language in proposed § 60.533(n)(2)(iii) that requires – or allows – a "new test method" be used for audit testing. Commenters (1543, 1550, 1643) oppose proposed language that would allow the EPA to substitute new methods into the audit program other than the certification test method. The commenters (1543, 1550, 1643) believe use of different methods would be arbitrary and capricious, would be contrary to Section 111 and would violate the Administrative Procedure Act's (APA) notice and comment requirements. The commenters (1543, 1550, 1643) add that just as the data used to derive the applicable emission standards should be based on the same methods as used for certification, so should the audit test methods have this same basis. Commenter (1521) believes that allowing a "new test method" would risk introduction of infidelity in the testing methods and resulting test data. The commenter (1521) states that the ideal outcome of an audit is that test results collaborate the results of the certification test and that by using a "new test method" or any other method not used for certification introduces variability and uncertainty in its usefulness and applicability. Commenter (1521) recommends that, if the EPA introduces a new test method, it would be more appropriately scheduled for use when a particular model line's certification is renewed.

Response:

We have revised the final rule to state that compliance with the original certification would only be based on an audit test using the same test method as the original. In other words, the final rule clarifies that the compliance audit test must be conducted using the same test method and procedure used to obtain certification.

2.12.21 Comment: Revocation of certification - § 60.533(n) and § 60.5475(n)

Compliance with Emissions Limit

Commenter (1521) believes that the provisions of proposed § 60.533(n)(4)(i) and (ii) seem to be redundant or contradictory to each other. The commenter (1521) states that the "certification

emission values limit" from § 60.533(n)(4)(i) could be interpreted to mean either the applicable emission limit to which the unit is subject (which would make this paragraph redundant with § 60.533(n)(4)(ii)) or the emission value identified from the testing done to obtain certification (which would allow the possibility of suspension of certification of a unit which actually tests below the applicable emission limit). The commenter (1521) questions whether § 60.533(n)(4)(i) is necessary. The commenter (1521) suggests that the language contained in § 60.533(n)(4)(i) and (ii) be revised to clarify the EPA's intent.

Documentation:

Commenters (1543, 1550, 1643) oppose the change that the EPA proposes to delete the final provision in § 60.533(n) that currently provides that "Any withdrawal of a proposed revocation shall be accompanied by a document setting forth its basis" because this leaves a gap in the administrative record and does not provide the manufacturer information to try to continue to manufacture the model line by making changes to satisfy the EPA's concerns. The commenters (1543, 1550, 1643) state that EPA has not explained why that provision has been deleted and it must do so.

Conditions for revocation:

Commenter (1551) believes discovery of procedural errors in fueling or other operations likely to affect the results of certification testing, or any reported values outside a plausible range, should trigger immediate invalidation of an EPA certification: i.e., efficiency values over 80% should be examined for credibility.

One commenter (1171) asks if there is a process in place or being considered where certification of a product may be challenged by an outside party, such as that utilized by the ENERGY STAR program.

Availability of test results:

Commenter (1397) states a non-CBI report of test results under § 60.533(n)(4)(ii) must be available to state and local regulators to ensure compliance with state and local standards (which are often more restrictive than EPA standards), and the process to ensure timely delivery of data requested by regulators included in the accreditation scheme.

Response:

We have clarified the final rule to state that audit test results will be compared to the applicable emissions limit. We have also replaced information in § 60.533(n) that requires us to specify the basis for the revocation to provide manufacturers information that would help them make changes to satisfy our concerns. However, we disagree with the suggestion for immediate revocation suggested by commenter (1551) because it does not provide an opportunity for the manufacturer to explain and correct any deficiencies. We welcome challenges to certification such as suggested by commenter (1171) and note the ISO process specifically allows for these

types of challenges. Finally, we will post compliance audit testing results on EPA's website and require manufacturers to post complete (non-CBI) results online on their websites as well.

2.13 Laboratory Accreditation and Third-Party Certification

2.13.1 Comment: Use of the tem "accreditation"

Commenter (1171) strongly recommends that the term "accreditation" be revised as the International Laboratory Accreditation Cooperation (ILAC) and the International Accreditation Forum (IAF), the groups responsible for evaluation of Accreditors, strongly discourage the use of the term and instead recommends using the term "recognized" or "approved" (or other synonyms) for the EPA's approval of a testing laboratory or certification body for this program. While there is no direct mandate which would apply to the EPA's choice of terminology for recognition of a participating organization, commenter (1171) believes changing to the recommended wording will significantly help to alleviate confusion in the accreditation industry related to this program's operation and will allow a clear, unambiguous understanding of the role of the accrediting bodies versus the role of the EPA. Specifically, commenter (1171) recommends removal of the word "accreditation" when discussing the EPA's act of approving/revoking a testing laboratory or certification body for participation in this program in § 60.535(a)(3), (b)(2), (c)(1), (c)(2), (d), (e)(3), (f)(1), and (f)(2).

Response:

We revised the terminology in the final rule to more clearly distinguish roles in the ISO-based process. In the final rule, we use the term "approved" laboratory to indicate a test laboratory that is approved for wood heater certification testing (under each subpart of the rule) or is an independent third-party test laboratory that is accredited under ISO-IEC Standard 17025 to perform testing using the specified test methods by an accreditation body that is a full member signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement and approved by the EPA for conducting testing (under each subpart). We also use the terminology "EPA-recognized accreditation body" in the final rule.

2.13.2 Comment: Terminology related to accreditation of testing labs and ISO/IEC 17011

Commenter (1546) asks for clarification of the definition of a "nationally recognized accrediting entity" that will accredit test laboratories. The commenter (1546) asks if this will be an international group established for this purpose, such as the International Laboratory Accreditation Cooperation (ILAC) or the International Accreditation Forum (IAF), who recognize accreditation agencies under a mutual recognition agreement (MRA) or a multilateral recognition arrangement (MLA). The commenter (1546) also asks if this will be a federal government agency program that duplicates the existing commercial accreditation schemes.

Commenter (1171) recommends that "nationally recognized accreditation body" be changed to an accreditation body that is signatory to the ILAC/MRA for purposes of accrediting testing bodies, compliant with ISO/IEC 17011.

Response:

The final rule clarifies that independent third-party test laboratories are accredited under ISO-IEC Standard 17025 to perform testing using the test methods specified in the rule by an accreditation body that is a full member signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement and approved by the EPA.

2.13.3 Comment: Terminology related to accreditation of "certifying entity" and ISO/IEC 17020, 1706

Commenter (1546) notes that the definition of "certifying entity" is confused. According to the commenter (1546), ISO/IEC 17020 is a standard describing "requirements for the operation of various types of bodies performing inspection," while ISO/IEC 17065 is a standard describing "requirements for bodies certifying products, processes and services." The commenter (1546) states that in product certification schemes, accreditation to ISO/IEC 17020 is not necessary when inspections are performed by the agency's own personnel, exclusively in support of their product certifications under ISO/IEC 17065, and accreditation to 17020 is called for only when inspections are performed "for hire," separate from the agency's own product certifications. The commenter (1546) suggests that references to ISO/IEC 17020 may be eliminated altogether from the EPA regulation, or the product certification under ISO/IEC 17065 may be eliminated as redundant, given that the EPA will review test reports and certify products themselves. In such a case, the commenter (1546) states that the EPA could require quality control management and production inspections to be conducted only by ISO/IEC 17020-accredited inspection bodies.

Commenter (1171) suggests revising the phrase "the nationally recognized ISO certifying entity" (e.g., in § 60.535(f)(1)(i)) to instead "the IAF MLA Signatory Accreditation Body." Commenter (1171) asserts that "certifying entities" / certification bodies are not permitted to offer accreditation to ISO/IEC 17025, per ISO/IEC 17011 (as implied in § 60.535(b)(1)(i), for example). Commenter (1171) further states that the term "certifying entity" is unclear to organizations familiar with the accreditation industry and recommends use of the term "Product Certification Body" (PCB) instead. Commenter (1171) believes the ISO/IEC standards listed under this definition do not appear to be appropriate for the scope of activities assigned to the Certification Bodies, stating that ISO/IEC 17020 is solely focused on accredited Inspections (organizations operating under this standard are known as Inspection Bodies). Commenter (1171) asserts ISO/IEC 17065 is applicable to PCBs and includes some aspects of the ISO/IEC 17020 standard, but only related to evaluation and surveillance of the product being certified. Commenter (1171) states ISO/IEC 17065 also addresses requirements for performing audits as part of the certification activities undertaken by a PCB. As this will be a component of the Product Certification itself, an organization may be accredited to ISO/IEC 17020, but commenter (1171) asserts this is adequately covered in section 6.2 of ISO/IEC 17065 and should only be required if the EPA is planning on mandating accreditation to this standard as well.

Commenter (1171) recommends clarifying the statement about the accreditation body that accredits the "Product Certification Body" (PCB instead of "certifying entity", as suggested above). Regarding the language used to discuss the accreditation standard, commenter (1171)

recommends that be revised to state, "…. Accredited by an 'IAF-MLA signatory Accreditation Body' to the current version of ISO/IEC 17065, and approved by the EPA for conducting certifications and certification-related activities under this subpart."

Commenter (1171) also recommends removing the mention of the ISO/IEC 17020 Inspection Body standard from this section and removing the requirement that the PCB be accredited to ISO/IEC 17025 in conjunction with ISO/IEC 17065. Commenter (1171) states that while it is possible (and occurring already in other industries such as the telecomm / TCB industry), it does not appear to be necessary for the Certification Body to also own and operate a testing laboratory since the EPA will be selecting and approving testing laboratories on its own. Commenter (1171) states they are not suggesting that an organization which operates accredited Certification and Testing activities should be barred, but rather that requiring a single entity to perform both functions is ultimately unnecessary and potentially restricting to parties wishing to participate in this program.

Commenter (1397) recommends the terminology corrections submitted by the American Association for Laboratory Accreditation (A2LA) [1171].

Commenters (1397, 1591) recommend that the EPA work with the American Association for Laboratory Accreditation (1171), testing labs and states to develop a detailed framework for guiding the product certification bodies utilized by this industry. Commenters (1397, 1591) believe this framework must include the requirement to share test data with EPA and interested states upon request.

Response:

The final rule explains that a third-party certifier (sometimes called third-party certifying body or product certifying body) means an independent third party that is accredited under ISO-IEC Standard 17065 to perform certifications, inspections and audits by an accreditation body that is a full member signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement and approved by the EPA for conducting certifications, inspections and audits under each subpart of the rule. The final rule further clarifies that a third-party certifier may apply to the Administrator for approval to be an EPA-approved third-party certifier by submitting credentials demonstrating that it has been accredited by a nationally recognized accrediting entity to perform certifications and inspections under ISO-IEC Standard 17065.

We agree with commenter (1171) and have removed the mention of the ISO/IEC 17020 Inspection Body standard from this section and removed the requirement that the PCB be accredited to ISO/IEC 17025 in conjunction with ISO/IEC 17065. We agree that it does not appear to be necessary for the Certification Body to also own and operate a testing laboratory, but it is allowed.

Finally, we require that testing data be shared with the EPA and with the States.

2.13.4 Comment: Terminology related to test methods and ISO/IEC 17025

Commenter (1171) recommends the QA requirements that test laboratories are subject to include accreditation to ISO/IEC 17025:2005 by an International Laboratory Accreditation Council, Mutual Recognition Agreement (ILAC MRA) signatory accreditation body (AB). The commenter (1171) states the ILAC MRA ensures that all signatory ABs operate under ISO/IEC 17011, and offer accreditations equivalent to those of all other signatory ABs through a peer review process. Commenter (1171) asserts that many other federal programs including ENERGY STAR recognize and use ILAC MRA as a basis for recognizing testing laboratories.

Commenter (1171) recommends revising the wording related to required test methods to state "…accredited by an ILAC-MRA signatory to ISO/IEC 17025, with the test methods specified in § 60.534 listed on its Scope of Accreditation…"

Response:

The final rule states that a laboratory must apply to the Administrator for approval to test under this rule by submitting documentation that the laboratory is accredited by a nationally recognized accrediting entity under ISO-IEC Standard 17025 to perform testing using the specified test methods (under each subpart). As noted above, the final rule also defines that a third-party certifier (sometimes called third-party certifying body or product certifying body) means an independent third party that is accredited under ISO-IEC Standard 17065 to perform certifications, inspections and audits by an accreditation body that is a full member signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement and approved by the EPA for conducting certifications, inspections and audits under each subpart of the rule.

2.13.5 Comment: Role of accreditation entities in reporting lab and certifying entity deficiencies

Commenter (1171) recommends that the requirement for reporting laboratory deficiencies found during ISO/IEC 17025 assessments be placed on the Accreditation Bodies, upon request from the EPA, not the testing laboratories. Commenter (1171) believes this process ensures that all pertinent conformity assessment data is submitted cleanly to the EPA without fear of missing information; it also alleviates some of the administrative burdens that the testing laboratories face under these proposed rules.

Commenter (1171) similarly recommends that any Certification Body deficiencies related to ISO/IEC 17065 assessments be reported by the Accreditation Body upon the EPA's request, not by the Product Certification Body (the commenter's terminology for "certifying entity").

Response:

The final rule retains the current responsibilities related to the laboratories, because they are regulated entities in this rule and conformity is crucial to the validity of the program.

2.13.6 Comment: Value and cost of ISO accreditation

Commenter (1567) believes that there is no reason or evidence to believe that requiring ISO certification does anything to improve laboratory performance or data quality. The commenter (1567) notes that many of the requirements for ISO/IEC 17025 accreditation have nothing to do with emissions testing of solid fuel burning devices or EPA's Certification/ Qualification Programs. The commenter (1567) states that ISO 17025 is meant to cover all laboratory activities and provides general and specific requirements for management reviews, personnel management and training, the quoting process and more; many of these criteria simply do not apply to small labs that are specifically focused on one type of activity. The commenter (1567) points to the success of the present wood stove certification program in terms of generating solid certification data in the absence of ISO 17025. According to the commenter (1567), the key to generating high quality test data is using laboratories with the experience, knowledge, capability and desire to produce the high quality test data that is demanded by the test methods being used. If the EPA would like to add some additional specific calibration or QA/QC requirements that actually would enhance data quality to the test methods or in the new rules, that is totally acceptable to the commenter (1567). The commenter (1567) is seeking to avoid being saddled with requirements that just add another layer of paperwork and expense and do nothing to enhance actual data quality.

Small labs (with only 3 to 4 employees on average) lack the cash flow to implement the proposed ISO 17025 accreditation, especially when combined with the ban on R&D testing under the proposed program, according to commenter (1567). Commenter (1567) anticipates that the total estimated cost of obtaining an ISO/IEC 17025 accreditation could be from $75,000 to $125,000, which includes additional expenses to obtain ISO-specific calibrations for the equipment and test methods to conduct the emission tests (estimated to be from $25,000 to $30,000 (see p. 4 of the comment letter for more detail). The commenter (1567) believes that the three small laboratories described in the comment letter would close under these conditions. The commenter (1567) adds that even if they were able to obtain ISO accreditation, they do not have sufficient volume of work to raise test fees without putting themselves at a competitive disadvantage.

Likewise, commenter (1397) states that requiring ISO accreditation may be problematic for small test labs and could result in the elimination of more than half of the already small number of EPA accredited test labs used by this industry sector, reducing competition and increasing potential delays in the certification process.

Commenter (1670) believes that the small laboratory coalition has overstated the costs involved in obtaining ISO/IEC 17025 accreditation. For example, commenter (1670) states, they have listed estimated expenses totaling $100,000 for "Associated Accreditation Expenses", "Consultant", "Additional Personnel" and "New Equipment and Calibration Costs," but if a laboratory already has the necessary equipment and calibration process to conduct the tests, it is uncertain why additional funds would need to be spent in this area. Commenter (1670) adds that if they are not already adequately equipped to conduct the necessary testing operations, then other questions arise. Commenter (1670) states that creating a QA manual for a laboratory's

operations that complies with ISO/IEC 17025 can be quite straightforward for smaller laboratories. Nor does commenter (1670) think it would be necessary to hire an expensive consultant or hire a full time employee for a small laboratory to deal with this process, because there are numerous templates available for this purpose that can be purchased for $200 to $600. Commenter (1670) notes that the costs involved with obtaining and maintaining ISO/IEC 17025 accreditation are proportional to the scope of the accreditation, and there are hundreds of small specialty laboratories that have obtained this accreditation from ICC-IAS, A2LA, Standards Council of Canada or other accrediting bodies.

Commenter (1670) agrees that there are significant additional overhead costs for independent laboratories to obtain and maintain ISO/IEC 17025 accreditation, but these costs are similar for large and small laboratories when compared on the basis of a specific scope. Commenter (1670) considers ISO/IEC 17025 accreditation is a "cost of doing business" in the independent testing field, and if small laboratories are given an exemption from this requirement they will have a cost advantage. Commenter (1670) believes that since ISO/IEC 17025 requires that certification testing be carried out by laboratories operating in compliance with ISO/IEC 17025, all laboratories should have this accreditation. At the least, commenter (1670) believes that before accepting its test reports, a non-accredited laboratory would need to demonstrate to a certification body that they meet the fundamental requirements of ISO/IEC 17025. Either way, commenter (1670) states, they will have to create a documented QA plan and follow procedures required to comply with ISO/IEC 17025. Commenter (1670) states that the only added cost to obtain accreditation would be the fees and expenses paid to the accrediting body. Also, commenter (1670) notes, certification bodies are not accreditation agencies with a primary focus on auditing laboratories to these elements, so this evaluation process may create more problems than it solves. Commenter (1670) believes using the ISO/IEC 17025 accreditation process supplies a common base for all of the laboratories to work from.

Commenter (1670) adds that it should be understood that the current process for obtaining direct EPA accreditation has not required the submission of an ISO/IEC 17025 compliant QA plan and procedures or even an on-site audit. As far as the commenter (1670) knows, all that has been required recently is the submission of an application and a Proficiency Test Report on a stove provided by EPA, staff curriculum vitae and copies of calibration certificates. Commenter (1670) concludes that requiring labs to be accredited per ISO/IEC 17025 is an appropriate means of assuring that all of the labs will be monitored and maintain a reasonable level of competence and quality in the future.

Response:

We agree with commenters that the ISO accreditation process is a valuable tool as we move to expand the scope of the wood heating rules to include certification testing of more models and more appliance types and as the test methods themselves evolve. Many of our stakeholders seek assurances that the test results represent complete and accurate emissions data and that the EPA does not become a bottleneck in approving the certification results. As stated previously, the introduction of the ISO-based process will result in higher quality, more consistent test reports, which will help streamline and focus the EPA's review and approval responsibilities.

However, we have balanced concerns by some laboratories regarding the potential burden of obtaining ISO/IEC 17025 accreditation by delaying implementation of this requirement until 3 years after the rule's effective date for EPA-accredited laboratories and until 6 months after the rule's effective date for laboratories that are not currently EPA-accredited.[19] This will provide additional time for laboratories that are not currently accredited to gather any needed resources to obtain the required accreditation. We also agree with commenter (1670) that some of the accreditation costs that concern the small laboratories have been overstated.

2.13.7 Comment: Roles of certifying entities and EPA in third-party certification

Support for EPA issuing certificates of compliance:

Commenter (1465) states there is a need for an independent third party to thoroughly review certification applications submitted by manufacturers under subparts AAA and QQQQ. To avoid a real or perceived conflict of interest, commenter (1465) asserts the role should be performed by the EPA, not contractors hired by the manufacturers. Commenter (1465) states the EPA should train staff regarding the test methods and review the data generated during certification testing. Commenter (1465) believes the process by which the EPA establishes and maintains the certification of test labs should be greatly strengthened and include a regular schedule of testing oversight, audits, and inspections by EPA staff.

Commenter (1551) has significant concerns about the use of the ISO process, specifically as they relate to public accessibility of emissions testing data, testing notification to regulatory authorities, and clear separation between research testing, conducting certification testing, and certifying results. Commenter (1551) states it is imperative that OECA direct appropriate resources to provide adequate oversight and inspection of test results and labs.

Regarding implementation of the Step 2 standards, commenter (1427) states EPA must commit to actively enforce all QA/QC protocols, conduct surprise audits of labs, and regularly conduct and publish a critical, transparent review and analysis of all submitted data and QA/QC information. Commenter (1427) believes full data from every test that the lab conducts should be required to be submitted to EPA for approval.

Commenter (0948) supports allowing ISO accredited labs to conduct certification testing. Commenter (0948) adds that the EPA should review all of the test results submitted by all agencies during the first year of the new rule. The commenter (0948) also agrees that the EPA should be able to review any certification test for any reason. Likewise, commenter (1503) states that the EPA can and should continue to monitor these and other labs to ensure that they continue to provide accurate certification data.

[19] In the case of hydronic heaters under subpart QQQQ, test laboratories already are required to be ISO-accredited under the voluntary hydronic heater program, and these laboratories will seamlessly transition to third-party certification upon the effective date of the final rule.

Opposition to EPA issuing certificates of compliance:

Commenters (1171, 1527, 1541, 1543, 1546, 1550, 1572, 1633, 1643, 1646) believe that independent third party certifying entities should issue certificates of compliance with the EPA focusing its limited resources on conducting oversight of certifying entities by conducting periodic audits of certifying entities' performance. The commenters (1543, 1550, 1643) add that rather than requiring certifying entities to send all materials relating to an application, they should instead be required to provide the EPA (or an accrediting body) with access to inspect any supporting documentation upon request. This approach would relieve the EPA of having to maintain large databases containing manufacturers' CBI, according to the commenters (1543, 1550, 1643). The commenters (1543, 1550, 1643) conclude that EPA can review quality assurance/control audit reports issued by accrediting bodies. Commenter (1632) also believes that the EPA should rely on third party labs for audit testing of manufacturers whereby the EPA could then audit the third party labs. The commenter (1632) requests that EPA ensure that audits not be based on fraudulent allegations.

Commenter (1527) states that the EPA should replace its function as the certifying entity with the commonly accepted and well-understood third party certification requirements involved in the ISO/IEC 17065 based certification programs. The commenter (1527) states that the EPA's attempt to add an additional layer of certification, results in provisions that actually conflict with the policies and procedures of accredited certifying bodies such as the provision in ISO-IEC 17065, 7.6.1, that makes the certifying body responsible for and retaining authority for its decisions relating to certification, but the EPA's proposal would result in two entities certifying the products (e.g., the EPA and the certifying body).

Commenter (1546) notes that the requirement for the EPA to conduct a second review of the test report and issue a second certificate adds expense and redundancy and will slow down the approval process, not speed it up. The commenter (1546) questions whether certification agencies can mandate any process or product changes if the EPA retains the sole authority to issue the certifications.

Likewise, commenter (1171) recommends more trust be placed in the accredited Product Certification Body (PCB), aka "certifying entity", with more emphasis on the EPA's approval process for those bodies. Commenter (1171) believes the additional reviews the EPA proposes to perform appear to be redundant, and would take away most of the value to be gained by a third-party certification system. Rather than utilizing its personnel to review information already reviewed by an accredited PCB, the EPA could periodically spot check those certification documents, rely more heavily on aftermarket surveillance activities, and focus on manufacturer quality audits and testing laboratory proficiency testing participation to ensure that products and data being sent through the certification process meet the stringent quality requirements that are in place.

As proposed, commenters (1543, 1550, 1643) are concerned that relying on the EPA certification would bring the industry to a standstill at the outset of the program absent comprehensive grandfathering / transition provisions and perhaps extensions of effective dates. Commenters

(1527, 1543, 1550, 1643) believe that independent third parties are better suited to issue certificates of compliance because they have more resources and data-handling infrastructure to commit to administering the certification program than the EPA, especially with the influx of new applications resulting from the establishment of standards for new wood heating appliance categories. These third parties will be able to apply their experience certifying safety standards and performing testing functions under existing subpart AAA according to the commenters (1543, 1550, 1643). Commenter (1527) lists several examples where they claim the EPA has not shown the technical expertise, staff or funding to adequately perform its QA role in the current NSPS program. The commenters (1543, 1550, 1643) add that these entities are strongly motivated to issue certifications reliably and effectively to protect their certification mark and accreditation. The commenters (1543, 1550, 1643) provide examples of successful independent third party certification programs such as the wood heater safety standards, FDA regulation of foreign food facilities and ENERGY STAR.

Response:

We see the final rule as a bridge between the original subpart AAA certification process, that relied solely on EPA oversight and approval of certification test reports and applications, to the ISO-based process that relies on a system where the manufacturer enters into a contractual agreement with an accredited certifying body/entity to conduct the emission test and submit the resulting application to the EPA for final approval. Rather than representing duplicative effort, this system will improve the quality of test reports and applications while reducing the time and resources required by the EPA to review and approve such applications. This will reduce delays to the manufacturer and provide other stakeholders with the assurances they seek regarding EPA's role. We have retained strong requirements in the final rule including notification of certification tests to the EPA, clarified the need to differentiate between CBI and non-CBI data, as well as clearly stating that emission data cannot be considered CBI, and ensured accessibility of test data and certification status to the states and public. As a related matter, we also retain oversight of all quality assurance related activities (including audit programs and results), and we will honor our enforcement obligations.

As all of the stakeholders gain experience with this process, we will assess whether adjustments should be made in the next review of the NSPS, such as reducing the instances where upfront EPA approval is needed of the certification application for example. In the meantime, the final rule provisions – that allow automatic certification of model lines that meet the Step 1 standards using approved test methods until the effective date of the Step 2 standards – should alleviate concerns that the initial phase of the program would be hampered by potential testing logjams and/or delays in obtaining EPA approval.

2.13.8 Comment: "Third-party witness" of remote testing program

Commenter (1665) states that the EPA's work with a certification laboratory to develop a remote testing program in order to reduce the financial burden of manufacturers and to address performance-related issues over the years has resulted in a reduction in emissions test fees between a manufacturer's lab and test agency. The commenter (1665) reports that a substantial savings can result by not having company engineers traveling to the test labs themselves during

testing. The commenter (1665) opines that the EPA must be eliminating the 3rd party witness program based on concerns by state regulators regarding the validity of tests done in manufacturer's labs. The commenter (1665) argues that the draft proposal provides extensive details as to the notifications necessary to the EPA of pending tests done at certified labs. Allowing for a 3rd party witness program can save a manufacturer $2,500 or more per model in certification costs.

Response:

"Witness" is a misnomer; the test must not just be witnessed but must be independently conducted by the EPA-approved laboratory. Neither the proposal nor the final rule prohibits certification testing by an EPA-approved test laboratory at the manufacturer's site provided that all required testing procedures are still followed. For example, there must be (1) no manufacturer participation other than observation, (2) no non-written communications between the manufacturer, (3) no written communications other than to notify the laboratory of an observed deviation in procedures, (4) documentation in the test report of all communications and (5) all communications must be consistent with instructions provided in the owner's manual [see 60.534(h) and 60.5476(g) that apply to all certification tests]. Furthermore, the EPA-approved test laboratory must use independent equipment and independent calibrations and must maintain absolutely controlled access at all times to filters, drying, filter scales, etc.

2.13.9 Comment: Testing laboratory logjam concerns

Commenter (1396) is concerned the capacity of the limited number of available certified testing laboratories will be compromised by the additional testing requirements. Commenter (1396) does not believe the EPA has adequately anticipated the burden that will be placed on the eight certified testing laboratories when numerous manufacturers are trying to certify wood heaters to one standard and then preparing to certify the same units in anticipation of a second standard just five years later.

Commenter (1448) is concerned that because relatively few forced-air furnaces and hydronic heaters have passed EPA certification, combined with the fact that very few laboratories in the U.S. have experience with CSA B415.1-10, there will ultimately be delays that will hold up the process to accommodate manufacturers in testing, verifying and labeling of the model lines submitted.

The commenter (1572) describes their experience under the EPA Phase 2 voluntary program that makes them concerned that EPA approval of test reports would be a terrible logjam under the new rule, which would result in some businesses having to wait for years before being able to operate again. The commenter (1572) states that they did not see anything in the proposal that would make the process of approval faster than it currently is.

Response:

The final rule includes provisions for currently certified models that meet the Step 1 PM emission limits using specified test methods to be automatically certified until the effective date

of the Step 2 PM emission limits. This will significantly decrease the number of model lines that require certification testing in the first 5 years after the rule's effective date. Further, the phasing of the PM emission limit compliance dates for forced-air furnaces will also alleviate testing logjam concerns.

Furthermore, to address the possibility that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA, especially in the first year, and so as to avoid unfairly restricting the production and sales of manufacturers who do all the things they should do and then potentially have to wait on the EPA approval, we have added a conditional, temporary approval by the EPA for room heaters subject to revised subpart AAA, based on the manufacturer's submittal of a complete certification application. The conditional approval would allow manufacture and sales for 1 year or until EPA review of the application, whichever is earlier. We also allow temporary, conditional approval by EPA for forced-air furnaces that meet the Step 1 PM emission limits early and want to market that those models comply with the Step 1 PM emission limits early. The 1-year conditional, temporary approval by the EPA does not apply to hydronic heaters because they are currently required to submit third-party certifications for the voluntary program and will continue to do so under the NSPS.

Regarding the potential for logjams based on experience with the hydronic heater voluntary program, we note that all parties have gained experience since the inception of that program and that models currently qualified under that program are eligible for automatic Step 1 PM emission limit certification until Step 2 PM emission limit certification.

2.13.10 Comment: One-year transition for accreditation of testing laboratories and certifying entities

Commenter (1570) states the EPA should not allow any transition period on the testing laboratory definition or retain the current "Administrator Approval Process". The commenter (1570) believes labs should be able to effectively incorporate the changes to the testing protocols by the effective date of the rule. An additional transition period could result in certification issues where devices are either certified, or not, based on erroneous results that could result in loss of faith in the program by industry and the public, according to commenter (1570).

Likewise, commenter (1546) states that there is no need for a transition period using the current "Administrator Approval Process" (see § 60.533(c)).

On the other hand, commenter (1171) recommends at least a 1-year transition period for participating testing laboratories and product certifiers to gain accreditation to ISO/IEC 17025 and ISO/IEC 17065, through an EPA-recognized accreditation body. Commenter (1171) believes this would allow most testing labs and product certifiers the time to complete the accreditation process. However, if participating testing labs already hold valid accreditation, commenter (1171) supports immediate implementation of the proposed rule, while new players would still be required to follow the appropriate accreditation process with the 1-year transition period.

Commenter (1397) believes that small labs (five or fewer employees) should be allowed to use the current "Administrator Approval Process" plus additional time to comply or find an acceptable alternate to ISO accreditation. Commenter (1397) recommends that labs with five or fewer employees be allowed an additional one or two year extension to prepare for ISO membership or propose a non-ISO alternative. Commenter (1503) is also concerned about the potential impact of small labs going out of business and suggests that the EPA consider allowing laboratories with five or fewer employees that have been accredited under appropriate state laboratory accreditation programs (where they exist) to qualify as certifying laboratories under the NSPS without having to become ISO-accredited.

Commenter (1486) believes 1 year is nowhere near long enough because nobody knows what the final rule will look like or how all of components of this new rule will play out. Commenter (1486) asserts that obtaining an ISO/IEC 17025 can take 6 months to a year to do and is a very expensive process and that no lab is going to spend money until it absolutely certain what will be required in the new NSPS. Commenter (1486) believes that if the EPA were to adopt the proposed rules as presently written, there is a very high probability there may not be many, if any, EPA accredited test labs on line to do certification tests. Commenter (1486) states that even if the status quo were maintained and all the present EPA accredited test labs continued operating to prevent a testing logjam, 1 year is simply not enough time for all of the affected products to be tested.

Likewise, commenters (1543, 1550, 1643) also recommend that the EPA expand the proposed grandfathering provision for laboratory accreditation beyond the proposed 1 year after the effective date of the final rule. The commenters (1543, 1550, 1643) state that this is an insufficient amount of time to apply for accreditation under the new rule and it risks creating a logjam at the EPA, which will need time to review and approve applications for accreditation.

Commenter (1567) states that existing EPA laboratories should be "Grandfathered" into the new NSPS as long as they complied with all of the other EPA laboratory requirements, e.g., participating in the biennial round robin proficiency testing program described in § 60.535(a)(2)(ii). According to the commenter (1546), the proposed final system – in which the Certifying Body issues a Certificate of Conformity then the report and certificate are reviewed by EPA and EPA issues a Certificate of Approval – is already redundant. The commenter (1567) adds that this change would prevent a testing logjam and would ensure a level playing field and prevent a situation where a business could use its position in the regulatory process to unfairly gain an advantage over some of its competitors.

Response:

As discussed in *Section 2.13.6*, the final rule balances the transition concerns raised by commenters. Current EPA-accredited laboratories may retain their accreditation until 3 years after the rule's effective date. Furthermore, for laboratories which are not EPA-accredited, we are allowing a 6-month transition for appliances other than hydronic heaters. (Laboratories conducting certification tests for hydronic heaters under subpart QQQQ are already ISO-accredited to the extent they participated in emission testing under the hydronic heater voluntary

program. Therefore, for hydronic heaters, there is no transition period provided for subpart QQQQ testing.)

See *Section 2.13.7* for more information on the role and impact of EPA approval in the certification process.

2.13.11 Comment: Requiring compliance audit testing for labs

Commenter (1551) believes the EPA should establish a more rigorous program to audit the performance of the labs that conduct certification testing and establish a fund to pay for independent review of laboratory results. Commenter (1551) additionally states the EPA should request and pursue the collaboration of states to assist in the random observation and evaluation of test labs during certification testing.

On the contrary, commenter (1171) recommends that the requirement for compliance audit testing of labs in § 60.535(a)(2)(v) be removed due to the potentially cumbersome nature of requiring an unknown number of tests "pro bono" from participating labs.

Commenter (0948) supports in-field audits as a means of ensuring that the laboratory testing is representative of actual performance. The commenter (0948) notes that the intent is not for every boiler to be evaluated in the field, but a manageable sample.

Response:

The certifying bodies/entities are subject to the quality assurance requirements associated with their ISO accreditation. This was a main objective of implementing the ISO process, and the EPA rules are designed to be congruent with that process. Regarding in-field measurement, we agree this is a worthy objective and will be considered in the next 8-year review.

2.13.12 Comment: Proficiency testing of certifying entities

Commenter (1171) recommends the requirement in § 60.535(e)(2)(iii) that "certifying entities" participate biennially in a proficiency testing program be removed from the proposed rule, because "certifying entities" which do not operate testing laboratories themselves are not performing any technical measurements where competence in methodology would need to be confirmed. In the event that a "certifying entity" does have an operating, accredited testing laboratory recognized to participate in this program, commenter (1171) asserts the proficiency testing requirements in § 60.535(a)(2)(ii) would address the participation of the laboratory's operations.

Response:

We corrected terminology in the final rule and clarified that these requirements apply to the approved test laboratories. The final rule requires that the test laboratory must agree to participate biennially in a proficiency testing program conducted by a nationally recognized accrediting entity.

2.13.13 Comment: Conflict of interest concerns regarding certification testing and R&D design services

Commenter (1171) believes the prohibition in § 60.535(e)(2)(vii), regarding a certifying entity performing initial certification reviews on any model which the certifying entity has conducted R&D on within the last 5 years, may go against the ISO/IEC 17065 requirement (clause 4.2.6d) that the "certifying entity" cannot offer or provide any consultancy (which clearly includes R&D activities) to its clients. Commenter (1171) recommends removing this proposed subpart from the rule, and instead encourages reliance upon the requirement of ISO/IEC 17065 prohibiting "consultancy", defined therein as, "Participation in the designing, manufacturing, maintaining, or distributing of a certified product or a product to be certified."

Commenter (1632) states that it is crucial for manufacturer's to be able to continue to have certified labs at their facility as it expedites testing and provides technology security. The commenter (1632) asserts that certified labs at manufacturer's facilities are used for safety testing so there is no reason not to allow them to be used for emissions testing. The commenter (1632) states that the EPA should rely on third party labs to not only test emissions but also to grant certification of emissions.

Commenters (1527, 1543, 1550, 1643) state that the EPA should revise the proposed accreditation procedures to prohibit laboratories from performing initial certifications tests on models for which it has provided "design services" (as opposed to merely R&D testing) to the manufacturer within the last five years. The commenters (1527, 1543, 1550, 1643) state that this change would clarify a vague definition of R&D, preserve an important source of laboratory review and continue to provide a valuable service to manufacturers.

Commenter (1527) adds that as long as an independent laboratory complies with prohibitions regarding becoming involved in the product design and maintains confidentiality, there is no conflict of interest in providing non-certification testing and also providing certification testing when the manufacturer requests it. Also, the commenter (1527) states it is common for appliances to fail to meet requirements early in a scheduled certification test program. When this occurs, the commenter (1527) explains that the client may choose to shift to non-certification testings with the client making modifications to the test unit. According to the commenter (1527), this makes cost effective use of the resources already devoted to testing the unit and helps the laboratory generate revenue.

Commenter (1546) asks if the EPA distinguishes between a "screening test," in which a manufacturer asks that the laboratory perform the standard emissions tests on a prototype unit, and "research and development tests," in which the laboratory is engaged to advise the manufacturer on design issues and revise the test sample with the goal of reaching a compliant configuration. Commenter (1546) suggests that the EPA needs to provide an appropriate definition for "research and development tests" to distinguish it from screening tests, which are a vital service laboratories can provide to smaller manufacturers who may not have the space, equipment, or financial ability to conduct tests at their own facilities. The commenter (1546)

concludes that as long as strict guidelines are followed, there is no conflict of interest inherent in performance of screening tests prior to certification testing by the same laboratory.

Commenter (1567) notes that the EPA has not precisely defined "R&D" as it relates to the "proposed ban on R&D testing", as the commenter phrases it. The commenter (1567) suggests that EPA eliminate this ban in the rule [e.g., in 60.535(a)(2)(vii)] or specify that all an accredited test lab can do is run certification tests. Otherwise, the commenter (1567) contends that the lack of clarity will require constant interpretation as to what R&D is or isn't. The commenter (1567) would object to limiting an acceptable test provision to only certification tests, seeks elimination of 60.535(2)(vii) in the final rule and suggests instead that the EPA adopts rules from ISO 17065 as needed to enable labs to provide design and R&D services.

Commenter (1567) offers insight on the perceived conflict of interest issue in allowing the same lab to participate in R&D and certification testing. The commenter (1567) states that under the present North American system, all the major certification agencies/entities, e.g., UL, CSA, Intertek and OMNI, recognize that product development, R&D and official testing can be integrated inside the same company if an adequate set of rules are applied to ensure the integrity of the official test results, specifically what they call "Satellite programs". According to the commenter (1567), this program and the others like it allow a company to perform certification tests in-house for safety certification of many different products, including wood-burning appliances. The commenter (1567) adds that there is also an ENERGY STAR Certification satellite program where testing can be done in-house. In order to maintain the validity of the data they generate, the commenter (1567) states that these in-house test programs are controlled by a set of criteria found in the ISO 17065 rules, and these same ISO 17065 rules could be used to define a program where non-ISO 17025 accredited labs could be allowed to perform design and/or R&D testing services as long as the lab complied with the rules. The commenter (1567) describes the applicable ISO 17065 rules (see pp. 8-9 of the comment letter) that they already follow, at least informally, at present. The commenter (1567) adds they are less susceptible to conflict of interest issues than similar work down by a manufacturer's in-house satellite label because they do not have a vested financial interest in the test results.

Commenter (1567) adds that the EPA does not offer any reasoning for its reversal on allowing accredited labs to do design work and R&D testing, i.e. no longer allowing labs to do design and R&D work. The commenter (1567) notes that in its discussion of BSER in the Preamble, the EPA repeatedly expresses a desire to get the new cleaner burning appliance model lines certified and available in the market place as soon as possible. The commenter (1567) believes that implementing the proposed ban on labs assisting with design work and performing R&D testing has just the opposite effect. The commenter (1567) suggests alternative regulatory provisions on pp. 13 and 14 of comment.

Commenter (1567) adds that, under the current EPA voluntary programs, certifying entities have refused to review test reports from two of the small laboratories because of (1) a perceived conflict of interest and (2) the fact that the small laboratories are competitors consisting of individuals who may have at one time worked at the laboratory now acting as the certifying entity. The commenter (1567) states that, unless the rules are changed to prevent this type of

blatant discrimination, the certifying entities will have been granted *de facto* monopoly power by the EPA and will be able to force the small laboratories out of business either by an outright refusal to review our reports or by failing to provide a timely, good faith review. The commenter (1567) believes that the larger laboratories have no incentive to work with the smaller laboratories to review reports. Therefore, the commenter (1567) suggests several proposed revisions to § 60.535(e) and (f) that should prevent this from happening, and if it does, provide the affected test lab and manufacturer an avenue to appeal the situation to the EPA.

From a small lab's perspective, commenter (1567) believes that ban on R&D testing is counterproductive to a smooth functioning product development and certification process. Commenter (1567) notes that small labs absolutely depend on the cash flow generated by R&D and small appliance manufacturers rely on these labs to help them comply with the new NSPS requirements. The potential reduction in support by currently accredited labs will slow the pace of bringing new low emission units to market, according to the commenter (1567).

From a small manufacturer's perspective, commenter (1514) strongly disagrees with the EPA's presumed conflict of interest, stating that it forces a small manufacturer to purchase and install lab equipment and hire personnel for R&D purposes. Commenter (1514) explains that as a small manufacturer, they depend upon their relationship with the testing lab for advice and R&D help. Commenter requests that the EPA remove § 60.535(a)(2)(vii) from the rule, as it will greatly increase development costs for small manufacturers.

Commenter (1670) supports development of a framework that preserves the ability of small laboratories to compete, but it is vital that the process maintain appropriate independence and objectivity throughout the conformity assessment and certification process. Commenter (1670) states that there is clearly confusion regarding the relationship between the testing (or evaluation) function and the certification function. Contrary to assertions and implications, commenter (1670) states that there is no conflict of interest in a certification body relying on its own testing and evaluation process to establish compliance. According to commenter (1670), conformity assessment necessarily includes both compliance evaluation (testing) and production surveillance (in-plant auditing). Commenter (1670) notes that there are many certification bodies that offer a wide range of product, service and management systems certifications, and virtually all rely primarily on their own resources and personnel to conduct compliance evaluations.

Commenter (1670) adds that it is particularly important for Product Certification Bodies (certifying entities) to have a high level of training and experience in the evaluation process where the products and test methods involved are highly complex and require extensive data collection and analysis. The commenter (1670) states that one cannot adequately review and verify compliance without a comprehensive understanding of the process involved, and requiring separation of testing and certification activity for the product types covered would make it harder to make the system work.

Commenter (1670) provides extensive discussion to ISO/IEC 17025 provisions that address the prohibition for independent testing laboratories and certification agencies from offering design consulting to their clients in any area where they offer compliance testing services (see p. 2-4 of

the comment letter). Commenter (1670) notes that these restrictions do not preclude certification bodies from basing certifications on tests conducted by outside laboratories that engage in consultancy, but it does require that the certification body follow a process that ensures that such testing is conducted objectively and correctly. This is frequently achieved through directing and witnessing the test process at the outside laboratory location. Commenter (1670) describes how data acceptance from outside laboratories can be conducted to provide the certification body with data quality assurances and confidence in the objectivity of the evaluation and the factors that limit their use.

Commenter (1670) supports the inclusion of criteria that would allow certification tests to be conducted by outside laboratories as long as the necessary verification procedures and controls are in place, but this process should require a representative of the certification body to oversee and direct the test process. Commenter (1670) states that this process must also require that the laboratory comply with the requirements of ISO/IEC 17025 as is required by ISO/IEC 17065. According to commenter (1670, the laboratory can obtain accreditation per ISO/IEC 17025 from an acceptable accrediting body or the certification body's staff can conduct an evaluation of the laboratory's compliance with ISO/IEC 17025 directly. Alternatively, commenter (1670) states, the laboratory would have to have a written QA procedure following ISO/IEC 17025 requirements applicable to the specific service being offered which would then be subject to audit and verification by a member of the certification body's QA staff. Commenter (1670) is concerned that if some alternate to ISO/IEC 17025 were offered to laboratories, it would become very difficult to verify the basic requirements for acceptance of data. In effect, commenter (1670) states, the alternate system would impede what it was supposedly set up to accomplish.

Response:

Commenters raise several valid points about how to manage the intersection of providing R&D services with the ISO process. The final rule does not ban all R&D testing by labs, but merely prohibits a lab from performing the initial certification test of any model(s) for which the lab has conducted R&D design services within the previous 5 years. Thus the final rule retains the requirement that a lab that performs R&D design services for a given model in the last 5 years is prohibited from conducting the certification test for that model line. However other R&D operations, including testing during R&D, are not prohibited. This change is consistent with ISO requirements. The concern that larger laboratories might discriminate against smaller laboratories was raised during the hydronic heater voluntary program, but these concerns have been resolved since that time.

2.13.14 Comment: Conflict of interest concerns regarding R&D testing services and audit testing services

Commenter (1171) asks for clarification of § 60.535(a)(2)(vii) regarding whether a testing laboratory that performed R&D (or consultation) on a product is still able to be selected for Compliance Audit Testing of the product within the 5-year "cooling off period."

Response:

As described above, this provision was clarified to limit the prohibition to R&D "design services." Compliance audit testing decisions are made on a case-by-case basis.

2.13.15 Comment: Round robin proficiency testing, repeatability and variability

Commenters (0541, 0948) support the simplification of the EPA audit testing programs. Commenter (0948) adds that it could be strengthened by having the EPA anonymously acquire a unit 1 to 2 years after certification and retesting it to ensure compliance with the test method for units that were certified before this rule is enacted. The commenter (0948) also suggests strengthening the audit process by sending a sample unit to multiple testing agencies to ensure adequate reproducibility and repeatability of the certification results. Commenter (1640) supports round robin testing every other year. Commenter (1541) states that unannounced "round-robins" of the same boiler be tested at different accredited test laboratories and the results analyzed to ensure they are within a tolerable deviation.

Commenter (1487) supports "round robin" testing but notes that this type of testing has not been implemented in the past despite being part of the 1988 NSPS. The commenter (1487) recommends that the EPA commit to and describe this round robin testing in the regulatory text and commit to making the test results of round robin testing available to the public.

Commenter (1171) supports the round-robin PT for testing laboratories on the proposed 2-year schedule. However, commenter (1171) states there appears to be no discussion on what would happen beyond additional re-tests (and no mention of schedule of those retests) if the laboratory's results fall outside the specified acceptable range. Commenter (1171) suggests that the retesting results be reduced to 2 or 4 reruns performed in the next available round (e.g. 3 to 6 months).

Commenter (1171) adds that the EPA could consider purchasing and sending around more than one sample heater. For instance, commenter (1171) suggested 25% of EPA-accepted laboratories would be responsible for testing and submitting their results in the first quarter of the year on sample A, another 25% of laboratories responsible for participation in quarter 2 of the year on sample B, and so on. Commenter (1171) believes this would allow the EPA to gather pertinent data from a set of participating laboratories, and offer the necessary feedback for the laboratories to know whether or not their testing is adequate, sooner than if only one single heater were sent around to ALL participating laboratories before data is collected and analyzed (a process that could take a significant amount of time).

Commenter (1647) supports the need for a laboratory round robin test program as the appropriate method to determine test method precision, but disagrees with the statement by the EPA in the proposal preamble that if the lab's results are not within ±10% of the value at which the heater was certified, then the lab must conduct another eight runs.

According to commenter (1647), proficiency test programs involve multiple participating laboratories testing or measuring the same or identical artifacts where the property of interest and

its uncertainty are known, which allows for evaluation of an individual laboratory's ability to accurately conduct the test and measurements. However, commenter (1647) states that under the EPA program neither the true value for the artifact (the emissions performance of a hearth appliance) nor the precision of the method are known. The commenter (1647) believes that the EPA appears to assume that the "certified emissions rate" is a true or accurate value, but the certified emission rate is merely the result of a single test series which itself is subject to all of the random variability and measurement uncertainties of any other single test series. The commenter (1647) states that EPA's proficiency test data collected over the past 25 years clearly demonstrates that the emissions result from any single test series is highly variable and the variability is much larger than 10% of the certified value. Based on the precision data available, the commenter (1647) states that no laboratory or the EPA itself can claim that the emissions rating determined from a single test series is accurate to level less than ± 3-5 g/hr.

Commenter (1647) states that any "proficiency" test series conducted under the EPA proposed rule would be quite unlikely to result in agreement with the certified value within 10%. According to the commenter (1647), of the 42 results available in the EPA proficiency test data (based on eight run weighted averages), only 2 (4.8%) were within 10% of the certified values and about 60% of the results were 50% or more (up to 500%) higher than the certified values. Thus, the commenter (1647) states, the norm under this proposal would be to require labs to conduct 4 test series (16 runs) instead of 2 series (8 runs), which implies double the out of pocket costs for labs as well as the loss of twice as much billable business while staff and facilities are tied up with proficiency testing. The commenter (1647) adds that if the EPA selects an appliance for this program with a "certified emissions rate" of 2 g/hr, the labs would be expected to achieve a result within ± 0.2 g/hr of 2.0 (1.8 to 2.2 g/hr). The commenter (1647) states that, given that the EPA originally assumed a repeatability of ± 1 g/hr and made no claim regarding reproducibility, they now seem to think there will be a 5-fold improvement. In fact, the commenter (1647) adds, the data shows just the opposite – repeatability and reproducibility are closer to 5 times worse.

Commenter (1647) states that EPA's proposed requirement to reproduce the sample product's certified value within 10% also would unacceptably introduce an inherent bias into the process. The commenter (1647) explains that in well-designed proficiency test programs, laboratories are provided with test artifacts with no information regarding the expected result to ensure that the laboratories do not have the ability to target a specific result or inappropriately screen the data submitted. The commenter (1647) adds that the EPA should modify any appliance selected so that the laboratories participating cannot look up a "certified value" in order to avoid any potential for bias in the testing process.

The commenter (1647) believes that the process proposed by the EPA is a transparent attempt to address the serious issue of variability in wood-burning appliance emissions testing by essentially telling laboratories what results the EPA wants them to get in the proficiency test process. The commenter (1647) states that all existing data indicate that emissions produced by cord wood-burning appliances can vary significantly around the level of the current and proposed emissions limits and nothing that the EPA has proposed in this revision of the NSPS would or can change this fact.

Regarding the precision issue, the commenters (1543, 1550, 1643) state that the Curkeet-Ferguson study has definitively addressed the inter-lab comparison issue showing that the EPA would be required to add anywhere from 4.5 to 6.4 g/hr to the standard for audits performed at labs other than the original certification lab. The commenters (1543, 1550, 1643) state that the study shows that the estimated intra-lab precision of ±1 g/hr is erroneous and actually ranges from 2.9 to 5.4 g/hr (at a 95% confidence level). The commenters (1543, 1550, 1643) state that one cannot confidently conclude that an audit test demonstrates non-compliance unless the difference between the audit test result and the certification emission value is greater than the inherent reproducibility and repeatability measures.

Likewise, commenter (1514) notes that the "50% audit parameter" (*sic?*) is unacceptable, pointing to HPBA's analysis that an EPA certified wood stove can vary ± 2.9 to 6.4 g/hr (*sic?*). The commenter (1514) concludes that this degree of variance, coupled with their interpretation of the "50% audit parameter" meaning 0.65 g/hr based on the 1.3 g/hr limit, would result in a 100% audit failure rate.

Likewise, commenter (1435) states that once a model line has been certified as being in compliance with EPA's NSPS limits, there is no need for or utility in additional emissions testing, particularly given the significant test method imprecision in measuring wood heater emissions performance, which allows for little confidence that a given test result is indeed indicative of any compliance problem with the appliance, much less the whole model line, rather than simply reflective of the inherent variability of wood burning. According to commenter (1435), the EPA expressly considered the imprecision of wood stove test methods in developing the current NSPS, assuming at the time that variability in an appliance's emissions performance after repeated testing in the same lab was +/- 1 g/h. Commenter (1435) asserts the EPA recognized the need to conduct future study to determine variability in test results observed from lab to lab, also assumed to be +/- 1 g/h during the regulatory negotiations, but the EPA never performed that study. Commenter (1435) asserts that the EPA should abandon its proposal to continue emissions testing as a QA/QC tool, noting that the costs cannot be justified as either beneficial or necessary. Commenter (1435) asserts that the EPA should abandon its proposal to continue emissions testing as a QA/QC tool, noting that the costs cannot be justified as either beneficial or necessary.

The commenters (1543, 1550, 1643) add that the EPA should eliminate audit testing altogether for subpart QQQQ until it has rigorously assessed the precision of the test methods used to determine compliance. Once the EPA has the proper data, the commenters (1543, 1550, 1643) state that it must include a sufficient compliance margin.

Commenter (1486) states that even small perfectly legal difference in lab configurations can result in a significant difference in test results and lists some possible reasons for this: 1) Technicians performing some of the testing tasks were not adequately trained on how to perform the assigned tasks. 2) Inherent variability in the fuel itself and in the hot coal bed that the test fuel is loaded on. The ±10% does not reflect the inherent variability in test results that result from burning a fuel load that is always different. 3) Test results for existing EPA certified stoves are from 4 different EPA test methods, M5H, M5H in the tunnel, M5G-1 and M5G-3 and, with the

start of mobile testing, a large number of different test labs. Because they are deemed equivalent, the presumption is that all of the EPA test methods give the same results but the correction factor used to correct M5G test results to a M5H equivalent causes the corrected test results to diverge as the raw test results approach zero, rather than converge. There is enough data available to suggest that some of the other test methods do not produce equivalent results. So if the EPA stays with its choice of M5G-3 (ASTM E2515) as the only reference method, the stoves initially selected for the round robins should have been originally tested with M5G-3 in an EPA accredited test lab. Otherwise, the method-to-method difference in test results and the facility-to-facility differences could easily result in a difference that is greater than the allowed ±10%. 4) Some inherent variability in test results for wood stoves is due to the constant variation in meteorological conditions, e.g., high BP, low BP, high %RH, low %RH, stable versus changing weather conditions, etc., which are beyond anyone's control and are impossible to duplicate. It is known that meteorological conditions, especially BP, affect test results, particularly dry burn rate. 5) Unless each lab is given a concise set of installation and operating instructions that provides the information listed below and reflects exactly how the lab that did the original certification testing installed the stove and what the lab did when operating the stove during each certification test, the round robin process will not be a level playing field because the lab that performed the original certification tests can use the information in the report as a reference and duplicate exactly what they did when they set up and prepared the stove for each certification test. The other labs, not having access to the information in the test report, will be at a major disadvantage and will have to figure out what to do in terms of "pounds up", start Delta T temperatures, fuel load weight, coal bed weight, etc. Without that information, the chances of matching the certification test series weighted average ±10% are slim at best.

Commenter (1486) suggests the following round robin test information:

> Chimney height: Black pipe height, Class A height and manufacturer
> Dilution tunnel induced draft, if any.
> Burn Category Info
> Primary Air Setting
> Lbs. of fuel per warm up fuel charge
> Dimensions of pieces used in the warm up fuel charges.
> Number of warm up fuel charges
> Lbs. of charcoal put back in the stove after the scoop
> Test Fuel Load Weight, length and moisture content
> Lbs up - weight of coals in stove above the upper end coal bed weight when air control(s) were adjusted to the run setting
> Fan Setting
> What lab did at test start with door, air controls, fan, etc.
> BP on day of test.
> Lab ambient at test start
> Start Delta T temps, stack temp and static.

Commenter (1486) asks why a lab has to repeat the entire round robin test series if the final results are either greater or less than ±10%. Commenter (1486) suggests the lab should be able to

do the necessary extra runs to replace the problem run(s) and bring the weighted average into spec rather than have to repeat the full 8 run test series. Commenter (1486) asserts this is what is allowed during certification testing where a manufacturer can replace one or more runs with one or more runs to reduce a stove's weighted average. Commenter (1486) also questions why, if a lab's results are <±10%, they should have to repeat anything—maybe the lab did a better job than the original lab. Not having to do any more testing if test results are better than the original results is what the commenter (1486) states is presently allowed for confirmation tests.

Commenter (1486) questions how labs will know that the stove being circulated in a round robin is actually within the stated specs in the "K-list" for the certified model line unless a list of the critical components and measurements is supplied to each lab. Commenter (1486) also questions how EPA arrived at the ±10% criteria and would like to see the data set that suggests that this kind of repeatability is possible.

Commenter (1486) also asserts that the existing round robin data set from tests done on EPA certified stoves clearly indicates that the weighted average is not even close to ±0.13, ±0.25 or even ±1.0 g/hr. Commenter (1486) states their lab "staged' one half of a round robin test series, successfully showing that the variability was much higher than ±1.0 g/hr for tests on the same stove that were valid in terms of all the test method criteria, yet had emission rates that were substantially different because of variations in parameters like start Delta temperatures, etc. Commenter (1486) also cites the Colville Demonstration showing that the repeatability of test results was significantly higher than ±10% or ±1.0 g/hr.

Commenter (1486) suggests the EPA fund a study where a minimum of 13 runs are done at each of 4 different specified primary air settings that produce dry burn rates of Low, M Low, M Hi and Hi with a set of detailed operating instruction on a catalytic and noncatalytic stove at one or more labs. Commenter (1486) believes this would go a long way towards really establishing what the repeatability and reproducibility of the wood heater test methods actually are.

Response:

Several commenters address the schedule and process for proficiency testing. For this final rule, we retain the biennial proficiency testing requirement, but we intend to focus such testing on models designed to meet future cord wood test methods that are intended to be more representative of in-home use. We will rely on the ISO accreditation process for the approved laboratories to provide the quality assurance oversight we are seeking on an on-going basis, as described in our *Section 2.12.14 through 2.12.17* responses.

Commenters raise a good point that any wood heater circulated for testing should be verified to be in compliance with the "k" list criteria. See also our response in *Section 2.12.12*. Other ideas provided by the commenters may be considered in the next NSPS review, as we re-assess proficiency testing requirement needs.

Other commenters address the relationship between proficiency testing and the repeatability and reproducibility of the wood heater test methods. As we develop new cord wood methods to better

represent emissions expected during in-home use, looking at these issues is an important task. We note that we have relaxed the proficiency test measure to ±1 g/hr or 10 percent, whichever is higher. As the test methods and stove designs improve, achieving this level of proficiency is obtainable, as shown by the last several years of compliance with the Washington state standards. A true test of precision would be to test a stove without knowing what the certification level is, which is not feasible in this program. For more discussion of test method variability and our response, see *Section 6.1.3*.

2.13.16 Comment: Consequence of failing to participate in proficiency testing

Commenter (1171) requests clarification on the EPA's actions, related to § 60.535(b)(1)(iv), if a laboratory were to accidentally miss participation in one proficiency testing "round", either at fault (e.g. not submitting results on time) or not-at-fault (e.g. the proficiency testing provider does not ship the participating lab a sample for testing in time for results to be gathered). Commenter (1171) recommends a two-miss limit with the requirement to notify the EPA of the first missed participation (and subsequent corrective action), which would allow the testing laboratory two opportunities to participate if found to be not negligent in their participation.

Response:

The proficiency testing program is simple to implement and the changes suggested by the commenter seem to address an extremely hypothetical concern. No changes have been made.

2.13.17 Comment: Proficiency testing conflict of interest concerns

One commenter (1171) supports the use of Proficiency Testing (PT) but is concerned with the language used in the proposed rule, "use of accreditation and auditing bodies that …. administer a laboratory proficiency program." Commenter (1171) asserts that Accreditation Bodies (ABs) are typically not permitted to offer services offered by their clients; for example, if an AB were to offer accreditation to ISO/IEC 17043 (for PT providers), that AB is not permitted to administer any PT programs. Additionally, commenter (1171) states rarely, if ever, does a testing laboratory also administer a PT program. Commenter (1171) recommends that the EPA require participation in an independently operated PT program with no direct ties to the testing laboratories participating in the EPA program. As ISO/IEC 17043 is relatively new, commenter (1171) recommends that the EPA consider the benefits of requiring a PT provider to be accredited to ISO/IEC 17043; if no such accredited providers exist, it may benefit to investigate any changes in the PT provider "marketplace" to see if any providers gain accreditation.

Response:

The final rule incorporates the commenter's recommendation to require participation in an independently operated PT program with no direct ties to the testing laboratories participating.

2.13.18 Comment: Conflict of interest and enforcement concerns overall

Commenter (1487) opines that the proposed conflict of interest requirements do not fully cover the range of conflicts (or appearances of conflict) that might arise between laboratories, certifying entities, and manufacturers. The commenter (1487) suggests that the EPA issue guidance or clarify in its regulation that past or present personnel relationships with device manufacturers, past or present ownership or investments in device manufacturers, and control relationships are to be reviewed as part of the accreditation process. The commenter (1487) further recommends that the EPA consider requiring manufacturers to alternate laboratories and certifying entities on a regular basis (e.g., every two to three years).

Commenter (1551) recommends that the EPA only accept test results conducted at accredited third-party labs and urges EPA to adopt procedures to ensure that the manufacturer plays no role in certification testing. Commenter (1551) adds that, to ensure the ability to conduct compliance assurance activities and enforcement, all tests must be conducted in the U.S. because the EPA lacks authority to take enforcement actions against foreign labs that conduct NSPS tests.

Response:

The safeguards inherent to the ISO accreditation and third-party certification process should address the concerns raised by commenters. As noted above, the final rule clarifies that laboratories that perform R&D design services for a given model in the last 5 years are prohibited from conducting a certification test for that model line.

2.14 Labeling and Owner's Manual Requirements

2.14.1 Comment: Permanent labels - General

Support and suggestions:

Commenters (1239, 1355, 1397, 1423, 1463, 1465, 1487, 1513, 1538, 1545, 1570, 1640) support the use of permanent labels. Commenters (1239, 1355) agree with the use of permanent labels and any additional information that will help consumers make informed decisions about the wood heaters that they purchase. Commenter (1463) notes the importance of having permanent labels readily visible to allow for confirmation that units meet applicable standards. Commenters (1463, 1570) note that the permanent label is useful for consumer awareness, for changeout programs, for local governments developing ordinances, and for regulatory agencies ensuring the standard is being met.

Commenters (1397, 1487, 1511) state the label should be prominently displayed and contain both emissions and efficiency numbers. Commenter (1487) opines that offering these facts solely online deprives certain purchasers of data relevant to their future welfare. Commenter (1397) states that displaying this information is especially crucial during the period from rule promulgation through Step 2 and will assist state and local regulators. Commenter (1465) states that to the greatest extent possible, permanent labels should use plain language and a minimum font size of 10. Furthermore, commenter (1465) states permanent labels should specify whether

the appliance is designed for indoor or outdoor use, specify the manufacturer, model, serial number, manufacture year, EPA-certification and/or expiration dates, maximum thermal output rating, and refer to the owner's manual for proper operation and maintenance. Commenter (1545) recommends that permanent labels also show average weighted emissions rates plus Burn Category IV (full-load) emissions rates and thermal efficiency as tested at full load firing rates (both under the Step 2 common test method).

Commenter (1570) also believes the EPA should include best burn practice requirements or adjustments (e.g. chimney height and draft specifications, moisture content of wood and limits on visible emissions) on appropriate labeling to ensure proper operation. Commenter (1570) states having these requirements on labeling will allow consumers to better identify and understand how to properly install and operate their appliance as well as provide state and local agencies an easier method of enforcing requirements.

Commenters (1423, 1538) support making the label more visible so, for instance, fireplace inserts do not have to be pulled out of their enclosure to verify their certification status. The commenters (1423, 1538) add that the permanent label lacks specificity about the certification status of the appliance, which can be problematic during stove changeout programs, where agencies are trying to easily identify uncertified or older certified units for replacement, or in places like Oregon, where uncertified unit must be removed upon the sale of the home. Commenter (1423) states should be corrected in the future through more specific information on the permanent label.

Commenter (1558) states the EPA must also require that $PM_{2.5}$ emission levels be available to consumers prior to purchase, graphically comparing this level with the level required by law in the NSPS. Commenter (1558) believes this information must include a warning on the harmful effects of breathing $PM_{2.5}$, similar to the warning on consumer cigarettes, permanently affixed to the device. Commenter (1558) adds that the EPA must annually review manufacturer web sites to discover and mitigate false advertising and provide a website or online form to report consumer fraud or problems with EPA-certified solid-fuel burning devices.

Commenter (1570) suggest that the EPA should assess appropriate fines to ensure manufacturers and/or retailers use only relevant certification test data and do not exaggerate performance claims.

Opposition and concerns, including regarding cut-off dates implied in § 60.536(b):

Commenters (1396, 1436) generally oppose permanent labels. Commenter (1436) opposes permanent labels because a label visible during sale and installation is adequate. Commenter (1436) states that, if used, the "permanent label" should have more data on it, though contends this information can just as easily be in the manual; and manuals are available forever, on line. Commenter (1396) opposes wood stove permanent labels containing language requiring homeowners to cease using a wood stove certified to the Step 1 standard after the effective date of the proposed Step 2 (and 3) standards. Commenter (1396) hopes this language [in § 60.536(b)] is a simple mistake that will be corrected by the EPA. Commenter (1396) states the

economic impact to manufacturers would be devastating and that they would not manufacture nor sell (or consumer be willing to buy) a wood heater that had a maximum five year lifespan.

Commenter (1546) likewise points to a perceived conflict between the provisions in § 60.532(a) which allows heaters certified to 1990 PM standards to remain certified until their certificates expire or are revoked and the labeling requirements specified in § 60.536(b) that imply the certification is invalid 6 months after the effective date. The commenter (1546) adds that a consumer that has purchased and installed such a labeled stove may assume he or she is legally barred from operating this new stove after 6 months of use.

Commenters (1543, 1550, 1643) have no objection to the EPA continuing its use in the revised regulations as a compliance tool but notes that permanent labels serve the limited purpose of communicating the compliance status of affected appliances only and they do not establish new requirements. The commenters (1543, 1550, 1643) assume that, since nowhere in the proposal does the EPA even hint at proposing to establish cut-off dates for the use of affected appliances, the language in question [in § 60.536(b)] is a mistake that will be corrected. The commenters (1543, 1550, 1643) state that nothing in section 111 would authorize this radical step, and even assuming it did, it is obvious the economic impacts would be catastrophic because no one would spend thousands of dollars to purchase an appliance, knowing it could only be used for a few years.

Commenters (1543, 1547, 1550, 1643) furthermore state that requiring the permanent label to be visible after installation is infeasible for some appliance types that are used in household living areas (e.g., a certified fireplace insert installed in a family room) and such a display requirement should be changed to state "where feasible." The commenters (1543, 1550, 1643) add that the permanent label may be a tool to document the use of complying heaters that may be required by state and local rules and/or to determine the unit's applicability to any future changeout programs, that information may be obtained in other ways, such as in owner's manuals and on manufacturer websites.

Response:

In the proposed rule, the EPA solicited comment on ways to improve the delivery of information on the permanent label. We received numerous comments concerning the use of permanent labels, with many commenters supporting the continued use of permanent labels. The EPA has determined that permanent labeling is an important enforcement tool and is also useful in changeout programs. In the final rule, we are continuing to require that each room heater under subpart AAA and central heater under subpart QQQQ be equipped with a permanent label consistent with the PM emission limit compliance dates in this rule. The permanent labels must contain: the month and year of manufacture of the individual unit; the model name and number; the certification value, test method, and standard met; and the serial number. This information will further aid consumers in their selection of a wood heating device.

The permanent label must be installed so that it is readily visible both before and after the unit is installed. This requirement is needed to assist state, local and tribal officials in determining if a

unit complies with state, local and tribal rules and in determining eligibility for any future changeout (replacement) programs. Note that "readily visible" does not mean under the body of freestanding stove but it does allow an easily removable decorative façade to cover the label.

Regarding the request that PM emission levels be available to consumers prior to purchase, the EPA's OECA and Burn Wise websites will list this information. Regarding the comment suggesting a health warning on the label, the EPA notes the space limitation on the label and also notes that EPA's Burn Wise website includes a Health Effects webpage which discusses the harmful effects of wood smoke (http://www.epa.gov/burnwise/healtheffects.html**)**. Regarding the comment concerning the cutoff date and legal use of existing heaters in homes, the EPA notes that this is a sales to consumers date cutoff, not a consumer usage date cutoff. This NSPS will not affect heaters already in use in people's homes; such an action is open to state, local, and tribal governments, but is not a required part of this federal rule.

2.14.2 Comment: Central heater permanent labels

Hydronic heaters:

Commenter (0948) offers several suggestions to improve the hydronic heater permanent label requirements:

- If multiple methods are used, the label should include a table with each method and the rating. If it was not evaluated under a certain method, the entry should be blank.
- A statement that fuel quality can significantly impact product performance.
- Guidelines that visible smoke, with few exceptions is a sign of poor operation.
- Sizing is very important and will impact product performance. Good sizing practices should be undertaken via an energy audit.
- Output must be clearly specified.
- For the U.S., efficiency can only be stated using the higher heating value.
- Identify if thermal storage is required.

Furthermore, commenter (1558) asserts that the EPA should require a warning to consumers, of the known and potentially fatal hazard from excessively high CO emissions, on a permanent label affixed to the hydronic heater and in owner's manuals. Since it is known by the EPA that many consumers place OHH in shelters and buildings, commenter (1558) believes this label must also be on outdoor units. Commenter (1397) believes permanent labels should include EPA emissions and efficiency.

Commenter (1558) states manufacturers should not be allowed to claim that a hydronic heater is "90% cleaner" without complying with the EPA's requirements as stated in the January 31, 2014 letter to manufacturers to specify the model and parameter that is "90% cleaner" than older models.

Commenter (1558) believes that, until operator variables can be controlled, the EPA must provide nuisance enforcement tools to local and state government by requiring that no person shall operate a hydronic heater in such a manner as to create a nuisance. Commenter (1558)

asserts this requirement must be permanently affixed on the hydronic heater and be published on EPA's web site, in hydronic heater operator manuals, and in manufacturers' promotional materials.

Forced-air furnaces:

Commenters (1543, 1549, 1550, 1643) suggest that grandfathered furnaces (*see Section 4.4.3*) have permanent labels that include both the safety listing and the CSA B415.1-10 listing.

Response:

While the EPA appreciates suggestions for further information to be included on permanent labels, we have determined that the inclusion of additional information would be impractical and overly detailed due to the space limitations of the label. EPA notes that the Burn Wise website (http://www.epa.gov/burnwise/index.html) and EPA's Compliance Monitoring website (http://www.epa.gov/compliance/monitoring/programs/caa/woodheaters.html) include such information. Regarding efficiency, Appendix I of the final rule requires that owner's manuals must describe how the efficiency was determined (e.g., use higher heating value of the fuel instead of lower heating value of the fuel, discuss sweet spot versus annual average versus annual fuel usage efficiency [AFUE]). Concerning safety testing, furnaces listed under CSA B415.1-10 are required to obtain a furnace safety listing per ANSI/UL-391 Standard for Safety for Solid-Fuel and Combination-Fuel Central and Supplementary Furnaces and/or CSA B366.1 Standard for Solid-fuel-fired Central Heating Appliances. EPA agrees with the comment that such furnaces include both the safety listing and the CSA B415.1-10 listing.

Regarding usage nuisance enforcement tools, we are not setting specific nuisance conditions in this final rule. However, the NSPS requires the owner to install, maintain and operate the wood heater properly and follow the instructions in the owner's manuals. The owner's manuals are required to instruct the user on proper operation (including proper draft and prohibited fuels) and follow all state, local and tribal requirements (such as stack heights, location and proper operation to avoid nuisance conditions). We encourage state, local and tribal jurisdictions to use observation of visible emissions as an indicator of potential improper operation. In addition, we emphasize that operators should note that some state, local and tribal jurisdictions have limits, prohibitions and other requirements beyond the NSPS that must also be followed. Finally, this final rule allows the EPA to approve state requests for delegation of enforcement authority for these NSPS requirements. We expect many state, local and tribal authorities will develop site-specific installation and operating requirements to ensure heaters are not over-sized, avoid nuisance conditions, and ensure proper operation.

2.14.3 Comment: Temporary hangtags - General

Support for removal of hangtags:

Commenters (1436, 1543, 1550, 1632, 1643) generally support the removal of hangtags. Commenters (1543, 1550, 1643) state that they have been a minor headache for retailers because of their tendency to become separated from the appliance on the sales floor, requiring the

necessity to maintain supplies of replacement hangtags. Also, the commenters (1543, 1550, 1643) assert that experience has shown that instead of assisting consumers in making informed purchases, hangtags often confuse them. The commenters (1543, 1550, 1643) believe that the EPA is correct in concluding that hangtags have become obsolete with the advent of the internet and its widespread use among consumers. Commenter (1436) believes customers will not pay attention to visible hangtags and will likely remove them as unsightly. Commenter (1436) believes a label visible during sale and installation is adequate. Commenter (1632) believes that the removal of the tag on the stove would not impact the consumer's ability to select heaters as they are already getting this information elsewhere.

Opposition to removal of hangtags and suggestions for content:

Commenters (1192, 1397, 1423, 1463, 1465, 1468, 1487, 1503, 1511, 1513, 1529, 1538, 1562, 1591, 1640, 1665) support the continued use of hangtags as a simple, effective tool for the customer to quickly and simply compare wood heating equipment and the cost savings to be realized through more efficient units and emissions performance. Commenter (1529) supports including efficiency and BTU output (as measured by a 3rd party test lab) on the hangtags. Commenter (1463) notes that hangtags will help drive the production of cleaner and more efficient units. Commenters (1463, 1487, 1503, 1562) state that relying on a website alone to transmit this information is insufficient because many rural households still do not have access to the internet, making test data available on the EPA website may only be confusing to some customers, and some customers may not even realize what material can be found on the website.

Commenter (1468) strongly opposes the elimination of the current hangtag requirement, which provides a clear and permanent label for consumers to know that their heating device is EPA-certified. This commenter (1468) conducted three rounds of wood stove changeout incentive programs and relied on EPA hangtags to help consumers and installers clearly identify which stoves are EPA-certified and which stoves are not. Commenter (1468) notes that clear labelling both at point of sale and during the lifetime of the device is critical for consumer awareness of the benefits of EPA certification.

Commenter (1430), representing over 4,385 petitioners, supports full disclosure to consumers of all test results on hangtags including efficiency ratings, particulate emissions and CO emissions for each appliance. Petitioners of comment (1430) believe that this information should be easy for consumers to find on the hangtag and that publication of test results will lead to stoves that are cleaner and more efficient. Commenter (1583) desires full disclosure of test results because it will produce competition for high performance stoves. Regarding the petition (above) which yielded about 4,500 signatures and hundreds of personal comments in just over a month, commenter (1583) notes that by far the best response they had was to emails about full disclosure of test results via a hangtag, where store shoppers could see it. Commenter (1583) asserts no manufacturer will want to be in the statistical bottom half if complete results are posted for cribs and cord wood, and for efficiency, CO emissions, and particulate emissions. Furthermore, commenter (1583) states for consistency and continuity, the EPA should specify the number of decimals that efficiency and emissions numbers are rounded to, especially on the "locked" spreadsheets.

Commenter (1665) states that, although they support the continued use of hangtags, the current tag creates confusion in the market place. The commenter (1665) recommends that the hangtags be reduced in size by 33%, and should include data on weighted grams per hour and actual thermal efficiency. The commenter (1665) opines that, by including their suggested data elements, there would likely be a reduction in misleading and less than credible claims on brochures and other manufacturer sales materials.

Commenters (1192, 1397, 1503, 1513, 1640) state tags should include actual emissions (not blunt arrow), actual overall efficiency (not a default value) and maximum (not partial) BTU output (as determined by the test lab as part of certification testing), with consideration given to allowing placement of these tags on the top, or sides or front of stove, similar to ENERGY STAR tags on other appliances. Commenter (1463) supports the use of hangtags at the time of sale that provide accurate, easy-to-read information in a visible location and include each unit's efficiency and tested emission levels in comparison to the levels established in the standard. Commenter (1487) urges EPA to include accurate and meaningful information on temporary hangtags for all wood heaters covered under the NSPS and provides specifics on the type of information that they believe should be included (e.g., the hangtag should include cost savings over 5 years). Commenter (1538) adds that while this information can be made available without labeling appliances, its availability at the point-of-sale will make it easier for consumers to select the cleanest burning, most efficient heater that is appropriately sized for their heat load.

Commenter (1465) believes the EPA should require hangtags for consumer education of appliance thermal efficiencies, Annual Fuel Utilization Efficiency (AFUE), proper sizing using the Air Conditioning Contractors of America's (ACCA) Manual J residential load calculations and to warn about fire and asphyxiation (CO) hazard should the appliance be inappropriately installed, operated or maintained. Commenter (1465) adds that the hangtag for pellet-burning appliances should recommend exterior storage of pellets due to CO off-gassing.

Commenter (1591) states hangtags should be mandatory and contain the following:

- Emission rate – delineated by g/hr for all appliances based upon real world test methods (cord vs. crib), with hydronic heater results based upon the State of Washington test method so emissions are real world;
- Heating Range (for correct sizing);
- Overall Thermal Efficiency rating (percentage);
- Carbon Dioxide – highest emission spike during any individual run, g/hr;
- Manufacturer and model of heater;
- Particle pollution – highest emission spike during any individual test run, g/hr;
- Improper Fuels notice – use of improper fuel voids manufacturer warranty; and
- Nuisance Prohibited notice – heater operator is responsible for complying with all laws for hydronic heaters, and no person shall operate a hydronic heater in such a way as to create a nuisance.

Commenter (1503) states that manufacturers and retailers should be required to immediately stop displaying "default" efficiency numbers on tags or other advertising materials because these

default factors are often grossly inaccurate, and are misleading to consumers. The commenter (1503) states that where actual efficiency numbers are not available for a stove based on data from a their previous certification tests, manufacturers and retailers should be required to state that the efficiency of the stove has not been tested and is not known. The commenter (1503) states that this requirement will provide more accurate information to consumers who are searching for a more efficient stove and will lead to more purchases of less polluting, more efficient devices. The commenter (1503) adds that to avoid misleading consumers further, the EPA should also remove the "default" emission factor column from its posted list of certified wood stoves.

Response:

In the 1988 NSPS, temporary labels (*e.g.*, hangtags) were required for wood heaters that are subject to the standards, as well as ones that are not (*e.g.*, coal heaters/stoves). These temporary labels were intended to assist consumers in comparing different appliance models and to inform the consumer about the importance of proper operation and maintenance. We proposed to remove the requirement for temporary labels, and we requested comment. After reviewing the comments received, the EPA now concludes that these temporary labels are most valuable if they assist purchasers in identifying the cleanest and most efficient heaters. Therefore, in this final rule the EPA is allowing manufacturers to apply a temporary NSPS label (hangtag) for each adjustable burn rate heater, single-burn rate heater, pellet heater/stove, hydronic heater and forced-air furnace sold at retail that meets the Step 2 PM emission limits before the Step 2 PM emission limit compliance date. This temporary label requirement would end upon the Step 2 PM emission limit compliance date.

In addition, we are providing an alternative compliance option for manufacturers of adjustable burn rate stoves, single-burn rate stoves, pellet stoves or hydronic heaters who choose to demonstrate compliance with Step 2 emission limits using cord wood testing rather than the standardized crib wood testing currently used as the primary compliance requirement. Each of the compliant models would be equipped with a permanent label and, at the discretion of the manufacturer, a special voluntary temporary label (hangtag) informing consumers that the wood heaters were tested and certified when burning cord wood. For forced-air furnaces, we already specify the use of cord wood for the certification tests (because forced-air furnace certification tests will be conducted according to CSA B415.1-10, which has specified cord wood as the test fuel since 2010). Manufacturers will receive an electronic template for the new voluntary temporary hangtag when a model is certified.

Regarding efficiency and test results, we agree with one commenter's concern regarding full disclosure of all appliance test results and note that the rule specifies an efficiency protocol (based on the higher heating value) and requires efficiency reporting. Efficiency results must be provided on the temporary hangtags and will be available online on EPA's Compliance Monitoring (OECA) website, on EPA's Burn Wise website and on each manufacturer's website. Furthermore, Appendix I of the final rule requires that owner's manuals must describe how the efficiency was determined (e.g., use higher heating value of the fuel instead of lower heating value of the fuel, discuss sweet spot versus annual average versus annual fuel usage efficiency

[AFUE]). Owner's manual must also include a recommendation to have smoke monitors and a recommendation to have CO monitors for areas that are expected to generate CO (e.g., heater fueling areas, pellet fuel bulk storage areas, sheds containing hydronic heaters). The rule also requires that a prohibited fuels list is required to be in each user's manual.

We are not requiring detailed nuisance warnings and proper sizing notices on the temporary labels. However, the NSPS requires the owner to install, maintain and operate the wood heater properly and follow the instructions in the owner's manuals. The owner's manuals are required to instruct the user on proper operation (including proper draft and prohibited fuels) and follow all state, local and tribal requirements (such as stack heights, location and proper operation to avoid nuisance conditions). We encourage state, local and tribal jurisdictions to use observation of visible emissions as an indicator of potential improper operation. In addition, we emphasize that operators should note that some state, local and tribal jurisdictions have limits, prohibitions and other requirements beyond the NSPS that must also be followed. Finally, this final rule allows the EPA to approve state requests for delegation of enforcement authority for these NSPS requirements. We expect many state, local and tribal authorities will develop site-specific installation and operating requirements to ensure heaters are not over-sized (e.g., based on ACCA's Manual J residential load calculations), avoid nuisance conditions, and ensure proper operation. EPA's Burn Wise website also provides instructions for proper burning and encourages proper sizing by a professional.

2.14.4 Comment: Hydronic heater temporary hangtags

Commenter (1541) states that the hangtag should give a clear and concise overview of the boilers thermal output and emissions ratings so consumers can make informed choices. Commenter (1640) thinks it would be helpful to have an emissions and heating capacity comparison between hydronic heaters and wood stoves so that the consumer would be able to make informed choices when trying to decide how to heat their home.

Commenter (1488) requests that the hangtag (label) for hydronic heaters properly inform consumers and operators and that the information also be made available online. The commenter (1488) requests that the following key metrics be included:

- Thermal efficiency rating – percentage
- Particle pollution – highest emission spike during any individual test run, g/hr
- Carbon monoxide – highest emission spike during any individual test run, g/hr
- Improper fuels notice – use of improper fuel voids manufacturer warranty
- Nuisance prohibited notice – no person shall operate a hydronic heater in such a way as to create a nuisance.

Response:

As noted in the previous response to comments, we are allowing manufacturers the option of applying voluntary temporary labels (hangtags) on wood heater models meeting Step 2 PM emission limits before the compliance date that would sunset upon that date. We are also allowing the application of voluntary hangtags on adjustable burn rate stoves, single-burn rate

stoves, pellet stoves and hydronic heaters, at the discretion of the manufacturer, to indicate models that meet the alternative Step 2 PM emission limit using cord wood instead of crib wood. For forced-air furnaces, we already specify the use of cord wood for the certification tests (because forced-air furnace certification tests will be conducted according to CSA B415.1-10, which has specified cord wood as the test fuel since 2010). More detailed information concerning all certified wood heater appliances and their emissions will be available on EPA's Burn Wise and Compliance Monitoring websites and on manufacturer websites. See our response above in *Section 2.14.3* regarding requests for efficiency, CO, improper fuels and nuisance prohibitions on the temporary hangtags.

2.14.5 Comment: Owner's manuals – General

Requiring installation and operation consistent with owner's manual:

Commenters (1543, 1550, 1643) state that the EPA must continue to rely on owner's manuals to guide consumers on proper installation practices and operating procedures, including the prohibition on certain fuel types and voiding of the warranty for operating in a manner inconsistent with the manual. However, commenters (1521, 1543, 1550, 1643) do not support the inclusion of best burn practices or adjustments to help ensure proper operation (e.g., chimney height and draft specifications, moisture content limits or visible emission limits) in the NSPS. First, the commenters (1543, 1550, 1643) state, such specific work practice requirements are not authorized under section 111, in light of EPA's issuance of numeric performance standards applicable to all appliances covered under this rulemaking. Second, the commenters (1543, 1550, 1643) state, the federal enforceability of manufacturers' appliance-specific installation and operation instructions [in the owner's manual] is really the best and only way of ensuring proper use, taking into account inevitable appliance-specific variation in product design and operating issues. The commenters (1543, 1550, 1643) believe that by broadly regulating the types of information that must be included within manufacturer owner's manuals, and leaving it to manufacturers to "fine tune" installation, operating, and maintenance instructions to fit the unique requirements of particular models as the EPA has done under the current subpart AAA and has continued to do in this proposal, the EPA more than adequately ensures that consumers will have the information they need to operate covered appliances in a way consistent with promulgated emissions standards.

Likewise, commenter (1487) supports EPA's proposal to continue current requirements that the owner or operator of a new wood heater operate the heater consistent with the owner's manual. Furthermore, commenter (1487) urges the EPA to consider requiring retailers and manufacturers to notify consumers of the NSPS requirements for proper operation. The commenter (1487) believes that advising individuals of the NSPS owner/operator requirements at the time of purchase is an easy step for manufacturers and retailers and will lead to a greater likelihood of proper use.

Commenter (1521), on the other hand, argues that the EPA's requirement that "[a] person must not operate an affected residential wood heater in a manner inconsistent with the owner's manual", and that the manual must "clearly specify that operation in a manner inconsistent with the owner's manual would violate the warranty" is not enforceable. The commenter (1521) also

asserts that such requirements are not appropriate for an NSPS and that it interferes with the private contract between the owner and the manufacturer.

Suggestions for owner's manual content:

Commenter (1572) states that the EPA should rely on its website to post important information for consumers and assume that businesses will be professional enough to include important information for running the appliance properly and using best burning practices since we are all looking to the future health of our businesses.

Commenter (1503) suggests that owner's manuals should be required to include information about optimum operating temperatures, thermometer location, proper air control regulation, wood moisture testing and proper annual maintenance. Commenters (1397, 1503) suggest owner's manuals should include actual efficiency and emissions that match the device certificate. Commenter (1176) recommends using the Owner's Manual for items such as firebox size, chunk size and coal bed size.

Commenter (1465) recommends manuals:

- specify that wood heaters need to be properly-sized (Manual J) for optimum efficiency and installed, operated and maintained according to manufacturer's recommendations;
- include user information about optimizing combustion and dispersion by providing recommendations for "best practices" including the use of dry, split, seasoned wood, not over-filling the combustion chamber, and installation of sufficient exhaust stack height to reduce air impacts;
- educate consumers that visible smoke represents lost fuel heat value and decreased appliance efficiency which poses a health hazard, and that consumers experiencing difficulty minimizing smoke emissions should consult with manufacturers;
- recommend the use of smoke and CO detectors in the home and include a schedule of recommended maintenance (e.g., replacing catalysts, chimney cleaning, etc.);
- for outdoor installations of hydronic systems, recommend use of insulated conduits and minimal siting distances from structure served to reduce heat losses in distribution lines; and
- include numerical results for parameters measured (PM, CO and efficiency) in certification tests.

Commenter (1397) suggests owner's manuals for wood stoves contain instructions on how to construct top down burns that reduce startup emissions. Further, commenter (1397) asserts owner's manuals should not be allowed to mislabel products, i.e. calling a qualified wood heater a coal stove or cook stove, nor should wood stove inserts be labeled as fireplaces. In addition to listing the EPA emissions and efficiency values, commenter (1397) suggests manuals contain instruction to visually check for emissions as an aid to proper stove operation.

Commenter (1397) also believes owner's manuals should state the chimney height necessary for proper draft and operation; especially crucial for mobile home where a short chimney can prevent proper drafting. Commenter (1436) states that pellets have as much variability as wood

and that chimney height and draft are difficult to manage variables and suggests clearer information in the manual would be good. Commenter (1436) asserts that most complaints that come back to them concern the chimney.

Regarding § 60.536(f) & (f)(2), commenter (1397) states owner's manuals should clearly state EPA emissions and efficiency next to model name.

Commenter (1665) opines that, although there is specific reference to consumers having to inspect their catalytic element 3 times annually, there is no statement that consumers need to inspect their noncatalytic appliances to make certain all parts are in good, operating condition 3 times annually. The commenter (1665) states that all solid fuel heaters must be treated equally in testing and consumer maintenance.

Response:

We have revised the rule to clarify that the current requirement to operate according to the owner's manual continues to include a list of prohibited fuel types that create poor or hazardous combustion conditions and include operation of pellet fuel appliances only with the specified grades of pellet fuels. Appendix I of the final rule requires that owner's manuals must also include: recommendations about building and maintaining a fire, especially for cold starts and the effectiveness of the top-down approach for starting fires; the importance of proper draft; instruction on proper use of air controls; instruction regarding ash removal and disposal; instruction on gasket replacement; and a warning against overfiring. The rule also requires that the owner's manuals include: a description of how the efficiency was determined (*e.g.*, use higher heating value of the fuel instead of lower heating value of the fuel, discussion of sweet spot versus annual average versus annual fuel usage efficiency [AFUE]); how operation and fuels affect efficiency (*e.g.*, seasoned wood versus high moisture fuel; operation at sweet spot versus low-burn rates); and how location affects the efficiency (*e.g.*, in main living area versus basement versus outdoors in sub-freezing temperatures). Owner's manuals must also include a recommendation to have smoke monitors and also CO monitors for areas that are expected to generate CO (e.g., heater fueling areas, pellet fuel bulk storage areas, sheds containing hydronic heaters). Regarding catalysts and catalytic stoves, the owner's manual must provide clear descriptions of symptoms and remedies to common combustor problems. It is recommended that photographs of catalyst peeling, plugging, thermal cracking, mechanical cracking, and masking be included in the manual to aid the consumer in identifying problems and to provide direction for corrective action. The owner's manual must also provide clear step-by-step instructions on how to remove and replace the catalytic combustor, including diagrams and/or photographs.

As noted in the preamble to the final rule, the current 1988 standards already include the requirement that the owner or operator must operate the heater consistent with the owner's manual and not burn improper fuels. Stoves which are not designed to burn wood (*e.g*, coal-only or corn-only stoves) will need to be labeled that they are not approved under the wood heater standard and that it is illegal to operate them with wood. Manufacturers typically void their warranties in cases of improper operation. Numerous states expressed their support for the continuation of these requirements. Some states and local jurisdictions have enforced similar

requirements, and the final rule will allow delegation of enforcement authority of these NSPS requirements upon the EPA approval of state requests.

While the EPA will not review the owner's manuals for pre-approval, manufacturers will be required to submit to OECA a link to the owner's manual on that manufacturer's website. Regarding the federal enforceability of manufacturers' appliance-specific installation and operation instructions, the EPA will prioritize resources for enforcement as appropriate.

2.14.6 Comment: Hydronic heater owner's manuals

Commenter (1558) believes that, until operator variables can be controlled, the EPA must provide nuisance enforcement tools to local and state government by requiring that no person shall operate a hydronic heater in such a manner as to create a nuisance. Commenter (1558) asserts this requirement must be permanently affixed on the hydronic heater and be published on EPA's web site, in hydronic heater operator manuals, and in manufacturers' promotional materials. Several commenters (1488, 1558, 1591) request that owner's manuals for certified hydronic heaters and all advertising and promotional materials be required to add a warning message similar to the following:

> *This hydronic heater needs periodic inspection and repair for proper operation. It is against federal law to operate this hydronic heater in a manner inconsistent with operating instructions in the manual. Hydronic heaters must produce no visible smoke, except for three minutes in any 30-minute period. No person shall operate a hydronic heater in such a manner as to create a nuisance. Improper use or failure to maintain the hydronic heater may cause nuisance conditions. Meeting the distance and stack height recommendations from the manufacturer and requirements in state and local regulations may not always be adequate to prevent nuisance conditions in some areas due to terrain or other factors. The operator of a hydronic heater is responsible for operation in a manner that does not create a public or private nuisance condition.*

Commenter (1558) also states the EPA must require a warning to consumers of the known and potentially fatal hazard from excessively high CO emissions, on a permanent label affixed to the hydronic heater and in owner's manuals.

Commenter (1591) states manufacturers should be required to specify proper fuels in the owner's manual. Likewise, commenter (1488) asserts that manufacturers should be required to specify prohibited fuel types in the owner's manual and to post copies of all certified hydronic heater owner's manuals and warranties. Commenter (1479) supports the addition of language regarding prohibited fuel types such as trash, plastics and yard waste.

One commenter (0948) suggests improving the hydronic heater owner's manual requirements by including a description of the different methods and results. Commenter (0948) also suggests requiring a specific page/section in the manual describing relevant performance information.

Response:

The owner's manual requirements in subpart QQQQ are similar to the guidelines in the EPA's current voluntary hydronic heater program with some improvements. Appendix I of the final rule specifies requirements for the owner's manuals, which are noted above in our response to *Section 2.14.5*. The final rule prohibits a list of fuels and requires that this list be published in the owner's manuals. All suggestions noted above by commenter (1479) for inclusion in the prohibited fuels list are indeed included as prohibited by the final rule. Also, as in the revised subpart AAA for wood heaters/stoves, we are requiring that the user must operate the hydronic heater or forced-air furnace in a manner that is consistent with the owner's manual. For pellet-fueled appliances, the final rule makes it clear that operation according to the owner's manual includes operation only with pellet fuels that have been used in the certification test and have been graded and marked under a licensing agreement with the PFI, ENplus, CANplus or equivalent (after request and subsequent approval by the EPA), to meet certain minimum requirements and procedures for a quality assurance process.

Data show that quality assurance provisions are necessary to ensure that the appliances operate properly such that emissions are reduced as intended. Owner's manuals must contain information pertaining to installation, operation and maintenance that will enable consumers to achieve optimal emissions performance. Regarding one commenter's concerns about availability of warranty information, this is typically included by the manufacturer in the owner's manual. Further, the final rule includes a requirement that manufacturers make current and historical owner's manuals available on their company website. Regarding issues of consumer safety, as noted previously in our responses, this information is also available on the EPA's Burn Wise website (http://www.epa.gov/burnwise/).

Regarding commenters' request that owner's manual include a warning message for hydronic heater users, we agree although the EPA is not setting specific visible emission limits and specific nuisance conditions in this NSPS. The NSPS requires the owner to install, maintain and operate the hydronic heater properly and follow the instructions in the owner's manuals. The owner's manuals are required to instruct the user on proper operation (including proper draft and prohibited fuels) and follow all state, local and tribal requirements (such as stack heights, location and proper operation to avoid nuisance conditions). We lack data to establish a specific visible emissions standard reflective of BSER at this time; however, we encourage state, local and tribal jurisdictions to use observation of visible emissions as an indicator of potential improper operation. In addition, we emphasize that operators should note that some state, local and tribal jurisdictions have limits, prohibitions and other requirements beyond the NSPS that must also be followed. This final rule allows the EPA to approve state requests for partial delegation of enforcement authority for NSPS requirements. In addition, we expect many state, local and tribal authorities will adopt some of the important and very successful strategies in *Strategies for Reducing Residential Wood Smoke* (http://www.epa.gov/burnwise/strategies.html) including developing site-specific installation and operating requirements to ensure heaters are not over-sized, avoid nuisance conditions, and ensure proper operation (e.g., using EPA Method 22 observations of visible emissions as an indicator of potential poor or improper operation) to help ensure healthy air for all.

2.14.7 Comment: Voluntary "cleanest of clean" labeling program

Several commenters (0541, 1397, 1463, 1503) support the EPA's suggested voluntary labeling program for the "cleanest of the clean", and encourage the EPA to develop such a program (in addition to required permanent labels and required hangtags) to promote the development of equipment that goes beyond the regulations and allows consumer choice to further improve efficiency and reduce emissions. Commenter (1545) suggests that the EPA develop a public list of manufacturers and models of hydronic heaters that show the cleanest and most efficient performance as tested under the Step 2 common test method. Commenter (1397) states the EPA should consider teaming with states and interested organizations to develop a green label to feature the cleanest of the clean devices.

On the contrary, commenters (1543, 1550, 1643) believe that such a program is unnecessary because continuing efforts to better educate consumers, both through EPA's Burn Wise program and outside of it, already provide ample means of ensuring that consumers will have the information they need to make intelligent purchasing decisions. The commenters (1543, 1550, 1643) add that, given the well documented precision issues associated with wood heater emissions measurement, and particularly the difficulty in distinguishing between similarly high-performing wood heaters, adding another labeling program (even a voluntary one) atop of permanent labeling and other applicable requirements only reignites confusion, without providing much meaningful new information.

Commenter (1436) suggests recognizing stoves that are simple to operate and have no "gadgets" using a pass/fail test. Commenter (1436) believes any better/best distinction encourages the use of gimmicks and gadgets in testing to create an artificial lab result.

Response:

The EPA agrees there is value in identifying for the consumer (1) which wood heaters already meet the Step 2 PM emission limits prior to 2020 and (2) which wood heaters meet the alternative compliance option for Step 2 PM emission limits based on cord wood as the test fuel. As discussed in previous responses, we are allowing (at the discretion of the manufacturer) the application of temporary labels (hangtags) which will clearly identify these models for the consumer, as well as special (required) permanent labels for heaters meeting the cord-wood alternative compliance option.

Regarding potentially "artificial lab results", as noted in other responses regarding the transition to a cord wood-based standard, the EPA has worked and will continue to work with states, laboratories and manufacturers to develop test methods which reflect typical in-home residential use, including the use of cord wood instead of crib wood as the test fuel. Beyond that, the EPA does not intend to dictate technological innovations in the marketplace by recognizing one technology as superior to another. Rather, we encourage manufacturer to innovate and design cleaner systems and technologies, capable of meeting the emission limits.

2.14.8 Comment: Warranty and durability requirements

Commenters (1551, 1665) support the need for a warranty for all appliance types. Commenter (1665) includes support for their position that there is a need for a warranty for all appliance devices by including excerpts from a hearth.com forum (under "Supportive Documentation For Warranty" attachment).

Commenter (1551) supports creation of a minimum warranty and durability requirements across all devices similar to those required for catalytic units to provide stronger consumer protections for ensuring control devices will last throughout a product's lifetime. The commenter (1551) asserts the current rule has different warranty and durability requirements for noncatalytic and catalytic devices, creating an unequal field of competition for these devices, making it more expensive to manufacture catalytic devices. Commenter (1665) believes that all wood stoves can be abused and, regardless of technology, emissions results can be compromised.

Response:

It is each manufacturer's responsibility to warranty their appliance as appropriate. The final rule requires that the owner's manual clearly specify that operation in a manner inconsistent with the owner's manual would void the warranty. This is required for all appliances subject to this NSPS, whether catalytic or non-catalytic. As in the 1988 rule, we are requiring manufacturers to provide warranties on the catalysts and prohibit the operation of catalytic heaters/stoves without a catalyst. In addition, we are requiring warranties for noncatalytic and hybrid heaters/stoves. We agree that both catalytic and non-catalytic stoves require proper installation and operation and therefore both have warranty obligations. See our responses in *Section 3.3* regarding catalytic versus non-catalytic stove concerns.

2.14.9 Comment: Labeling revisions based on audit results

Commenters (1543, 1550, 1643) state that there should be no need for manufacturers to revise labeling and marketing information (or for the EPA to change certification scores) if audit testing shows that a model line is compliant. The commenters (1543, 1550, 1643) state that the audit testing results could be higher or lower than the results from earlier certification testing, but in either case the data only illuminate what is already known – the range of uncertainty (imprecision) associated with the test method.

Response:

The EPA will handle compliance audit testing issues on a case-by-case basis. The final rule states that if a tested device's emissions exceed the applicable emission limit, then the Administrator will notify the manufacturer that certification is revoked for that model line. In cases where the Administrator issues a notice of revocation, the manufacturer may request a review following the hearing and appeals procedures described in the final rule.

2.15 Recordkeeping Requirements

2.15.1 Comment: Records required under manufacturer's quality assurance program

Regarding proposed § 60.537(a)(4), commenter (1397) states that reports of failed tests must be available to state and local regulators.

Response:

The final rule requires that the quality assurance plan must include a report for each audit under ISO-IEC Standard 17065 and ISO-IEC Standard 17020 that fully documents the results of the audit. The third-party certifier must submit all such reports to the Administrator and the manufacturer within 30 days of the audit. The audit report must identify deviations from the manufacturer's quality assurance plan and specify the corrective actions that need to be taken to address each identified deficiency. Within 30 days after receiving each audit report, the manufacturer must report to the third-party certifier and to the Administrator its corrective actions and responses to any deficiencies identified in an audit report.

For these emissions tests conducted pursuant to the manufacturer's quality assurance program, records (of all test reports, data sheets, laboratory technician notes, calculations, and test results for all test runs, the remedial actions taken, if any, and any follow-up actions such as additional testing) must be maintained by the manufacturer for at least five years, pursuant to § 60.537(a)(4) under subpart AAA and § 60.5479(a)(4) under subpart QQQQ. These records must be made available to EPA upon request and EPA will make non-CBI versions available to state and local regulators upon request.

2.15.2 Comment: Records required of test labs and certifying entities

Regarding § 60.537(b), commenter (1171) recommends that the EPA request copies of the Scope and Certificate of Accreditation for each participating laboratory and certifier as part of the recognition process and consider requirements for resubmitting these when they are extended, renewed, expanded or reduced in size for testing related to this program. Commenter (1171) states that as each accrediting body may operate with slightly different renewal timelines, the EPA should consult with accrediting bodies, labs and certifying entities to determine what is appropriate for ensuring that the EPA is made aware of pertinent changes to each entity's accreditation status. Commenter (1171) notes that ISO/IEC 17011 requires the accrediting body to publicly make available information about the current status of accreditations.

Response:

The EPA has revised the regulatory text of the final rule at § 60.537(b) to require approved test labs and certifying entities (third-party certifiers) to submit their ISO-IEC accreditation credentials to the Administrator. In addition to ISO-IEC accreditation credentials, approved test labs must also submit all proficiency test results to the Administrator, and third-party certifiers

must submit each certification test and quality assurance program inspection report to the Administrator.

2.15.3 Comment: Requirement for test laboratories to seal tested appliances

Commenters (1543, 1550, 1633, 1643) believe that the requirement to seal tested appliances is unnecessary, imposes needless expense on laboratories and should be deleted. According to the commenters (1543, 1550, 1643), to suggest that the sealing requirement serves as a check on the accuracy of design drawings and specifications is flawed because the design drawings that manufacturers submit to the EPA are themselves the foundation for the quality assurance/control program, *not* the actual appliance upon which certification testing is performed. Likewise, commenter (1632) believes there is also no need for the EPA to keep "sealed units," as it is the labs' job to make sure the unit tested is within specifications of the prints provided by the manufacturer. As for the EPA's insistence that a stove must be retested in the same condition as the original certification test, that explanation rests on a fundamentally flawed assumption that emissions retesting is a reliable quality assurance/control tool, according to the commenters (1543, 1550, 1643). Commenters (1543, 1550, 1643, 1647) state that the poor precision of the proposed test methods proves that it is not a reliable or effective quality assurance/control tool, and thus it matters little whether a stove can be retested in precisely the same condition as the original certification test.

Commenter (1647) states that if the EPA adopts the ISO/IEC 17065 process, the requirement to seal the tested appliance is moot as the certification bodies will be responsible for maintaining design and production controls to ensure that certified appliances are accurate reproductions of the tested units. The commenter (1647) adds that they are not aware of a case where a sealed unit was needed to verify design details or to be used for verification tests. The commenter (1647) states that this requirement is an unnecessary burden both on manufacturers and laboratories. The commenter (1647) adds that a manufacturer's certification could be jeopardized in the event that a "sealed" test unit is damaged in shipping or while in storage.

Commenter (1562) recommends deleting the requirement in 60.5479(c) because sealing and storing a unit(s) increases cost, decreases market and prevents people from utilizing a renewable energy source, benefiting no one. Commenter (1562) asks if this standard practice for the automotive industry. Likewise, commenter (1633) states that the cost of storage for a hydronic heater is prohibitive (CBI cost information provided).

Response:

The EPA has revised this requirement under subparts AAA and QQQQ in the final rule to now require that the tested appliance (upon which certification tests were performed and model certification granted) must be maintained in a sealed and unaltered state for 5 years after the certification test. These appliances must be made available to the Administrator upon request for inspection and testing. We have determined that this is sufficient time to identify any problems.

2.15.4 Comment: Reporting of sales

Commenter (1665) asserts that the EPA's proposed requirement for manufacturers to report to the Administrator sales of products by state every two years would be burdensome (costing approximately $3,000 every two years to enter data that is not currently entered) and is complicated by manufacturers not having sales data from their distributors. The commenter (1665) is also concerned about submitting proprietary sales information to the EPA. The commenter (1665) requests that the EPA clearly define why they want proprietary sales data by stove model and by state. The commenter (1665) recommends that the EPA follow the model used by Washington State. According to the commenter (1665), in Washington State, all stove sales (including make and model) are reported and a modest fee is paid by the retailer.

Commenter (1562) suggests modifying § 60.5479(d) to require reporting the total number of certified units sold every 2 years. The commenter (1562) adds that reporting each model sold in each state is overly burdensome and adds undue cost to the product, decreasing markets and preventing people from utilizing a renewable energy source.

Response:

The EPA disagrees with the commenter. Submitting a report to the Administrator every 2 years following issuance of a certificate of compliance for each model line, that includes the sales for each model by state, should not prove unduly burdensome as manufacturers routinely track sales data. If a manufacturer has concerns regarding the confidential nature of their sales data, they may submit this data as CBI. In addition to the sales for each model by state, the manufacturer must certify that no changes in the design or manufacture of this model line have been made that require recertification.

2.15.5 Comment: Record retention

Regarding § 60.537(e)(1), commenter (1171) recommends that the EPA specify which entity is responsible for which type of record retention under this subsection and consider revising the minimum retention time period to include the life of the certified product, in addition to some amount of time afterward (e.g. "all records … must be maintained … for a period of no less than the certification life of the product plus 2 years").

Response:

We have revised the final rule to clarify that, unless otherwise specified, all required records must be maintained by the manufacturer, commercial owner of the affected wood heater, approved test laboratory or third-party certifier for a period of no less than 5 years.

2.15.6 Comment: Responsibility for submittal of test data

Regarding § 60.537(f), commenter (1171) recommends that the responsibility for submittal of testing data rely upon the contracts entered into by the manufacturer of the certified product,

except when the contracts with the testing lab and/or certifying entity omit any provisions for submission of data, when this responsibility should be the manufacturer's.

Commenter (1397) states a non-CBI report of test results must be available to state and local regulators to ensure compliance with state and local standards (which are often more restrictive than EPA), and the process to ensure timely delivery of data requested by regulators included in the accreditation scheme.

Response:

We have revised § 60.537(f) of subpart AAA and § 60.5479(f) of subpart QQQQ to clarify that the manufacturer must submit the performance data electronically within 60 days after the date of completing each performance test (e.g., initial certification test, tests conducted for quality assurance, and tests for renewal or recertification). Non-CBI reports will be available to state and local regulators. The final rule also requires that within 30 days of receiving a certification of compliance for a model line, the manufacturer must make the full non-CBI test report and the summary of the test report available to the public on the manufacturer's website.

2.15.7 Comment: Electronic submittal of test data using the ERT

Commenters (1397, 1465, 1503, 1551, 1546) support use of the Electronic Reporting Tool (ERT). Commenter (1465) strongly supports the requirement of electronic submittals in locked spreadsheets. Commenters (1397, 1551) feel strongly that all reports related to this rule should be submitted via the ERT to ensure proper oversight of testing efforts by state and federal enforcement agencies. Commenters (1397, 1551) state public and state regulators should have full access to all non-CBI materials submitted through an ERT and that if such a tool is delayed, OECA should already be planning for an alternate method to fulfill state requests for data in a timely manner. Commenter (1397) states that OECA should be tasked with completion of the ERT for wood burning devices before the rule is finalized. Regarding § 60.537(f), commenter (1397) asks what method will be used to submit data electronically prior to implementation of ERT.

Commenter (1503) is encouraged by the EPA's proposal to require manufacturers to use electronic reporting in the future, but because this requirement will apply *only* if the test data is "collected using test methods compatible with [the Electronic Reporting Tool (ERT)]" and *only* if the ERT is operational this raises the distinct possibility that test data will continue to be submitted on paper for some time. The commenter (1503) urges the EPA to continue working toward the timely implementation of mandatory, industry-wide ERT reporting; the EPA should immediately begin requiring manufacturers and labs to scan and electronically submit any paper data they currently submit (e.g., in Portable Document Format (PDF) or similar format). The commenter (1503) states that the EPA should make these PDFs available on its website within a reasonable amount of time (less than 60 days), so that the public can access this data, as required by CAA section 114.

Commenter (1546) asks how the proposed electronic spreadsheet submission process will work; in particular, will the EPA provide standardized spreadsheets in light of the intellectual property

issues inherent in laboratories being asked to release their own internally-developed spreadsheets.

Response:

In the final rule, the EPA has removed the proposed requirement that performance test data must be submitted electronically to the EPA's Central Data Exchange (CDX) by using the Electronic Reporting Tool (ERT) because the ERT is not ready for use by wood heater manufacturers and laboratories at this time. For the final rule, each manufacturer or accredited test laboratory or certifying entity must submit non-CBI test data electronically to WoodHeaterReports@epa.gov, with CBI submitted via mail to the EPA's OECA CBI Office on a compact disk or other commonly used electronic storage media (including, but not limited to, flash drives).

2.16 Prohibited Activities

2.16.1 Comment: Handling of prohibitions and violations by OECA

Commenter (1397) asks how OECA will monitor compliance, what measures OECA will implement to provide a venue for reporting activities prohibited by this rule and how OECA will inform states of confirmed violations. Commenter (1397) recommends any violations and corresponding corrections be publicly available.

Response:

OECA has a long-standing enforcement structure in place for the monitoring and enforcing of all prohibitions and potential violations. OECA designs, develops, implements and oversees national enforcement programs, while the regional offices work with states, tribes, and others to implement these programs. The national program ensures compliance using a variety of tools, including civil and criminal enforcement, compliance assistance, incentives, and monitoring, as well as other strategies to improve compliance, such as publication of compliance information. EPA works closely with the states and tribes to ensure that compliance assurance and enforcement programs achieve the protections of the environmental laws and provide a level playing field for responsible businesses. EPA has prepared a Small Business Implementation to help ensure that small businesses understand the requirements of this rule. OECA has existing reporting mechanisms (online and by phone) for observers to report potential violations. We encourage observers to contact State and local authorities directly, in addition to the EPA, if potential violations are noted.

EPA's long-standing practice is to contact States and local authorities to share information when we are investigating potential violations. Similarly, EPA's long-standing practice is to make actual violations and remedies publicly available as far as possible. Of course, if a violation results in changing the EPA certification value, the corrected value would be placed on the EPA certification list on the EPA website. Additional information about OECA's CAA compliance monitoring and enforcement programs can be found at:

http://www.epa.gov/compliance/monitoring/programs/caa/index.html and
http://www.epa.gov/compliance/civil/caa/index.html.

See also our response to *Section 2.18.2* regarding the third-party certification system required by the final rule, which will assist overall in ensuring compliance.

2.16.2 Comment: Concerns regarding unenforceable prohibitions

Commenter (1521) opines that the requirement that no person be permitted to operate an affected wood heater that does not have a permanent label (§ 60.536(b), (c), or (d)(2) through (d)(5)) appears to weaken the rule as the provision is practically unenforceable (similar to the requirement of tags on newly purchased bed mattresses). The commenter (1521) requests that the inclusion of such activities be characterized as "recommended activities" for the owners and operators of residential wood burning appliances.

Response:

The EPA disagrees that the requirement in § 60.538(a) and § 60.5480(a) that no person is permitted to operate (or advertise or sell) an affected wood heater that does not have the required permanent labeling (pursuant to § 60.536 and § 60.5478) somehow weakens the rule. EPA works with state and local authorities to ensure compliance. As we noted in earlier comments, these labels provide not only important information to consumers for purchasing appliances, but also important compliance information to enforcement officials. Some states (e.g., Washington, Oregon, California) already enforce their own wood heater rules that prohibit use of uncertified heaters on bad air quality days (using visible emissions as an enforcement tool). It is not in the best interest of public health (especially impacted neighbors) or the environment for the EPA to compromise any state's ability to enforce air pollution regulations.

2.16.3 Comment: Prohibiting self-certification of test report

Commenters (1463, 1541) state that the accredited test laboratory performing the equipment testing should not be allowed to also perform the review and certify these same results as the certifying entity. This commenter requests clarification of this component of the rule.

Commenter (1527) states that there is no justification in the preamble or elsewhere for why a certifying entity is not permitted to certify its own certification test report. The commenter (1527) states that this prohibition runs counter to common practice in the operation of product compliance assessment and certification programs and procedures that the EPA is proposing to adopt in this rule. The commenter (1527) adds that this proposed prohibition appears in sections related to "Activities" prohibited under subparts that relate primarily to the sale, installation operation or alteration of affected facilities and is not mentioned in the sections related to the certification process.

Commenter (1527) provides a simplified model of third-party certification that should be adopted by the EPA (see pp. 4-5 of the comment letter). If EPA's rule forces these organizations to choose between the testing business and offering certification, the commenter (1527) would

probably opt out of the emissions certification process. However, if this occurs, the commenter (1527) states that the synergy with safety certification and related cost and time savings will not be realized.

Commenters (1448, 1543, 1550, 1643) state that the proposed prohibition of the ability of a certifying entity to certify its own certification test report (e.g., § 60.538(i)) conflicts with ISO/IEC 17065, which plainly contemplates that a certification entity can perform evaluation (testing) activities "either with its internal resources or with other resources under its direct control." Commenters (1543, 1550, 1643) add that ISO/IEC 17065 requires certifying entities to maintain technical competence and oversee the evaluation/testing process, which the certifying entities do by operating their own testing facilities. Also, the commenters (1543, 1550, 1643) add, ISO/IEC 17065-7.6.2 requires that certification decisions be made by personnel who are not involved in the testing process. The commenters (1543, 1550, 1643) request that instead of prohibiting certifying entities from certifying their own test reports, the final rule should instead give laboratories the choice to pursue both qualifications or just one. Commenter (1527) describes additional safeguards provided by the ISO/IEC 17065 certification framework and history that show the strong need to maintain a direct link between certification activities and emission testing.

Commenter (1567) interprets the language in § 60.535(a) and (e) and § 60.538(i) as prohibiting certifying entities from certifying their own test reports, and presents an analysis showing how this could have significant negative impact on the make-up and capacity of the laboratories to address the need to develop and certify new appliances under the NSPS. The commenter (1567) anticipates that the three small labs will close if compelled to obtain ISO accreditation and if they are prohibited from performing R&D, leaving two labs with three test locations; a reduction of 50% of the existing accredited test laboratories with ASTM E2515 testing capacity. The commenter (1567) states that, given the current proposal, the remaining two laboratories must choose whether to be an accredited test lab or a certifying entity. The commenter (1567) believes that this creates a substantial hardship for the industry because these two active ISO labs are also the labs that do most of the safety testing and safety listing inspections in the industry. The commenter (1567) states that if the ISO laboratories chose to become accredited testing laboratories, they cannot be a certifying entity and the manufacturers will have two laboratories coming to do inspections, i.e., one for safety and one for the NSPS. The commenter (1567) continues that if the ISO laboratories doing safety testing opt to become certifying entities, they have to give up being accredited certification testing laboratories but can do both safety and "certifying entity" inspections simultaneously if they are willing to accept, review and certify test reports from all EPA accredited test labs. In the latter case, the manufacturer (1567) states, the manufacturers will only have one laboratory coming to do inspections but will have to find another accredited emissions test lab. The commenter (1567) concludes that if both ISO laboratories opt to stick with safety testing and all three small labs drop off line, there will not be any (active) accredited test labs available, so there will be no way to certify new products and manufacturers will not be able demonstrate compliance for any of their model lines and will rapidly go out of business.

Commenter (1487) recommends that the EPA require each party involved in the certification process – manufacturers, laboratories and certifying entities – to self-certify the truth, accuracy, and completeness of information used in this regulatory program.

Response:

The EPA agrees with the commenters that certifying bodies be allowed to make certification decisions as allowed under ISO/IEC 17065, as long as those certification decisions are made by personnel who are not involved in the testing process, as stated in ISO 17065-7.6.2. We expect that any laboratory that is approved by the EPA and is ISO-accredited will act in such a way that will not create a conflict of interest. We have retained in the final rule the exception at § 60.535(a) and § 60.5477(a) wherein the testing laboratory may not perform initial certification tests on any models manufactured by a manufacturer for which the laboratory has conducted research and development design services within the last 5 years. We have removed § 60.538(i) from the final rule, which prohibited certifying entities from certifying their own test reports.

2.17 Petition for Review Procedures

2.17.1 Comment: Suggestions for finalizing streamlined appeal process

Commenters (1543, 1550, 1643) agree with the EPA's proposal to streamline the subpart AAA hearing and appeal procedures (and use this same process in subpart QQQQ) by substituting an informal Petition for Review for the formal adjudicatory hearing. The commenters (1543, 1550, 1643) believe that this streamlined process satisfies the Administrative Procedure Act because it provides licensees with prior notice of revocation and an opportunity to demonstrate compliance and because the Clean Air Act does not require formal adjudicatory proceedings. The commenters (1543, 1550, 1643) add that the proposed changes may be advantageous to small manufacturers, for whom formal adjudicatory hearings may prove prohibitively expensive. The commenters (1543, 1550, 1643) add that they know of no hearings conducted under the current rule, so the likely impact of this change is negligible. However, to satisfy the Administrative Procedures Act, the commenters (1543, 1550, 1643) believe that EPA must explain in the final rule why its desire for a streamlined process outweighs the risk of harm to manufacturers and laboratories.

(*Response is below Section 2.17.3.*)

2.17.2 Comment: Information required of petitioners

Commenter (1171) supports having a Petition for Review process for manufacturers and testing laboratories but states subparts QQQQ and RRRR lack additional information for the petitioners' benefits aside from a time limit on submitting their petition. For example, commenter (1171) asks what information petitioners need to provide to the EPA with their petition and if there any timeline in which the EPA is required to respond to the petition.

(*Response is below Section 2.17.3.)*

2.17.3 Comment: Role of certifying and accrediting entities in petitioning

Commenter (1171) states it is not in the best interests of the program for manufacturers and testing labs to contest audit findings, lab accreditations, certification denials, etc., directly to the EPA. Commenter (1171) states complaints should first be directed to "certifying entity" or "accrediting entity" for handling before being elevated to the EPA. Commenter (1171) asserts these are current requirements of ISO/IEC 17025, ISO/IEC 17065 and ISO/IEC 17011.

Response:

We had proposed replacing the current subpart AAA hearing and appeal procedures with a streamlined Petition for Review process and also to use this process in subparts QQQQ and RRRR. However, based on comments received, and our additional review of the history of the 1988 rule, we have determined that there is no need to make the proposed changes. Therefore, we are retaining the Appeals and Administrative Hearing Procedures outlined in the 1988 rule.

2.18 Implementation and Enforcement Issues - General

See Sections 3.5, 4.4, and 5.9 for appliance-specific implementation comments.

2.18.1 Comment: Delegation of EPA authority

Commenters (1543, 1550, 1643) note that the preamble to the proposed rule states that "the intent of the delegation section is to clarify the regulatory provisions for which the EPA has retained sole enforcement authority (definitions, compliance and certification, test methods and procedures, laboratory accreditation, reporting and recordkeeping, revocation of certification, and hearings and appeals procedures)." However, according to the commenters (1543, 1550, 1643), the delegation provisions in the proposed rule (§§ 60.539a, 60.5482, and 60.5494) require the EPA to retain only the authorities contained in the provisions governing definitions; compliance and certification; test methods and procedures; and laboratory accreditation. The commenters (1543, 1550, 1643) state that this apparent oversight of failing to require the EPA to retain authority over the provisions governing reporting and recordkeeping, revocation of certification, and hearings and appeals procedures is important to ensuring uniform application of these important provisions across the country.

Commenter (1502) agrees that the EPA should regulate the manufacturers of wood-burning heaters by promulgating national emissions standards, while allowing states and local agencies to regulate other issues, such as siting and installation requirements, to address local air quality concerns and reduce impacts on neighboring properties.

Commenter (1551) supports efforts to allow states to take partial delegation of this rule, thus creating the flexibility necessary for states and local health departments dealing with residential wood smoke problems to enforce federal requirements.

Commenter (1503) supports delegating some of the agency's monitoring and enforcement responsibilities to the states, but the EPA should clarify the following elements: 1) what specific

authorities will states have to monitor, enforce, and remedy potential violations; 2) how will the agency determine whether to delegate these functions to states; 3) how will the EPA monitor and respond to allegations that delegated states are not carrying out their enforcement responsibilities; and 4) how will the standards be enforced in cases where the EPA does not delegate monitoring and enforcement authority.

Response:

Section 60.539a of subpart AAA and § 60.5482 of subpart QQQQ have been revised to clarify that, under section 111(c) of the CAA, the Administrator may partially delegate the following implementation and enforcement authority to a state, local or tribal authority upon request: enforcement of prohibitions on the installation and operation of affected wood heaters in a manner inconsistent with the installation and owner's manual; enforcement of prohibitions on operation of catalytic wood heaters where the catalyst has been deactivated or removed; enforcement of prohibitions on sale of uncertified model lines; enforcement of proper labeling of affected wood heaters; and enforcement of compliance with other labeling requirements for affected wood heaters. These sections of the final rule also list what may not be delegated.

The final rule further clarifies that although the EPA may partially delegate implementation and enforcement authority to state, local and tribal authorities upon request, (1) nothing in these delegations will prohibit the EPA from enforcing any applicable requirements (including delegated elements), and (2) nothing in these delegations will limit states, local or tribal agencies from using their authority under section 116 of the CAA to adopt or enforce more restrictive requirements. Additionally, manufacturers may also specify installation requirements for their models.

We plan to work with tribes, state and local regulating agencies that have been granted partial delegation of the final rule to clearly delineate rule monitoring and enforcement responsibilities. Where partial delegation has not been requested and/or granted, we will be responsible for implementation and enforcement.

2.18.2 Comment: EPA enforcement capacity and tracking complaints

Commenter (1640) is concerned about the resources required by the EPA to implement these rules. Commenter (1640) believes the EPA must commit adequate oversight for a program that will encompass a larger range of wood heating appliances, new test methods, and auditing of the program to ensure success. Without these resources, commenter (1640) believes the EPA will be challenged to maintain adequate record keeping, test auditing, and a means to share compliance testing information with states who are trying to enforce programs within their state — the EPA should staff and resource its wood stove program accordingly. Commenters (1503, 1591) state that OECA/EPA should begin planning now to provide adequate staffing to conduct periodic (no less than yearly) reviews of manufacturer web sites to discover and reduce false advertising.

Likewise, commenter (1503) states that the EPA should separately commit to improving OECA's capacity, and the capacity of enforcement staff in EPA's regional offices, to ensure that manufacturers and retailers comply with the NSPS. Commenter (1529) supports the

strengthening of the capacity of OECA to expeditiously make more testing and other data transparent to the public and to the states, because credible testing and enforcement is an essential component of any NSPS under the CAA. Commenter (1503) supports Washington State's recommendation that OECA redirect its resources to examine retailers' and manufacturers' sales claims and provide a mechanism for online reporting of false advertising. Commenter (1503) adds that, because wood stoves are analogous to motor vehicles (in that they are tested, certified, mass-produced, and then sold into commerce), the EPA should consider adopting and adapting elements of its vehicle and engine compliance programs for the wood stove context, as appropriate. For example, commenter (1503) would support a rigorous EPA spot-check program to ensure that all market participants are complying with the rule.

Likewise, commenters (1397, 1551, 1463) support the development of procedures to submit and track substantiated claims of unit issues, such as consumer complaints related to false advertising or observation of high in situ emissions. Commenter (1591) suggests that the EPA should provide a website or online form for reporting consumer fraud or other relevant problems. Commenters (1397, 1551) suggest tracking these issues by the manufacturer's model and once a model receives more than 25 claims, the EPA should conduct an investigation and/or require retesting. Commenter (1397) recommend that OECA redirect staff resources to allow routine (no less than yearly) examination of sales claims by retailers, online marketers and manufacturers and create a mechanism for online reporting of false advertising with a link to this reporting form placed in various locations within the EPA domain (e.g. Burn Wise, Wood Smoke Education, Report a Violation, etc.) allowing the public, industry and regulators to participate in the elimination of false claims. Commenters (1397, 1591) recommend that OECA/EPA should prepare a recall process to address devices that are improperly tested, labeled or marketed. Commenter (1397) believes this is especially for imported devices since a high percentage of wood heater companies are located in Canada and elsewhere.

On the other hand, commenters (1543, 1547, 1550, 1643) note that the EPA requested comments on how to best ensure that manufacturers, retailers, and online marketers of affected appliances make claims based only on valid certification data and not make exaggerated claims, and further note that EPA requested language that it should require manufacturers and retailers to provide to consumers to help explain the relative benefits of high performing heaters versus low performing heaters. Commenters (1543, 1547, 1550, 1643) support these laudable goals, but believe they fall under the purview of the Federal Trade Commission Act, 15 U.S.C. § 41, *et seq.*, and various state statutes, not the provisions of the CAA that govern this rulemaking. The commenters (1543, 1550, 1643) state that nothing in section 111 or elsewhere in Title I of the CAA relevant to NSPS gives the EPA the authority to regulate or prescribe the content of consumer marketing materials (also citing other statutory arguments, p. 135).

Response:

We include several elements in the final rule to facilitate regulatory flexibility and reduce potential resource issues in order to implement the final rule in a timely manner. One such element includes the incorporation of third-party certification beginning 6 months after the effective date of the rule (except for hydronic heater third-party certification which will be in

effect upon the effective date of the rule, because this process is already in place under our hydronic heater partnership program since 2008). The third-party certifier/certification body/entity must be accredited by a nationally recognized accrediting entity (under ISO-IEC Standard 17065) and must register their credentials with us and receive our approval prior to conducting any certifications or related work used as a basis of compliance. We will oversee the third-party certifier's work and retain the right to revoke the approval if appropriate. This process requires that, after testing is complete, a certification of conformity be issued by the third-party certifier with whom the manufacturer has entered into contract for certification services. Upon review of the test report and quality control plan, the third-party certifier may certify initial compliance and submit the required documentation to the EPA for review, approval and listing of the certified appliance.

As discussed in the final preamble, to address the possibility that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA, especially in the first year, and so as to avoid unfairly restricting the production and sales of manufacturers who do all the things they should do and then potentially have to wait on the EPA approval, we have added a conditional, temporary approval by the EPA. This conditional, temporary approval by the EPA applies to room heaters subject to revised subpart AAA, as well as to forced-air furnaces subject to subpart QQQQ, based on the manufacturer's submittal of a complete certification application. The application must include the full test report by an EPA-accredited laboratory and all required compliance statements by the manufacturer. The conditional approval would allow manufacture and sales for 1 year or until EPA review of the application, whichever is earlier. Within 1 year, the manufacturer must submit a certificate of conformity by a third-party certifier. (The 1-year conditional, temporary approval by the EPA does not apply to hydronic heaters because they are currently required to submit third-party certifications for the voluntary program and will continue to do so under the NSPS.)

Additionally, as also detailed in the final rule's preamble, regulatory text and in numerous other responses (e.g., see *Section 2.8.3*), we are deeming models that already show compliance with the Step 1 PM emission limits as automatically certified to the Step 1 PM emission limits. No additional certification will be required until the Step 2 PM emission limits. By allowing automatic certification for wood heaters that are already meeting the required Step 1 PM emission levels, we reduce the resource burden for both the regulated industry and the EPA, which allows enforcement to be prioritized appropriately and effectively.

Regarding reporting and tracking of complaints, EPA's OECA has existing reporting mechanisms (online and by phone) for observers to report potential violations. We encourage observers to contact State and local authorities directly, in addition to the EPA, if potential violations are noted. EPA's long-standing practice is to contact States and local authorities to share information when we are investigating potential violations. Similarly, EPA's long-standing practice is to make actual violations and remedies publicly available as far as possible. Of course, if a violation results in changing the EPA certification value, the corrected value would be placed on the EPA certification list on the EPA website. Additional information about OECA's CAA compliance monitoring and enforcement programs can be found at: http://www.epa.gov/compliance/monitoring/programs/caa/index.html and

http://www.epa.gov/compliance/civil/caa/index.html**.** Furthermore, as noted in *Section 2.18.1*, state, local and tribal agencies may request partial delegation authority under this rule, including especially enforcement of compliance and prohibitions. In all situations, whether partial delegation has been granted or not, we maintain authority to revoke model certifications where we determine that a violation warrants revocation.

In response to the commenters who claim that nothing in the CAA gives the EPA authority to regulate or prescribe the content of consumer marketing materials, the commenters are mistaken. In fact, the original rule for subpart AAA (published February 26, 1988) includes consumer marketing materials content requirements (labeling and owner's manual content requirements [§ 60.536]) under sections 111 and 114. Section 114 gives EPA authority in regard to records, reports, information to the public and representations of compliance status. Under section 111(h)(1) of the CAA, the EPA is provided the authority to promulgate a design, equipment, work practice or operational standard (or combination thereof) that reflects the best technological system of continuous emission reduction. This means, that in addition to establishing technology-based standards for wood stove appliances, we also have authority to promulgate requirements to ensure that continuous emission reductions are met from certified models (including prescribing and specifying labeling and owner's manual content requirements).

Section 111(h)(1) of the CAA states:

> For purposes of this section, if in the judgment of the Administrator, it is not feasible to prescribe or enforce a standard of performance, he may instead promulgate a design, equipment, work practice, or operational standard, or combination thereof, which reflects the best technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated. In the event the Administrator promulgates a design or equipment standard under this subsection, he shall include as part of such standard such requirements as will assure the proper operation and maintenance of any such element of design or equipment.

In addition, we will continue to make updates to the Burn Wise website (http://www.epa.gov.burnwisekit.html) to include educational information that informs consumers, air quality agencies, chimney sweeps and hearth retailers on the proper operation of stoves to reduce particle pollution and improve safety.

2.18.3 Comment: Resolving Confidential Business Information (CBI) issues

In the process of reviewing this proposed rule, commenter (1551) requested emissions data from OECA but was unable to obtain that data in time for these comments due to common industry practices that include submitting the entire test reports as CBI. Furthermore, because of the standard industry practice of submitting all test data, including emissions information, as CBI, commenter (1551) claims to be unable to analyze the full data set for space and central heating devices. Commenter (1551) is seeking basic data that do not raise CBI concerns, such as manufacturer names, model numbers, test methods used, technology descriptions for the units,

emission rates by burn categories (if Method 5G is used, EPA should provide emission rates as Method 5G and Method 5Gadj), burn rates, and duration of tests. Commenter (1551) asserts this is in conflict with the OGC's determination in 2006 that emissions data for this source category is not CBI (see attachment D to comment). Commenter (1551) believes the EPA should provide such information in a timely manner that allows others to provide additional input on where EPA's proposed standards may be strengthened to better protect public health and only information that is truly confidential is treated as CBI.

Response:

Although we allow for owners and operators to claim some of their information submitted as confidential, it is true that most manufacturers erroneously submitted entire test reports as CBI, rather than just those elements of the report that were justifiably CBI. Because of this experience, we have explicitly stated in the final rule – in § 60.533(b)(4) and § 60.5475(b)(4) – that all emissions data, including all information necessary to determine rates in the format of the standard, cannot be claimed as CBI. The final rule furthermore requires – in § 60.537(f) and § 60.5479(f) – that if CBI is claimed (*e.g*., design drawings), industry must submit both CBI and non-CBI versions to the EPA and the non-CBI version must be submitted electronically. Finally, § 60.537(g) and § 60.5479(g) require that within 30 days of receiving a certification of compliance for a model line, the manufacturer must make the full non-CBI test report and the summary of the test report available on the manufacturer's website.

2.18.4 Comment: Sell-through provisions - General

Note: See Sections 3.5 and 4.4 for more detail on specific appliance sell-through comments.

Commenters (1397, 1503) recommend only those units already achieving the relevant proposed standards be allowed to delay retesting until the end of their current certificate; certified but non-compliant wood heaters should not be allowed to be sold if their current certificate extends beyond promulgation. Commenter (1503) adds that there are already numerous catalytic, noncatalytic, and pellet stove models on the market that meet the Step 1 limits and allowing high-emitting, inefficient stoves to stay in the market is inappropriate given the state of technology and the importance of reducing emissions from wood stoves.

Commenter (0403) supports a 6-month sell-through period and believes that most wood burners cannot afford to upgrade to newer models. Commenter (1261) suggests the EPA ensure that manufacturers and retailers can sell any wood heaters certified by the EPA for 5 years from date of certification in the final rule.

Commenter (1115) asserts the EPA has not released a testing method or finalized the standard, giving manufacturers a very small window to make changes, which is unfair and unrealistic. If the EPA moves forward with their stricter regulations, then commenter (1115) believes they should allow the manufacturers time to begin making the switch in a cost effective manner and allow ample time to sell off current inventory before being forced to sell a new design. If not, commenter (1115) states the extra cost and quick implementation will push several

manufacturers (e.g., in southern Illinois and southeastern Missouri) to shut down or downsize, causing job losses in the region.

For dealers, commenter (1456) believes retail appliance sell-through would be even more difficult now that appliances will be higher priced than ever.

Commenter (1643, Attachment 7) reports that they conducted the sell-through analysis that commenters (1543, 1550, 1643) relied upon. Commenter (1643, Attachment 7) conducted a survey of retailers commissioned by HPBA to assess the factors that affect buying patterns, inventory levels and inventory clearance periods (sell-through) in the hearth industry. Commenter (1643) provides an overview of retail sales practices, the difficulties that manufacturers, distributors and retailers have in accurately forecasting sales in any future sales year and then matching inventory to those historically unpredictable outcomes and the impacts that inventory imbalances can have on sales and the financial consequences of "being wrong." Commenter (1643) also describes other factors that influence distributor and retailer buying decisions including credit limits, early-buy programs, warehouse space limitations and the seasonality of the hearth business, all of which limit the amount of inventory that retailers can stock and make it highly unlikely that retailers will attempt to stockpile previously certified or otherwise previously approved and previously unregulated appliances prior to the effective date of the applicable provisions in the final rule that would prohibit manufacturers from introducing further units in a model line into commerce. Finally, commenter (1643) addresses potential outcomes to manufacturers, distributors and retailers caused by the various uncertainties imposed by the proposed NSPS requirements and what that means to retailers including challenges associated with knowing what to buy, how much to buy and what will happen to leftover inventory of "obsoleted" models.

Commenter (1643, Attachment 7) stressed that distributors and retailers need adequate time to avoid standing inventory. According to commenter (1643), in the HPBA Hearth Retailers Survey, retailers were questioned as to how much time they needed to sell best-selling, moderate-selling and slow-moving appliances. Commenter (1643) reports that the majority of retailers felt that they needed 12 to 24 months to sell moderate and slow selling inventory and four of the retailers felt that they needed much more time than 24 months. Commenter (1643) adds that it will be very difficult to predict what will happen in the unstable environment created by NSPS implementation (i.e., Will dealers dump older stoves at a discount? How will this affect new appliance sales? Will consumers choose new EPA compliant models over older EPA certified models?).

Commenter (1643, Attachment 7) adds that retailers' reluctance to buy models that are not given an unlimited sell-through period will have profound financial impacts on appliance manufacturers because many retailers will stop buying appliances they are not absolutely sure that they can sell, and the manufacturers will lose the revenue from the sales of these stoves; revenue that is needed to fund the design, testing and the launch costs for new NSPS compliant models. Commenter (1643) notes that it has been reported that this is already happening in the warm air furnace market and will be exacerbated unless the EPA grants adequate sell-through relief. Commenter (1643) reports that, in the survey, retailers were asked how it would affect

their purchase of an appliance if they knew the date that a given appliance could no longer be manufactured. Commenter (1643) states that 15 of the 26 retailers surveyed (over 57 percent) indicated that they would not buy, would not keep inventory on hand, would close out inventory or would hesitate in buying depending on how long they could sell the appliance.

On the other hand, commenter (1719) notes that an advertisement by one prominent hydronic heater manufacturer suggests that distributors and dealers are not reluctant to stock units currently (i.e., before the NSPS has passed). According to the commenter (1719) this advertisement claims that "sales of [these] furnaces are rapidly escalating" and that the manufacturer "has recently increased production to fulfill the rising demand". Commenter (1719) requests that EPA consider this contradictory information when reviewing the economic impact of the NSPS on businesses versus the need to protect human health from outdoor wood boiler pollution.

Response:

We considered all the comments we received in support and in opposition to allowing for retail sell-through of inventory of heaters manufactured before the compliance deadline. We proposed allowing 6 months for sell-through of inventory for wood stoves and no allowance for sell through of inventory for hydronic heaters and forced air furnaces. Based on numerous comments from small business manufacturers and small business retailers and some states, we are lengthening the retail sell-through period for subpart AAA from 6 months from the effective date of the final rule to December 31, 2015, approximately 8 months from the expected effective date. That is, no retailer may sell or offer to sell new stoves after December 31, 2015 that do not meet the Step 1 emission limit. Eight months will better cover the primary selling period after the rule is final and will affect a very small number of appliances. (This provision does not affect resale of used stoves/heaters; such resale is not restricted by this rule.)

Like subpart AAA requirements, the subpart QQQQ requirements in the final rule provide additional time (through December 31, 2015) for the sale of unsold hydronic heaters manufactured before the compliance date. This additional sell-through time does not include forced-air furnaces because we have determined that it is reasonable for forced-air furnace manufacturers to revise their owner's manuals, training and marketing materials to comply with the work practice and operational standards by the effective date of the rule.

2.18.5 Comment: Proper sizing of appliances

Commenter (1465) recommends that the EPA consider establishing requirements for proper sizing of appliances using the ACCA's Manual J residential load calculations, partly to address the concern that emissions from wood burning appliances exceed emissions from displaced systems that burn ultra-low sulfur heating oil, natural gas or propane.

Likewise, commenters (1397, 1541, 1558) recommends a standardized metric, such as the HVAC Manual J, "Residential Load Calculation," be required for sizing all wood biomass hydronic heaters and furnaces, enabling state and local air agencies to address problem emissions through enforcement against vendors who sell oversized units.

Response:

We acknowledge that proper sizing of appliances to address emissions from wood burning appliances are design considerations that manufacturers need to consider when they design their wood burning appliances to meet the emission limits of subparts AAA and QQQQ. We do not, however, specify sizing and load requirements for manufacturers of differing appliances. Sizing costs should be calculated as part of the installation process for a specific heating appliance and site, and heat demand analyses would be model- and site-specific. Therefore, because of specificity needed for both sizing and load calculations, these calculations are best established by the manufacturer of the wood burning appliance that a consumer plans to install.

The EPA does encourage proper sizing. To minimize both wood fuel input and particulate emissions, on our Burn Wise website we encourage consumers to contact professionals to determine the right size and model for a given residence. Such professionals can appropriately size units to match the theoretical heat demand of the residence (using, for example, HVAC Manual J residential load calculations available at http://www.acca.org/technical-manual/manual-j/).

Finally, as noted in other responses, we emphasize that some state, local and tribal jurisdictions have limits, prohibitions and other requirements beyond the NSPS that must also be followed. This final rule allows the EPA to approve state requests for partial delegation of enforcement authority for NSPS requirements. In addition, we expect many state, local and tribal authorities will adopt site-specific installation and operating requirements to ensure heaters are not over-sized, avoid nuisance conditions, and ensure proper operation.

2.18.6 Comment: Education and outreach regarding proper burn practices

Commenter (0957) states that the EPA should stress the importance of correctly burning wood. Commenters (1192, 1397) also believe the EPA should emphasize the importance of properly seasoned cord wood and low visible emissions during stove operation. The EPA could also contribute to education on dry wood storage, commenter (1137) states, such as providing support for classes on wood shed building to help emphasize the importance of dry wood for burning cleanly.

Commenter (1463) supports the EPA's efforts to continue improving education and outreach programs for consumers on the selection and effective use of the cleanest certified appliances and wood fuel with appropriate moisture content. Commenter (1463) recommends that the EPA provide materials and education to local governments about siting and land use issue for residential wood heaters and other wood burning appliances. Commenter (1456) also feels education of the public by the EPA, manufacturers and even retailers is important. Commenter (1397) suggests the EPA reach out to consumer protection agencies and NGOs to find ways to feature ratings by these groups relevant to wood burning devices.

Response:

We agree with the commenters. For the reasons stated by the commenters, we have established and will continue to update and improve our Burn Wise website (http://www.epa.gov/burnwise/). Burn Wise is a partnership program of the U.S. EPA that emphasizes the importance of burning the right wood, the right way, in the right wood-burning appliance to protect consumer homes and health, and the air we breathe. The website includes information for (1) consumers on how to burn wood wisely, (2) tribal, state and local agencies on ways to improve air quality in their communities through changeout programs and education, and (3) partners on how they can work with the EPA to bring cleaner-burning appliances to market.

The final rule also emphasizes the importance of proper burn practices. The rule prohibits operators from burning a specific list of prohibited fuel types (including unseasoned wood, which the rule defines) and requires that consumers operate the wood heater consistent with a list of specific instructions required in each owner's manual (or the warranty will be voided). The rule requires that the owner's manuals provide information adequate to enable consumers to achieve optimal emissions performance, including: installation requirements for achieving proper draft; operation and maintenance information; fuel loading procedures (including recommendations on fuel selection, moisture content and quantity; and warnings on what fuels not to use, such as treated wood, colored paper, cardboard, solvents, trash and garbage); fire starting procedures; proper use of air controls (including how to establish good combustion and how to ensure good combustion at the lowest burn rate for which the heater is warranted); ash removal procedures; instructions for replacement of gaskets, air tubes and other parts that are critical to the emissions performance of the unit; and other maintenance and repair instructions specific to appliance type (*e.g*, catalytic, hybrid, non-catalytic).

2.18.7 Comment: Other suggested regulations and implementation restrictions

Federally-implemented "No Burn Days":

Commenter (1497) suggests consideration of "No Burn Days" at the national level in combination with the standards of the proposed rule. Commenter (1497) states "any significant reductions could offset the need to place an added financial burden on wood stove manufacturers as an alternative".

Specifying chimney configurations:

Commenter (1513) suggests the EPA consider flue/chimney specifications to improve dispersion and minimize ground level exposure to smoke, which could include such parameters as minimum stack height and configuration of rain caps. Likewise, commenters (1192, 1397) state the EPA should specify a minimum stack height; specifically needed for mobile homes where low draft conditions prevent wood stoves from operating properly.

Requiring removal of appliance upon sale of house:

Commenters (0541, 0650, 0957) support efforts to address the increasing particle pollution from existing high particulate appliances, including requiring the removal of such appliances when a residence is sold.

Moisture content regulations applicable to sale of cord wood:

Several commenters (0526, 1137, 1488, 1570) support standards for moisture content in wood fuel. Commenter (0526) believes the EPA should draft regulations regarding what "dry" firewood should be instead of forcing more regulations on wood stove manufacturers that might put them out of business. Commenter (0526) states that if the intent is reducing PM, then dealers selling "dry" firewood should be held to some type of moisture content regulation. Commenter (1137) believes an important gap in the proposed regulations is the critical importance of burning fully seasoned wood with a moisture content of less than 20 percent. Commenter (1137) suggests that States set clear standards for cord firewood with a wood seller being required to provide wood at 20 percent moisture content as measured on freshly exposed grain in order for the product to be certified as "seasoned" wood.

Response:

Regarding federally-implemented "no burn days", this NSPS is a technology-based standard under Section 111 of CAA and does not establish "no burn days" at the national level. However, tribal, state and local agencies, in an effort to improve air quality in areas under their jurisdiction, have the ability to establish "no burn days" if they determine such a requirement is necessary (e.g., for attainment of the NAAQS). In fact, the EPA's *Strategies for Reducing Residential Wood Smoke* document (http://www.epa.gov/burnwise/strategies.html, pages 6-7) states that wood-burning curtailment programs are one of the quickest and most effective ways an air quality agency can reduce wintertime wood smoke and that several communities implement both voluntary and mandatory curtailment programs depending on the severity of their air quality problem.

Regarding specifying chimney configurations, we again note that NSPS are national standards under Section 111 of CAA. Implementation restrictions such as flue/chimney specifications, including minimum stack height and configuration of rain caps, are site- and appliance-specific and are not part of this NSPS. However, this NSPS does require manufacturers to include proper installation and operation best practices information in the owner's manual and the users are required to be consistent with the owner's manual. Also, tribal, state and local agencies, in an effort to improve air quality in areas under their jurisdiction, have the ability to establish such specifications and we expect many of these authorities will adopt site-specific installation and operating requirements to ensure heaters are not over-sized, avoid nuisance conditions, and ensure proper operation.

Regarding requiring removal of the heater upon sale of the house, NSPS do not apply to existing sources, nor does this NSPS affect the resale of used stoves/heaters. It is beyond the scope of this rulemaking to require removal of existing wood stove appliances. However, as noted above, nothing precludes tribes, states and local agencies for establishing requirements beyond those that are required by the NSPS in order to address the air quality in areas under their jurisdiction.

The EPA's *Strategies for Reducing Residential Wood Smoke* document (http://www.epa.gov/burnwise/strategies.html, page 8) states that, "[t]o get old stove "off-line," some local communities require the removal and destruction of old wood stoves upon the resale of a home." As noted in the document, this requirement has proven effective in locations like Mammoth Lakes, CA; Washoe County, NV; and the State of Oregon.

Finally, although we do not include a regulatory requirement affecting wood sellers, we do include unseasoned wood (defined as greater than 20% moisture) on the list of prohibited fuel types – both in the rule itself and required to be listed by manufacturers in owner's manuals. The rule further requires that owner's manuals clearly specify that operation of the heater by the consumer in a manner inconsistent with the owner's manual would void the warranty. We also require that manufacturers include moisture meters as part of the sale of hydronic heaters and forced-air furnaces under subpart QQQQ. As stated above, nothing precludes tribes, states and local agencies for establishing requirements beyond those that are required by the NSPS in order to address the air quality in areas under their jurisdiction. The EPA's *Strategies for Reducing Residential Wood Smoke* document (http://www.epa.gov/burnwise/strategies.html, page 8) acknowledges that, "to increase the likelihood that stove owners will burn seasoned wood, some air pollution control agencies have encouraged the use of wood moisture meters", and some areas "deem it illegal to sell, advertise or supply wood unless the wood moisture content is 20 percent or less."

2.19 Executive Orders, Acts and Procedures

See Section 6.1.1 for National Technology Transfer and Advancement Act concerns.

2.19.1 Comment: Executive Order 12866 concerns

Commenters (1484, 1506) note that the EPA did not fully address EO 12866 which calls for identification and assessment of available alternatives to direct regulation, including economic incentives, as well as analysis of options with varying stringencies. Commenter (1484) suggests that the EPA should examine the continued and expanded use of voluntary partnership programs as an alternative to the proposed rule. The EPA should also examine the possible modification of the joint EPA – DOE framework for the ENERGY STAR program, establishing federal grades for wood heating devices falling into ranges of emission levels, according to the commenter (1484).

Commenter (1543) claims that EPA's Regulatory Impact Analysis (RIA) fails to consider proven alternatives it has previously identified to reduce fine particulate emissions from residential wood heaters as detailed in its publication EPA Document No. EPA 456/B-09-00 [presumably commenter means *EPA Document # EPA-456/B-09-001 Strategies for Reducing Residential Wood Smoke,* available at http://www.epa.gov/burnwise/strategies.html].

On the other hand, commenter (1496) notes that EO 12866 stresses "material failures of private markets" as a criterion for regulation and explains why it is unlikely that the private markets will work in "Coasian" fashion (regarding the Coase economic theorem) to resolve the issue of PM emissions without government regulation. Commenter (1496) concludes that it is highly unlikely

that private markets will work to control PM emissions and therefore regulation in principle is justifiable (see pp. 6-7 of comment for reasoning).

Commenter (1506) points to OMB guidance which recommends that agencies ordinarily consider analyzing at least three options: the preferred option, a more stringent option, and a less stringent option.

Response:

We have fully addressed the requirements of EO 12866 under this rulemaking. NSPS are technology-based standards based on BSER. When determining BSER under subparts AAA and QQQQ, we considered all available options for regulation under the NSPS. This final rule was developed following CAA section 111(b)(1)(B) review of the existing residential wood heater NSPS, and because emissions from residential wood heaters can be a significant source of air pollution, and thus adverse health effects, in some areas. Under section 111 of the CAA, emission standards must reflect the degree of emission limitation achievable by the application of BSER, although the EPA has significant discretion to determine the appropriate level for the standards. The EPA must evaluate the potential emission limit from that technology review in conjunction with costs and other factors (e.g., benefits, non-air quality impacts). As part of this analysis, we considered numerous factors relating to the potential cost of the regulation, including industry organization and market structure, available technologies, and estimated costs of R&D to employ these technologies across the industry.

Over the years, in addition to the existing regulations for wood stoves under subpart AAA, we developed several programs to encourage (1) manufacturers to produce lower emitting wood heaters, (2) consumers to purchase lower emitting wood heaters rather than use older, higher emitting heaters, and (3) state and local agencies to develop, programs that would reduce PM emissions from wood heaters:

- *Burn Wise*: Burn Wise is a partnership program of the EPA that emphasizes the importance of burning the right wood, the right way, in the right wood-burning appliance to protect homes, public health, and the air we breathe. The site provides information for consumers to make informed decisions about what it means to burn wise. State and local agencies will discover ways to improve air quality in their communities through changeout programs and education. And partners will learn about how they can work with EPA to bring cleaner-burning appliances to market. (http://www.epa.gov/burnwise/)
- *Hydronic Heater Voluntary Program*: The voluntary EPA hydronic heaters program was first launched in 2007. Today the program has evolved to Phase 2, whereby EPA-qualified units are required to be up to 90 percent cleaner than older unqualified units. Currently, it is estimated that only 20 percent of hydronic heaters meet the Phase 2 limits. (http://www.epa.gov/burnwise/participation.html#hydronic)

Although these programs have been in place, manufacturers continue to manufacture and sell higher-emitting stoves and states and local governments, in addition to their local programs have

expressed the need for more stringent standards. In addition to the requested need from state and local governments, we were required to review under CAA section 111 the existing residential wood heater NSPS and update standards (as necessary) to "reflect the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated." The technology-based standards finalized with this action are a result of that review.

In conjunction with emission limits, we note the benefit of encouraging the manufacture and purchase of cleaner, lower-emitting stoves. Therefore, as part of this rule, we require the use of special permanent labels and allow the voluntary use (at the discretion of the manufacturer) of special temporary labels (hangtags) for those adjustable burn rate stoves, single-burn rate stoves, pellet stoves and hydronic heaters certified with cord wood, which recognize that cord wood testing more closely reflects actual in-home use. For forced-air furnaces, we already specify the use of cord wood for the certification tests (because forced-air furnace certification tests will be conducted according to CSA B415.1-10, which has specified cord wood as the test fuel since 2010). We have also established and are allowing manufacturers the option of using temporary hangtags to highlight those models which meet Step 2 emission limits early. (This hangtag requirement sunsets on the Step 2 compliance date.) The cord wood and early compliance labelling options encourage manufacturers to develop heaters that perform well in actual in-home use and to develop lower-emitting heaters sooner, relative to the rest of the industry. Our labeling also educates and encourages consumers to purchase lower-emitting heaters.

2.19.2 Comment: Executive Order 13563 concerns

Commenter (1506) notes that the preamble makes no mention of the EO 13563 requirement for rules to be written in ways that facilitate evaluation of their consequences and measurement of actual results, "nor does it offer a plan for retrospective review or commit to gathering information to determine how effective the revised NSPS are at achieving the stated objectives". Commenter (1506) maintains that in order to evaluate whether the proposed rule is "designed and written in ways that facilitate evaluation of [its] consequences", it should be measured against five criteria:

- Did the agency clearly identify the problem that its proposed rule is intended to solve?
- Did the agency provide clear, measurable metrics that reviewers can use to evaluate whether the regulation achieves its policy goals?
- Did the agency commit to collecting information to assess whether its measurable metrics are being reached?
- Did the agency provide a clear timeframe for the accomplishment of its stated metrics and the collection of information to support its findings?
- Did the agency write its proposal to allow measurement of linkages between actions required by regulation, outputs and outcomes to enable review of whether the standards directly result in the outcomes that the agency intends?

Commenter (1506) claims that the EPA did not identify clear evaluation metrics, that the EPA's projection of benefits will not be measurable, and recommends a more rigorous statistical analysis to evaluate the merits of the EPA's approaches and their projections (citing Louis Anthony Cox Jr., "Improving Causal Inferences in Risk Analysis," *Risk Analysis* Volume 33, Issue 10, pages 1762–1771, October 2013). The commenter (1506) notes that the EPA's costs are more conducive to measurement, but the EPA has not committed to monitoring the costs; the commenter thus recommends that the EPA measure costs and health effects.

To facilitate retrospective review, commenter (1506) further recommends that the EPA evaluate the following: (1) emission reductions in areas where wood heating is prevalent, in order to evaluate whether predicted emission reductions were accurate; (2) concentrations of $PM_{2.5}$, particularly in winter months, in those areas, to evaluate whether modeled relationships between emissions and air quality were accurate; (3) population health endpoints identified with $PM_{2.5}$ exposure in the areas affected by the rule; (4) sales of covered products, by category, to evaluate projected replacement of existing units and market penetration of lower-emitting units; and (5) unit prices of covered wood heaters, to evaluate the accuracy of cost estimates.

Comment (1506) believes that the proposed rule is bad public policy and lists and elaborates on several reasons why (e.g., rule must have a stated goal, it must be reasonable to attain that goal, the rule must be narrowly constructed to meet the stated goal without being broad or vague).

Response:

We disagree that we did not meet Executive Order 13563 requirements, which are addressed in Section VII.A. and other sections of the preamble. As noted previously, section 111(a)(1) provides that NSPS are to "reflect the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated." We evaluated the potential emission limit from our technology review in conjunction with costs and other factors (e.g., benefits, non-air quality impacts). As part of this analysis, we considered numerous factors relating to the potential cost of the regulation, including industry organization and market structure, available technologies, and estimated costs of R&D to employ these technologies across the industry.

We refer the commenter to the preamble, the final RIA (including the final Regulatory Flexibility Analysis) and supporting documents for these final rules (available for review in the docket) for supporting information that the commenter states is missing for the rulemaking (e.g., basis for rules, predicted emissions reductions, costs, benefits, health impacts, economic impacts). For example, the RIA includes all potential health impacts associated with exposure to wood combustion-related $PM_{2.5}$. Table 7-1 of the RIA on human health effects of ambient $PM_{2.5}$ has an extensive list of the above-mentioned health endpoints that were considered and monetized, including exacerbation of asthma among children, and Table 7-2 of the RIA shows the results of the assessed health incidence reductions and related benefits from $PM_{2.5}$ reduced exposure associated with this NSPS.

Moving forward, we anticipate using updated data as a result of emissions tests and other data (e.g., sales data by state) obtained under the new rules and other programs (strategy documents, inventories, State Implementation Plans) to assess the effectiveness of the rules when we conduct future reviews (required every 8 years for NSPS) and to support any future rulemakings (e.g., when developing the cord wood standard).

2.19.3 Comment: Paperwork Reduction Act concerns

Concern regarding Information Collection Requests (ICRs):

Commenter (1435) asserts the ICRs are full of ambiguities and inconsistencies that render it impossible for an interested manufacturer, laboratory, or OMB to meaningfully and accurately understand the information collection requirements at issue, or their burdens and costs. One example, according to commenter (1435), is in the subpart AAA ICR wherein section 1(b) of the Supporting Statement refers to Attachment 1, a list of ICR for sources subject to EPA's rulemaking. Commenter (1435) states Attachment 1 requirements listed include requirements under provisions that would be discontinued under the proposed rule, and replaced with entirely new provisions (for example, current subpart AAA's removable label requirement, and emissions testing and QA provisions currently located at § 60.533(o)). By contrast, commenter (1435) notes a similar list under the same heading in the subpart QQQQ Supporting Statement, identifying newly proposed provisions in the list of requirements. A second example, according to commenter (1435) is in section 5(c) of the AAA Supporting Statement identifies small entity flexibilities included in the proposed rule, including a proposal "to allow up to an additional 2 years for recertifying existing model lines that meet the proposed standards." Commenter (1435) states while related transitional provisions appear in the proposed rule, this provision does not. Similarly, commenter (1435) states subpart AAA and subpart QQQQ Supporting Statements characterize the proposed rule's audit testing provisions as "Random Audit Compliance Tests," yet the proposed rule does away with this terminology in its revised compliance audit testing provisions, effectively merging the two audit programs in subpart AAA (random compliance audits and selective enforcement audits) into one.

Commenter (1435) states the PRA expressly requires that agencies ensure that their ICRs identify the reason and use for each information collection, estimate the burdens of the information collection, and certify that each collection has used "plain, coherent, and unambiguous terminology and is understandable to those who are to respond." Accordingly, before finalizing the proposed rule, commenter (1435) asserts the EPA must revisit its PRA certifications, and ensure that it has coherently and accurately represented the burdens and costs associated with each of the proposed rule's relevant requirements.

Response:

We acknowledge that some of the nomenclature and regulatory cross-references in the proposal supporting statements and attachments for subpart AAA and subpart QQQQ were inconsistent with the published versions of the proposed rules. We have made changes to the final rule and final rule supporting statements to remove these inconsistencies (e.g., random audit compliance

tests are no longer referenced), and attachment regulatory citations were revisited and updated to reflect the final rules.

The EPA considered how to minimize the potential ICR burdens and has incorporated several features that result in a paperwork reduction impact. For example, the final rule allows one representative heater to be tested for a model line rather than requiring every heater to be tested. Subpart AAA has also been revised to include an automatic EPA certification of heaters that have EPA certifications under the 1988 NSPS that show that they would meet the Step 1 emission limits until Step 2. Similarly, the revised subpart QQQQ also includes an automatic EPA NSPS Step 1 certification for hydronic heaters with valid EPA Phase 2 qualifications under the EPA Hydronic Heater Partnership Agreement of October 12, 2011, as well as hydronic heaters certified by the New York State Department of Environmental Conservation (NYSDEC) that show compliance with the Step 1 emission levels until Step 2. The final rule also includes an automatic NSPS Step 1 certification for residential pellet hydronic heaters/boilers that have been qualified under the Renewable Heat New York (RHNY) program until Step 2. In addition, forced-air furnaces independently certified (i.e., not self-tested) under Canadian Standards Association (CSA) B415.1-10 as well as forced-air furnaces certified by the NYSDEC that show compliance with the Step 1 emission limits will be deemed EPA certified to meet the Step 1 emission limits under this final rule until the Step 2 compliance date. These automatic certifications mean that no additional certification will be required until Step 2 for qualifying wood heaters. This automatic EPA certification will avoid unnecessary economic impacts on those manufacturers (over 90 percent are small businesses) who can then focus their efforts on developing a full range of cleaner models that meet Step 2 emission levels. This measure should also help avoid potential "delays" at laboratories conducting certification testing for heaters newly subject to the NSPS.

The final rule also reduces the ICR burden for laboratories and certifying entities/third-party certifiers compared to what would have been required under the proposed rule. For labs, we allow currently EPA-accredited labs up to 3 years to obtain ISO-accreditation under subpart AAA; and a 6-month extension has been granted for obtaining ISO-accreditation under subpart AAA for labs not currently EPA- or ISO-accredited. We proposed that certifying entities be required to receive ISO accreditation upon the effective date of the final rule; however, commenters stated that ISO accreditations can take 6 months. Requiring use of ISO-accredited certifying bodies/entities on the effective date of the final rule can be difficult for small manufacturers of wood stoves/heaters and forced-air furnaces, which previously have not been required to obtain certifications from ISO-accredited certifying bodies/entities; therefore, we are allowing a 6-month transition for models other than hydronic heaters. (The 6-month transition period does not apply to hydronic heaters because they already use ISO-accredited certifying bodies/entities for the EPA's voluntary partnership program.)

We also minimize the potential ICR burdens by allowing manufacturers who obtain automatic certification to the Step 1 emission limits, 1 year until they must follow the third-party administered quality assurance program, prior to which they may operate according to their existing quality assurance plan for the applicable model. This provision will extend until 1 year after the effective date of the Step 1 standard. This timeframe is designed to allow an additional

6-month window after the 6-month delayed requirement for certifying bodies/entities to obtain accreditation under subpart AAA to oversee manufacturers' quality assurance plans. This additional window allows time for manufacturers and certifying bodies/entities to enter into contractual agreements related to the required quality assurance plans.

Additionally, when making our revisions to the supporting statements for subparts AAA and QQQQ, we revised the associated capital costs (e.g., owner's manuals, certification testing) based on capital cost estimates provided by an analysis prepared by Ferguson, Andors & Company for the Hearth, Patio and Barbecue Association.[20] The information requested from manufacturers, as detailed in each of the supporting statements (for subpart AAA and subpart QQQQ), will be used: (1) to ensure that the best system of emission reduction is being applied to reduce emissions from wood heaters; (2) to ensure that the wood heater tested for certification purposes is in compliance with the applicable emission standards; (3) to provide assurance that non-tested production model heaters have emission performance characteristics similar to tested models; and (4) to provide an indicator of continued compliance. The information requested from laboratories will be used to grant or deny laboratory accreditation and to assist in enforcement and compliance activities.

Concern with certification costs and burdens:

Commenter (1435) states that before finalizing the proposed rule, the EPA must closely revisit all of its Paperwork Reduction Act (PRA) certifications, and ensure that it has coherently and accurately represented the burdens and costs associated with each of the proposed rule's relevant requirements. Commenter (1435) states the EPA's Information Collection Requests (ICRs) fail to inform manufacturers, labs, and the Office of Management and Budget (OMB) of these substantial additional costs. For example, commenter (1435) asserts the EPA estimated costs per respondent for certification testing required under proposed subpart AAA cannot possibly take into account a second round of testing with an additional fuel, which would add at least another $10,000 per model line (in other words, another $27,727 per respondent, for a total cost of at least $55,454 per respondent). Likewise, commenter (1632) asserts that the EPA underestimates the cost of certification per model line. The commenter (1632) reports that certification testing is at least $15,000 per model, not per model line. According to the commenter (1632), this would mean that if there are 3 models in a model line that includes 3 different sizes and that certification testing is $45,000 and not the $10,000 assumed in the R&D assumption.

Commenter (1435) states EPA's estimate of certification costs per model line does not appear to account for the fact that many times a model line will not meet certification requirements the first time around, and the manufacturer must go back and refine its product design and begin the certification process anew. Thus, commenter (1435) states, the true costs of certification testing

[20] Ferguson, Robert (Ferguson, Andors & Company), prepared for the Hearth, Patio & Barbecue Association, May 2014. Proposed Wood Heater NSPS Incremental Cost Effectiveness Analyses. Submitted as an attachment to comment on the proposed rule to Docket EPA-HQ-OAR-2009-0734 from the Hearth, Patio and Barbecue Association available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1643.

under the proposed rule – including the costs of more than one round of testing under the proposed rule, plus the costs of testing with an additional fuel – are likely to be at least $30,000 to $40,000 per respondent, meaning that even at the low end EPA's estimate of $27,727 per respondent is off by some $55,000 (i.e., at $30,000 in certification costs per model line, with 183 model lines and 66 respondents, total costs per respondent would equal approximately $83,181). Commenter (1435) believes the EPA is obligated under the PRA to account for and justify all of these costs.

Response:

We reassessed and revised the supporting statement ICR associated capital costs (e.g., owner's manuals, certification testing, hangtags) for subpart AAA and subpart QQQQ based on capital cost estimates provided by an analysis prepared by Ferguson, Andors & Company for the Hearth, Patio and Barbecue Association and submitted to the docket in response to the proposed rule.[21] For subpart AAA ICR costs, we assumed a cost of $16,750 per model, and for subpart QQQQ ICR costs, we assumed a cost of $55,000 per model for EPA testing, safety testing and shipping of the prototype.[22] It should be noted that the final rule does not require two different fuel-based tests. It is also important to note that our research and development cost estimates assume that there are multiple tests performed prior to manufacturers conducting certification testing whereby only one round of testing should be required. Therefore, we have not modified our capital costs to reflect testing more than one round per model under our PRA ICR estimates.

Concern with compliance audit costs and burdens:

Commenter (1435) states that once a model line has been certified as being in compliance with the EPA's NSPS limits, there is no need for or utility in additional emissions testing, particularly given the significant test method imprecision in measuring wood heater emissions performance, which allows for little confidence that a given test result is indeed indicative of any compliance problem with the appliance, much less the whole model line, rather than simply reflective of the inherent variability of wood burning. According to commenter (1435), the EPA expressly considered the imprecision of wood stove test methods in developing the current NSPS, assuming at the time that variability in an appliance's emissions performance after repeated testing in the same lab was +/- 1 g/h. Commenter (1435) asserts the EPA recognized the need to conduct future study to determine variability in test results observed from lab to lab, also assumed to be +/- 1 g/h during the regulatory negotiations, but the EPA never performed that

[21] Ferguson, Robert (Ferguson, Andors & Company), prepared for the Hearth, Patio & Barbecue Association, May 2014. *Proposed Wood Heater NSPS Incremental Cost Effectiveness Analyses.* Submitted as an attachment to comment on the proposed rule to Docket EPA-HQ-OAR-2009-0734 from the Hearth, Patio and Barbecue Association available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1643

[22] See http://www.reginfo.gov for the ICR supporting statements for the New Residential Wood Heaters New Source Performance Standards (NSPS) (OMB Control Number 2060-0161), Hydronic Heaters and Forced-Air Furnaces New Source Performance Standards (NSPS) (OMB Control Number 2060-0693)(40 CFR Part 60, Subparts AAA and QQQQ).

study. Unless the EPA abandons its proposal to continue emissions testing as a QA/QC tool, commenter (1435) states that the EPA cannot support its certifications that the proposed rule's requirements are necessary and minimally burdensome. Whatever the cost of QA/QC testing under the proposed rule, commenter (1435) concludes the costs cannot be justified as either beneficial or necessary.

Commenter (1435) asserts the EPA's proposed compliance audit testing scheme is unsupported as a matter of PRA compliance. To the extent that any audit testing would have a QA/QC purpose, such compliance audit testing is unjustified. The only meaningful use for compliance audit testing, according to commenter (1435), is under the rare circumstance where the EPA reasonably suspects fraudulent or otherwise invalid certification testing. Outside of this, commenter (1435) asserts compliance audit tests serve no legitimate purpose, rendering their costs needless, unduly burdensome, and ultimately unwarranted. As such, commenter (1435) believes the EPA's PRA certifications are unsupported and erroneous, and the EPA's proposed compliance audit provisions should be revised prior to any approval for a final rule.

Response:

In response to comments that there is no need for, or utility for, requiring compliance audit testing because of test method imprecision in measuring wood heater emissions performance, we disagree. These compliance audit tests will resemble the audit tests supported by commenter (1435) and would be conducted under rare circumstances on a case-by-case basis. We see this EPA-directed audit testing as a bridge between the original Subpart AAA quality assurance program, based solely on EPA oversight and approval, to the ISO-based process that relies on a system where the manufacturer enters into a contractual agreement with an accredited certifying body/entity to design and operate according to a quality assurance plan. As we have noted regarding other aspects of the ISO-based process, we are still retaining oversight and approval authority, but anticipate this system will require fewer EPA resources and will result in more timely approvals. We plan to re-assess our approval role as well as the need for EPA-directed audit testing provisions in the next NSPS review.

We have addressed several deficiencies of the proposed program, such as elimination of the previous funding (escrow) mechanism, clarified that audit tests must be performed using the same test method as the certification test and taken steps to address variability. That said, we will review the audit information available at the new NSPS review and determine if the ISO-based quality assurance program does make the audit compliance program an unnecessary feature of the NSPS. The test method variability concerns raised by commenters are not an issue for the Step 1 standards, but nonetheless, we do not anticipate requiring any compliance audit tests during the Step 1 period. This is because the attention of all parties (manufacturers, test laboratories and EPA) is best focused on taking steps to ensure compliance with the Step 2 standards and developing improved cord wood test methods. As part of this evolving process, test method variability is one of the issues to be addressed as is improving the performance of appliances to reduce the variability inherent in burning wood and other operational concerns.

We agree to a minimum of a 1 g/hr (+/-) allowance during emissions tests associated with compliance audits because the proposed requirement of a 10 percent compliance allowance becomes unreasonably stringent as we move to the Step 2 standards and beyond. The final rule reflects this 1 g/hr (+/-) allowance and requires that if emissions from the EPA compliance audit testing exceed the applicable emission standard by more than 50 percent using the same test method used to obtain certification, the Administrator will notify the manufacturer that certification for that model line is suspended (pending further action, as detailed in the rule).

2.19.4 Comment: Small Business Regulatory Enforcement Fairness Act concerns

Commenters (1543, 1550, 1643) summarize concerns related to the EPA's failure to address many of the issues raised by members of the Small Business Advocacy Review (SBAR) Panel. For example, the commenters (1543, 1550, 1643) state, the Small Business Administration (SBA) and Office of Management and Budget (OMB) panelists were concerned that "it was unclear whether adoption of a more stringent standard for new sources would slow the adoption of new, cleaner burning heaters, potentially delaying improvements in air quality." The commenters (1543, 1550, 1643) state that the Panel as a whole specifically called for the EPA to "consider reviewing . . . the intra- and inter-lab precision, and the importance of this variability in determining emission standards," and the EPA panelist recommended that the Agency consider "using the ASTM emission test procedure [then] being developed for [hydronic heaters with] heat storage options, as appropriate."

Commenters (1543, 1550, 1643) note that the full Panel further recognized the need for "flexibilities that will most directly minimize the small business burdens" in achieving compliance with the rule. According to the commenters (1543, 1550, 1643), the proposed rule and preamble barely acknowledge the changeout implications of EPA's proposed standards (much less consider them in the course of standard-setting), fail to adequately account for well-known measurement uncertainty, ignore or inappropriately "Christmas Tree" relevant voluntary consensus test methods, and overlook much-needed transitional support for manufacturers of products other than wood stoves currently regulated under subpart AAA.

Commenters (1543, 1547, 1550, 1643) add that EPA's current proposed rule – a proposal materially different from the one considered by the SBAR Panel roughly 3 years earlier – further aggravates many of the concerns originally identified, and adds to them in ways the Panel has not been afforded an opportunity to consider. The commenter (1643) states that the EPA's proposed rule reflects a profound shift in the Agency's thinking from the proposal considered by the Panel, including major changes in the stringency of the emissions standards proposed and how compliance would be measured. Commenters (0960, 1514, 1547, 1592, 1643) add that by so dramatically altering the basic outlines of its proposal – without any additional Panel input – the proposed rule effectively makes a mockery of Small Business Regulatory Enforcement Fairness Act (SBREFA) review.

The commenters (1543, 1550, 1643) state that the flaws in the SBREFA process ultimately underscore the need for the EPA to reconsider various aspects of the proposed rule. The commenters (1543, 1550, 1643) believe that, ideally, the EPA would reconvene the SBAR Panel to provide for further small business review in light of the many components of the proposal that

the Panel was unable to consider in its earlier review. In any event, the commenters (1543, 1550, 1643) state, the EPA must take to heart the significant concerns raised by the SBAR Panel, many of which further support HPBA's own substantive comments on this rulemaking.

Commenter (1261) commends the EPA for convening a Small Business Advocacy Review panel and recognizing that the rule(s) will have a substantial economic impact on a significant number of small businesses. Commenter (1261) states that the EPA should consider how this rule will impact those small businesses that use residential wood heaters as a source of heat for their facility/business. The commenter (1261) believes the EPA should seek out such data.

Commenter (1436) asserts that many significant manufacturers are foreign or foreign-owned and that parties at the Small Entity Representatives (SERs) panel discussions did not represent the industry.

Commenter (1514) notes that the EPA is using a NAICS code 333414 of a "small business" (which is fewer than 500 employees) but that nearly all manufacturers have fewer than 500 employees and asks about those companies with fewer than 25 employees.

Response:

Pursuant to section 603 of the Regulatory Flexibility Act (RFA), the EPA prepared a final regulatory flexibility analysis that examines the impact of the rule on small entities along with regulatory alternatives that could reduce that impact. As required by section 609(b) of the RFA, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), the EPA also convened a Small Business Advocacy Review (SBAR) Panel in 2010 to obtain advice and recommendations of representatives of the small entities that potentially would be subject to the rule's requirements. Over 90 percent of wood stove burning appliances (regulated under subpart AAA and subpart QQQQ) are considered small businesses. We fully considered the impacts of these rules on all small businesses (inclusive of those with employees less than 25).

Before beginning the formal SBAR Panel, we actively engaged in outreach with entities that would potentially be affected by the upcoming proposed rulemaking, including organizations such as HPBA, MHA and PFI and many of their member companies to discuss the rule under development and to provide these contacts with an early opportunity to ask questions and discuss their concerns. The Panel consisted of 26 small entity representatives (SERs) that represented manufacturers that sell their wood heaters in the U.S. and also import and sell stoves in the U.S. that are manufactured in other countries (e.g., Vogelzang International Corp.). Regarding one commenter's concern that the SERs did not represent foreign interests, the Panel was not required to include all of the industry world-wide and there has been opportunity to comment on the proposal whereby foreign-owned manufacturers that were not represented in the Panel could provide comment.

The SBAR Panel provided the opportunity for questions and comment during the meeting on various aspects of the proposal being developed, including the expanded scope of the rule, changes to the current requirements under consideration, preliminary cost information and follow up regarding the SERs' ideas for regulatory flexibility. The SERs voiced general support for the

planned proposed rule and shared specific concerns with the Panel members. A detailed discussion of the Panel's advice and recommendations is found in the final Panel Report (Docket ID No. EPA-HQ-OAR-2009-0734). A summary of the Panel's recommendations and how we incorporated those recommendations is also presented in the preamble. In the final rule, we have included provisions consistent with several of the Panel's recommendations. We have attempted to follow the Panel's recommendations to the degree we can while also ensuring that the options are practicable, enforceable, environmentally sound and consistent with the CAA. For those recommendations not adopted by the EPA, we included an explanation for why we rejected them.

Although we do not plan to reconvene a SBAR Panel, we have considered Panel input and comments received under the SBREFA process and on the proposal with regards to small business implications. We note again that the final rule includes several measures to minimize impacts on small businesses in the final rule, including easing the transition to the more stringent Step 2 standards. These cost-saving transitional provisions are noted in numerous other responses (e.g., see our response in *Section 2.19.3*).

Regarding concerns about inter- and intra-laboratory precision, repeatability and uncertainty, see our responses in *Sections 2.8.3, 3.2.2 and 6.1.3*. Regarding concerns about changeouts, see our response in *Section 7.1.1*.

2.19.5 Comment: Executive Order 13175 concerns

Commenters (1239, 1355) state the EPA does not appear to fully understand EO 13175 or the intent behind it. Commenter (1239) asserts EO 13175 requires the EPA to develop an accountability process to ensure "meaningful and timely input by development of regulatory policies that have tribal implications," NOT implications to tribal governments. Nevertheless, commenter (1355) finds that the EPA conducted consultation with Indian Tribes with a positive outcome, specifically, as a result of consultation with Indian Tribes and other outreach meetings with Tribal representatives, making it clear in the proposed rule that "Traditional Native American bake ovens" will not be required to comply with emissions limits for wood heaters (see § 60.530(c)(4)) and providing an appropriate definition for such ovens (see § 60.530(1)).

Response:

This final action does not have tribal implications. We disagree with the commenter regarding our understanding of EO 13175. Although we conduct outreach to tribal governments, they represent their tribes with regards to tribal implications. Nonetheless, we agree with the commenter that our consultations with Indian Tribes and other outreach meetings resulted in positive inputs from the tribes which addressed tribal concerns regarding the treatment of

"traditional Native American bake ovens" under subpart AAA. We plan to continue outreach initiatives to Indian Tribes as necessary to ensure Tribal interests and concerns are addressed.

2.19.6 Comment: Executive Order 12898 Environmental Justice (EJ) concerns

Commenter (1503) states the Environmental Justice (EJ) analysis conducted by the EPA at proposal of the rule did not consider the full range of potential impacts on low-income and minority communities from wood heater emissions. For example, commenter (1503) notes that the analysis focused primarily on cancer correlations, while failing to fully examine many other considerations that could and should be part of an EJ analysis. Commenter (1503) thinks that it is important for the EPA to recognize that some low-income and minority communities are more likely to rely on wood as a primary heating fuel, and that these groups may be forced to rely on older, uncertified heaters which are more polluting and less efficient. For these reasons, commenter (1503) believes that a full, comprehensive EJ analysis would better account for the significance of reducing PM and other emissions from wood heating devices as a key step in eliminating the disproportionate impact that wood heater emissions can have on low-income and minority communities. Commenter (1503) urges the EPA to undertake a more comprehensive EJ analysis in the context of any future revisions to these wood heater performance standards.

Commenter (0736) provides an abstract to apparent journal article (but no citation) which concludes that: "On average, higher-income areas have lower wood smoke $PM_{2.5}$ concentrations and intake. Our results emphasize the importance of urban wood smoke as a source of $PM_{2.5}$ exposure and highlight the comparatively large population exposure and potential environmental justice benefits from reducing wood smoke emissions."

Commenter (1114) states that a recent study conducted by the Oregon Department of Environmental Quality found that in the Portland metropolitan region, residential wood combustion is a concerning source of air-toxics in terms of risk to human health, and that air-toxics from wood stoves disproportionately impact Hispanic and Latino communities, exacerbating existing health disparities.

Response:

As discussed in the proposal preamble, the report, "Analysis of Exposure to Residential Wood Combustion Emissions for Different Socio-Economic Groups," shows that on a nationwide basis, cancer risks due to residential wood smoke emissions among disadvantaged population groups generally are lower than the risks for the general population due to residential wood smoke emissions. Thus, nationally, we have determined that this rule will not have disproportionately high and adverse human health or environmental effects on minority, low-income or indigenous populations because it increases the level of environmental protection for all affected populations without having any disproportionately high and adverse human health or environmental effects on any population, including any minority low-income or indigenous

population.[23] This rule establishes national standards that will reduce primarily PM emissions from new residential wood heaters and, thus, would decrease the amount of these emissions to which all affected populations are exposed. To the extent that minority populations and low-income populations are more vulnerable, this rule will help.

Although these technology-based standards will reduce PM emissions from new residential wood heaters, we acknowledge that local air quality concerns may exist and that local air quality would likely benefit from existing older higher-emitting heaters being replaced with the newer lower-emitting heaters being required under these technology-based rules. As with other states that have regional concerns, Oregon has addressed their regional situation (that indicates that there is a disproportionate impact from wood smoke from wood stoves to Hispanic and Latino communities) by establishing changeout and tax incentive programs that encourage the replacement of older higher-emitting wood-burning stoves with newer lower-emitting stoves. Where local communities and air quality issues are identified, we encourage local government agencies to establish and implement changeout and/or tax incentive or other financial incentive programs to encourage the replacement of older higher-emitting wood-burning stoves with newer lower-emitting stoves. Changeout programs can use financial incentives to encourage the replacement of older wood-burning appliances with cleaner home heating options. The Burn Wise website at http://www.epa.gov/burnwise/how-to-guide.html presents guidance on "How to Implement a Wood-burning Changeout Program." Other financial incentives (including tax incentives) can also be used to encourage households to replace or retrofit old wood-burning appliances. The EPA's *Strategies for Reducing Residential Wood Smoke* document (http://www.epa.gov/burnwise/strategies.html, pages 21-24) outlines financial incentives (including discounts/vouchers, tax credits, property assessed clean energy and federal program incentives) that can be used.

[23] "Analysis of Exposure to Residential Wood Combustion Emissions for Different Socio-Economic Groups, Revised Draft Report." Prepared for Gil Wood, U.S. EPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC. Prepared by EC/R Inc., EPA Contract No. EP-D-05-085, Work Assignment No. 4-3. April 22, 2010.

3.0 Response to Comments Regarding Subpart AAA

Chapter 3 presents comments specifically related to room heaters and the NSPS requirements that the EPA proposed to regulate room heaters (40 CFR part 60, subpart AAA). Refer to Chapter 2 for additional overarching comments, generally applicable to all subparts of the proposed rule. Refer to Chapter 6 for comments regarding test method procedures.

3.1 Appliances Subject to Subpart

3.1.1 Comment: Device category groupings

Commenter (1520) supports grouping wood stoves, pellet stoves and single burn rate stoves in one emissions standard category to simplify review and compliance procedures and eliminate loopholes that would inadvertently exempt units.

Commenter (1521) opposes the grouping together of all three categories of wood-burning appliances (catalyst, noncatalyst, and pellet), asserting it is not logical, as the categories are designed to operate and control emissions differently. The commenter (1521) suggests that the EPA develop standards for each wood-burning appliance category (based on what has done in other NSPS/NESHAP) by identifying the top performers in each of the three residential wood heater categories.

Commenter (1397) recommends dividing room heaters/space heaters into "hand fed" and "automatic feed" categories, with the option of slightly different methods and standards for these categories.

Response:

We grouped appliances into "room heaters" and "central heaters" in order to simplify the rule and compliance with the rule, while also allowing flexibility in the rule for current and future technological innovations. Hybrid technology, for example, does not fall neatly into catalytic or non-catalytic heater categories but is nonetheless a heater. Furthermore, a far-reaching effect of NSPS and environmental regulations in general is that they can spur innovation and foster competition. Grouping wood heating technologies by function and allowing free market competition where practicable – rather than giving unfair advantage to one technology over another – can have a technology-spurring effect that ultimately benefits the environment and the industry.

Regarding "hand fed" and "automatic feed" categories, as eluded to above, we are hesitant to judge one technology by a different standard than another. Rather we prefer to leave it to the industry to innovate and decide the best method/solution to meet the emission limit with a market-worthy product. Thus, we do not currently see a reason that such different standards are necessary or advisable, but we can revisit this logic in future NSPS rulemakings.

3.1.2 Comment: Pellet stove category

Commenters (1192, 1423, 1503, 1513) suggest the EPA establish a separate category for pellet stoves. One commenter (1192) states this should be regardless of whether they are catalytic or noncatalytic, with an emission limit of 2.5 g/hr for Step 1. Commenter (1423) believes some manufacturers of these appliances have enjoyed a competitive advantage in not complying with the NSPS by creating devices with high air-to-fuel ratios, an unintended consequence of what was intended to be a basis for excluding fireplaces. Commenter (1423) asserts pellet stove manufacturers of uncertified units have been competing in the market with certified pellet stove manufacturers and cord wood heaters, without having to comply with the NSPS requirements including certification testing, labeling, ongoing QA, etc. Commenter (1423) supports subjecting all pellet stoves to certification requirements.

Commenter (1503) states the pellet stove fuel used for certification will not change significantly (as it will for cord wood stoves) and that the EPA has ample data showing that the Step 2 pellet stove limits are achievable and even lower limits are possible. Therefore, commenter (1503) believes no midterm review would be necessary for pellet stoves and that the distinction in test methods between traditional wood stoves and pellet stoves is yet another good reason for treating pellet stoves as a separate subcategory.

Commenter (1479) proposes that a 35:1 air to fuel ratio be a maximum for testing with wood pellets.

Response:

We agree with commenters that we have ample data that show that many pellet stoves can easily meet the Step 2 PM emission limits and some can do even better. We designed this final rule to eliminate loopholes and we think that regulating any wood fuel-based technologies that serve as "room heaters" or "central heaters" will serve this purpose and address the loophole problem in the 1988 rule and encourage further market competition. Regarding establishing a separate category for pellet stoves, we note our response in *Section 3.1.1*. Again, it is not our intention to give one technology unfair advantage over another technology; nor is it our responsibility or mission to ensure all current technologies continue into the future with unchanged market shares. Rather we encourage the industry to use the free market to innovate and develop technologies capable of meeting the final emission limits.

In regard, to the suggestion that we set a 35:1 air to fuel ratio maximum for pellet stoves, when practical, we prefer to allow manufacturers to choose how to best meet the PM emission limits.

3.1.3 Comment: Single burn rate stove category

Commenter (1423) recommends that the EPA treat single burn rate stoves as room heaters, and establish emission limits at the same level as room heaters and subject these units to the same emission testing and certification requirements as those applied to other room heaters. Commenter (1423) states, because they are fueled using cord wood and used for the same purpose, their emissions should be similarly regulated. Commenter (1423) believes this would be

more equitable with manufacturers who have spent significant time and resources developing cleaner burning appliances.

Commenter (1176) recommends that a new single burn rate category be established where, based on a worst-case scenario, it could be certified using a cold start followed by the burn rate for which the product is designed and will be marketed. The commenter (1176) asserts that this would lend itself to on-site testing for innovation and regulation.

Commenter (1423) recommends single burn rate stoves be subject to the minimum burn rate testing, without which there is no incentive for these manufacturers to incorporate readily available emission control technology.

Response:

We agree that single burn rate stoves should be regulated as room heaters and the proposed and final rule requires these devices to meet the same Step 1 and Step 2 emission limits as all other room heaters. The testing for certification is similar to the testing required for certification of adjustable burn rate stoves in many respects. However, due to the inherent difference between a single burn rate and an adjustable burn rate stove, the testing protocol for certification is necessarily different.

Single burn rate stoves are designed to burn at one burn rate; they are not installed or equipped with a damper to allow the operator to vary the burn rate conditions. In fact, the final rule requires that the permanent label on each single burn rate heater clearly state "This single burn rate heater is not approved for use with a flue damper". Using a damper to achieve a minimum burn rate during testing is contrary to the NSPS. Because single burn rate stoves are designed and required by the NSPS to burn at only one rate, without damper control, these stoves are tested for certification at this single burn rate using the protocol detailed in Appendix X1 of ASTM E2780-10 "Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters."

3.2 Best Systems of Emission Reduction for Room Heaters

This section presents BSER comments specific to room heaters. See *Section 2.1.1* for overarching comments regarding BSER.

3.2.1 Comment: Demonstration of BSER

Commenter (1487) asserts it would be inconsistent with section 111(a) of the CAA for the EPA to establish a standard of performance that reflects anything less than what the best wood stoves now available can achieve. The commenter (1487) states several types of wood stoves already meet the proposed Step 2, so there is little doubt that this standard is "adequately demonstrated." The commenter (1487) believes section 111 of the CAA does not require the EPA to establish standards that can be met by all types of sources using all types of fuels. Commenter (1487) states that the record does not indicate that the Step 2 standards are unachievable using cord wood fuel or even that wood stoves perform consistently worse on cord wood. The commenter

(1487) reports that one company (Woodstock Soapstone) has tested one of its new wood stove models using both cord and crib wood, at a variety of burn rates. The commenter (1487) asserts the tested stove achieved well below the Step 2 standard under all three cord wood test runs, which included a relatively low burn rate of 0.89 kg/hr as well as a relatively high burn rate of 2.56 kg/hr. According to commenter (1487), emissions from the tested stove ranged from 0.5 to 0.88 g/hr, comfortably below the proposed Step 2 standard. The commenter (1487) asserts that these results did not vary dramatically from the emissions of the same stove fueled with crib wood, which ranged from 0.34 g/hr to 1.32 g/hr.

Commenter (1503) states that, as the EPA has correctly noted in recent rulemakings, performance standards under section 111 of the CAA are meant to be technology-forcing, rather than maintaining the status quo. Commenter (1503) believes that, although the EPA's proposed Step 2 limits for wood stoves will force some technological innovation, the EPA could go further by setting a reasonable, achievable, and more stringent near-term standard in Step 1 of the proposed NSPS. Given the current state of wood stove technology, commenter (1503) believes that if the Step 2 limits remain as proposed, five years to meet the stricter standards with cord wood is reasonable. Commenter (1503) states their analysis of the EPA's wood heater certification data indicates that for EPA-certified noncatalytic wood heaters the median emission rate is 4.1 g/hr , for catalytic stoves is 3.0 g/hr, and for pellet stoves is 1.88 g/hr. Commenter (1503) states that the median for the entire wood stove category (including catalytic, noncatalytic, and pellet stoves) is 3.6 g/hr, and the average across all stoves is approximately 3.7 g/hr. Commenter (1503) further asserts that review of the HPBA database indicates that the top 20% of stoves (a cross-section that includes both catalytic and noncatalytic stoves) are already able to meet a 2.5 g/hr emission limit when the data is converted to 5G equivalents.

Commenters (1514, 1543, 1549, 1550, 1643) state that the best "system" of emission reduction connotes more than just technology and, here, the best "system" is a coupling of technology aligned with adequate price-demand incentives for homeowner changeouts, producing a performance standard that reflects both features of this "system." The commenters (1543, 1549, 1550, 1643) state that the subpart AAA proposed Step 2/3 limits do not do this. The commenters (1543, 1549, 1550, 1643) assert that the demonstrated imprecision of the test methods, lack of correlation between certification scores and field performance, and the demonstrated cost-ineffectiveness of the proposed Step 2/3 standards (including the adverse impacts of these standards on changeouts/scrappage) all show that the proposed Step 2/3 standards exceed the bounds of reasonableness, do not reflect BSER and have not been "adequately demonstrated." Thus, the commenters (1543, 1549, 1550, 1643) believe that the proposed Step 2/3 standards conflict with section 111 and must be abandoned.

Commenter (1521) argues that it is inappropriate to promulgate 2020 Step 2 standards, considering the imprecision and uncertainty of the test methods and resulting data from which the proposed Step 2 standards were derived. Commenter (1521) reports that fuels, test methods, and testing protocols are highly variable and do not provide an adequate foundation upon which to promulgate Step 2 standards.

Commenter (1514) claims that the EPA's proposed approach greatly misses the BSER mark because, rather than a true "system", the proposal aims at forcing a 4.5 g/hr level down to a 1.3 g/hr level, which will have a minuscule effect upon the actual air shed pollution. The commenter (1514) contends that a true "system" approach would include a plan to replace older stoves with newer, cleaner, certified units (e.g., through incentive-based programs such as the Libby, Montana Comprehensive Stove Changeout).

Commenter (1543) opines that the EPA has failed to fully analyze alternative approaches (e.g., focusing on the changeout of existing uncertified wood heaters with currently achievable certified wood heaters) to reduce total fine PM from residential wood heat and the costs and benefits of such alternatives as compared to what the EPA is proposing for the NSPS residential wood heaters. The commenter (1543) states that those alternatives are documented in publication EPA-456/B-09-001.

Commenter (1554) states there is insufficient data demonstrating that wood stoves using BSER can reliably achieve compliance with the proposed limits using the proposed new test method. Thus, commenter (1554) adds the EPA cannot require use of the proposed new test method to determine compliance. Commenter (1436) states no stoves have been tested to the proposed protocol and that the published certification numbers are weighted averages. Commenter (1436) questions the median certification value for all certified models stated as 3.4 g/hr and adds that having a certificate is no indication of actual sales.

Commenter (1543) believes that the new NSPS Step 2 proposed approach (Steps 2/3 of the alternative approach) does not meet the best demonstrated available technology (BDAT) requirements as the proposed new technology has not yet been developed or tested.

Response:

We recognize that some commenters contend that the proposed rule was inconsistent with section 111 of the CAA because the limits were not stringent enough, while other commenters contend the proposed rule was inconsistent with section 111 because the limits were too stringent and not achievable. We maintain that the final limits rest solidly on section 111 of the CAA, that they are achievable and based on BSER that has been adequately demonstrated, and that we have balanced emission reductions with cost considerations as is appropriate under section 111.

Regarding the appropriate level of the standard for this NSPS, under section 111 of the CAA, the EPA has significant discretion to determine the appropriate level for the standards. Section 111(a)(1) provides that NSPS are to "reflect the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated." After identifying what technologies exist that best reduce emissions, we must evaluate the potential emission limit from that technology review in conjunction with costs and other factors (e.g., benefits, non-air quality impacts). As part of this analysis, we considered numerous factors relating to the potential cost of the regulation, including industry organization and market

structure, available technologies, and estimated costs of R&D to employ these technologies across the industry.

We maintain that our final Step 1 and Step 2 limits balance well achievable emission limits with cost and market considerations. The Step 2 limits, although achievable, are technology-forcing for much of the industry. The Step 1 limits are technology-forcing for some, but are primarily designed to give manufacturers the ability to bring products to market (minimizing testing logjams) while designing appliances to meet the more stringent Step 2 limits. In general, for this rulemaking, we have determined that the first step represents the emission levels that many models can readily achieve now using today's designs and technology. We have also determined that the second step represents stronger emission levels achievable for all appliance types at reasonable cost, allowing appropriate lead times for manufacturers to redesign their model lines to accommodate the improved technology across multiple model lines and test, field evaluate, and certify new model lines. Regarding comments in response to our proposal that discussed the details of the crib certification test data for Step 2, we note that 89 percent of catalytic/hybrid and 18 percent of noncatalytic stoves meet Step 2 of the final rule. Thus, not only are the emission levels clearly demonstrated, the percentages of current heaters that already meet Step 2 are quite reasonable, especially considering that Step 2 is 5 years after the effective date.

To further ease the transition on small businesses, we are not requiring new testing of heaters that have current certificates of compliance under the 1988 NSPS that show they meet the Step 1 emission levels. Those certificates will be automatically extended beyond their current expiration date until the compliance deadline for the Step 2 emission limits. Furthermore, to address the possibility that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA, especially in the first year, and so as to avoid unfairly restricting the production and sales of manufacturers who do all the things they should do and then potentially have to wait on the EPA approval, we have added a conditional, temporary approval by the EPA for room heaters subject to revised subpart AAA based on the manufacturer's submittal of a complete certification application. The conditional approval would allow manufacture and sales for 1 year or until EPA review of the application, whichever is earlier.

Regarding a cord wood-based standard, as noted in other responses (e.g., *Section 2.8.2*), we encourage manufacturers to design wood heaters that best represent in-home performance using cord wood. Towards that goal, we have provided an alternative compliance option based on cord wood. However, the ASTM cord wood test methods are not complete and only limited testing using the draft methods has occurred so far. We received numerous comments from noncatalytic stove manufacturers, laboratories and some states with concerns about when the cord wood test methods would be ready. These concerns included how quickly noncatalytic stoves could be redesigned to perform well under cord wood certification testing. Considering all of the above, we have determined that we do not have sufficient data at this time to adequately support a regulatory requirement for cord wood testing. The alternative cord wood compliance option will inform and enhance the BSER database for the next NSPS.

Commenters' concerns regarding BSER resting on new test methods should be ameliorated by the fact that the final rule's test methods under subpart AAA continue to be based on crib wood;

the new cord wood-based methods (e.g., ASTM E2780-10) underlie the alternative compliance option but are not required. We address commenters' concerns regarding the claimed imprecision of the test methods in other Sections including *Sections 2.8.3, 3.2.2 and 6.1.3*.

We address commenters' request for changeout programs in *Section 2.1.5*, noting that the principal authority for this rulemaking (and the 1988 subpart AAA) is CAA section 111 and this rule is applicable to new sources. We agree with the comments that replacing old uncertified wood stoves can result in very large emission reductions and be very cost-effective. We have conducted workshops and provided changeout education and outreach tools for many years. See the EPA's *Strategies for Reducing Residential Wood Smoke* document on the EPA Burn Wise website for more details (http://www.epa.gov/burnwise/strategies.html).

3.2.2 Comment: Precision and variability in certification data informing BSER

Commenters (1543, 1554, 1549, 1550, 1643) believe that the proposed Step 1 limit meets the requirements of BSER, with compliance demonstrated by relevant ASTM and CSA test methods, without the deviations from those methods proposed by the EPA.

Commenter (1429) asserts that, in the preamble (V.B.1.a), the EPA dismisses the relevance and validity of the only existing database upon which the precision of the wood stove emission test process can be judged, misstating and ignoring the clear purpose of the proficiency test program the EPA itself created. Commenter (1429) states the EPA never published an analysis of the proficiency test data or made a determination of the precision either for within lab repeatability or between lab reproducibility. Commenter (1429) states the EPA provided the accumulated data, analyzed according to standardized statistical procedures, which provides a clear indication that the variability in wood-burning appliance emissions testing is real and substantial as noted in the Curkeet-Ferguson study (EPA Wood Heater Test Method Variability Study Analysis of Uncertainty, Repeatability and Reproducibility based on the EPA Accredited Laboratory Proficiency Test Database, Rick Curkeet, Robert Ferguson, October 6, 2010).

Commenter (1429) believes the EPA dismisses a major problem with the primary regulatory process – its inability to reliably distinguish between emissions performance differences on the order of 3 to 5 g/hr – by wrongly claiming that the labs: 1) had no incentive to try and produce consistent test results because no repeatability limits were specified and they were not being paid to do the proficiency tests; and 2) that a lab allegedly intentionally manipulated or "staged" the test process to demonstrate how variable the results could be. Commenter (1429) further asserts that the EPA misstates the impact of emission test precision by referring to proposed Step 2 limits, when it is just as critical to Step 1.

Commenter (1429) contends that regulations based on performance testing and numerical results must be based on limits that take into account the demonstrated precision of the test method. While it is possible and perhaps likely that new consensus test methods such as ASTM E2515, E2780 and E2618 include refinements that may improve precision somewhat, commenter (1429) believes there is insufficient data available to quantify the precision of these methods. Commenter (1429) adds that Curkeet-Ferguson's finding that the major contributor to poor

precision was the inherent variability associated with burning wood suggests caution in predicting significant improvement. Thus, commenter (1429) believes the only available data, which indicates repeatability and reproducibility are on the order of 3 to 6+ g/hr for wood stoves, should preclude the EPA from setting limits lower than the existing NSPS.

Commenter (1429) states the EPA's proposal includes many specific test method changes that the EPA thinks will mitigate the variability problem, all of which are based on assumptions, beliefs and opinions with no credible scientific evidence to support them. Commenter (1429) asserts the EPA relied upon Oregon DEQ data that "suggested" the repeatability of Method 28 would be about ± 1g/hr when actual data accumulated by the EPA in the last 25 years under the requirements of its regulations has proven this suggestion to be wildly optimistic.

Commenter (1429) states the EPA Certified Wood Stove database being used to establish BSER is inadequate even for the Step 1 limit as every certified emissions rate represents the results of a single test series. A single data point, commenter (1429) states, does not tell the mean or standard deviation of that distribution. From the proficiency test data, commenter (1429) expects that the standard deviation for most stoves would be at least 1.5 to 2 g/hr. Looking at the implications for the EPA's proposed Step 1 limit of 4.5 g/hr and assuming a best case scenario of a 1.5 g/hr standard deviation, commenter (1429) infers the mean emissions rate of currently produced certified stoves is 3.33 g/hr. Given a true mean emissions rate of 3.33 g/hr, commenter (1429) asks what the lowest value reasonably expected to occur may be within a 5%, 10%, 15%, etc., probability. Commenter (1429) states that comparing these probability based estimates of results to the actual proportions of the 123 certified stoves that meet the same emissions limits shows little difference between the distribution of emissions results in the EPA database and the expected distribution results from a single wood stove with a true mean 3.33 g/hr rate tested 123 times (see figure in comment letter p. 5). Thus, commenter (1429) states the hypothesis that all certified wood stoves perform with essentially the same emissions distribution cannot be disproven and any apparent differences may be due to random variability. Commenter (1429) concludes that, even if there is a difference between technology and emissions performance among the certified stoves, the differences cannot be reasonably quantified based on this data.

Commenter (1429) states the Step 2 level has not been demonstrated to be achievable and believes an additional 3% gain may not be achievable. Commenter (1429) suggests the EPA hold off making a determination of future limits until new standards have been in use long enough to generate a new database. Commenter (1429) further suggests the EPA fund research to better evaluate the variability issue. Commenter (1429) opines the most defensible approach to determining BSER would be to set a single new compliance limit (Step 1) based on 1.645 standard deviations above the mean of the currently qualified devices, resulting in a 95% probability that appliances with a true mean at the current mean value of certified products would pass.

Commenters (1543, 1547, 1549, 1550, 1554, 1643) state that the EPA's proposed Step 2/3 standards are fundamentally incompatible with CAA section 111's requirement that standards be "adequately demonstrated." Commenters (1543, 1547, 1549, 1550, 1554, 1643) state the proposed limits do not adequately account for substantial imprecision and other uncertainties in

the test methods used to determine compliance with the emission limits. The commenters (1543, 1549, 1550, 1643) state that the EPA's own data establish that the precision of wood stove test methods will not allow meaningful distinction between models that achieve certification scores within the range of interest here (1.3 to 4.5 g/hr). The commenters (1543, 1549, 1550, 1643) express concern regarding the precision of the test methods and how that affected development of the original rule.

Commenter (1397) states that claims of unmanageable variability do not align with a more rigorous statistical analysis of test results that eliminates outlier data (citing materials presented by PSCAA as part of pre-proposal meeting in St. Louis).

Commenters (1543, 1549, 1550, 1643) state that the authors of the Curkeet-Ferguson study concluded that "variability in wood heater emission testing results for any given appliance is most likely a function of the random nature of burning wood." Commenters (1543, 1547, 1549, 1550, 1554, 1643) add that the study concluded that the "current testing process cannot consistently distinguish emissions performance differences of less than 3 to 60 grams per hour."

Commenters (1543, 1549, 1550, 1643) state that the EPA's criticisms of the Curkeet-Ferguson study constitute an unfair and inaccurate general attack on the behavior and competency of EPA-approved test laboratories (by stating they lack regulatory requirements or incentives to achieve highly reproducible results in proficiency testing), and ignores that outliers in the test data were excluded from the study's precision analysis. The commenters (1543, 1549, 1550, 1643) add that it is incorrect to assume that the EPA's proposed "improvements" meaningfully address the existing precision issues, an assumption that the Lab Coalition (commenter 1647) comments refute.

Commenters (1543, 1549, 1550, 1554, 1643) also refute the Puget Sound Clean Air Agency's (PSCAA) criticism of the Curkeet-Ferguson study. The commenters (1543, 1549, 1550, 1643) conclude that PSCAA's attempt to fault HPBA for what it perceives as flaws in ASTM's standard procedure for evaluating test method precision—one developed through ASTM's consensus-based process for cross-industry, broad application—is clearly inappropriate. Commenter (1643, Attachment 9) stands by the original conclusions of the Curkeet-Ferguson study that the EPA NSPS wood stove emissions measurement process has a large variability relative to the specified limits and none of the individual "certified" emissions rates can be considered a definitive or reliable measure of the appliance's true emissions performance. The commenters (1543, 1549, 1550, 1643, Attachment 9) stand by the conclusion that the variability in results observed is due primarily to actual differences in the product's performance from test to test and not to significant error in the measurements themselves.

Commenter (1554) adds that the EPA's reliance on the PSCAA study is insufficient because even that analysis shows greater variability than the 1.3 g/hr limit proposed by the EPA, showing a testing variability of +/- 1.8 g/hr. Commenter (1554) adds that the Curkeet-Ferguson study was very robust, involving several different stove models tested at over a dozen different EPA-certified laboratories whereas the PSCAA study evaluated testing at only two laboratories and inappropriately excluded so-called "outliers" without adequate justification. For these reasons,

the commenter (1554) concludes that it is not reasonable to discount the Curkeet-Ferguson study and, instead, rely on the PSCAA study. Commenter (1711) presented a point by point rebuttal to the above, questioned the independence of a variability study financed by industry, questioned the independence of laboratories that are paid by the manufactures and concluded that the Curkeet analysis is wrong and that data for his Model 205 stove show a variation of only 0.17 g/hr.

Regarding the reproducibility of test results at lower levels of the standard for Method 28 (FR 79 at 6356), commenter (1436) states that while the EPA asserts the Ferguson test is a scam, their data supports it. Commenters (1436, 1554) state that repeatability and variability in the methods is a barrier to the 1.3 g/hr proposal, or any proposal <4.5 g/hr. Commenter (1436) states that while the current (1988) test method can distinguish a good stove from a bad one, it cannot distinguish better from best. Repeatability is impossible, according to commenter (1436) because variability is not due to manufacturing variability but rather to the way a stove is loaded, the way the wood falls in on itself during the fire, the knots, the temperatures, the nature of each individual piece of wood—all have an impact.

Commenter (1573-A2) notes the fundamental uncertainties of burning wood, which amplifies the variability of the test results, such as the moisture content of the wood, the density of the wood, the amount and location of sap deposits, the shifting of the fuel load within the combustion chamber, the temperature, composition and quality of the coal bed, etc., making achieving the Step 2/3 limit problematic. Commenter (1573-A2) is concerned that all four runs need to be less than 1.3 g/hr, and this level of exactness is not possible based on the EPA's own round robin test reports.

Commenter (1396) notes that, even when tested using a standardize Douglas fir crib, variability in the emissions testing results is most likely a function of the random nature of burning wood; numerous relatively small, uncontrollable variables are inherent in the wood combustion process and can significantly affect the outcome of each emissions test. Commenter (1396) asserts that an analysis of repeatability and reproducibility of emissions test results showed that the current testing process simply cannot consistently distinguish emissions performance differences of less than 3 to 6 g/hr. Commenter (1396) states that a study performed using the EPA's proficiency test data showed the EPA's assumption that inter-laboratory variability in test data of ±1 g/hr was significantly exceeded—the analysis found that intra-lab precision would range by as much as ± 4.5 to 6.4 g/hr. Thus, commenter (1396) states the EPA's own data would indicate that, between the proposed Step 2/3 limits of 1.3 and the proposed Step 1 limit of 4.5 g/hr, the precision of wood stove test methods will not allow meaningful distinction between certified wood heaters. Commenter (1396) requests the EPA provide an explanation and supporting data used in determination of the ± 1 g/hr variability result.

Commenter (0651) is concerned that the wood heater test method is not capable of differentiation at the low levels that the EPA is proposing. The commenter (0651) describes the financial catastrophes that would result from a situation where a manufacturer obtains a certification in Step 2, but faces a high risk of failing follow-up emissions compliance audits due to variability.

Response:

We summarized and cited commenters' precision concerns in the preamble to the proposed rule, noting that we made improvements to the test methods which would increase reproducibility and repeatability, but also calling into question the extent of and reasons for the claimed imprecision. For example, we noted the lack of regulatory requirements or incentives for the test laboratories to achieve highly reproducible results in proficiency testing. We stand by our conclusion in the proposal preamble that the proficiency testing results merit consideration but that they do not mean that lower emission standards cannot be measured accurately. We note the rigorous statistical analysis by the Puget Sound Clean Air Agency (PSCAA) which calls into question the degree of the imprecision assertions of the Curkeet-Ferguson study. In addition to the PSCAA analysis, the testing we performed and reported as part of the NODA support our earlier conclusion, as does the detailed assessment of the Curkeet-Ferguson study by one manufacturer[24] commenting in response to the NODA. We agree with the NODA commenter that it is false and misleading to conclude that the the random nature of wood burning creates variability enough to render test results non reproducible and not repeatable. Furthermore, for some stoves repeatability is good even between crib and cord wood. The emissions test data presented in the NODA for three stoves from two catalytic/hybrid wood stove manufacturers show that their EPA-certified wood stoves tested using cord wood – and making no design changes to adjust for crib wood versus cord wood in the tests – have similar emissions as stoves tested using crib wood. The BNL cord wood testing for the NODA showed that repeatability of the cord wood test method results can sometimes be very good (i.e., within 15 percent). Although we will continue to improve test methods for future rulemakings, we are satisfied with the reproducibility and repeatability of test results and maintain that the rule's test methods result in sufficient precision to undergird our Step 1 and Step 2 limits.

Finally, we note that the State of Washington Department of Ecology has successfully required a 2.5 g/hr standard for catalytic stoves since 1995 and numerous stoves have been EPA-certified at 1.0 g/hr, half of the final Step 2 standard of 2.0 g/hr. Again, we also note that the final rule includes revisions to the methods that should improve precision.

See additional commentary and our responses regarding the claimed imprecision of the test methods in *Sections 2.8.3 and 6.1.3*

3.2.3 Comment: Certification values as predictors of real world emissions

Commenters (1543, 1550, 1643) claim that relevant data reveal that certification test scores based on laboratory data using dimensional lumber Douglas fir cribs for fuel are not reliable predictors of emissions performance in homes burning cord wood in "real world" installations (implicating different and varying flue draft conditions as an example). Thus, the commenters (1543, 1550, 1643) state that lower emissions limits are not likely to translate to lower emissions

[24] Comment on the NODA to Docket EPA-HQ-OAR-2009-0734 from T. Morrissey of Woodstock Soapstone Company; available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1711

from new wood stoves when installed and operated in American homes. The commenters (1543, 1550, 1642, 1643) describe factors affecting the relationship between lab and field performance and the results of review of such information by Dr. James Houck, conducted for HPBA. The commenters (1543, 1550, 1643) attach a rebuttal (1643, Attachment 10) by Dr. Houck to a critique prepared by PSCAA, which concludes that the PSCAA critique offers no data or additional information that would contradict this analysis.

Commenter (1643, Attachment 10) provides the analysis cited by commenters (1543, 1550, 1643), above. Commenter (1643, Attachment 10) compare emissions data from 409 "real world" emissions tests from 85 wood heaters comprised of 41 certified models to emissions data from in-home sampling programs. The commenter (1643) states that there is no clear correlation between certification values and the in-situ emission rates and, in most cases, the magnitude of the emission rate for a given sample is larger than the certification value of the heater. The commenter (1643) notes that the overall average of all 409 samples was 10.5 g/hr as compared to the average certification value of the 41 certified heater models reviewed of 3.9 g/hr. The commenter (1643) adds that, while the data set is imperfect, it is clear that certification values do not predict the "real world" performance of certified wood heaters nor do certification values predict the relative ranking of certified wood heaters under in-home usage. Commenter (1643) concludes that when the data are studied, it is obvious that the database does not support the efficacy of promulgating lower, more health protective emission standards with the current NSPS testing procedures.

Commenters (1543, 1550, 1643) state laboratory certification test scores cannot be used to predict the relative performance of certified models in the field, because the rank order of certified appliances based on certification test scores will not hold up in the field. According to commenters (1543, 1550, 1643), a wood stove model with a certification value at or below 2.5 g/hr (or even 1.3 g/hr) may not perform as well in the field as a model with a certification score of 4.5 g/hr. The commenters (1543, 1550, 1643) conclude that the EPA's proposed Step 2/3 emission limits have not been "adequately demonstrated" and the EPA should address this information in the rulemaking process.

Response:

We understand that manufacturers tune their models for the crib-based certification tests in order to meet the PM emission limit. As noted in previous responses (e.g., *Section 2.8.2*), we continue to agree with comments that cord wood testing is more representative of in-home use. In fact, for forced-air furnaces, we specify the use of cord wood for the certification tests (because forced-air furnace certification tests will be conducted according to CSA B415.1-10, which has specified cord wood as the test fuel since 2010). Based on the existence of a viable draft cord wood method, there was an expectation at proposal that the ASTM test methods for cord wood (which better represent in-home use) would be complete soon after the NSPS proposal and that significant testing of these wood heater models re-tuned to perform well on cord wood would occur before promulgation of this final rule. Based on this expectation, we proposed to require testing only with cord wood for compliance with Step 2 PM emissions limits. However, the ASTM cord wood test methods are not complete for these heaters and only limited testing using

the draft methods has occurred so far. We received numerous comments from noncatalytic stove manufacturers, laboratories and some states with concerns about when the cord wood test methods would be ready. These concerns included how quickly noncatalytic stoves could be redesigned to perform well under cord wood certification testing, that we proposed to be required for Step 2 PM emission limits, i.e., 5 years after the effective date. Considering all of the above, we have determined that we do not have sufficient data at this time to adequately support a regulatory requirement for cord wood testing (except for forced-air furnaces).

As previously noted, we are allowing an alternative cord wood-based compliance option for manufacturers of room heaters who choose to certify compliance based on cord wood instead of crib wood testing under subpart AAA. We hope that many manufacturers will choose this option so that consumers will have the marketplace choice of stoves that are tuned for in-home performance rather than being tuned for laboratory crib wood tests. Stakeholders agree that tuning for the laboratory crib wood tests often results in poorer performance in homes. Additionally, we hope that within the next few years we will receive considerable cord wood test data allowing us to establish a cord wood test-based regulatory requirement for the next NSPS revisions.

3.2.4 Comment: Transitioning from crib to cord wood-based wood stove standards

Commenters (1543, 1550, 1643) claim that the EPA's proposal to mandate cord wood-based compliance with the proposed Step 2/3 1.3 g/hr emission limit is completely unsupportable as a matter of law because the EPA has proposed standards for cord wood performance before data have even begun to be generated with the new method. The commenters (1543, 1550, 1643) state that imposing cord wood-based test methods and emission limits for its proposed Steps 2 and 3 before the relevant data from the appropriate test methods have been developed per force renders such standards undemonstrated under CAA section 111. The commenters (1543, 1550, 1643) add that the EPA must ensure that its standards are derived from data based on the same reference methods by which compliance will be measured, or offer a very strong justification for departing from this principle. The commenters (1543, 1550, 1643) conclude that the EPA's proposal to require certification based on use of cord wood rather than crib wood at Step 2 is fundamentally incompatible with CAA section 111, and must be abandoned.

Commenter (1396) asserts the EPA has presented no data to support a reduction to the 1.3 g/hr limit can be achieved while testing with cord wood and believes this violates CAA section 111. Commenter (1396) states that although one manufacturer located in the northeast has made the claim that all their wood stoves can meet the 1.3 g/hr limit with cord wood, no EPA witnessed cord wood emissions tests or data using any proposed test methods have been produced to support this claim. The only test report and data commenter (1396) states they saw from this company thus far uses current testing methodology including crib wood and a weighted average. Commenter (1396) asks that the EPA provide any information they have from this or any other manufacturer including the methods followed, whether cord wood was used, calculated results (with no run greater than the proposed limit of 1.3 g/hr), and EPA approval of the emissions test.

Commenter (1465) believes the 2020 PM standard should be based upon the use of crib wood unless the EPA finalizes a cord wood test method. Commenter (1465) states the EPA should finalize a cord wood-based test method in advance of its review of this subpart in 2023.

Commenters (0651, 1546) state that there is no relevant base (at least one that has been thoroughly reviewed) available to the EPA to establish emission limits for cord wood and any emissions limit at this time is arbitrary.

Commenter (1547) states that the Step 1 rule should be implemented with current tests procedures and methods and then allow the industry to develop a database using cord wood so that a cord wood method could be developed in 8 years at the next NSPS revision.

Commenter (1640) understands concerns about meeting 1.3 g/hr based on an undeveloped cord wood method and the limited results for how stoves will perform. Once test results are available, commenter (1640) recommends the EPA apply a correction factor to account for cord wood testing which may result in a different emission level; until then, continue to require a 1.3 g/hr limit, especially if stoves are tested using crib wood.

Even assuming the appropriateness of a Step 1 scheme that would allow a manufacturer to elect to certify with either fuel, commenters (1543, 1550, 1643) state that cord wood data are irrelevant to a manufacturer's compliance demonstration, unless that manufacturer elects to certify with cord wood and vice versa for crib wood. Commenters (1543, 1550, 1643) state that the dual testing doubles costs and would exacerbate the existing "bandwidth" problems, i.e., test laboratories' already limited capacity, which is a major obstacle already to implementing the revised NSPS program. Commenters (1543, 1550, 1643) add that while the objective to shift toward a cord wood-based testing and certification paradigm is a reasonable long-term objective, there are substantially more measured and sensible ways of advancing this objective that better account for existing data deficiencies (for example, selective cord wood testing or CAA section 111(j) waivers).

Commenters (1543, 1550, 1643) adds that a transition to cord wood cannot be achieved as abruptly as the EPA proposes—namely, allowing manufacturers just 5 years to transition from a crib-based standard of 4.5 g/hr to an undemonstrated cord wood-based standard of 1.3 g/hr. The commenters (1543, 1550, 1643) states that the proposed rule prematurely would adopt cord wood-based certification requirements, while skirting the obvious data limitations precluding lawful use at this time of cord wood testing to determine compliance. The commenters (1543, 1550, 1643) add that the requirement to test only with cord wood to demonstrate compliance with Step 2/3 standards is nothing more than a blind step forward into the unknown, uninformed in any way by meaningful, data-driven analysis.

Commenters (1543, 1550, 1643) suggests that rather than finalizing the Step 2/3 limit as proposed, the EPA should, pursuant to CAA section 111(j), adopt an alternative cord wood-based limit of 7.5 g/hr that would serve as a temporary bridge between crib-based standards and cord wood-based standards. Then, according to the commenters (1543, 1550, 1643), upon generation of a sufficient set of data based on cord wood testing, the EPA can reevaluate whether

a different cord wood-based standard constitutes BSER in a future rulemaking. The commenters (1543, 1550, 1643) believe that with creativity, the EPA can develop a section 111(j) program that would: (i) foster innovation within the industry—namely, designing/redesigning wood stoves to minimize emissions that result from burning cord wood; (ii) achieve equivalent or greater "real world" PM emission reductions than that which would otherwise be achieved under crib-based standards; and (iii) acknowledge the need to move toward cord wood-based testing, by serving as an appropriate "bridge" between crib and cord wood-based testing programs given that insufficient data exists at present to move any further in the direction of a cord wood-based certification program.

The commenters (1543, 1550, 1643) suggest that the EPA should set an alternative emissions target of 7.5 g/hr and grant alternative certificates of compliance for model lines that can demonstrate compliance with that target through testing pursuant to the new ASTM cord wood test method. Because cord wood test results should be much more predictive of field performance than crib test results, the commenters (1543, 1550, 1643) expects that model lines that meet this alternative emissions target will achieve substantial reductions in field emissions beyond what is achieved, on average, by currently certified wood stoves.

Commenters (1543, 1550, 1643) state that an alternative cord wood emissions target of 7.5 g/hr would improve upon the status quo considerably. The commenters (1543, 1550, 1643) expect that the universe of wood stoves certified to meet this alternative cord wood limit will achieve an average emissions rate significantly lower than the 7.5 g/hr emissions target. The commenters (1543, 1550, 1643) note that a comparison of existing crib wood-based subpart AAA noncatalytic standards and the mean and median weighted average emissions rates (when burning crib wood, not cord wood) for wood stoves currently certified to meet those standards reflects that wood stove manufacturers are often able to achieve emissions rates well below established standards. In other words, the commenters (1543, 1550, 1643) state, the way to evaluate the anticipated emissions reductions that would result from establishing an alternative cord wood emissions target of 7.5 g/hr is by comparing the predicted average emissions rate that would be achieved by the universe of wood stoves that qualified for the alternative target (as opposed to the alternative emissions target itself) with the average real world emissions rate of wood stoves that are currently certified under subpart AAA.

Commenter (1665) states that, in as little as five years, manufacturers will be required to test with a fuel (cord wood) that will have very limited data. The commenter (1665) asserts that it is not prudent to include both a much lower standard (1.3 gr/hr) and that such standard be based on cord wood testing. The commenter (1665) opines that the use of crib fuel, when combined with Method 28 modifications recommended by Paul Tiegs, provides the EPA and other air regulators with the very best possible comparison of how individual stoves perform. The commenter (1665) is concerned that the EPA may require a patchwork of different cord wood tests on various species of wood to address regional and state regulator concerns. The commenter (1665) includes limited CAA CBI cord wood burn data as an attachment (included under Supportive Documentation For Cordwood Testing and maintained by the EPA as CBI under the CAA) to their comment letter. The commenter (1665) suggests that the EPA (in lieu of setting standards at this time based on cord wood) require all new cord wood-burning appliances to conduct a

minimum of one cord wood run at the time of certification and that the data collected could be used to set a standard under a future NSPS review. The commenter (1665) recommends that the EPA use Method 28 with the refined parameters as suggested by Paul Tiegs.

Although supportive of cord wood testing, commenter (0958) states that any emission limits should be based on meaningful cord wood emission data. Commenter (1551) urges the EPA to adopt a transition period to move to the new procedure given the lack of data and correlation between cord wood tests and crib fuel tests. If the EPA selects the final Step 2 limit based on insufficient cord wood data, commenter (1503) supports a midterm review of the Step 2 emission limit at least 12 months before the effective date of the Step 2 limit. The commenter (1503) suggests that the EPA review additional cord wood data and determine if changes to the emissions standard are needed to reflect the cord wood data. The commenter (1503) states that such a midterm review is authorized by the CAA, and would be in line with the approach that the EPA has taken for regulating emissions from mobile sources (which, like wood heaters, are typically mass-produced devices that are certified and then sold into commerce).

Commenter (1487) states that, because the proposal requires that all wood stoves test using both crib and cord wood beginning with Step 1 of the rule in 2015 (even though manufacturers would be allowed to comply using only crib wood results), the EPA will have ample additional data which can confirm the proposed Step 2 emissions standards, and, if necessary, allow the EPA to make appropriate modifications.

Commenter (1436) states that labs and the EPA are already log jammed and that Stage 2 testing as required under § 60.534 must be crib.

Response:

As explained in previous responses (e.g., *Section 2.8.2*), the final rule under subpart AAA will require compliance with the crib-based test method not a cord wood-based test method. Based on the existence of a good draft cord wood method, the expectation at proposal that the ASTM test methods for cord wood (which better represent in-home use) would be complete soon after the NSPS proposal, and the related expectation that significant testing of wood heaters re-tuned to perform well on cord wood would occur before promulgation of this final rule, we proposed to require testing only with cord wood for compliance with Step 2 PM emissions limits. We still encourage manufacturers to design wood heaters that best represent in-home performance using cord wood. However, the ASTM cord wood test methods are not complete and only limited testing using the draft methods has occurred so far. We received numerous comments from noncatalytic stove manufacturers, laboratories and some states with concerns about when the cord wood test methods would be ready. These concerns included how quickly noncatalytic stoves could be redesigned to perform well under cord wood certification testing. Considering all of the above, we have determined that we do not have sufficient data at this time to adequately support a regulatory requirement for cord wood testing under subpart AAA.

Nonetheless, we recognize that the industry will benefit from regulatory guidance to transition from crib-based to cord wood-based standards. The alternative cord wood compliance option

will provide that guidance as well as data to inform and enhance our BSER database for the next NSPS rulemaking. Special permanent and (optional) temporary labels for room heater models (wood/pellet stoves) certified with cord wood will specify that they meet a PM emissions limit of 2.5 g/hr, rather than the required 2.0 g/hr level for room heaters tested with crib wood. The cord wood option of 2.5 g/hr for wood stoves is based on the cord wood test data submitted to us for three catalytic or hybrid wood stoves included in the NODA and the 1995 Washington State catalytic stove emission standard of 2.5 g/hr (using cribs). The cord wood compliance limit is 25 percent higher than the 2.0 g/hr regulatory requirement for cribs, allowing some cushion for measurement imprecision. We consider the alternative compliance option to be at least as stringent as the required crib wood-based limit. Several models of hybrid and catalytic wood stoves can meet this cord wood limit already. We believe this value is a good balance that recognizes the industry leaders and encourages others to follow quickly.

3.2.5 Comment: Use of European technology and data

Commenter (0651) disputed the notion that the Europeans are technologically way ahead of North America regarding emissions and efficiency for wood stoves. Based on the commenter's (0651) experience, the significantly different test methodology only gives the impression of superiority and the commenter provides an example of a European model that had to be extensively redesigned to meet the Washington state standard and still had the lowest overall heating efficiency of their entire North American product line.

Commenter (0948) states that the Europeans have made substantial advancements and the U.S. biomass industry by in large (there are a few notable exceptions) is far behind them. However, there is little to encourage U.S. manufacturers to adopt and apply these advancements; tightening the emissions limits will provide some motivation to do so.

Commenter (1487) reports that countries in the European Union have long required that wood stoves meet stringent emission standards while using cord wood fuel. The commenter (1487) states that a 2010 survey of emissions test data from approximately 45 European wood stove models, commissioned by NYSERDA, identified over 30 models with total suspended particulate (TSP) emissions of 1.3 g/hr or less. The commenter (1487) opines that, although the European test method (EN 303-5) differs from EPA's Method 28, the European experience is indicative of the level of performance that can reasonably be expected from American wood stoves operated on cord wood. Thus, the commenter (1487) believes that the EPA's use of this data is reasonable and consistent with the "wide latitude" that courts afford the agency "in determining the extent of data-gathering necessary to solve a problem."

Response:

We agree that European regulations have advanced the state of the science for the European wood heating industry, although American and European test methods differ. We also agree that this NSPS will likewise spur innovation and be technology-forcing for the American wood heating industry. Some American manufacturers already produce clean and efficient stoves able to compete in the European market. This NSPS will help advance the rest of the industry.

3.3 Catalytic Stove Standards and Technology

3.3.1 Comment: Single versus separate standards for catalytic and noncatalytic stoves

Support for single standard

According to commenter (1551), in the central heating category, recent state emission standards for OWBs, such as those in ME, MA, NY, and VT, do not differentiate between catalytic and noncatalytic units even though manufacturers have employed both control strategies. Commenter (1551) fails to see why space heaters would need this bifurcation when other device types do not and is concerned that by setting a control technology-specific emission standard, we may be limiting technology options.

Commenter (1430), representing over 4,385 petitioners, supports a single standard for all wood and pellet stoves, whether catalytic or noncatalytic, noting that a single standard will lead to more innovation and better performing appliances, while preventing manufacturers from choosing between standards of different stringency. Commenter (1430) explains that a single standard will not reward a particular technology with a lenient emissions target but rather focus the industry on a single low target. Commenter (1544) also supports a single standard if the 50-hour conditioning of the catalyst requirement is retained.

Commenters (1394, 1665) state that the reason both catalytic and noncatalytic wood stoves should be held to the same standard is backed by recent studies done of the durability of catalytic combustors in well-engineered products and the reason a dual standard was set in 1988 was due to lack of available information.

Commenter (1665) applauds the EPA for having a single standard for catalytic and noncatalytic wood stoves. The commenter (1665) asserts that continuing different standards for different technologies complicates sales and confuses the marketing message and creates an unwarranted bias against catalytic technology. The commenter (1665) includes an attachment to their comment letter that supports their position that there is an unwarranted bias against catalytic technology (included under Supportive Documentation For Bias Against Catalytic Technology). The commenter (1665) also includes an attachment that presents the results of a study regarding aged catalyst to support their contention that all wood stoves wear over time whether equipped with catalyst or not. The study was prepared by OMNI Environmental Services, Inc. in 2010 (included as an attachment under Supportive Documentation For Bifurcation, entitled "The Interim Wood Stove Catalytic Combustor Longevity Study") for The Catalytic Hearth Coalition. The report concludes, based on four catalytic combustors from two selected stoves, that the catalytic combustors maintained substrate integrity without substantial particulate matter emissions performance reduction. The study acknowledges that more testing is needed before conclusive statements can be made about the majority of catalytically-equipped wood-fired heaters and their combustors.

Commenter (1665) also requests that the EPA acknowledge test data that supports that 80% of the time, catalytic wood stoves perform below their weighted average level. The commenter (1665) provides an attachment to their comment letter (retained by the EPA as Confidential Business Information under the CAA; Support Documentation For Weighted Average vs. Worst Case Scenario Testing) that includes burn rate and emissions data from certification runs of multiple stoves to support their position (and a document provided to the Catalytic Hearth Coalition written by Dr. Jim Houck that discusses the benefits of catalytic technology [Support Documentation For Distinction Of Technology Performance]).

Likewise, commenter (1397) believes a single standard and warranty obligation for both catalytic and noncatalytic stoves makes long-term sense given the uniform maintenance and durability of contemporary devices in both types. Commenter (1397) adds that a single standard would make it easier to test hybrid stoves employing both technologies. The bifurcated standard used in Washington was based on the flawed performance of 1980s era catalytic combustors, according to commenter (1397), and was seen as a means of combating the early degradation of catalytic combustor common at that time. Commenter (1397) states this issue no longer exists, with both contemporary catalytic and noncatalytic stoves now equal in durability and maintenance requirements. Commenter (1397) asserts backsliding by catalytic stove manufacturers seems unlikely, given the challenge to meet the more stringent Step 2 emission standard.

Commenter (1665) supports the EPA setting a single emission standard for catalytic and noncatalytic stoves at 4.5 gr/hr based upon crib fuel testing and a four burn weighted average. The commenter (1665) opines that this is necessary to discourage owners of noncatalytic wood stoves and pellet stoves from modifying their stoves in order to achieve overnight burns and to reduce low-end BTU production during "shoulder" season heating. The commenter (1665) reports that the website hearth.com has blogs in their forums on how to make these modifications (e.g., how to remove damper stops; commenter includes examples from the web site hearth.com under Supportive Documentation For Standards Push For Modifications).

Commenter (1640) understands wanting to go to one standard for all room heaters, however recommends the EPA require at least the Washington state level of 2.5 g/hr upon promulgation. Commenter (1640) is concerned about the possibility of backsliding if catalytic stoves are allowed to go from the current limit of 4.1 g/hr to 4.5 g/hr. By 2020 (the Step 2 deadline), the EPA should require all catalytic and noncatalytic stoves meet the same standard, according to commenter (1640). Likewise, commenter (1192) suggests maintaining the distinction between catalytic and noncatalytic wood-burning devices during the implementation of Step 1. Commenter (1192) is concerned about the relaxation of the standard and that the approach may be unfair to manufacturers who have invested in developing cleaner, more efficient devices.

Commenter (1544) suggests a passing grade of 2 g/hr for both combustion technologies.

Opposition to single standard

Commenters (0650, 1554) state that the EPA has the authority to establish separate standards for catalytic and noncatalytic wood stoves, it did so in the 1988 rule and it routinely does so for

other types of combustion sources (i.e., stationary engines), and several other states have followed this lead. Commenter (1554) adds that the EPA should recognize the difference in design between catalytic and noncatalytic stoves and develop separate NSPS for these two types of stoves.

Commenters (0653, 1554) state that catalytic stoves are run in the open mode 40% or more of the time ("Stevenson Survey"), producing more particulates than a noncatalytic EPA Certified stove based on field studies of homeowner behavior. Commenter (1554) adds that the Stevenson study also reported that about 20% of catalysts were not working in the 5-10 year timeframe and believes that owners who regularly operate stoves with the damper open would be unlikely to maintain and replace catalysts as recommended. Commenter (1554) cites public hearing testimony from Dave Hannah (a chimney sweep) who states that he often finds elevated creosote levels in chimneys of catalytic wood stove users which indicates operation with the bypass damper open for a significant amount of time. Commenters (0653, 1554) state that noncatalytic certified stoves should not be held to the lowest catalytic stove emission standard. Commenter (1554) adds that setting separate standards is consistent with the 1988 rule, various state rules and programs and European standards.

Commenter (1554) notes that it is important to develop a regulation that establishes an NSPS that can be met with both catalytic and noncatalytic stove design to preserve consumer choice. Because of the uncertainties of meeting the 1.3 g/hr proposed limit as described in the BSER comments and elsewhere, the commenter (1554) is fearful that the EPA's proposed limits and changes to test methodology would pose a significant risk of eliminating from the marketplace a large percentage of the noncatalytic stoves currently being sold (90% of the overall market). Likewise, commenter (1399) opines that there is a risk that, if both catalytic and noncatalytic wood stoves were held to the same standard, noncatalytic wood stoves could be eliminated from the market.

Response:

We are making a single determination of BSER for catalytic, noncatalytic and hybrid heater systems so as not to restrict open market competition. The final Step 2 limit will be 2 g/hr for all room heating combustion technologies. Our preference is not to separate or distinguish by control technology but rather give manufacturers the choice in how they wish to design their stoves to meet the NSPS and consequently to give consumers maximum choice as well. Promulgating different standards based on control technology unnecessarily inserts the EPA's influence into the innovation and design process and therefore into the marketplace. Furthermore, we agree that there is no longer a compelling reason for a bifurcated standard which distinguishes by control. We view the elimination of the distinction between catalytic and non-catalytic heater models in the final rule as progress.

Catalytic and even hybrid technology has also become well-established and the durability of catalysts has improved. As we noted in the preamble to the proposed rule, after 25 years of catalyst heater development experience, manufacturers have demonstrated that the performance of these heaters typically remains consistently good over the course of proper operation because

of changes manufacturers have made to improve heater design to protect the catalysts from flame impingement and other factors that previously caused catalysts to degrade significantly. At proposal, we pointed to a recent study of four catalytic combustors from two heaters/stoves which demonstrate that the combustors maintain substrate integrity without substantial PM emissions performance reduction.[25] Therefore, we have decided that establishing a separate limit to accommodate ‘‘degradation’’ would create a distinction where none exists and would add unnecessary confusion to the overall regulation.

We considered requiring catalyst replacement on a regular schedule but determined that federal enforcement of such a requirement would be difficult. As in the 1988 NSPS, we are requiring manufacturers to provide warranties on the catalysts, prohibit the operation of catalytic heaters/stoves without a catalyst and require operation according to the owner's manual. In addition, we are requiring manufacturers to provide warranties for noncatalytic and hybrid heaters/stoves and require operation according to the owner's manual. We agree that both catalytic and non-catalytic stoves have parts that are critical to their emission performance and require proper installation and operation; therefore both have warranty obligations. (Both also have conditioning requirements prior to certification testing. See *Section 3.3.9* for discussion regarding the conditioning requirements.)

Regarding concern over relaxation of the standard for catalytic stoves compared to the 1988 rule, as we noted at proposal, we think that the likelihood of actual "backsliding" is extremely low because of other factors driving the wood heater market. Given the pending implementation of the 2020 Step 2 limits and the fact that some manufacturers have heaters that already achieve Step 2 (2.0 g/hr), all manufacturers would have market incentives to improve performance as soon as possible rather than degrade performance. Also, with consumer education regarding the impacts of PM emission levels, we think that consumer pressure will favor better performing units that in general are more energy efficient and lower emitting at reasonable cost, especially as they compare wood heaters and gas heaters.

As noted in other responses and in the final preamble, we have decided to require compliance with the 4 burn rate weighted average rather than the proposed compliance at Category 1 and 4 burn rates. Furthermore, we are aware of the on-line forums which discuss modifications to non-catalytic and pellet stoves to enable, for example, overnight burns. This rule allows the EPA to approve state requests for delegation of enforcement authority and we think such added enforcement by states, tribal and local agencies will help discourage and minimize such illegal modifications.

Regarding the Stevenson Survey, we agree that homeowner behavior is important. We think that requiring operation according to the owner's manuals, the educational information the EPA provides regarding proper burn practices (e.g., on EPA's Burn Wise website), as well as the rule implementation capabilities provided to the states, tribes and local agencies under partial

[25] The Interim Wood Stove Catalytic Combustor Longevity Study, Prepared for the Catalytic Hearth Coalition by L. Pitzman et al, OMNI Environmental Services. January 4, 2010

delegation will serve to inform and increase proper operation of both catalytic and non-catalytic stoves.

Regarding concerns that the limit cannot be met by non-catalytic stoves, the final Step 2 limit of 2.0 g/hr based on the weighted average of four burn rates is already met by a sizeable number of both catalytic and non-catalytic models. All wood stove manufacturers, including non-catalytic manufacturers, have had many years to prepare for this NSPS and will have 5 more years to bring more models to market able to meet the 2020 Step 2 limit. There is no reason to conclude that non-catalytic stoves will be eliminated from the market, especially given that some models already meet the 2020 final Step 2 limit.

3.3.2 Comment: Catalyst equivalency standard

Commenters (1391, 1396, 1397, 1404, 1665) disagree with the proposed elimination of the catalyst equivalency program. Commenter (1396) strongly disagrees with the proposed elimination of the catalyst equivalency because this will impose additional burdensome costs for certification since each stove will have to be certified using multiple catalysts. Commenter (1396) wants to know what the EPA's justification is in proposing to eliminate this provision that is very important to manufacturers. Commenter (1391) states the proposal to test and certify these catalytic materials individually for every model of every brand of wood stove, at enormous cost, is truly inappropriate and contends that it is especially unreasonable to require testing of these materials in wood stove models that are no longer manufactured. Commenter (1391) recommends the draft be amended and equivalency be granted to a catalyst that passes full certification in any stove granted certification since 2012.

Commenter (1404) believes that without the equivalency program, the current NSPS approach will deter the development of improved catalysts with lower emission rates, and will pass higher cost onto consumers and manufacturers of both stoves and catalysts. Commenter (1404) recommends Applicability Determination #138 be broadened to include the use of any modern catalytic test stoves certified after 2012 or a date selected by the EPA for the equivalency certification. Commenter (1404) suggests that any third-party EPA-approved test lab be used and that the test data be compared to the test data from the original certification of the stove being used. Commenter (1404) proposes that the data must show that the new catalyst emissions be within $\leq$1 g/h range of the average emissions of the original certification; given the variability of the existing test and understanding that cord wood will be an even larger variable, this range be not greater than +1.0 g/hr if cord wood is used.

For any new catalyst not currently certified under AD 138 and also not being used on multiple OEM stove units, commenter (1404) proposes that an additional aging requirement with a 4-week burn evaluation in the stove prior to the certification run. Commenter (1404) believes this equivalency should be made once, for all brands and models of wood stoves using a catalyst, and will allow for more competition, faster development, and still allow the EPA oversight.

Commenter (1391) supports a new standard that catalyst emissions be within, less than or equal to, 1 g/hr average emissions of original certification, given variability of the existing emissions

test method, and noting that cord wood has even greater real world variability. Commenter (1391) asserts this equivalency standard should be made once, for all brands and models of wood stoves, as long as combustor dimensions and CPSI (cells per square inch) are the same as the OEM catalyst being replaced. Another commenter (1397) recommends changing the proposal regarding catalytic combustor equivalency such that, rather than always testing with an OEM combustor, the EPA should grant an equivalency status for combustors that yield emission test results with x% (perhaps 5%) of the original test or better.

Commenter (1665) suggests that the EPA propose that, if a suitable combustor is sourced or offered to a manufacturer by a supplier, then the manufacturer must select the worst performing emission run from the original certification test and re-run that single run with the proposed suitable replacement. The commenter (1665) suggests that if the proposed new combustor is equal to +/- 1 g/hr of the original emissions results from the worst run, it should be permitted to be used as a suitable replacement. The commenter (1665) explains that the need for the +/- g/hr requirement is because (1) cord wood in not a metered fuel and (2) there is variability with respect to emissions test results. The commenter (1665) recommends that third party suppliers (after market resellers) be required to not sell any catalytic combustor unless they have been specifically tested and approved to perform in any appliance for which they are marketing the catalyst combustor.

Response:

We are not eliminating the catalyst equivalency program, but we are clarifying that the catalyst design change requests must be made by the heater manufacturers, as they are for all potential heater design changes. That is, it is the responsibility of the heater manufacturer to ensure that all potential changes match the heater-specific requirements and NSPS emission performance requirements. As with all design change requests that may potentially increase emissions, the manufacturer must submit adequate rationale, preferably with robust emission test data to support that the potential change will not increase emissions. The final rule clarifies that "a change in the make, model, or composition of a catalyst is presumed to affect particulate matter and carbon monoxide emissions and efficiency, unless the change has been requested by the heater manufacturer and has been approved in advance by the Administrator, based on test data that demonstrate that the replacement catalyst is equivalent to or better than the original catalyst in terms of particulate matter emission reduction."

Applicability Determination (AD) 138 for the 1988 NSPS previously allowed EPA approval of replacement catalysts that had been shown via a full certification test in a Blaze King Princess reference stove. For this NSPS, we will potentially accept test data on a replacement catalyst in one heater to also be used to support heater manufacturer requests for potential changes to other heaters, provided that the heater manufacturer submits, in advance, adequate rationale that the test data are applicable and that the emissions will not be increased.

We will consider the other equivalency standard suggestions above with regards to cord wood while developing the new cord wood test method.

3.3.3 Comment: Catalyst degradation concerns

Commenter (0541) cites positive experience with long lasting stainless steel catalysts that control emissions for hundreds of cords of wood. Based on observation of catalysts on the shelf for extended periods of time, the commenter (0541) believes that time is not a factor in deterioration and that deterioration due to thermal aging, flame impingement or burning of prohibited fuels is not possible in a well-engineered system and when users follow EPA fuel guidelines. Commenter (0541) suggests that because time is not a factor in catalyst deterioration, the corresponding language should be deleted from the proposed rule.

Commenter (1583) believes Durafoil™ catalytic combustor technology (introduced by Texas Instruments in 1996 and first used in wood stoves in 2008) portends more improvements in wood stove efficiency and emissions. Commenter (1583) asserts Durafoil™ catalysts are not very sensitive to wood moisture content, and are effective at emissions reduction with unseasoned wood; though burning unseasoned wood will suppress emissions performance slightly, but not affect the base metal or the catalyst chemistry. Commenter (1583) claims Durafoil™ catalysts are very durable, activate at low temperatures, and are not very sensitive to moisture content; a well-designed stove using this type of catalyst is capable of producing a low emissions profile that is completely reproducible from test lab to test lab, or from crib wood to cord wood (see attachment to comment letter).

On the contrary, regarding the EPA's example of a recent study of four catalytic combustors from two selected catalytic stoves showing that the combustors maintained substrate integrity without substantial PM emissions performance reduction, commenter (1436) asserts that catalytic combustors were selected with no documented use history. Commenter (1436) states that most catalytic stoves last a long time because owners run the stoves in bypass, thus, combustors that are not engaged do not have a limited life. Similarly, commenter (1554) states that the EPA's conclusion that performance of catalytic stoves remains consistently good over time is not adequately supported by evidence that shows catalysts degrade over time and ignores information documenting that catalytic stoves are operated with bypass dampers open for a significant percentage of operation. Commenter (1554) cites a 2008 study (Houck and Pitzman) that states that "Catalytic heaters were more susceptible to deterioration than noncatalytic stoves due to damage to the catalyst itself and the catalyst bypass which is a sealing/moving art." Commenter (1554) states that the EPA's apparent reliance on the 2010 Pitzman Study for the Catalytic Hearth Coalition is not justified as that study only involved two stoves that were properly maintained and the catalyst was cleaned before degradation testing. Commenter (1554) states that there is no reason to believe that these stoves reflect the natural condition of stoves in the field. Commenter (1554) adds that the 2010 Pitzman study concludes that "more testing is needed before conclusive statements can be made about the majority of catalytically-equipped wood-fired heater and their combustors." Commenter (1554) believes that the EPA must reconcile the change in the studies' conclusions between 2008 and 2010 and have a reasonable basis to ignore the 2010 conclusion that more study is needed to reach conclusions for the majority of catalysts.

Likewise, commenters (1365, 1587) assert the proposed rule provides no evidence in support of the statement: "After 25 years of catalyst heater development experience, manufacturers have demonstrated that the performance of these heaters typically remains consistently good over the course of proper operation" (p. 103). Commenters (1365, 1587) state the sole study cited by the EPA to make their case was sponsored by the Catalytic Hearth Coalition, an industry group that promotes catalytic wood heater technology, and this study used only two wood heaters. The commenters (1365, 1587) are unaware of any robust independent studies supporting claims that catalytic components are longer lasting than in the past.

Response:

We agree that catalysts have improved and are longer-lasting especially when the stove and catalyst are used according to EPA's Burn Wise guidelines and manufacturer's instructions and warranty conditions. The final rule requires information be included in the owner's manuals and warranties to safeguard proper catalyst operation. The following information must be supplied in the owner's and warranty manuals: catalyst manufacturer and model; catalyst warranty details; and instructions for warranty claims. The owner's manuals must also include a recommendation to visually inspect combustor at least three times during the heating season, a discussion on expected combustor temperatures for monitor-equipped units; and suggested monitoring and inspection techniques. The owner's manual must provide clear descriptions of symptoms and remedies to common combustor problems. The final rule recommends that photographs of catalyst peeling, plugging, thermal cracking, mechanical cracking, and masking be included in the manual to aid the consumer in identifying problems and to provide direction for corrective action. Finally, the owner's manual must provide clear step-by-step instructions on how to remove and replace the catalytic combustor.

Stakeholders agree that all stoves – not merely catalytic stoves – need to be properly maintained and operated. The study done by the Catalytic Hearth Coalition shows that catalysts do not degrade over time as earlier generation catalysts did. This conclusion is also supported by their data that show that warranty calls do not indicate having to replace the catalyst within its specified lifetime. Regarding the contention that the study by the Catalytic Hearth Coalition should be disregarded as self-interested, we note that well-respected wood stove testing experts not directly involved in the Catalytic Hearth Coalition are also on record in strong support of catalytic technology.[26]

3.3.4 Comment: Regulating catalyst replacement conditions and performance criteria

Commenters (1365, 1587) note that the proposed rule does not address the issues of degradation or proper maintenance of catalytic components beyond requiring that the owner's manual for these devices state that, "This wood heater contains a catalytic combustor, which needs periodic

[26] See "Lifting the Curtain for a Look at Woodstove Politics", a comment submitted on the proposed rule to Docket EPA-HQ-OAR-2009-0734 from T. Morrissey of Woodstock Soapstone available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1583

inspection and replacement for proper operation." Unless independent studies show that the performance of catalytic components do not degrade throughout the entire life of the device, commenters (1365, 1587) believe there should be a regulatory mechanism in place that requires change out and maintenance of the catalytic components at pre-specified intervals; if not, then commenters suggests that catalytic devices not be certified as part of the proposed rule.

Likewise, commenter (0506) believes there should be an enforceable mechanism to ensure that people replace their catalyst in their wood-burning stove, or the predicted the emission reductions will decrease dramatically after 2 or 3 years. Commenter (0506) suggests the following options:

- Require that vendors and/or manufacturers require pre-payment of replacement catalysts at the time of purchase of the stove (when buying the stove, you pay for a replacement catalyst. Two or three years later, the manufacture or vendor sends a catalyst of the address of the purchaser. While the purchaser may have moved, it is extremely unlikely that the stove did.
- Require the vendors and/or manufacturers to track sales of replacement catalysts and report to the EPA if there is not a sale. The EPA could then take an administrative enforcement action for the cost of a catalyst plus the EPA's costs or even just injunctive order requiring the owner to buy a replacement catalyst.

Commenter (0541) suggests that the EPA should require catalyst replacement based on composition and use because not all catalysts are created equal. The commenter (0541) states that it is very easy to determine if the catalyst is working using a temperature probe above the catalyst.

Commenter (1570) states the EPA should require catalytic performance criteria based on overall emissions if the emission rate distinction between catalytic and noncatalytic equipment is removed. In addition, commenter (1570) suggests the EPA develop and require a means to easily and effectively determine if catalytic performance criteria are being met. Commenter (1570) believes that since the useful life of this equipment is long, and the ability to ensure continued catalytic performance cannot adequately be determined by initial testing, a means to ensure appropriate performance of the equipment must be developed and required to ensure that emissions reductions are achieved throughout the life of the equipment. Commenter (1570) adds that this would prevent backsliding.

Response:

Regarding catalyst degradation concerns, as noted above, we maintain that the study done by the Catalytic Hearth Coalition (cited above in *Section 3.3.1* response) provides credible evidence that catalysts do not degrade over time as earlier generation catalysts did. In addition to Catalytic Hearth Coalition's 2010 study, other commenters have noted their positive experience with long lasting catalysts (e.g., stainless steel catalysts), as mentioned above in *Section 3.3.3*. Given the current durability of catalysts, we maintain that requiring specific catalyst warranty information and instructions be supplied in the owner's manual – and furthermore requiring voiding of the warranty if the stove is not operated according to the owner's manual – is the appropriate level of

regulation. We disagree that an enforceable mechanism, beyond voiding of the warranty, is warranted. Furthermore, we have seen no data indicating that emission reductions decrease after 2 to 3 years as one commenter claims, but have seen data indicating the contrary.

As noted in our response to *Section 3.3.3*, the final rule requires that the owner's manuals provide clear step-by-step instructions on how to remove and replace the catalytic combustor as well as clear descriptions of symptoms and remedies to common combustor problems. However, regarding the request for catalytic performance criteria, we note that catalytics and noncatalytics both can be destroyed by overheating. Nonetheless, in addition to requiring that the owner's manuals suggest visual inspection of the combustor at least three times during the heating season, we require that the catalytic heater be equipped with a temperature probe/sensor to monitor catalyst operation. The owner's manuals will indicate that properly functioning combustors typically maintain temperature in excess of 500°F and often reach temperatures in excess of 1,000°F; therefore the owner's manual's catalyst troubleshooting section should be consulted if the catalyst is not reaching temperatures in excess of 500°F. The temperature probes will also be useful for indicating overheating conditions, although it should be noted that some current catalysts can reportedly be operated continuously at temperature exceeding 2,000°F without suffering oxidation damage.[27]

3.3.5 Comment: Installation considerations for catalytic stoves

Commenter (1521) notes that, based on surveys of dealers and stove and chimney maintenance professionals, catalyst stoves require more draft than noncatalytic stoves to overcome the resistance caused by the additional filter (the catalyst) in the exhaust path. The commenter (1521) notes that the proposed regulation requires that the owner's manual "specify" the appropriate installation parameters for the stove, including chimney and draft requirements which differ for different wood stove technologies. The commenter (1521) expresses concern that, if a homeowner installs a catalyst-equipped stove to replace a noncatalytic stove without making adjustments to the chimney, the homeowner would be violating the NSPS because of improper installation of a catalyst-equipped stove. The commenter (1521) states that, although manufacturers would cover themselves under this situation legally [by including the specifications in the owner's manual], homeowners would not. The commenter (1521) further states that hybrid models (consisting of both catalyst and noncatalyst emission reduction technologies) currently come in many stove pipe and chimney parameter requirements where installation in an existing home is likely to compromise some installation parameters keeping a unit from optimal operation.

Commenter (0957) describes how differences in chimney design confound the "one-size-fits all" catalyst, resulting in improper operation and unhappy consumers. The commenter (0957) finds the current noncatalytic stoves to burn great and be less draft sensitive. The commenter (0957) concludes that catalytic stoves should be available, but only if certain venting criteria are met.

[27] Comment on the proposed rule to Docket EPA-HQ-OAR-2009-0734 from T. Morrissey of Woodstock Soapstone; available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1583

Response:

The final rule requires that owner's manuals include a section regarding achieving proper draft via proper installation. This requirement is for all stoves because proper draft is critical for all stoves, not just catalytic stoves or hybrid stoves. In fact, this is a critical service that all dealers normally provide to ensure that their customers' stoves perform properly, so that their customers are satisfied with their purchases. We agree that customers may need to also modify their existing chimney to ensure safe, adequate draft. Dealers and installers discuss these factors as part of normal purchasing discussions. We note that in the very successful wood stove changeout campaign in Libby, Montana, over half of the existing wood stove installations were unsafe and needed to be fixed in order to change to the newer, cleaner EPA-certified wood stoves that were generously made available. We further note that most of those new, replacement stoves were noncatalytic stoves.

The rule provides examples of text for the section on the importance of proper draft. One example is "Draft is the force which moves air from the appliance up through the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions, and other factors. Too much draft may cause excessive temperatures in the appliance and may damage the catalytic combustor. Inadequate draft may cause backpuffing into the room and 'plugging' of the chimney or the catalyst. Inadequate draft will cause the appliance to leak smoke into the room through appliance and chimney connector joints."

We agree with commenters that it is best for the manufactures, not EPA to specify chimney height and other draft parameters for the variety of heaters and local conditions. Thus, the final rule states that no person is permitted to install or operate an affected wood heater except in a manner consistent with the instructions on its permanent label and in the owner's manual (which includes requirements for achieving proper draft). The final rule also allows authority to be delegated to state, local and tribal agencies regarding enforcement of prohibitions on the installation and operation of affected wood heaters in a manner inconsistent with the installation and owner's manual.

Although this rule does not require certified installers, the EPA strongly encourages installation by certified installers (e.g., on our Burn Wise website at http://www.epa.gov/burnwise/maintenance.html**)**.

3.3.6 Comment: Operation and maintenance concerns for catalytic stoves

Commenter (1399) asserts that there are significant differences between catalytic and noncatalytic wood stoves and that noncatalytic wood stoves are both less expensive and easier to maintain. The commenter (1399) reports that consultations with a Maine wood stove manufacturer led to the manufacturer expressing concerns that the proposed rule will substantially increase manufacturing costs of their noncatalytic wood stoves that will be passed on to the consumer and could discourage consumers from making new purchases. In response to the commenter, commenter (1394) asserts that, based on a recent analysis done by the Alliance for Green Heat, there are an equal number of both catalytic and noncatalytic wood stoves that

would pass a lower emissions standard as proposed in the NSPS draft proposal (although they do not support the proposed 2020 limit of 1.3 g/hr). The commenter (1394) reports that there are two reasons why the State of Maine purchases more noncatalytic wood stoves than catalytic wood stoves: (1) In response to the original NSPS, dozens of catalytic wood stoves were poorly designed and did not include elements necessary to protect the catalytic combustor from damage (causing an anti-catalytic bias by consumers, dealers, and some manufacturers); and (2) there are vastly more numbers of clean burning noncatalytic wood stoves. The commenter (1394) also disputes the commenter's (1399) claim that noncatalytic stoves are easier to maintain. The commenter (1394) asserts that there is absolutely no greater barrier to maintenance of a catalytic wood stove than any current noncatalytic wood stove. The commenter (1394) reports that some of the cleanest burning noncatalyst wood stoves employ bypass mechanisms, secondary air tubes and other components found in today's catalytic and hybrid catalytic wood stoves.

Commenter (1521) opines that stoves equipped with catalysts are perceived by the general populous as cleaner burning stoves than noncatalyst stoves so they do not have them serviced as often (commenter states that this assumption has been confirmed by those in the wood stove installation and maintenance and chimney sweep business). The commenter (1521) states that this is bad both for the installation and maintenance businesses and for safety. According to another commenter (0653), homeowners falsely believe that their catalytic stove does not produce creosote, so chimney sweeping is dangerously postponed. The commenter (0653) states that creosote is found in stoves operated in the by-pass mode.

Commenter (0653) (chimney sweep) states that customers avoid service calls of their catalyst stoves until the system fails because of the difficulty of servicing the stove and delays in getting parts. According to another commenter (1521), several dealers throughout the State of Maine have provided estimates for replacement costs of $350 and $500 for the catalyst alone, and an additional $150 to $200 for the service call. The commenter (1521) estimates that, in aggregate, costs are between $500 and $700 at today's prices, whereby catalyst replacement will likely be required several times during the life of the wood stove. The commenter (1521) reports that the significant added expense for catalyst-equipped stove owners is a substantive economic deterrent to those in the market for a new wood burning, home heating appliance. Commenter (1521) states that, because of the cost of replacing the catalyst, it is common for homeowners to bypass the catalyst and continue to heat their homes whereby the stove becomes much less efficient.

Commenter (0945) describes his company's poor experience with catalyst technology in terms of operational difficulties and cost and vastly prefers a secondary combustion technology (e.g., SS baffle, stainless steel tubes with ceramic baffle and blanket).

One commenter (1283) operates three retail hearth stores and finds that the average service call costs on a catalyst stove are five times as high as the costs of servicing a noncatalytic wood stove and the frequency of maintenance and repair is double with the catalytic stove. The commenter (1283) adds that with noncatalytic stoves the performance is the same for the life of the stove, but many catalytic wood stoves are deemed unrepairable after 10 years. To the commenter (1283) this explains why they sell noncatalytic stoves 10 times more than catalytic stoves.

Commenters (1365, 1587) assert there is no economic incentive or functional reason for the user of the stove to replace the catalytic components or maintain them properly: the negative consequences of degraded catalytic components, which are primarily increased emissions, occur outside the user's home and have little effect on them while they are inside operating the device. Commenters (1365, 1587) state that even using the industry's most optimistic claims, the maximum lifespan of a wood heater's properly maintained catalytic components is 8–10 years, while the EPA states that the lifespan of a wood heater is greater than 20 years.

On the contrary, commenter (1583) asserts the assault on catalytic combustors by noncatalytic stove manufacturers at least recognizes that catalytic stoves are implicitly more efficient and produce lower emissions. Commenter (1053, 1583) refutes claims that catalytic stoves are more difficult to install, more expensive, and hard to operate. Anyone who can learn to dry their wood and take the ashes out of their wood stove can easily operate a catalytic stove, according to commenter (1583), and a wood stove owner who does not learn to properly dry their wood is much better with a catalytic stove than anything else (see attachment to comment letter). The commenter (1053) adds they already produce several hybrid stoves which combine both catalyst and noncatalyst technologies and that their most recent hybrid wood stove, and several other noncatalytic designs, already meet the proposed EPA standard for 2020.

Response:

We agree that catalytic stoves are no more difficult to install or operate properly than are noncatalytic stoves – that is, both catalytic and noncatalytic stoves should be installed by a professional to ensure proper installation (which we encourage on EPA's Burn Wise website at http://www.epa.gov/burnwise/maintenance.html) and both catalytic and noncatalytic stoves must be operated according to the owner's manual (which the rule requires) to ensure safe and proper burning. Consequently the rule requires that the permanent label on *all* certified wood heaters must contain the following statement: "This wood heater needs periodic inspection and repair for proper operation. Consult owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in the owner's manual." For catalytic and hybrid models we are also requiring the owner's manuals to include the following statement regarding operation and maintenance: "This wood heater contains a catalytic combustor, which needs periodic inspection and replacement for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual, or if the catalytic element is deactivated or removed."

Regarding concerns about meeting the final Step 2 limit of 2.0 g/hr, both catalytic and noncatalytic stoves can meet this limit. We estimate that 89 percent of catalytic/hybrid and 18 percent of noncatalytic stoves meet Step 2 of the final rule.[28] While it is true that proportionally more current catalytic and hybrid models meet this limit than do noncatalytic models, both types of combustion technologies can meet this limit. It is a manufacturer's decision regarding exactly how to design their models' combustion technology to best meet this limit from an engineering

[28] Memo to USEPA, from EC/R, Inc. Derivation of wood heater model percentages meeting Step 2 standards. November 2014.

and profit perspective; the EPA does not wish to interfere in such free market decisions by creating a non-level playing field (via different emission limits based on combustion technology).

Likewise, regarding the cost of replacement catalysts, the EPA does not wish to dictate what manufacturers should market and consumers should buy, as long as they meet the NSPS requirements. Rather the market should decide. We note that recent data show that hybrids and catalytic work well and also that a good proportion of noncatalytic stoves have been upgraded to increase burn rates. The EPA is focused on specifying allowable emissions, not on specifying allowable emissions technology. Manufacturers will decide which technology to use to meet our limits; consumers will decide which technology they wish to purchase.

Regarding servicing of catalytic stoves, the EPA is working with chimney sweeps, as part of our Burn Wise program, to get the word out to consumers and educate them regarding the need to maintain their stoves and chimneys. EPA's Burn Wise website currently provides a link to the Chimney Safety Institute of America (http://www.csia.org/) and states "One of the best ways to find competent installation and maintenance professionals is to check their credentials. The Chimney Safety Institute of America (CSIA) is a source for finding a certified chimney sweep. CSIA is a non-profit, educational organization dedicated to chimney and venting system safety. To learn more about CSIA and to locate a CSIA specialist, visit the Chimney Safety Institute of America." (See http://www.epa.gov/burnwise/maintenance.html.) We note again that proper maintenance is required for both catalytic and noncatalytic wood stoves; both types of stoves can be abused maintenance-wise and misused by homeowners.

Finally, regarding incentives for homeowners to replace catalysts as needed, we note that the ease of operation and maintenance is noticeably better when catalysts are replaced according to the owner's manual instructions. For example, if a catalyst is malfunctioning and plugging up, smoke will back up into the house and efficiency will noticeably decline (i.e., the homeowner will notice that more wood is required to keep the house warm). However, it is not likely that a catalyst will have to be replaced several times, as durability has improved over the years, as noted in response to other comments in this section.

3.3.7 Comment: Warranties on catalysts / prohibition of operation of catalytic stoves without a catalyst

Commenter (1521) asserts that manufacturers are not a regulating body and that the EPA's proposal to require manufacturers to provide warranties on the catalysts and prohibit the operation of catalytic heaters/stoves without a catalyst (in essence prohibiting certain actions by their customers) is a misuse of the relationship between manufacturers and their customers. The commenter (1521) opines that if there were consequences of operating an appliance contrary to the owner's manual, those consequences should be per the EPA or the delegated authority and not the manufacturer.

Response:

The requirement that manufacturers provide warranties (in general and specifically on catalysts) and prohibit misuse by voiding the warranty if the catalytic stove is operated without the catalyst, is not new to this NSPS or exclusively required of this industry. The 1988 NSPS requires this as do rules regulating many other industries.

3.3.8 Comment: Temperature sensor requirement

Commenter (1479) agrees with the requirement for a temperature sensor that can monitor combustor gas stream temperature within or immediately downstream of the catalytic combustor surface.

Commenter (1397) believes the requirement for a temperature sensor in 60.532(h) should apply to hybrid (catalytic/noncatalytic) stoves.

Commenter (1521) asserts that it is inappropriate to require that an affected wood heater equipped with a catalytic combustor be equipped with a temperature sensor that can monitor combustor gas stream temperatures within or immediately downstream. The commenter (1521) questions the purpose for such instrumentation, who would monitor and what temperature might be appropriate and why, and how the temperature information would be used. The commenter (1521) opines that there is no point to adding costs where there is no realistic environmental or health benefit.

Response:

The final rule is requiring a temperature sensor/probe and the rule's language applies to "an affected wood heater equipped with a catalytic combustor", which includes both catalytic and hybrid stoves. Regarding the reason and benefits to requiring a temperature sensor, it is common knowledge in the industry that temperature is used to monitor the operation of the catalyst to ensure proper operation and achieve the best efficiency. The owner's manuals must also include a discussion on expected combustor temperatures.

3.3.9 Comment: Catalyst conditioning requirement

Commenter (1479) objects to the 50-hour pre-burn test of the catalyst and the operation of a medium heat output rate category II or III test for 50 hours for catalytic appliances. The commenter (1479) states that this test is based on a lack of data in 1988 regarding catalyst longevity, mostly in regards to ceramic catalyst. According to commenter (1479), in 2014, catalysts have come a long way, and this requirement is only a financial burden limiting the adoption of BSER. Commenter (1479) proposes removing this requirement or adding electrostatic precipitators, bag houses, and cyclones to this requirement as well.

Commenter (1665) states that having a requirement of more conditioning time for a catalytic wood stove (80 (sic) hours) than a noncatalytic wood stove (50 (sic) hours.) creates a bias towards noncatalytic wood stoves. In addition, Commenter (1665) states that requiring 80 hours

of combustor conditioning in a test lab, rather than in-house in a manufacturer's facility will significantly increase test lab costs. Commenter (1665) states that it is also unclear whether the conditioning time will be considered R&D and therefore exclude the same lab from conducting emissions tests. Commenter (1665) is concerned that if manufacturers are not permitted to perform conditioning in house and in advance of the emissions tests at certified labs, conditioning must then be performed at the lab. Commenter (1665) recommends that all solid fuel heaters be required to perform a 50-hour break in period and that such periods be permitted by individual manufacturers in the labs and documented in writing and if necessary by video.

Commenter (1544) suggests retaining the 50-hour conditioning requirement of the catalyst prior to testing because the original logic is still sound and there has been no significant improvement in wood stove catalyst technology since the first NSPS other than changes to substrate materials.

Response:

The final rules (subparts AAA and QQQQ) contain requirements to pre-condition heaters for certification tests, including those with and without a catalyst, for 50 hours because this is needed to ensure the heater is functioning properly. As commenters have indicated, both catalytic and noncatalytic heater have parts that are critical to their emission performance. However, we have revised the requirements to allow an option for such conditioning to take place at the manufacturer's facility rather than at the test lab. In all cases, the test report must document the location of the conditioning operation and include a statement from the manufacturer that it was conditioned for a minimum of 50 hours. This will address the commenter's concern regarding test lab costs. We also note that conditioning a heater at a test lab would not be considered R&D services.

3.3.10 Comment: Bypassing of catalyst and other devices in testing protocols

Commenter (1436) states that catalytic stoves may test better in a lab but there is no intrinsic motivator for a consumer to operate them correctly, maintain them correctly or in fact, use the catalyst at all. Commenter (1436) believes if a stove has a user control that may be misused, it should be tested with the control in the misused position and that a single lever controlled stove with no opportunity for by pass should be given credit for that, or the alternative stoves should have a handicap.

Commenter (1436) also states gadgets that help in test results only (simulation of 5-minute door opening) should be handicapped by bypassing them. Commenter (1436) asserts the new proposed barometric gadget to regulate primary and secondary air will only work if you have no carpet, cats, dogs, or dust.

Response:

There is always the potential for consumer misuse of any stove. We encourage manufacturers to design appliances that limit the potential for such misuse, to include misuse as a violation of the warranty and look to consumer education via Burn Wise and manufacturer materials to limit potential misuse.

3.4 Particulate Standards – Room Heaters

This section contains comments specific to the room heater particulate standards, which supplement more general comments in *Section 2.8*. For additional critique regarding the proposed level of the emission limits for room heaters, see also BSER *Sections 2.1.1, 3.2.1, 3.2.2, and 3.2.4*.

3.4.1 Comment: Form of the room heater standards

Commenter (1559) opines that a fundamental flaw in the proposed standards is that they set PM emissions for wood and pellet stoves in terms of a mass per unit time irrespective of the size of the appliance. According to the commenter (1559), this approach means that larger and smaller units have to perform in the same manner. The commenter (1559) suggests that it would be more sensible to express the emissions in terms of mass per unit of energy input to the system per unit of time in the same way the hydronic heater (subpart QQQQ) proposal has both a lb/mmBtu output and a g/hr limit averaged over the entire test burn.

Commenter (1427) states the EPA should adopt a concurrent emission factor (grams of $PM_{2.5}$/kg of fuel or grams of $PM_{2.5}$/MMBtu) standard for wood stoves which scales similarly to the emission rate, as a part of the Step 2 standard. Commenter (1427) believes a concurrent emission factor would 1) prevent a drive toward simply reducing the size of stoves rather than improving the combustion quality and efficiency (e.g., homeowners installing multiple small, cheap stoves rather than one more efficient stove), and 2) ensure that the emission factors will drop appropriately, which is crucial for state and local air quality agencies whose long-term emissions inventories and planning use emission factors.

Commenter (1479) asks whether "excess of 1.3 g/hr (0.003 lb/hr) for any burn rate" means any burn rate based on volume or by weight.

Response:

As we noted in responses to *Section 2.8*, we are maintaining the g/hr format of the standard because the EPA is concerned with reducing emissions and this form of the standard addresses the total temporal particulate pollution directly. Furthermore, the states use this form of the standard for their State Implementation Plans (SIPs).

We agree that the efficiency of the heater is an important consideration and for that reason are requiring manufacturers to (1) report their efficiency test data to the EPA and (2) post efficiency test data on the manufacturer's website. The reported heater efficiency data will help consumers make informed choices to reduce fuel costs and emissions when purchasing a wood heater. We will post the submitted efficiency data as well as provide educational materials for consumers regarding efficiency on EPA's Burn Wise website. Furthermore, to minimize both wood fuel input and particulate emissions, on our Burn Wise website we encourage consumers to contact professionals including hearth product retailers to determine the right size and model for a given residence. Such professionals can appropriately size units to match the theoretical heat demand of the residence (using, for example, HVAC Manual J residential load calculations available at

http://www.acca.org/technical-manual/manual-j/). Sizing costs should be calculated as part of the installation process for a specific heating appliance and residence, and heat demand analyses would be model- and site-specific.

The final rule's Step 2 limit of 2.0 g/hr (0.045 lb/hr) requires compliance of the weighted average of all tested burn rates, rather than compliance at individual tested burn rates as we had proposed. Specifically, EPA Method 28 specifies four burn rate categories at which the heater must be tested, ranging from minimum rate to maximum rate. Burn rate is defined as "the rate at which test fuel is consumed in an appliance" during each test run. It is measured in kilograms or lbs of wood (dry basis) per hour (kg/hr or lb/hr). Method 28 also provides a sample calculation of how to determine the weighted average emission rate.

3.4.2 Comment: Level of the adjustable burn rate wood heater Step 1 standard

Commenters (1543, 1549, 1550, 1632) support the adoption of the Step 1 standard (4.5 g/hr) of the proposed approach and alternative approach (4.5 g/hr). Commenter (1573) recommends that the EPA promulgate the 2015 Step 1 standard only. Likewise, commenter (1514) notes that going from 7.5 g/hr to 4.5 g/hr is "both reasonable and attainable" but does not support a limit less than 4.5 g/hr. Commenter (1456) believes the certified wood burners will survive Phase 1 and bring the whole category up to standard.

Commenter (1487) states that, given the overwhelming data that Step 1 standards are already routinely achieve in practice, the proposed Step 1 limit represents the minimum standard that new stoves should initially be required to meet. The commenter (1487) believes that a more stringent standard would be justified as BSER.

Commenters (1465, 1477, 1487, 1508, 1513, 1551, 1559, 1585) generally support a more stringent standard such as Massachusetts' BSER standard of 3.5 g/hr or less. Commenter (1551) states that lowering the indoor wood stove standard for Step 1 to 3.5 g/hr will result in installation of cleaner devices during the transition period from Step 1 to Step 2. Commenter (1465) states the proposed emission standard for 2015 does not reflect the current state of the market because the 3.5 g/hr level can be met by industry; 50% of models on the market in 2010 had PM emissions rates of 3.5 g/hr or less and nearly all models met the 4.5 g/hr standard as of 2010. Therefore, commenter (1465) asserts the EPA's proposal cannot be considered BSER. Commenter (1508) suggests that the EPA consider revising the proposed Phase I emission standard for new wood stoves to reflect the emission rates of units currently in use. The commenter (1508) believes that with the pace of technological improvements in the residential wood-burning appliance industry that manufacturers can meet an emission standard lower than 4.5 g/hr.

Commenter (1477) states the EPA data shows that 50% of the models met this emission rate (3.5 g/hr) in 2010 and believes this would be more consistent with Congressional intent to use section 111 to "authorize standards of performance that promote technological improvement." 79 FR at 1,465 (citing *Sierra Club v. Costle*, 657 F.2d at 325 and the legislative history of section 111).

Commenters (1417, 1561) recommend that the EPA tighten the Phase 1 standards because half, if not more, of new wood stoves already meet a 3.5 g/hr level.

Commenters (1395, 1513) believe the 4.1 g/hr standard should be retained in the first stage for catalytic wood-burning devices, and the 4.5 g/hr standard should apply only to noncatalytic devices. Commenter (1395) states this will ensure devices are not allowed to backslide on standards.

Commenter (1423) recommends that, instead of a 'Step 1' standard of 4.5 g/hr for variable heat output stoves and fireplace inserts, the EPA adopt the Washington State standard (4.5 g/hr noncatalytic, 2.5 catalytic).

Commenter (1529) supports requiring wood stoves to meet a 4.5 g/hr standard and pellet stoves a 2.5 g/hr standard from 2015 to 2020.

Commenters (1543, 1549, 1550, 1643) believe that the EPA should set the subpart AAA standard at 4.5 g/hr, accepting a limit of 4.5 g/hr for better performing noncatalytic stoves.

Commenter (0541) suggests that the phrase "at retail" be deleted from the Step 1 emission limit on p. 6339 of the proposal where the EPA states that *Under this Proposed Approach, the Proposed Step 1 emission limits for these sources would apply to each source (a) manufactured on or after the effective date of the final rule or (b) sold at retail on or after the date 6 months from the effective date of the final rule*.

Response:

Over 85 percent of heaters/stoves being sold today already meet the Step 1 emission limit. In this final rule we make clear that those heaters/stoves with EPA certifications under the 1988 NSPS that show compliance with the Step 1 emission levels will be automatically deemed as certified to meet the Step 1 emission limits under this final rule until the Step 2 compliance date. No separate certification will be required. This automatic certification will avoid unnecessary economic impacts on those manufacturers (over 90 percent are small businesses) who can then focus their efforts on developing a full range of cleaner models that meet Step 2 emission levels. This measure should also help avoid potential "delays" at laboratories conducting certification testing for heaters newly subject to the NSPS.

This percentage (over 85 percent) was determined by reviewing a database prepared by HPBA (provided as a supporting document to the proposed rule)[29] which are the results of an effort to delete models that are no longer manufactured and remove duplicate certifications. This industry data from 2010 indicate that nearly 90 percent of stoves (130 out of 145 catalytic, noncatalytic

[29] Hearth, Patio and Barbecue Association (HPBA) Enhanced EPA Wood Heater Database – 2/25/2010, Supporting & Related Material on the proposed rule to Docket EPA-HQ-OAR-2009-0734 available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-0266

and pellet stoves combined) already meet the Step 1 limit. (Note that a list of all certified wood stoves is available from EPA's OECA at http://www.epa.gov/compliance/resources/publications/monitoring/caa/woodstoves/certifiedwood.pdf.) Accordingly, we have described the Step 1 limits as "emission levels that almost all models can readily achieve now using today's designs and technology", while the Step 2 limits ultimately reflect BSER. We maintain that the stepped emission limits appropriately reflect application of BSER while taking into account cost and economic impact considerations, as is appropriate for NSPS under section 111 of the CAA.

Regarding concerns over relaxation of the standard for catalytic stoves compared to the 1988 rule, as we noted at proposal, we think that the likelihood of actual "backsliding" is extremely low because of other factors driving the wood heater market. Given the pending implementation of the 2020 Step 2 limits and the fact that some manufacturers have heaters that already achieve Step 2 (2.0 g/hr), all manufacturers would have market incentives to improve performance as soon as possible rather than degrade performance. Also, with consumer education regarding the impacts of PM emission levels, we think that consumer pressure will favor better performing units that in general are more energy efficient and lower emitting at reasonable cost, especially as they compare wood heaters and gas heaters.

Regarding the adoption of two different emission limits for catalytic and noncatalytic stoves similar to the Washington state standard, please see our response in *Section 3.3.1*. We maintain similar reasoning in response to the suggestion that we promulgate different Step 1 standards for cord wood versus pellet heaters. That is, we are regulating all room heaters to ultimately meet the final emission limit and do not intend to intervene in the free market beyond that mandate. It is up to manufacturers to decide what combustion technology to use to meet the emission limits and up to consumers to decide which heaters they wish to purchase that are certified to meet those limits.

3.4.3 Comment: Level of the adjustable burn rate wood heater Step 2 standard

Commenter (1559) supports a 2020 Stage 2 standard that fully implements the levels of high efficiency and low emissions that have been demonstrated in European technologies and now being implemented in domestic systems that are coming onto the market. Commenter (1423) recommends the EPA establish a more stringent Step 2 standard (with no specific limit suggested) provided certifiable stoves are available at an affordable cost and that it be put in place not longer than five years in the future as proposed by the EPA.

Commenters (0957, 0958, 0961, 1396, 1456, 1514, 1543, 1544, 1549, 1550, 1573, 1632) do not support the proposed 1.3 g/hr emission limits. Commenter (0961) believes that the 1.3 g/hr limit is a totally artificial test lab number and has very little to do with stove operation in the real world. Commenter (1396) strongly opposes the proposed Step 2 limit due to the unreasonably higher costs incurred while designing, manufacturing, testing and certifying wood heaters. Likewise, commenter (1514) does not support a limit less than 4.5 g/hr because any limit lower than this "will cause an elevated cost to test and produce products that will in turn cause a significant increase in retail price for these products, such that it will be cost prohibitive for

many consumers." Commenter (1514) also claims that the 1.3 g/hr limit "is too low and largely unattainable by the majority of wood heaters, especially considering the proposal's provision that the 1.3 grams per hour is a worst case scenario and not a weighted average." Commenter (1573) recommends that the EPA promulgate the 2015 Step 1 standard only, not the 2020 Step 2 standard.

Commenter (1543) opposes the adoption of the proposed Step 2 of the proposed approach (Steps 2/3 of the alternative approach) for residential wood heaters. Commenter (1543) asserts that the only technology that the EPA has defined as approaching its Step 2 proposed approach (Step 3 of the alternative approach) emission limits for residential wood heaters are currently existing pellet fueled residential heaters.

Commenter (1456) suggests the EPA ease the Phase 2 limit of 1.3, especially if cord wood is also being added to the mix in order to ease the economic impact on manufacturers and retailers.

Commenter (1436) states a reasonable "hurdle" for the second phase, using a protocol known today is possible. If the standard is draconian, commenter (1436) asserts the new standard and test protocol must be developed before any standard can be set; setting up any passing grade for an unknown protocol is impossible to agree to. Commenter (1436) adds that solid fuel room heaters have already spent 25 years capturing the low hanging fruit, improvement can only be a small margin over time and the biggest improvements have been captured for this category. Commenter (1436) adds that these issues apply to the alternative approach as well.

Commenter (1429) suggests that Step 2 limits should be set after assessing the impact of Step 1 and the gathering of further data, particularly given the new test methods where almost no such data currently exists.

Commenter (1544) suggests a passing grade of 2 g/hr for both catalytic and noncatalytic combustion technologies.

Commenters (1543, 1550, 1643) believe that the proposed Step 2 / Alternative Step 3 standards conflict with section 111 and must therefore be abandoned.

Response:

We have revised the proposed Step 2 PM emissions limit for new residential room heaters, including catalytic and noncatalytic adjustable burn rate stoves, single burn rate stoves and pellet stoves from 1.3 g/hr (based on cord wood) to 2.0 g/hr based on crib wood. Compliance for room heaters will be determined using the weighted average of burn rates rather than requiring each individual burn rate to meet the limit. Based on the HPBA-provided wood heater database and removing the Method 5G to 5H correction/conversion factor (consistent with the final rule), the data shows that 18% of noncatalytic and 89% of catalytic/hybrid stoves already meet a limit of

2.0 g/hr based on a weighted average using crib wood.[30] We maintain that the Step 2 limit is based on emissions achievable under the BSER, is technology-forcing for many, yet takes into account economic and feasibility/timing considerations, as is appropriate for an NSPS under section 111 of the CAA.

The final rule is requiring only modifications to existing test methods for compliance rather than wholly new test methods, although an alternative cord wood-based compliance option may be used, at the manufacturer's choosing. This alternative cord wood limit is 2.5 g/hr using EPA Method 28R or an alternative cord wood method approved by the Administrator (e.g., ASTM E2780-10 with modified burn rates).

Note: For additional overarching critique regarding the proposed limit levels for adjustable burn rate stoves, see also BSER Sections 2.1.1, 3.2.1, 3.2.2 and 3.2.4.

3.4.4 Comment: Level of the pellet heater Step 1 and Step 2 standards

Commenter (1549) supports the Step 1 limit of 4.5 g/hr and the use of ASTM E2779-10 in its entirety.

Commenters (1192, 1503, 1508, 1513, 1520, 1585, 1640) recommend that the EPA adopt a stricter Phase 1 particulate standard for pellet stoves. Commenter (1192) asserts that, generally, pellet stoves are cleaner wood-burning devices than certified wood stoves, and believes most pellet stoves are able to meet a suggested 2.5 g/hr limit. (See memo from EC/R Inc. to the EPA on February 22, 2013: 19 of 24 pellet stove models, or approximately 80%, met a limit of 2.5 g/hr in a 2010 study.) Commenter (1520) notes that the 2.5 g/hr standard is currently met by catalytic stoves in use in Washington State. Commenter (1640) notes their concern about the existence of any dirty pellet stoves out on the market, especially since they have been exempted for the past 25 years. Commenters (1503, 1513) state that the EPA should use its authority under section 111(b) to set this tighter standard (2.5 g/hr) for pellet stoves. According to commenter (1503), nearly every model of pellet stove manufactured today is capable of achieving a 2.5 g/hr emission limit—an emission rate that is already far below the EPA's proposed Step 1 (4.5 g/hr) limit for other wood stoves. Commenter (1508) suggests that the EPA consider revising the proposed Phase I emission standard for new pellet stoves to reflect the emission rates of units currently in use. The commenter (1508) believes that with the pace of technological improvements in the residential wood-burning appliance industry that manufacturers can meet an emission standard lower than 4.5 g/hr.

Commenter (1513) asserts 80% of the models available already meet this standard, according to the EPA data. Because these stoves are already achieving, in practice, an emission rate that is far below both the current NSPS performance standard for pellet stoves and the standard that the EPA proposes to establish for Step 1 of the NSPS, the commenter (1503) believes that the CAA requires the EPA to take this into account by setting an emission limit for pellet stoves that

[30] Memo to USEPA from EC/R, Inc. Derivation of wood heater model percentages meeting Step 2 standards. November 2014.

reflects the emission reductions that these devices achieve in practice. The commenter (1503) believes that this information demonstrates that the "best" system of emission reduction for pellet stoves is capable of achieving emission rates that are much lower than the limits proposed by the EPA.

For pellet stoves, commenter (1585) believes moving directly to Step 2 may be justified since a majority of EPA-certified stoves already emit less than 2.5 g/hr.

Response:

We agree with comments that most pellet models meet the Step 1 limit of 4.5 g/hr and furthermore that a significant portion of pellet stove models can already meet a limit of 2.5 g/hr (the proposed alternative interim limit). The final Step 2 limit of 2.0 g/hr will be technology-forcing for some pellet manufacturers and readily achievable for others. We estimate that 70% of pellet stove models already meet the 2020 Step 2 standard.[31] As noted in other responses, in consideration of the fact that over 90% of wood stove manufacturers are small businesses, we are providing phased-in two step limits to allow manufacturers time to certify existing models while focusing on R&D of models able to meet Step 2.

As we note in other responses, we disagree with the suggestion that we promulgate different (more stringent) Step 1 standards for some room heaters and not others (e.g., for pellet-fueled versus cord wood-fueled heaters). We are regulating all room heaters to ultimately meet the final emission limit and do not intend to influence the market beyond that mandate. It is up to manufacturers to decide what combustion technology/wood fuel to use to meet the emission limits and up to consumers to decide what types of heaters they wish to purchase that are certified to meet those limits.

3.4.5 Comment: Level of the single burn rate wood heater Step 1 standard

Commenter (1508) suggests that the EPA consider revising the proposed Step 1 emission standard for single bum rate stoves to reflect the emission rates of units currently in use. The commenter (1508) believes that with the pace of technological improvements in the residential wood-burning appliance industry that manufacturers can meet an emission standard lower than 4.5 g/hr.

Commenter (1397) does not support an additional 1-year "adjustment" period for either Step 1 or alternative Step 1 with regard to single burn rate stoves.

Commenter (1479) supports that single burn rate wood heaters have to meet the proposed emission limits as well.

[31] Memo to USEPA from EC/R, Inc. Derivation of wood heater model percentages meeting Step 2 standards. November 2014.

Response:

We agree with the commenters that single burn rate stoves, like all room heaters regulated under subpart AAA, be required to meet the emission limits without a compliance extension (regarding which we specifically requested comment at proposal). We furthermore agree that single burn rate stoves, after additional R&D, can ultimately meet a standard lower than the final Step 1 limit of 4.5 g/hr. We are therefore requiring that single burn rate stoves also meet the Step 2 limit of 2.0 g/hr 5 years after Step 1.

3.4.6 Comment: Level of the single burn rate wood heater Step 2 standard

Commenter (1479) supports that single burn rate wood heaters have to meet the proposed emission limits as well.

Commenter (1397) is uncertain that single burn rate stoves can achieve the Step 2 emission standard without additional add-on technology and believes obtaining the Step 2 emission standard is laudable but must not create an untenable increase in the purchase price of these devices. Commenter (1549) requests that the EPA adhere to the proposed approach and eliminate Step 2 until the next review of the NSPS.

Commenters (1543, 1550, 1643) believe that the proposed Step 2 / Alternative Step 3 standards conflict with section 111 and must therefore be abandoned.

Response:

We agree with the comment that single burn rate stoves be required to meet the stepped limits. Although previously unregulated and a less developed technology than adjustable burn rate stoves, single burn rate stove designs have been undergoing R&D in anticipation of the proposed NSPS and cleaner designs are in progress. Furthermore, the final Step 2 limit (2.0 g/hr based on crib wood) is not as stringent as the proposed Step 2 limit (1.3 g/hr based on cord wood). Finally, we maintain that our phased-in Step 1 and Step 2 limits, based on crib wood testing consistent with the existing BSER database, meet all legal and policy obligations under section 111, including balancing achievable emission reduction with cost considerations for small businesses.

Note: For additional overarching critique regarding the proposed limit levels for single burn rate stoves, see also BSER Sections 2.1.1, 3.2.1, 3.2.2 and 3.2.4.

3.4.7 Comment: Phase-in period for stepped room heater standards

Commenter (1570) supports either an acceleration of the proposed 5-year phase-in of the second, more stringent standard, or a lower emission rate than the 1.3 g/hr proposed if implemented on the 5-year timeframe.

Commenter (0940) believes that the EPA should reduce the phase-in time from 5 years to 3 years because of the need for stronger standards to protect health. The commenter (0940) points to the available technology to meet stronger standards in Europe.

Commenters (1192, 1487, 1513, 1520) request that the EPA accelerate implementation of the stricter emission standards in the proposed amendments to subpart AAA and believe the effective date for the Step 2 emission standards should be 2018. Commenter (1487) states that the currently proposed 5-year deadline unnecessarily postpones the critical health protections associated with the rule. Commenter (1192) states that a 5-year period is longer than necessary, noting a memo from EC/R to the EPA, in which some manufacturers stated it takes about 10 to 14 months to develop and manufacture a wood-burning device from start to finish. Commenter (1192) asserts some manufacturers will only need to redesign their existing models. Commenter (1513) states there are already devices for sale that meet the standard proposed for this stage, and others that are very close.

Commenter (1477) states that, if the EPA does not revise the phase 1 limit to 3.5 g/hr, then they should require the phase 2 standard more quickly, such as in 3-4 years. The sole support for a 5-year phase-in period, commenter (1477) asserts, is an estimate provided by just two manufacturers that it would take "5 to 6 years of intensive engineering and R&D efforts" to produce a model line that would comply with the new limit (Regulatory Impact Analysis (RIA) at 9-11). Commenter (1477) states the EPA has not provided sufficient information in the RIA or elsewhere to substantiate the position of these two manufacturers, much less to show that their estimate is representative of the industry as a whole. Similarly, commenter (1477) states the EPA has not supplied adequate information to evaluate whether its laboratory "logjam" concern is well founded, and if so, how it supports a 5-year compliance period instead of a shorter period.

Commenter (1487) states that, although they support providing a lead-time given that the NSPS applies to manufacturers of consumer products, the information in the docket indicates that manufacturers are able to develop, test, and begin manufacturing a new stove model within 10-18 months. The commenter (1487) reports that a shorter lead-time would be consistent with the lead-time in the original subpart AAA, which included a 2-year window for compliance with a more rigorous standard, and the EPA emission standards for other consumer products, such as small ignition engines (which has a similar lead time of approximately 2 to 3 years).

Commenter (1192) thinks 2 years to receive certification is sufficient because the EPA proposes to authorize testing and certification through third-party ISO-accredited laboratories and certifying bodies, thus shortening the EPA's time to process certifications.

Commenter (1585) supports the shorter, 5-year implementation period for the NSPS, with the shorter phase-in for wood and pellet stoves mentioned (3.5 g/hr or less for wood stoves and Step 2 limits for pellet stoves).

Commenter (1444) states the current long transition period cannot be justified, given the health costs of stoves that emit up to 4.5 g/hr - many thousands of dollars per year. Rather than install new unacceptably-polluting stoves now, commenter (1444) suggests it would be far better for households to wait until new models with acceptable emissions are available. Commenter (1444) states a cost benefit analysis is needed to compare the health benefits and costs of reducing the transition period to less than 1 year and that the EPA's duty is to protect public health, not the

profits of the wood heating industry, who are only too aware of the health costs of breathing wood smoke pollution and that they have a public duty to ensure their products are safe.

Commenter (1436) states that there is no acceptable protocol for setting the Step 2 limits and that a new protocol will require 5 years of data collection before any "passing grade" can be set. If the protocol was proven and data collected, commenter (1436) believes the Step 3 limits [in 8 years under alternative approach] could make sense, but passing grade cannot be set on an unknown protocol. Likewise, commenters (1543, 1550, 1643) believe that the proposed Step 2 / Alternative Step 3 standards conflict with section 111 and must therefore be abandoned.

Response:

As noted in previous responses, the EPA is tasked with balancing achievable BSER-based emission reductions with cost considerations for NSPS under section 111 of the CAA. As part of this analysis, we considered numerous factors relating to the potential cost of the regulation, including industry organization and market structure, available technologies, and estimated costs of R&D to employ these technologies across the industry. We also considered implementation feasibility such as testing logjam concerns. We maintain that the final limits are achievable, based on BSER and yet are technology-forcing, and that the phased-in compliance timeline balances emissions reduction with cost and implementation considerations, as is appropriate under section 111.

We recognize that many commenters support a shorter phase-in time of the stepped limits while other commenters support a longer phase-in time or no Step 2 limit at all. We received comments from industry that the 6-year R&D period used in our analyses was too short and comments (like the ones in the above comment summary) that the 6-year period was too long. Based on our research (described in the background technical memoranda in the docket), we think the 6-year R&D period is a reasonable estimate which avoids understating the time required for R&D of many of these devices. Furthermore, we received numerous comments from manufacturers and from testing laboratories regarding the reality of testing logjam concerns, including comments that a lead time is needed for ISO accreditation. We think these concerns are legitimate and have therefore taken measures in the final rule to ameliorate such concerns.

We note again that the primary authority for this rulemaking is section 111 of the CAA and as such standards must be based on BSER taking into account cost considerations, not on health-based bans. State, tribal and local governments may decide that health-based bans (or delay in consumer sales, as the commenter above suggests) are warranted, but NSPS are technology-based (not health-based) standards under section 111.

Finally, regarding concerns that there is no acceptable protocol for Step 2, we have revised the proposed requirement that Step 2 be based on cord wood. The final Step 2 is based on existing BSER using a crib-based testing protocol. Therefore we maintain that the 5 years between Step 1 and Step 2 is sufficient time to develop Step 2 compliant models.

3.4.8 Comment: Proposed versus alternative approach for room heaters

Commenters (1192, 1239, 1397, 1423, 1551, 1640) support the 2-step proposed approach. The commenter (1239) states the approach results in greater emissions reductions and health savings compared to a shorter, single emissions limit compliance approach that would place undue burdens on manufacturers and consumers alike. Commenter (1239) states this approach gives manufacturers the time necessary to meet the requirements of the proposed rule while spreading the cost for doing so over a five-year period, potentially benefiting manufacturers and consumers while avoiding possible logjams at testing labs. Most important, according to commenter (1239) is that the EPA estimates overall emissions reductions for wood heaters using the 2-step compliance approach greater than the emissions limits that wood heaters must meet currently and the costs of compliance using the 2-step approach are far outweighed by the monetized health benefits of the proposed rule.

Commenter (1423) notes that the alternative three-step, eight-year implementation schedule is too long to wait for further emission reductions and does not create the necessary incentives for the introduction of cleaner burning appliances, particularly since EPA does not appear to be relying on significant emission technology innovation. Additionally, according to the commenter (1423), as eight years is the statutory schedule for reviewing the NSPS, it will not allow enough time for the more stringent standards to take effect for EPA to evaluate their effectiveness.

Commenter (1514) is opposed entirely to the alternative 3-step approach because it "cuts short the time needed to certify to the 1.3 g/hr limit" and whatever the limit, a full 5 years is needed to get to that limit. Commenter (1514) also asserts that manufacturers are not going to support the cost of the testing twice. Commenter (1549) is also opposed to the EPA's proposed alternative approach as it would place an additional burden on all parties.

Commenter (0541) supports the alternative approach. Commenter (1479) specifically supports the 1.3 g/hr limit as part of Step 3 because current technology available to the industry will improve within the next 8 years and will allow manufacturers to achieve this limit within the 8 years. Also, given that 27 of the current adjustable wood heater models already meet this standard, the commenter (1479) finds that the 1.3 g/hr limit is a plausible limit for 8 years out, and allows manufacturers time to achieve the limit if they have not already done so. The commenter (1479) finds that the cost of the technology will be reduced within the 8-year limit.

Response:

We agree with the majority of commenters that the 2-step approach is superior to the alternative proposed 3-step approach, both environmentally and cost-wise. The final rule is a 2-step approach to phased-in limits.

3.5 Implementation and Enforcement Issues – Room Heaters

3.5.1 Comment: Compliance extensions / grandfathering of wood stoves

Commenter (1396) vehemently opposes the EPA's proposal that certificates for wood heaters certified prior to the new standards will not be renewed once they expire. Commenter (1396) firmly believes that certified wood heaters demonstrated to meet the Step 1 standard should be recognized as certified throughout the duration of Step 1, assuming said duration is 5 years as proposed. If the final rule retains the 5-year period between Steps 1 and 2, commenter (1396) asserts manufacturers will be scrambling to redesign and test the full line of wood heaters to meet the new Step 2/3 standards.

Commenter (1549) requests a compliance extension of at least 1 year after promulgation of the proposed rule. Commenter (1261) suggests the EPA ensure that manufacturers and retailers can sell any wood heaters certified by the EPA for 5 years from date of certification in the final rule. Commenters (1171, 1479) support the proposed transition period for heaters/stoves currently being sold or manufactured until the original certification expires (5 years) or has been revoked. Commenter (1479) adds that every certification should be good for 5 years in order to allow manufacturers time to develop another unit and to accumulate savings for the next round of testing. Commenter (1547) states that existing certified units should be grandfathered.

Commenters (1543, 1550, 1643) state that nothing less than the full certification period for subpart AAA appliances is essential to account for the substantial time and investments necessary for all manufacturers – mostly small businesses, as recognized by the EPA – to undertake necessary new product development and complete the rule's rigorous new testing and certification requirements. Commenter (1546) agrees that 5-year certificates issued prior to the effective date should be honored as those products were tested in good faith to regulations applicable at the time tested. Commenter (1546) adds that the same holds true for certificates issued under Step 1.

According to commenters (1543, 1550, 1643), any "grandfathering" period less than the full certification period would fail to satisfy section 111's BSER requirement. Commenters (1543, 1550, 1643) add that adequate time is needed to avoid "logjams" at certifying laboratories facing an influx of certification tests for wood stoves and other appliances. Also, commenters (1543, 1550, 1643) anticipate that the demonstrated imprecision of the test methods (and the lack of correlation between certification scores and real world emissions) are relevant here as well. The commenters (1543, 1550, 1643) state that, on average, there are unlikely to be meaningful differences in emissions performance between "grandfathered" models (even those with certification scores >4.5 g/hr) and models certified to Step 1 requirements.

Commenter (1665) requests that the EPA extend a grandfathering exception to reduce costs of complete retesting of an appliance they manufacture. Specifically, the commenter (1665) requests that the EPA permit manufacturers to conduct one test run at a certified lab. The commenter (1665) explains that the single run test could be based upon the appliances' highest emitting run on the original test, but using cord wood and newly established test methods.

According to the commenter (1665), if the results of the run are the same or better in terms of emissions, and again within the same burn rate range, the appliances' certificate should be grandfathered during both the Step 1 and Step 2 proposed periods.

Commenters (1543, 1550, 1643) stress that the EPA must be clear as to how manufacturers obtain transitional status, and what is required of them. Commenters (1543, 1550, 1643) state that it is unnecessary to impose additional, duplicative requirements on manufacturers who have already obtained certifications under the current subpart AAA procedures. Commenters (1543, 1550, 1643) state that such manufacturers should not be required to obtain any additional duplicate certification or take any other specific measures inconsistent with preexisting requirements imposed under the current subpart AAA. For example, commenters (1543, 1550, 1643) add, there are significant problems with applying the proposed revised QA/QC provisions to currently certified units. According to commenters (1543, 1550, 1643), to the extent the new QA/QC provisions apply to currently certified units, they must be changed because they are based on a flawed assumption that independent third-party certification entities can approve and oversee QA/QC plans for models for which certifications were granted based on testing by other laboratories. For such grandfathered models, commenters (1543, 1550, 1643) state, the "threat" that the certifying entity will withdraw its listing based on QA/QC issues is absent because the testing that supported certification was performed by laboratories that do not offer the services necessary to meet the proposed QA/QC requirements. According to commenters (1543, 1550, 1643), 60 days is not nearly enough time for manufacturers of grandfathered models to develop and submit new QA/QC plans, nor is 30 days sufficient for independent third-party certifying entities to approve them or for the EPA to review and approve them. Commenters (1543, 1550, 1643) suggest the use of the QA/QC programs already in place pursuant to the safety listings for grandfathered appliances to fill this gap.

Commenters (1543, 1550, 1643) add that, absent notification by the EPA that a particular model is ineligible for the transition period (e.g., through a cease and desist notice), manufacturers can manufacture and market appliances until the expiration of the grandfathering period. The commenters (1543, 1550, 1643) believe that this type of grandfathering period is relatively modest, as many of these qualifications are likely to expire well before the end of the proposed Step 1 period, but it is vital to manufacturers' ability to remain in the marketplace while undertaking the necessary adjustments to comply with the various requirements set forth in the proposed subpart QQQQ. Commenters (1543, 1550, 1643) state that it is also necessary to avoid crippling delays at certifying laboratories that must demonstrate their proficiency with new test methods (not knowable until promulgation), while also being deluged by certification requests pertaining not just to hydronic heaters, but all other appliance categories subject to the proposed rule.

Commenter (1436) states that existing heaters could be troubled by recertification and the short life left if not certified this year. Commenter (1436) is concerned because their stoves were tested with now obsolete Method 5H (the approved protocol at the time) and believes these should be grandfathered in. Commenter (1436) adds that grandfathering in existing certified wood stoves will alleviate log jamming. Commenter (1436) believes existing certified stoves should have 10 years or until the next phase; even with supposed 5-year phase 1, no stove will have 5 years

unless certified or renewed on 12/31/14, depriving manufacturers of their investment. Commenter (1632) supports grandfathering Step 1 models using current test methods as being the only option that is justifiable to propose. Commenter (1436) believes that without this extension several stoves will run out in less than a year, unduly penalizing them.

Commenter (1436) states that all stoves tested to 5H with emissions below 4.5 g/hr should be grandfathered for the duration of Step 1.

Commenters (1514, 1640) recommend wood stoves meeting the proposed Step 1 emission limits of 4.5 g/hr be allowed to keep their certification for the full 5-year period. Commenter (1514) explains that if a currently certified model's certificate expires during the 5-year period, such a grandfathering would allow a manufacturer to supply a full line to the market while completing any further testing. For any wood stove whose emissions are above 4.5 g/hr or are tested to 5H, commenter (1640) states they should be required to undergo certification at the time of promulgation or up to 6 months after promulgation.

Given the variability in certification expirations, commenter (1551) supports a blanket extension for all currently certified units (wood stoves and pellet stoves) that meet the EPA's final Step 1 emission limits until implementation of Step 2 standards or until January 2020, whichever is earlier. Commenter (1551) recommends that only those units already achieving the relevant proposed standards for Step 1 be allowed to delay retesting.

In return for the certificate extension, commenter (1551) suggests the EPA require that companies provide the EPA with a complete cord wood test for these units within 18 months of promulgation of this rule. Commenter (1551) states units that do not comply with the Step 1 emission limits should not be allowed to be sold if their current certificate extends beyond the initial rule promulgation and does not support extending certificates beyond the date Step 2 standards come into effect.

Commenter (1397) states grandfathering creates regulatory difficulties in the short term and is not a preferred option, however, room heaters tested in good faith to the proposed method, achieving the proposed emission limits and receiving a certificate could receive a reasonable extension beyond promulgation for Step 1, if the test method has been changed enough to give reasonable doubt about the accuracy of previous test results. Commenter (1397) does not support grandfathering for devices as Step 2 is implemented. Commenter (1397) adds that those receiving this extension should be required to complete cord wood testing prior to the end of their extension.

Commenter (1529) does not support grandfathering any device that does not meet the Step 1 standards in 2015 and Step 2 standards in 2020.

Commenters (1423, 1477, 1487) generally oppose the certification provisions. Commenter (1423) does not believe currently certified new appliances with a higher emission level should be grandfathered beyond the effective date of the standard. Commenter (1477) states that, at minimum, the EPA should limit the exemption by not approving manufacturer certifications

submitted after the date the proposed rule was signed and having existing certifications expire a year after the final rule takes effect.

Commenter (1487) requests that the EPA not finalize the proposed provision allowing all stoves certified under the existing NSPS to continue to be manufactured and sold for 5 years after certification. The commenters (1477, 1487) express concern that noncatalytic stoves that are currently certified with emissions as high as 7.5 g/hr could be allowed to be manufactured and sold for as long as five years after the final rule is published. The commenters (1477, 1487) report that roughly 15% of wood stoves do not meet the proposed Step 1 NSPS limit of 4.5 g/hr and there would be a gap in coverage of emissions from these stoves. The commenter (1487) asserts that this gap in coverage is inconsistent with section 111 requirements of the CAA and would unnecessarily delay the full benefits of the Step 1 standards for an additional 5 years. The commenter (1487) also asserts that finalizing the proposed certification extension would be a disincentive for manufacturers of high-emitting stoves to certify as many of those devices as possible before finalization of the rule.

Commenter (1487) urges that, if the EPA finalizes the proposed certification extension, the EPA limit its applicability only to those stoves that are certified at or below the 4.5 g/hr Step 1 limit. The commenter (1487) asserts that the technology is available for all wood stoves to meet the Step 1 standards and that the small portion of stoves that do not currently meet it have a reasonable amount of lead-time to do so.

Commenter (1514) notes that the 1988 NSPS allowed extra time to comply for manufacturers who produced less than 2,000 units per year and contends that the proposed rule "disregards the real economic devastation it will have for small businesses."

Response:

We agree that it is important that we clearly outline the transition from the 1988 NSPS to the revised NSPS for subpart AAA, and we have made clarifying revisions to the final rule and preamble. We considered all comments that both supported and opposed any certification extension for wood stoves/heaters currently certified by the EPA under subpart AAA. After consideration of concerns expressed by commenters, we have included an automatic certification approval under subpart AAA for wood heaters/stoves with EPA certification in effect at promulgation of the rule that can meet the Step 1 levels until the Step 2 effective date. We will not require new testing of heaters that have current certificates of compliance under the 1988 NSPS that show they meet the Step 1 emission levels. Those certificates will be automatically extended beyond their current expiration date until the compliance deadline for the Step 2 emission limits. This automatic certification for wood heaters/stoves that meet the Step 1 limit will also reduce the potential for "logjams" at laboratories conducting certification testing.

Further, to address the possibility that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA, especially in the first year, and so as to avoid unfairly restricting the production and sales of manufacturers who do all the things they should do and then potentially have to wait on the EPA approval, we have added a conditional, temporary approval by the EPA for room heaters subject to revised subpart AAA based on the

manufacturer's submittal of a complete certification application. The application must include the full test report by an EPA-accredited laboratory and all required compliance statements by the manufacturer. The conditional approval would allow manufacture and sales for 1 year or until EPA review of the application, whichever is earlier. Within 1 year, the manufacturer must submit a certificate of conformity by a third-party certifier.

Furthermore, as explained in more detail in our response in *Section 2.12.15*, we have clarified the provisions related to quality assurance plans for the grandfathered units in the final rule. The rule allows manufacturers, who obtain automatic certification to the Step 1 emission limits, 1 year until they must follow the third-party administered quality assurance program, prior to which they may operate according to their existing quality assurance plan for the applicable model. This provision will extend until 1 year after the effective date of the Step 1 standard and allows time for manufacturers and certifying bodies/entities to enter into contractual agreements related to the required quality assurance plans.

Regarding cord wood testing, we have determined that, to require both crib and cord wood testing would be unduly burdensome. However, as discussed in our response in *Section 2.8.2*, we agree that cord wood testing is more representative of in-home use and will provide better information for consumers to choose the cleanest and most efficient heaters. We still encourage manufacturers to design wood heaters that best represent in-home performance using cord wood. However, the ASTM cord wood test methods are not complete and there has only been limited testing using the draft methods. Thus, we have determined that we do not have sufficient data at this time to adequately support a regulatory requirement for cord wood testing. Although we are not requiring testing with cord wood, we are allowing manufacturers the choice to test with cord wood. Under the final rule, we are providing an alternative compliance option for manufacturers who choose to demonstrate compliance with Step 2 standards based on cord wood testing.

We are not allowing a 1-year compliance extension for low-volume manufacturers, i.e., companies that manufacture (or export to the U.S.) fewer than 2,000 heaters per year in the final rule. Over 85 percent of these appliances already comply with Step 1 emission levels and manufacturers have known this rule was forthcoming (and have therefore had time to plan for it). However, the certification extensions for appliances already meeting Step 1 emission limits and the two-step compliance approach included in the final rule acknowledges and limits the impacts of this rule on both small and large manufacturers.

3.5.2 Comment: Sell-through provisions

Commenters (1396, 1436, 1456, 1521, 1543, 1547, 1549, 1550, 1643) believe the 6-month sell-through provision is too short. Commenters (1543, 1550, 1643) state that the proposed 6-month sell-through period for subpart AAA is insufficient and presented without adequate justification. Commenters (1543, 1550, 1643), referencing analysis (1643, Attachment 7), urge an unlimited sell-through period for existing inventory. Commenter (1521) advocates extending the 6-month sell-through provision to one full year for the dealers, and including the 6-month provision applicable to manufacturers only. Commenter (1456) states the industry is seasonally driven and the selling season is usually about 4 months long on average, which gives a retailer 8 months of slower to little floor traffic to get rid of product. Commenter (1456) notes they do not count

business on a calendar yearly basis but on the fall/winter season basis (usually October through January, though it can vary from year to year depending on weather). Commenter (1456) suggests at least an 18-month sell-through period to get rid of existing non-compliant inventory, giving two selling seasons to get rid of product.

Commenter (1549) states that since pellet stoves were previously unaffected appliances under the current NSPS and that most manufacturers of pellet stoves will be impacted by the proposal, they opine that there is a potential for "logjams" in testing labs where transition relief will be needed. Commenter (1549) requests authorization for retail sell-through of at least 2 years after the compliance date of the proposed rule and that the compliance date be extended by at least one year after promulgation of the proposed rule.

Commenter (1547) describes that because they sell to large retail chains, sales are very seasonal and purchasing decisions are made months in advance and this could translate into a terrible year for the manufacturer even before the ruling goes into effect. The commenter (1547) notes that the current subpart AAA regulations provided for a sell-through period of 2 years and (at least) this length of time should be maintained.

Commenter (1665) recommends that sell-through conditions for solid fuel heaters be increased to a minimum of 1 year to avoid irreparable financial harm. Commenter (1665) states that not all months are equal in the eyes of the hearth retail business (e.g., retailers have their slowest months in the first 2 quarters of the calendar year) and having only a 6 month sell-through will hurt sales.

Summarizing the results of the Page Report (1643, Attachment 7), commenters (1543, 1550, 1643) describe the potential economic implications of inadequate sell-through relief and provides examples of the estimated stranded inventory in 2013 that could result in millions of dollars in losses if not sold within the proposed 6-month sell-through allowance. Commenters (1543, 1550, 1643) note that all of these stranded devices are certified stoves and there are de minimis environmental implications if they are allowed to be sold.

Commenter (1436) asserts the proposal would effectively stop the industry because this is a seasonal business. Commenter (1436) states dealers construct displays with inventory in the spring for fall /winter sale and would surely have unsellable inventory they may be "stuck" with. Commenter (1436) states retailers commonly carry display and burn models for up to 2 years; general inventory may sit for a year or two. Commenter (1396) adds that extending the sell-through into fall and winter would greatly increase their ability to move remaining inventory.

Commenter (1397) believes 1 year is acceptable but prefers the proposed 6-month extension. Commenter (1640) supports the 6-month sell-through provisions (or a maximum of 1 year), except for single burn rate stoves which should not be offered the sell-through period.

Commenter (1477) states the EPA should eliminate the sell-through provision, stating there is no legal support in section 111 for such an exemption, which would result in more pollution that harms public health and the environment.

Commenter (1551) is concerned about the continued sale of high emitting devices and recommends that the EPA eliminate sell-through periods for exempt, uncertified wood stoves fueled with cord wood. For certified space heating units emitting greater than the Step 1 emission standard of 4.5 g/hr and pellet stoves, commenter (1551) supports a 1-year period to sell existing inventory. While the EPA has proposed a 6-month sell-through period, commenter (1551) believes that a 1-year sell-through provides a more reasonable time. Commenter (1551) also requests that the EPA simplify and streamline the numbers of exceptions and sell-through periods so that enforcement agencies charged with ensuring compliance with the new emission standards can determine which devices remain legal to sell.

Commenter (1397) believes devices not already compliant with the 2015 or 2020 standards should not be allowed to sell-through the end of their certificate expiration data when that date goes beyond the start date of these standards.

Commenter (1503) states that because manufacturers could continue to certify new models up until the effective date of the final rule, the Proposed Rule's approach to grandfathering provides manufacturers with an incentive to quickly certify all of their high-emitting stoves before the deadline, rather than discontinuing production of less clean devices and transitioning toward a cleaner wood stove fleet. The commenter (1503) notes that section 111 appears to anticipate and preempt such a perverse incentive, in that it defines new sources as those sources for which "construction or modification . . . is commenced after the publication of regulations (or, if earlier, proposed regulations) prescribing [an NSPS]." Commenter (1503) proposes allowing a 6-month sell-through period for stoves that do not comply with the Step 1 standards. Commenter (1503) adds that stoves with emissions lower than the Step 1 standards that were certified before the Proposed Rule (i.e., under the existing crib wood test methods) should be allowed to be manufactured and sold until their certificate expires or the Step 2 standards take effect (by which time those stove models should be required to either be re-certified under the revised test methods or removed from the market).

Commenter (1640) asserts the EPA's proposed rules make it very confusing for states to know how to enforce regulations regarding which stoves could be sold in the state at which times. Commenter (1640) believes it would be challenging for states to know which stoves were in compliance because they had certification extensions versus those being sold by an unwitting retailer trying to unload existing stock. To avoid confusion, commenter (1640) recommends all stoves certified to the 1990 standard cease being sold by January 1, 2016 (the 6 months to 1 year sell-through period), that only Step 1 certified stoves be allowed to be sold from rule promulgation through 2020, and to require labeling on the stove that indicates the expiration date of when a stove can be sold.

See Section 2.18.4 for additional commentary regarding sell-through provisions in general.

Response:

The EPA has had contact with, and participated in meetings with, stakeholders (including wood stove manufacturers) during the development of this rulemaking. For example, in November 2009, we released a draft review document of the rule with preliminary draft conclusions and WESTAR sponsored a meeting on November 17-19, 2009 that included both regulatory agencies and the regulated community to discuss the Woodheater NSPS (*see* Docket ID No. EPA-HQ-OAR-2009-0734 for stakeholder and outreach documentation, www.regulations.gov). Therefore, manufacturers have had plenty of time to plan for this rulemaking and a 2-year sell through period is not warranted for pellet or other wood stoves.

As we noted in response to *Section 2.18.4*, we considered all the comments we received in support and in opposition to allowing for retail sell-through of inventory of heaters manufactured before the compliance deadline. At proposal, we stated that we would allow 6 months for sell-through of inventory for wood stoves under subpart AAA. After consideration of comments received on the proposal regarding small business concerns, we have revised the final rule to allow retailers to sell their wood stoves that do not meet the Step 1 emission levels until December 31, 2015. This approximately 8-month sell-through period will better cover the primary selling period after the rule is final and (the two month difference from proposal) will affect a very small number of appliances. Additionally, as noted in other responses (e.g., in *Section 3.5.1*), the final rule has been revised to include an automatic certification approval under subpart AAA, until the Step 2 effective date, for wood heaters/stoves with EPA certification in effect prior to promulgation (i.e., under the 1988 rule) that meet the Step 1 limit.

Regarding labeling suggestions to minimize confusion for state regulators, the final rule requires that each room heater under subpart AAA be equipped with a permanent label clearly stating the effective date of the USEPA standard that the unit meets. For example: "Certified to comply with 2015 particulate emission standards. Not approved for sale after [date 5 years after effective date of rule]" or "Certified to comply with 2020 particulate emission standards using crib wood" or "Certified to comply with 2020 particulate emission standards using cord wood".

3.5.3 Comment: Single burn rate stove extension of compliance and retail sell-through period

Commenter (1503) states that currently exempted wood stoves—sometimes referred to as single burn rate stoves, or 35-to-1 stoves should not be grandfathered or given any sell-through period.

Commenter (1397) states single burn rate stoves should not need an added extension to comply with the Step 1 standard but may require additional time to achieve the Step 2 standard but that any extension should not overlap with the next scheduled NSPS review.

Commenter (1549) states that until the rulemaking is final, a manufacturer does not know conclusively what test method to apply to a product. Commenter (1549) asserts that because these appliances were classified as non-affected facilities, a manufacturer cannot realistically be expected to produce compliant products upon promulgation. Commenter (1549) notes that with

the first NSPS, the EPA allowed 2 years for retail sell-through. Commenter (1549) requests the same time line for this category of appliances. Commenter (1549) explains that that 2 years will allow for R&D testing and time for compliance testing in a lab. According to the commenter (1549), the 2 years of sell-through following the compliance date would allow retailers to clear out inventory. Commenter (1549) states that it is important to note that if the compliance date is May 2015, retailers would not be selling heating products until October at the earliest and that there needs to be time built in to allow retailers to release their current product.

Commenter (1549) expresses that they need time to develop effective technology to incorporate into these devices that can meet the emission requirements and still be safe and cost effective to the end user. The EPA states in the preamble that some models would need modification, but commenter (1549) asserts all models will require modifications to be compliant because these models do not have any technology built into the appliance for emission reduction.

Response:

We agree that single burn rate stoves manufactured on or after the effective date of the final rule should not be granted an extension of compliance under subpart AAA. The EPA has had contact with and participated in meetings with stakeholders (including wood stove manufacturers) during the development of this rulemaking (i.e., manufacturers have known about this rulemaking for a while). For example, in November 2009, we released a draft review document of the rule with preliminary draft conclusions, and WESTAR sponsored a meeting on November 17-19, 2009 that included both regulatory agencies and the regulated community to discuss the Woodheater NSPS (*see* Docket ID No. EPA-HQ-OAR-2009-0734 for stakeholder and outreach documentation, www.regulations.gov). Therefore, manufacturers have had plenty of time to plan for this rulemaking and an extension of compliance for single burn rate stoves is not warranted. The final rule requires that single burn rate heaters manufactured on or after the effective date of the final rule must meet the Step 1 limits.

However, to address the possibility that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA, especially in the first year, and so as to avoid unfairly restricting the production and sales of manufacturers who do all the things they should do and then potentially have to wait on the EPA approval, we have added a conditional, temporary approval by the EPA for room heaters (including single burn rate stoves) subject to revised subpart AAA based on the manufacturer's submittal of a complete certification application. The application must include the full test report by an EPA-accredited laboratory and all required compliance statements by the manufacturer. The conditional approval would allow manufacture and sales for 1 year or until EPA review of the application, whichever is earlier. Within 1 year, the manufacturer must submit a certificate of conformity by a third-party certifier.

We considered all the comments we received in support and in opposition to allowing for retail sell-through of inventory of heaters manufactured before the compliance deadline. At proposal, we stated that we would allow 6 months for sell-through of inventory for wood stoves under subpart AAA. After consideration of comments received on the proposal regarding small

business concerns, we have revised the final rule to allow retailers to sell their wood stoves (including single burn rate stoves) that do not meet the Step 1 emission levels until December 31, 2015. This approximately 8-month sell-through period will better cover the primary selling period after the rule is final and (the two month difference from proposal) will affect a very small number of appliances.

3.5.4 Comment: Concern regarding flue dampers in single burn rate stoves

Regarding the tamper proof setting requirement on some models (FR 79 at 6357), commenter (1436) states that no one uses a stove at a single burn rate, rather if the stove has no internal control, an external one is needed and installed. Commenters (1397, 1551, 1640) are generally concerned about the use of flue dampers. Commenter (1551) is concerned that a single burn rate stove can be easily modified into a variable rate stove with the simple addition of a flue damper, allowing units to operate at much lower burn rates with higher emissions. Commenters (1397, 1640) suggests warranties be voided by the addition of a flue damper to single burn rate stoves. Similarly, commenters (1397, 1551, 1640) are generally concerned about the use of flue dampers. Commenter (1551) is concerned that a single burn rate stove can be easily modified into a variable rate stove with the simple addition of a flue damper, allowing units to operate at much lower burn rates with higher emissions. Commenter (1397) is concerned with the circumventing of tested emission rates with the addition of a flue damper by the consumer, thus increasing emissions in an attempt to extend total burn duration. Commenters (1397, 1551, 1640) note that the addition of a flue damper allows single burn rate stoves to operate at much lower burn rates with higher emissions and recommend requiring all single burn rate stoves to have emission and efficiency testing conducted with a damper in the flue.

Response:

Single burn rate stoves are designed to burn at one burn rate; they are not installed or equipped with a damper to allow the operator to vary the burn rate conditions. The final rule explicitly defines a single burn rate stove as a wood heater that is not equipped with or installed with a burn control device to allow the operator to vary burn rate conditions, prohibits the use of flue dampers in these stoves and also requires that the permanent label state that "This single burn rate heater is not approved for use with a flue damper." Despite this, we acknowledge that there may be some operators that modify their single burn rate stoves by adding a flue damper. Using a damper to achieve a minimum burn rate during testing is contrary to the NSPS. Because single burn rate stoves are designed and required by the NSPS to burn at only one burn rate, without damper control, these stoves are tested for certification at this single burn rate using the protocol detailed in Appendix X1 of ASTM E2780-10 "Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters."

The final rule also requires that a person must not operate an affected residential wood heater in a manner inconsistent with the owner's manual and that the owner's manual must include information consistent with operating instructions provided by the manufacturer to the test laboratory for certification testing. For a single burn rate stove model, adding and operating a flue damper would be inconsistent with operating instructions in the manual and should void the warranty.

4.0 Response to Comments Regarding Subpart QQQQ

Chapter 4 presents comments specifically related to central heaters and the NSPS requirements that the EPA proposed to regulate central heaters (40 CFR part 60, subpart QQQQ). Refer to Chapter 2 for additional overarching comments, generally applicable to all subparts of the proposed rule. Refer to Chapter 6 for comments regarding test method procedures.

4.1 Appliances Subject to Subpart

4.1.1 Comment: Grouping device technologies as "central heaters"

Commenters (1365, 1587) commend the EPA for certifying hydronic heaters and forced-air wood furnaces under a discrete subpart so that localities will not have to rewrite their rules to continue to prohibit the sale and installation of hydronic heaters and forced-air wood furnaces. Commenters (1365, 1587) state it is critical to maintain this distinction in the final rule so that certification is not used to open the door to the sale of hydronic heaters and forced-air wood furnaces in areas of the country that currently prohibit them.

Commenter (1488) believes that the EPA has failed to justify why hydronic heaters should be regulated under a new subcategory called "central heater" with a separate performance standard and unit/form of the standard. Commenter (1488) supports the EPA distinguishing between wood heaters and hydronic heaters (in order that new federal standards do not suddenly permit hydronic heaters in jurisdictions that restrict their use), but states hydronic heaters differ from wood stoves, not in the composition of the smoke but in their ability to generate significant quantities of smoke for sustained durations throughout the year.

Commenter (1549) disagrees with the EPA's proposal to regulate forced-air furnaces along with hydronic heaters under subpart QQQQ. Commenter (1549) states that hydronic heaters and forced-air furnaces are vastly different technologies. Commenter (1549) reports that, unlike hydronic heaters, forced-air furnaces have virtually no heat storage capabilities with their distribution media and are not able to consistently operate in their "sweet spot" due to many safety concerns and common use habits by end users. Commenter (1549) adds that there are significant differences in the size and weight of these two appliances. Commenter (1549) asserts that forced-air furnaces, made to be installed indoors in a basement or utility room, present a significant design and engineering challenge because they have size and weight restrictions that need to be considered for add-on control technologies to improve emissions.

Commenter (1665) opines that the EPA has taken a leap to include both hydronic heaters and warm air furnaces under the same category. Commenter (1665) reports that warm air furnaces must satisfy different safety tests as they are largely installed into basements or lower levels of homes and are generally smaller so they can fit through common door entrances.

Response:

We are regulating residential wood heaters and note in general that there are two basic approaches to heating a residence with wood fuel – technologies that heat a room or only portion of the house by warming the space immediately surrounding the device ("room heaters") and technologies that heat the entire house by warming spaces other than where the device is located ("central heaters"). Currently there are two main types of wood-fueled central heaters – hydronic heaters and forced-air furnaces – but there may be additional technologies in the future. Our goal is to reduce emissions across any-and-all technologies used for wood-based heating, rather than to tailor regulations to a myriad of individual technologies, thereby creating an uneven playing field and potentially creating inadvertent loopholes. This approach helps keep EPA from favoring/choosing one technological solution over another, while enabling maximum flexibility in the rule to regulate emerging and future technologies that also seek to serve as wood-based central heaters. This approach of promulgating stepped standards for all central heaters is consistent with maximizing, as far as practicable, marketplace helpful influences that also help achieve EPA's mission of emissions reduction.

We acknowledge the concern regarding forced-air furnace size limitations enabling installation (through doorways and other entrances to basements) and the concern that the space limitations may affect the ability to adequately insulate the models that may be installed in close proximity to combustibles. We acknowledge these concerns but note that coal, oil and natural gas forced-air furnaces and indoor hydronic heaters that have similar space limitations and proximity to combustibles conditions have successfully handled those concerns for many years. For example, numerous cord-wood-fired indoor hydronic heaters have been safely installed without large volumes of thermal insulation around the firebox

4.1.2 Comment: Hydronic heater applicability

Commenter (0465) wonders if noncompliant commercial hydronic heaters (e.g., for farms and other businesses) can still be sold, since the rules apply to residential appliances only. Commenter (0465) also asks if there is a minimum BTU output for commercial wood boilers.

Commenter (1463) states concern that certain hydronic heaters, such as units located at small commercial or institutional locations in residential neighborhoods, may fall outside the proposed applicability of these standards. The commenter (1463) notes that while the Preamble establishes the "central heater" category to better ensure that all potentially affected appliances are addressed, the term "central heater" is not used in § 60.5472, which describes the applicability of subpart QQQQ.

Commenter (0908) describes the inadequacy of the voluntary hydronic heater program to protect public health in New York State, noting that the proposed NSPS does not close all loopholes (e.g., commercial boilers) and that it fails to address ongoing damage.

Response:

All wood-fueled and wood pellet-fueled central heaters for residential use are subject to this final rule. We define "central heater" to mean a fuel-burning device designed to burn wood or wood pellet fuel that warms spaces other than the space where the device is located, by the distribution of air heated by the furnace through ducts or liquid heated in the device and distributed typically through pipes. Unless otherwise specified, these devices include, but are not limited to, residential forced-air furnaces and residential hydronic heaters. We define "residential hydronic heater" to mean a fuel burning device designed to burn wood or wood pellet fuel for the purpose of heating building space and/or water through the distribution, typically through pipes, of a fluid heated in the device, typically water or a water and antifreeze mixture.

Subpart QQQQ will cover all hydronic heaters and forced-air furnaces for residential heating. If the heater is used to heat a residence, even if only partially, it is subject to this rule. To give a specific example: if the heater is used to heat any part of a residence, and that same heater is also used to heat commercial space (*e.g.*, a greenhouse located adjacent to the residence) it is subject to the rule.

4.1.3 Comment: Requiring thermal storage for hydronic heaters

Commenter (1591) suggests the EPA consider requiring all hydronic heaters to include 100% thermal storage if that is the only way that the system can be used and ensure that emission standards are met. Commenter (1591) is concerned that if water storage is not part of the system, how will the EPA ensure that creosote buildup is not an added danger from slow smoldering fires, adding that the EPA has a responsibility to protect not only the health of people's lungs but also of the risk of increased fire.

Commenter (1558) believes all hydronic heaters that use cycling technology must be required to have separate, full heat storage to ensure that heat is captured and to reduce or eliminate the need for a hydronic heater to cycle and damper the fire. Commenter (1558) asserts the proposed NSPS that allows cycling hydronic heaters is based on flawed engineering design and that Phase 2 hydronic heater emissions are a proven health threat and nuisance to neighbors because they are designed to cycle and smolder.

According to commenter (0948), most boilers are over-designed, meaning that even on the coldest day of the year, the boiler is only operating at 33-50% output and for 90% of the time they will be operating at or below 20-35% output such that performance is typically mediocre at these levels. Commenter (0948) states that thermal storage is essential to balancing out this heating load and boiler output mismatch and allows the boiler to operate at maximum output regardless of the heating load.

Commenters (1397, 1463, 1558, 1562) request that any unit tested with partial thermal storage be sold and installed with thermal storage. Commenters specify that such storage must provide at least as much storage capacity as tested (1463, 1562) or at least 60% of the maximum heat output (1397, 1558, 1562). Commenters (1558, 1562) would not allow the unit to be sold without the

thermal storage under an agreement that the customer provide and install the thermal storage on site.

In the case of central heating units, commenter (1551) supports the EPA efforts to encourage the use of full thermal storage systems and recommends that any unit tested with thermal storage must be sold with thermal storage.

Commenter (1520) urges the EPA to include installation requirements for these units that specifically require that the heater be installed with specific volume and configuration of heat storage or other equipment used in the certification test. Commenter (1520) asserts that installation requirements are needed to ensure that these devices will be installed appropriately even when state or local building codes vary.

Response:

We agree that thermal storage can significantly reduce emissions. The final Step 2 emission limit of 0.10 lb/mmBtu can be met by hydronic heaters with thermal storage. We note that the final rule requires that all units tested with storage must be installed and operated with at least the amount of storage used in the certification test. Full thermal storage is highly recommended for all units but not required for cord wood units tested with EPA Method 28WHH or ASTM 2618-13 or EPA 28WHH-PTS. We will evaluate the results and consider requiring full thermal storage in the next NSPS review.

Over 20 pellet heaters/boilers are already qualified under the Renewable Heat New York (RHNY) program and will be automatically deemed to be EPA-certified for Step 1 provided they comply with the RHNY requirements for installation and operation with adequate thermal storage. The RHNY-qualified units include installation of thermal storage to maintain high-efficiency and low emissions performance throughout daily and annual cycles. The minimum size thermal storage for boilers less than 85,000 BTU/hr is 119 gallons or 2.0 gallons per 1,000 BTU/hr, whichever is less. For boilers greater than 85,000 BTU/hr, the minimum heat storage is 2.0 gallons per 1,000 BTU /hr.) The NSPS also allows models to be tested for certification to the Step 1 standard using European National (EN) test method EN 303-5 only for units sold with thermal storage.

4.1.4 Comment: Hydronic heater automatic dampers

Commenter (1591) states the use of automatic dampers to control the air flow needs to be reviewed as the 1988 NSPS was specifically devised to require air flow to cut emissions. Commenter (1591) is not clear why the EPA is now ignoring the very elemental requirement for a hot fire to reduce emissions.

Response:

The commenter is incorrect in saying that the 1988 NSPS required air flow to reduce emissions. Actually, the 1988 NSPS established emission limits that in effect encouraged manufacturers to

reduce the excessive air flows that were causing high emissions. The CAA prefers for NSPS to be emission standards as far as possible. The final NSPS (like the proposal and the 1988 NSPS) allows manufacturers to choose the technology that is best for them to achieve the emission standards. There is not just one answer for all cases. The right answers for the right combinations of time, temperature and turbulence may include more air, less air, modulated air, computerized lambda controls, and various combustion chamber designs, insulation, flow paths, catalysts, etc.

4.1.5 Comment: Applicability of other devices and fuels

Regarding central heaters (FR 79 at 6358), commenter (1436) believes larger firebox residential wood heaters should be included or have some provision. Commenter (1436) asserts existing regulations have encouraged other exempted technologies and prevented development of whole house wood stoves.

According to commenter (1448), proposed certification and regulation on combination oil/wood/coal, gas/wood/coal or electric/wood/coal forced-air furnace type product is not adequately addressed by the EPA in the preamble or elsewhere in the proposed rule. Commenter (1448) states that this category type is a large forced-air furnace (>100,000 BTU) that heats the entire home or building on one of the fuels that is specific to the unit. Commenter (1448) states that this furnace type will operate solely as gas, oil or electric furnace when there is no one to load the firebox, therefore it is indeterminate as to whether combination furnaces are considered to be affected heaters or not. Commenter (1448) states that the EPA needs to clarify the applicability of test method, certification and regulation of combination forced-air furnaces for purposes of this proposal.

Response:

Any central heater that uses wood for a fuel is subject to the requirements of this rule; only residential heating appliances that do not burn wood or wood pellets (such as coal-only heaters) are exempt from this rule. The rule is intended to be flexible and all-inclusive with regards to residential wood heating technology (and remedy the unintended loopholes created by the 1988 rule) so that any wood-burning device of any size that is used to heat a residence – either partially or fully – is subject to this rule. Heaters that burn fuels other than wood in addition to wood must meet all applicable emission limits of this rule (when burning wood during the certification test) and all fuels allowed to be burned in the device must also be specified in the Owner's Manual.

4.1.6 Comment: Pellet boilers

Commenter (1576) asserts that whole house wood pellet boilers are becoming more and more prevalent in the U.S. and provide even higher energy efficiencies, air quality benefits, and GHG reductions. Commenter (1576) supports the EPA's development of emission standards for this category and notes that Massachusetts is poised to incentivize these appliances.

One commenter (0541) believes that torrified biomass pellets should be permitted as a viable clean fuel.

Response:

This NSPS regulates whole house wood pellet boilers including both the device and the wood pellet fuel. Heaters that burn wood pellets in addition to non-wood biomass pellets are subject to this rule and all pellet fuel for which the device was designed and certified must be listed in the Owner's Manual. The listed wood pellet fuel for these devices must also be licensed by a pellet standards organization (e.g., Pellet Fuel Institute, ENplus, CANplus). While current test methods do allow testing with alternative biofuels, this NSPS pertains to wood-fueled heaters. As such, testing pellet boilers with certified wood pellet fuel is necessary in determining compliance with the emissions standards of this rule. The EPA is not at this time regulating heater/stoves that are designed to combust only biomass other than wood (e.g., grass, corn, walnut hulls, fruit pits) because we do not have sufficient information at this time to develop standards. However, the EPA may consider the need for such requirements during the next NSPS review.

Torrified wood-only pellets are subject to this rule and must be licensed by the Pellet Fuel Institute, ENplus, CANplus or an equivalent standards body approved by the EPA. These torrified wood pellets must also be specified in the Owner's Manual as certified for the device.

4.2 Best Systems of Emission Reduction for Central Heaters

This section presents BSER comments specific to central heaters. See *Section 2.1.1* for overarching comments regarding BSER.

4.2.1 Comment: Demonstration of BSER for hydronic heaters

Data from differing test methods

Commenters (1543, 1550, 1643) believe that the EPA lacks sufficient data derived using the required test methods to support an adequate demonstration finding to establish Step 2/3 limits. Commenters (1543, 1550, 1643) state that the EPA has no cord wood data derived from testing with any of the proposed Step 2/3 test methods. Moreover, upon elimination of data derived from testing with flawed, outdated methods (Method 28 OWHH), as well as data derived from testing with a fundamentally different method (EN 303-5), commenters (1543, 1550, 1643) state that the EPA is left with only three data points within the range of interest, and none of those data points meets the Step 2/3 standard and one of those data points barely meets the alternative step 2 standard. Commenters (1543, 1550, 1643) state that it would be arbitrary for the EPA to establish the Step 2/3 standard based on such a limited dataset, particularly because: (i) the EPA has not evaluated precision for any of the hydronic heater test methods; and (ii) the EPA does not know whether test results for cycling models burning crib wood are even likely to be representative of real world emissions.

Commenter (1546) agrees that the EPA has overstated its BSER data set. Commenter (1546) notes that as of May 2, 2014, the Burn Wise voluntary partnership "List of Qualified Hydronic Heaters" shows three models produced by one manufacturer meeting the Step 2 emission limit, but two of the heaters listed are actually the same unit burning two different fuel types. Commenter (1546) adds that it is a false equivalency to state that 50 European models tested to EN 303-5 meet the proposed standard because EN 303-5 is an entirely different test standard from Method 28 WHH and the results of one test method are not comparable to the other.

Commenter (1544) adds that the use and emphasis on so-called superior European products and test methods as the basis for BSER is unsupported by actual test data rigorously comparing the performance of the European test methods to the existing NSPS EPA test method. Nor has any testing or data been generated from the testing of North American products in comparison to the European test methods or vice versa, according to commenter (1544). Citing rules in Vermont and Maine that allow European units to be sold without testing while requiring North American products to be tested and certified before sale in these states, commenter (1544) states this is unfair and should not be allowed in the context of the NSPS.

Commenter (1563) believes the test data the EPA uses to support BSER is flawed because the data are derived from Method WHH 28, EN 303-5 and CSA B415.1-10, but each of these test methods are materially different from the test method by which the EPA would determine compliance with the proposed NSPS and, thus, cannot provide a proper basis for establishing BSER emission limits. Commenter (1563) describes differences in fuel test (crib vs. cord), burn rate averaging provisions, burn rate category specifications and handling of condensed particulates. Commenter (1544) adds that there are no data demonstrating that the European and North American test methods are in any way comparable.

Commenters (1543, 1550, 1643) add that BSER must be based on standards derived from data using the same reference methods by which compliance will be measured, absent a strong justification for ignoring this principle. Commenters (1543, 1550, 1643) add that the EPA cannot rely on data from pellet models to establish a single standard for all hydronic heaters, because it must issue a standard based on combustion of the "dirtiest" fuel, which many perceive to be cord wood. Commenter (1544) also believes that data do not support the EPA's assertion that the four currently approved North American models and 50 European models represent BSER. According to commenter (1544), two of the North American models are pellet-burning products, which cannot be assumed to establish BSER for stick wood products.

Commenters (1543, 1550, 1643) present an extensive discussion of why the EPA cannot use data derived from EN 303-5 testing to justify the proposed Step 2/3 standard. See pp. 108 – 110. Commenters (1543, 1550, 1643) note that the NYSERDA survey does not acknowledge several critical differences between EN 303-5 and North American test methods. Commenters (1543, 1550, 1643) reference two other comparisons of EN 303-5 and North American test methods (one prepared by Intertek Testing Services and one by the Lab Coalition [see docket]) that explain in further detail why these critical differences make it extremely unlikely that any meaning correlation exists between data derived using these different approaches. Commenters (1543, 1550, 1563, 1643) note that the EN-303-5 methods states:

> The particulate matter emission measured according to this European Standard does not include condensable organic compounds which may form additional particulate matter when the flue gas is mixed with ambient air. The values are therefore not directly comparable with values measured by dilution tunnel methods. Neither can they be directly translated into ambient air particulate concentrations.

Commenters (1543, 1550, 1643) also describe manufacturer test data that illustrate the inability to compare results between the methods (see 1643, Attachments 16 and 17).

Problems with Method 28 OWHH data

Commenters (1543, 1550, 1643) state that it is unacceptable to use data to set the Step 2/3 standards based on testing with Method 28 OWHH, a method that has been shown to have unacceptably high uncertainty in measuring delivered heat and overall efficiency. Commenters (1543, 1550, 1643) describe the concerns identified by BNL with the method's result as well. Commenters (1543, 1550, 1643) state that the only two qualified (stick wood) models that the EPA claims can meet the proposed Step 2/3 standard had the highest efficiency values (95.3% and 101.9%) when tested using what apparently was an outdated, ad hoc modification of the method. Because those models had efficiency values higher than what is theoretically possible, commenter (1643) states the EPA cannot continue to rely on the outdated emissions levels attributed to those two units. Commenters (1543, 1550, 1643, Attachment 18), describe subsequent test runs on those units at various burn rate categories, using both hot and cold starts and using both crib and cord wood (see 1643, Attachment 18). Commenters (1543, 1550, 1643) state that the results confirm that the 0.04 lb/mmBtu levels that previously resulted from testing with an ad hoc method are misleadingly low, further confirming the inappropriateness of the EPA's reliance on those prior results for its adequate demonstration findings in this rulemaking. See footnote 337 (p. 111) of the commenter's letter or Attachment 18 (1643) for more discussion of the test program and results.

Commenter (1643) states that the EPA cannot establish the proposed Step 2/3 standard based on the very limited data available from Method 28 WHH testing of only three models, none of which can achieve 0.06 lb/mmBtu and one of those models narrowly achieves the alternative Step 2 emission limit of 0.15 lb/mmBtu. Commenter (1643) states that the problem is compounded because the EPA has no data on test method precisions and Method 28 WHH data are not representative of real world emissions because the test fuel is oak cribs and not cord wood. The very limited data on precision only points to problems in setting these low emission limits, according to commenter (1643). In addition, based on the Curkeet-Ferguson analysis, commenter (1643) expects that the precision of the hydronic heater test method is only going to be worse than for wood stoves, because hydronic heater testing involves measurement of both PM and heat output.

Commenter (1562) notes that, on May 9, 2013, the EPA requested manufacturers of OWB equipment posted on the EPA's Qualified List remove efficiency numbers from all advertising

because of inaccuracies. Furthermore, NYSERDA stated in its "Review of EPA Method 28 Outdoor Wood Hydronic Heater Test Results" that "Given the extensive issues with existing test data and method, output and efficiency ratings based on the original M28 OWHH tests as published cannot be considered accurate or valid." Commenter (1562) states that as the efficiency numbers listed were used to develop the emission numbers, the emission numbers are also inaccurate and, therefore, the qualified list of equipment must not be used as justification that 0.06 lb/mmBtu is attainable.

Commenter (1593) understands that the EPA created an interim voluntary program for OHHs but states this was never intended to be used as a model for NSPS. Commenter (1593) claims there is not enough research to make them an emissions standard for NSPS. Commenter (1593) asserts NYSERDA, in its report, "Review of EPA Method 28 Outdoor Wood Heater Test Results" stated that 90% of the data for the OWB voluntary program was missing or incorrect. Furthermore, commenter (1593) adds that if the seven attorneys general wanted the EPA to just continue the voluntary program for OHHs they would not have sued the EPA to update the NSPS.

Tests with differing fuels

Commenters (1543, 1550, 1643) state that the EPA has not referenced any data on the relationship between laboratory testing with crib fuel and real world use, where cord wood is the predominant fuel choice. Commenters (1543, 1550, 1643) believe it is impossible to predict the impact that lowering lab-based test emission limits will have on actual hydronic heater emissions in the field. Commenters (1543, 1550, 1643) note that lack of representativeness is a significant issue because certification test scores for wood stoves cannot be used to predict the relative performance of certified models and, thus, by example, a wood stove with a certification value of 2.5 g/hr or below may not perform as well as a model with a certification value of 4.5 g/hr. The commenters (1543, 1550, 1643) state that the EPA has no basis to expect that certification scores for hydronic heaters will be any more representative of performance in the field.

Commenter (1563) notes that the EPA has proposed to change Method 28 WHH by requiring testing with cord wood rather than dimensional lumber crib wood, which has been used to test indoor stoves for more than 25 years and hydronic heaters since the establishment of the EPA voluntary program in 2007. The commenter (1563) states that testing has been conducted this way for the express reason that the EPA and the stakeholders involved in establishing that test method, including states, NESCAUM and others, believed that testing with dimensional crib wood produces test results that are much more capable of being replicated than test results obtained with cord wood. Because cord wood, by its variable nature, the commenter (1563) believes that it is expected to produce results with greater inherent variability than dimensional lumber which is much more uniform than cord wood. The commenter (1563) concludes that emission standards should reflect this variability.

Commenter (1563) states that emission standards must reflect the range of fuels used by affected appliances, including those permissible fuels shown to produce the greatest emissions and until the EPA develops (or can obtain from independent sources) data from tests conducted with a

variety of cord woods, it is simply impossible for the EPA to develop emissions standards that reflect "real world" emissions using "worst case" cord woods available in the U.S. The commenter (1563) adds that testing with multiple fuels will also unreasonably and drastically increase the costs and time associated with testing wood heaters.

Other commenters on BSER

Commenter (1429) notes several data sets from research testing on hydronic heaters and furnaces that evaluated repeatability with findings of poor precision (see Test Of A Wood-Fired Hydronic Heater For Emissions And Efficiency per CSA B415 2008 Draft - Performance Testing of Solid-Fuel-Burning Heating Appliances, Research Contract No. K4C21-07-7315 Intertek Report No. 500070861-1, 04/21/08). Commenter (1429) states one of the lowest emissions hydronic heaters tested had a weighted average emission range of 0.21 to 0.57 lb/mmBtu output when the multiple replicate weighted average emissions results were evaluated; the average was 0.39 lb/mmBtu output and the repeatability at 95% confidence was 0.50 lb/mmBtu output (see attached data summary). Thus, commenter (1429) believes the EPA's proposal to set emissions limits that are lower than the test methods' precision are untenable as it makes compliance a matter of random chance that a test result happens to come out in what amounts to a low probability "tail" of the likely wide range of the distribution of possible results.

Commenter (1563) states as emission limits become more stringent, manufacturers have to consider that the emission limits are approaching the amount of unburnables that are inherent to wood. Because wood contains minerals and elements that cannot be combusted, those unburnables end up being captured during the test as particulates, according to the commenter (1563). Commenter (1563) concludes, with the proposed Step 2 emission limit of 0.06 lbs/MMBtu heat output and the fact that you have to meet that with four consecutive test burn rates, three of which will be at the dirtiest burn rate, the emission limit and testing requirements become exponentially tougher to meet.

Commenter (1062) questions the EPA's assertions that hydronic heater manufacturers have had 7 years to take part in the voluntary program because (1) the EPA has not settled on a test method, (2) boilers installed with thermal storage cannot participate in the voluntary program and (3) it was not until 2008 that the EPA suddenly changed its voluntary program to include indoor units.

Contrary to the above commenters, commenter (1488) states that the EPA's Step 1 proposal for hydronic heaters does not meet the BSER objective required under the NSPS nor does it properly consider available technology. According to commenter (1488), in revising existing standards, the Administrator is required to consider "emission limitations and percent reductions achieved in practice." Commenter (1488) asserts that what the EPA has proposed for the initial regulatory standard is based on the highest emitting models qualified by the EPA's Phase 2 voluntary program which the EPA acknowledges has already been met by "almost all" existing models. Commenter (1488) notes the Phase 2 voluntary program uses the same 0.32 lb/mmBtu standard that the EPA has included in the 2014 proposed rule. The commenter (1488) states that the best performing hydronic heater on the list is 8x better than the worst performing hydronic heater, indicating that technology has advanced even as the EPA proposes the same old standard.

Response:

The final rule's stepped limits and test methods for hydronic heaters rest solidly on existing BSER. We understand and concur with concerns regarding the transition from crib to cord wood needing more time. The final Step 1 and Step 2 PM emission limits for hydronic heaters are both based on crib wood not cord wood test protocols, which differ from our proposed standards as explained in other responses (e.g., *Section 2.8.2*). The Step 1 PM emission limit is the EPA "Phase 2" voluntary program lb/mmBtu weighted average emission limit, including the voluntary program's 18 g/hr cap at each burn rate, and is already met by all 50 of the 50 hydronic heater models built by U.S. manufacturers participating in the voluntary program. In addition, there are 19 qualification tests that have been recently submitted to EPA and, if valid, are all expected to be added to the Phase 2 qualification list very soon. Our proposed Step 2 PM emission limit was 0.06 lb/mmBtu for each run based on cord wood, but the revised final Step 2 PM emission limit is 0.10 lb/mmBtu for each run based on crib, with an alternative compliance optional limit of 0.15 lb/mmBtu per run based on cord wood. The Step 2 emission limit is already met by 9 of the 50 (18 percent of) hydronic heater models built by U.S. manufacturers participating in the voluntary program, as well as over 100 European models per test method EN 303-5 and over 20 pellet boilers (U.S. and European) that have been qualified in the Renewable Heat New York (RHNY) program. We note that additional manufacturers not participating in the voluntary program may also have models meeting Step 1 and Step 2. Thus data show that at least 18 percent of current hydronic heater model designs can meet the Step 2 emission limit without intensive R&D efforts.[32]

Furthermore, we are providing manufacturer's with considerable flexibility/choice as to the test method used for certification. We have finalized an expanded list of test methods in the final rule, especially for Step 1 compliance in 2015, in order to ease the transition to compliance with the more stringent Step 2 limits. As listed in § 60.5476(c), Step 1 compliance for hydronic heaters may be based on Method 28 WHH, Method 28 WHH PTS, ASTM E 2618-13 (using crib wood) and EN 303-5 (for units sold with thermal storage). Step 2 compliance in 2020 may be based on all of these test methods except EN 303-5. Regarding EN 303-5 concerns, we have added the requirement to include the organic compounds as part of the PM and we note that we are only adopting the emissions level measurement requirements (not a design standard). We agree with commenters that in the long run, without changes or improvements, other test methods may be preferred over EN 303-5. Until that point, given that we are committed to develop a cord wood method that better represents in-home use, we see value in allowing EN 303-5 as one of a suite of available methods.

We have addressed the limitations in Method 28 WHH, including the development of Method 28 WHH-PTS. We have also clarified the applicability of the various test methods, including requirements related to heat storage. We have corrected our oversight regarding inclusion of full

[32] Memo to USEPA from EC/R, Inc. Derivation of wood heater model percentages meeting Step 2 standards. November 2014.

thermal storage and have revised the final rule to correctly reference all applicable ASTM methods, including ASTM E2618 Annex/Appendix A1, to be consistent with the hydronic heater voluntary program.

Thus, the data show that the final Step 1 and Step 2 limits are achievable and have a strong foundation in existing BSER. We furthermore note that the stepped nature of the limits take into account cost and implementation considerations as is appropriate under section 111 of the CAA, allowing manufacturers the time and resources to develop Step 2 compliant models.
On the other hand, we note that other commenters are concerned that the limits are not stringent enough to represent BSER. Regarding concerns that we are merely extending the voluntary program with the Step 1 limit, we note that the voluntary program is not mandatory and while we estimate that the 30 manufacturers participating in the voluntary program represent approximately 90% of total U.S. sales, Phase 2-qualified models are only 20% of their sales, according to industry sales data. We further note that the Step 1 limit is not the final goal in this NSPS, but merely an interim step to the more stringent Step 2 limit. Thus, the stringency of the Step 2 limit rests solidly on BSER yet is technology-forcing for much of the industry.

4.2.2 Comment: Demonstration of BSER for forced-air furnaces

Existing Data Supporting BSER

Commenters (1543, 1550, 1643) agree that the consensus-based CSA B415.1-10 is an appropriate reference method and that the 0.93 "passing grade" (Step 1) embedded in that method is an achievable limit that constitutes BSER for smaller warm air furnaces (*e.g.*, <65,000 BTU/hr delivered heat output). Commenters (1543, 1550, 1643) believe that the 0.93 lb/mmBtu limit has been adequately demonstrated as achievable by manufacturers of smaller furnaces, taking into account its cost effectiveness and other relevant factors under section 111. For example, commenters (1543, 1550, 1643) note there are a few small furnace models already listed to this "passing grade" produced by Canadian manufacturers.

Commenter (1549) reports that all of the furnaces that are currently listed to B415.1-10 appear to be manufactured in Canada. The commenter (1549) reports that these Canadian furnaces would be classified as small furnaces by definition. The commenter (1549) states that no major American forced-air furnace manufacturer currently produces a furnace that meets the requirements of B415.1-10. The commenter (1549) also reports that there are no known large furnaces by definition that have been tested and certified to the limits of B415.1-10. The commenter (1549) reports that smaller furnaces are primarily designed for supplemental heating of homes, while larger furnaces are designed to be whole home heaters.

Commenter (1448) states that BSER has not been demonstrated for the proposed Step 1 limit of 0.93 lb/mmBtu for large forced-air furnaces. The commenter (1448) has not found a single large forced-air furnace (e.g., >100,000 BTU/hr) in either Canada or the U.S. that has been tested or listed to the CSA B415.1-10 standard. Commenter (1448) asserts that the 10 – 15 U.S. manufacturers of wood-burning forced-air furnaces would need substantially more lead time for

R&D and certification to the emission standard than the approximately 1-year transition period proposed.

Commenter (0941) is concerned that the standards' reliance on CSA B415.1-10 directly promotes Canadian based manufacturing at the expense of unnecessary and unreasonable damages to American manufacturers. Because, according to commenter (0941), Canadian firms already meet the B415 limits, but no major American furnace manufacturer currently produces a furnace that meets these regulations since this was a previously unaffected source category. Commenter (0941) cites the lack of a voluntary program for forced-air furnaces like the one for hydronic heaters, combined with the uncertainties of meeting the B415 limits, as posing enormous concerns for meeting the new standards 60 days after promulgation. As the largest U.S. forced-air manufacturer, commenter (0941) disagrees with the EPA's contention that allowing 6 years of lead time to meet Stage 2 limits based on the statements of one catalytic model manufacturer, is totally unreasonable. The commenter (0941) challenges the EPA to produce the data that sets this number as BSER and supporting evidence that the limit is justified.

Commenters (1549, 1665) provide feedback on the EPA's assertion in the proposal preamble that the largest forced-air manufacturer in the U.S. already has a catalytic model meeting the proposed Step 2 emissions of 0.06 lb/mmBtu. Commenter (1665) opines that the EPA is referring to their APEX-CBT catalytic warm air furnace. Commenter states that they are not the largest warm air furnace manufacturer in the nation and that the emissions specified in the draft proposal are not based on CSA B415.1-10 test results. Commenter (1665) expresses concern that they will not have enough time to bring several of their wood-burning warm air furnace models (MP80 and VC120, never subject to testing before) into the world of emissions regulated furnaces. Commenter (1665) requests that 3 full years for product testing, plus an additional 2 years for real world testing, be allowed to bring their products into the world of emissions regulated furnaces. Commenter (1643-A6) adds that many warm air furnace manufacturers are in the steep part of the learning curve regarding the challenges imposed in integrating emission control technology into their warm air furnace model lines.

Commenter (1549) states that they are the largest forced-air furnace manufacturer in the U.S. and can, if the EPA requests, submit CBI that substantiates this claim. Commenter (1549) reports that they do not have a furnace that meets the requirements and limits of B415-1-10 nor manufacture a catalytic model that meets the proposed Step 2 emissions of 0.06 lb/mmBtu.

Small vs. Large Furnaces Technology Transfer Issues

Commenters (1448, 1643, Attachment 4) describe the challenges associated with transferring emissions control technology from other appliance categories to wood-burning warm air furnaces and how they differ between smaller and larger warm air furnaces. Commenter (1643, Attachment 4) believes that manufacturers of smaller warm air furnace models (< 65,000 BTU total heat output) have the opportunity to apply wood stove-based technology to reduce PM emissions, but warm air furnace safety standards impose requirements that put temperature limits on air jacketing and ducts to protect against fire hazards that are not included in wood stove

safety standards, and therefore must be addressed during the product development and certification processes.

Commenters (1543, 1550, 1643, Attachment 4) add that, while the downdraft combustion technology used to control emissions in hydronic heaters could potentially be applied to larger, higher heat output warm air furnaces in the future, very significant design challenges would need to be met to adopt this technology to warm air furnaces. According to commenters (1448, 1643), those challenges arise from the fundamental differences in the heat exchange media: water in the one case, and air in the other and managing the heat spikes that are common in low emission combustion technology is easier in hot water-based systems than hot air systems. Commenter (1643) adds that the warm air furnace safety standards that address the potential fire hazards created by these temperature spikes in air jacketing and hot air delivery systems reflect these differences between water and air systems, and impose a significant obstacle to transferring hydronic heater downdraft technology to warm air furnaces. Commenter (1643) states that size constraints on warm air furnace models and the significant cost increases implicated by employing downdraft combustion technology are other hurdles that must be addressed.

Response:

We have revised our proposed forced-air furnace standards. Commenters are very concerned about the infeasibility of enforcing PM emission limits for forced-air furnaces due to the technical and economic impracticability of testing and certifying approximately 50 forced-air furnaces in the 60 days between publication of this rule and the effective date. For example, a typical forced-air furnace certification test takes approximately 1 week in the laboratory after the furnace is shipped to the laboratory and a time is scheduled to begin testing. Typically, the laboratory takes approximately 3 or 4 weeks to prepare a complete test report for the manufacturer to submit to the EPA. A reasonable overall estimate is approximately 1.25 months, not counting potential conflicts with other testing in the laboratories. Currently, there are only 4 laboratories that can test forced-air furnaces. We estimate that approximately 12 small forced-air furnaces and 38 large forced-air furnaces would need to be tested as soon as possible. If those tests were to be divided equally among the 4 laboratories, it would take a minimum of approximately 4 months to submit the 12 certification test reports for the small furnaces and an additional year to submit the 38 certification test reports for the large furnaces to the EPA, far longer than the 60 days between the publication date and the effective date. Thus, on the effective date, we are requiring work practice and operational standards, as allowed under section 111(h)(2) B) of the CAA, and requiring Step 1 PM emission limits for small forced-air furnaces 1 year after the effective date and Step 1 PM emission limits for large forced-air furnaces 2 years after the effective date. Specifically, the manufacturers must develop model-specific descriptions of proper operation and best practices; include them in their owner's manuals; provide training on them to their distributors; and provide them in written and video format to purchasers/operators/users of their heaters. The specific details that must be included in owner's manuals are in § 60.5474 and Appendix I of this rulemaking.

The following paragraphs are excerpts of the operational standards required in this rule that must be included in the owner's manuals.

Operators must not burn unseasoned wood. The use of properly split, stored and seasoned wood has much lower PM emission than high-moisture wood, i.e., green wood or wet wood. Operators must not burn improper fuels such as (1) residential or commercial garbage; (2) lawn clippings or yard waste; (3) materials containing rubber, including tires; (4) materials containing plastic; (5) waste petroleum products, paints or paint thinners, or asphalt products; (6) materials containing asbestos; (7) construction or demolition debris; and (8) paper products; cardboard, plywood or particleboard (Note that best practices do allow the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected heater); (9) railroad ties or pressure treated lumber; (10) manure or animal remains; (11) salt water driftwood or other or other previously salt water saturated materials; (12) unseasoned wood; and (13) any materials that are not included in the warranty and owner's manual for the subject heater or furnace.

The owner's manual and training materials must also educate operators on the use of proper operating practices, including correct positioning of bypasses and air dampers during startup, normal operation and reloading. Proper practices also include checking air tubes, catalysts (if so equipped), heat exchangers and other critical parts of the heater to ensure they are working properly and are maintained as needed.

Best burn operational practices are already highlighted in many manufacturers' owner's manuals, educational materials from HPBA and Burn Tips on EPA's Burn Wise web site. Numerous comments noted that best work practices and proper operation and maintenance can significantly reduce emissions at reasonable costs. Thus, considering all of the above, the EPA has determined that these work practice and operational standards represent the best systems of emission reduction as required by section 111(h)(1) for the immediate time frame from the effective date until the Step 1 PM emissions limits apply.

With respect to commenters' points concerning different design challenges for large versus small forced-air furnaces, the final rule allows one year for small furnaces and two years for large furnaces to meet Step 1. The final Step 1 PM emission limit applies to small (less than 65,000 BTU/hr heat output) forced-air furnaces manufactured or sold on or after 1 year after the rule's effective date (i.e., in 2016). The final Step 1 PM emission limit applies to large (65,000 BTU/hr heat output or larger) forced-air furnaces manufactured or sold on or after 2 years after the rule's effective date (i.e., in 2017). The final Step 2 PM emission limit will apply to each forced-air furnace heater manufactured or sold at retail on or after 5 years after the rule's effective date (i.e., in 2020).

We acknowledged at proposal and continue to acknowledge that significant re-design efforts will be needed to develop forced-air furnaces capable of meeting the Step 2 limits in particular. Our cost estimates have reflected this additional effort relative to most other appliance categories. We maintain that our work practice standard and Step 1 limit represents BSER now and in the near-term, while our final Step 2 PM emission limit represents BSER in 5 years. As illustrated in our below response, the final rule balances achievable emission reduction with cost considerations and testing feasibility, as is appropriate under section 111 of the CAA.

The Step 1 PM emission limit is based on the established BSER used in Canadian standard B415.1-10 standard, as developed through a stakeholder process completed in 2010 that included both Canadian and U. S. manufacturers and laboratories. Canadian and U.S. manufacturers compete in the same marketplace and manufacture products for both Canada and the U.S. Although the B415.10-10 standard has been in place since 2010, we have incorporated allowances into the Step 1 PM emission limit which help ease the burden on forced-air furnace manufacturers as they prepare for transition to the more stringent Step 2 PM emission limits. Our proposed Step 1 PM emission limit was 0.93 lb/mmBtu (weighted average) and a cap of 7.5 g/hr for any individual test run. In the final rule however, we deleted the proposed 7.5 g/hr particulate emission limit per individual burn rate because the CSA B415.1-10 certifications are based on lbs/mmBTU heat output limits at the higher burn rates, not g/hr limits and most manufacturers do not have sufficient experience with meeting g/hr limits for these furnaces at the higher burn rates. Furthermore, we are allowing automatic Step 1 EPA certification for new forced-air furnaces that are independently certified (i.e., not self-tested) under CSA B415.1-10 to meet the Step 1 PM emission level or that are certified by NYSDEC and meet the Step 1 PM emission level. Finally, for forced-air furnaces not able to be automatically certified, we are concerned that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA, especially in the first year. We want to encourage sales of cleaner forced-air furnaces as soon as possible by allowing manufacturers who do all the things they should do to not potentially have to wait on EPA approval of marketing of cleaner models, that may be delayed due to limited certifiers and resource constraints at the EPA. Thus, we have added a conditional, temporary approval by the EPA for forced-air furnaces to be marketed as Step 1 PM emission limit compliant based on the manufacturer's submittal of a complete certification application. The conditional approval would allow such marketing for 1 year or until EPA review of the application, whichever is earlier. The final work practice standard and phased PM emission in conjunction with the automatic certification and temporary conditional approval allowances balance well achievable emissions reduction with cost considerations and testing considerations.

Our proposed Step 2 limit was 0.06 lb/mmBtu for each run based on cord wood, but the revised final Step 2 PM emission limit is 0.15 lb/mmBtu for each run based on cord wood. (Note that forced-air furnace certification tests are conducted according to CSA B415.1-10 which has specified cord wood as the test fuel since 2010.) For forced-air furnaces, we judge that a final Step 2 PM emission level of 0.15 lb/mmBtu within 5 years as BSER is a reasonable balance of environmental impacts and costs. We expect that forced-air furnace designs will be able to meet the Step 2 PM emission limit may be based on systems and technology transferred from wood stove and hydronic heater designs. However, we note and agree with those commenters who state the downdraft combustion technology used to control emissions in hydronic heaters could potentially be applied to larger, higher heat output warm air furnaces in the future, while acknowledging the very significant design challenges that would need to be met to adopt this technology to warm air furnaces. Section 111 of the CAA looks forward toward what may fairly be projected for the regulated future. Advances in systems and emissions control technology for forced-air furnace through technology transfer to match control levels achievable by other wood heated devices can reasonably be anticipated within the time period (5 years) until the Step 2 PM emission limits will become applicable. Further, even assuming a significantly larger cost for

research and development, our analysis shows the cost to be reasonable and far less than the monetized health benefits. We also believe this approach is consistent with a goal of section 111 to promote the development and implementation of technology. See *Section 4.3.4* for related discussion.

4.3 Particulate Standards – Central Heaters

This section contains comments specific to central heater particulate standards, which supplement more general comments in *Section 2.8*. For additional critique regarding the proposed level of the emission limits for central heaters, see also BSER *Sections 2.1.1, 4.2.1 and 4.2.2.*

4.3.1 Comment: Form of the hydronic heater standards

g/hr format

Commenters (1443, 1558, 1591, 1593) state the standards for hydronic wood boilers should be exactly the same as the standards for indoor wood stoves. Commenter (1443) believes it makes no sense to set different standards for devices that perform similar functions even due to differing design. By making all wood-burning devices, especially hydronic heaters, subject to the same emission standards as wood stoves, commenter (1443) asserts you simplify things, make compliance much easier and clean up the air all with a simple rule. Commenter (1593) questions why the EPA has decided the device that has caused the most harm, OHH, should get special exception and be measured in lbs/MMBtu vs. g/hr as with all other residential heating devices. Commenter (1591) adds that a single, stringent emission standard for all devices will simplify comparisons between classes of heaters, such as a consumer weighing the differences between a wood stove, pellet stove, or hydronic heater and prevent harm to human health.

Commenter (1479) supports defining residential central heaters as having a category IV burn rate over 5 kg/hr (11 lb) and less than 20 kg/hr (44 lb) where particulate emissions are limited to an average of 2.5 g/hr for every 5 kg/hr of input so that the standard across all wood heaters would be the same. The commenter (1479) suggests that if the limit is not tied to the g/hr emissions by input/hr burned across heaters, then fireboxes will become smaller over time to meet the cap limits and consumers will be commonly purchasing several smaller heaters, which will circumvent the purpose of the rule in reducing emissions. However, commenter (1442) states hydronic heater fireboxes are very large because of the heat demand they provide and it is illogical to require 8-12 cu. ft. furnaces to meet the same standard as that of a typical 2-3 cu. ft. wood-burning wood stove.

Commenter (1593) believes a lb/mmBtu format does not accurately show the actual amount of particulate as a weight per hour standard would and, in essence, is stretching out the results. Commenter (1593) asserts this has been shown as far back as the NESCAUM report. According to commenter (1593), the Vermont Department of Environmental Conservation (VT DEC) determined, pursuant to litigation, that a unit produced by Central Boiler (Model CL-7260) had

an "adjusted emission rate" of 93.76 g/hr for PM, a number derived by state review of laboratory testing conducted by the manufacturer, though claims in their submission of the tests that the actual rate was 3.6 g/hr. After review, commenter (1593) states the VT DEC APCA concluded that Central Boiler incorrectly interpreted the data and believes that the state's calculations of 93.76 g/hr are accurate. Commenter (1593) asserts this is a good example of the lb/mmBtu vs. g/hr argument.

Commenter (1488) opposes any hydronic heater standards based on emissions per energy input or output as they do not limit maximum emission concentrations (spikes) that harm health at the time of exposure. Commenter (1488) asserts that a performance emission standard to certify new hydronic heaters should limit the rate of particulates released into ambient air over a set unit of time, such as g/hr. Commenter (1488) argues that there are technical and economic justifications for a 1.3 g/hr standard with an interim 2.5 g/hr emission cap today. However, another commenter (1562) is unsure that any nonpellet hydronic heater will ever be able to get to the 1.3 g/hr level. Commenter (1562) asserts that, as an engineer, they have conducted efficiency and emissions research since 1985 and the best their lab is able to attain with a batch burn, full thermal storage, nonmodulating, two stage gasification burner averages 2.8 g/hr using cord wood as the fuel (see test results posted at www.garn.com). Commenter (1562) believes that the lowest limit attainable for stick wood burners may be 2.5 g/hr.

Commenter (1558) opposes the proposed BTU emission limit because BTU measurements do not account for operational variables and have proven efficiency rating flaws, as admitted by the EPA in its May 9, 2013, letter to manufacturers. Commenter (1558) asserts that particle emissions cause human health harm related to concentration at the time of exposure, not by the rate of energy consumed or released by the heater and, thus, believes the standard should be a rate of emissions over a unit of time, such as g/hr.

Add Emission Cap

Commenter (1423, 1551) believe the proposed lb/mmBtu requirements should include an emissions cap (g/hr) to reduce the emissions from oversized units operating below their optimum range and to capture emission spikes from cycling units. Similarly, commenter (1487) recommends that the EPA supplement the Step 2 standard with a time-based emission rate limit expressed in g/hr that would apply to individual test runs. Commenter (1487) does not recommend a limit but believes that it should be no higher than the proposed Step 1 emission cap of 7.5 g/hr.

Commenter (1463) believes it is important to establish a g/hr cap in both steps of the standard to ensure that this regulation limits the overall emissions from these units as well as the exposure levels of residents living next to them. Unlike other NSPS, commenter (1463) notes this proposed regulation addresses equipment designed for residential settings and often sold with very low stacks limiting pollutant dispersion.

Commenter (1397) asserts Washington State will not accept test results from M28 WHH unless fueled with a softwood species and all emission spikes are kept at no more than 4.5 g/hr (at least

four pellet fueled hydronic heaters and one cord wood hydronic heater have already applied for and received Washington State approval based on this criteria). Commenter (1397) states this emissions cap (g/hr) is essential for inclusion with the Step 2 standard in order to reduce the emissions from oversized units operating below their optimum range. Commenter (1397) recommends a graduated standard based on unit size, thus avoiding inequities for very large and/or very small units, but including an emission rate cap to prevent excessive loading into the airshed.

Commenter (1558) is concerned that the EPA does not require that the g/hr limit cannot be exceeded at any time during the 8-hr burn cycle to ensure all emission spikes are captured. Commenter (1558) states the proposed sampling rate of once during each 4-test category is insufficient to capture all emission spikes. Commenter (1558) recommends the EPA adopt the Washington State test method that samples emissions once each minute during the entire burn cycle, from startup to finish, to ensure that the g/hr cap is not exceeded at any time.

Commenter (1503) agrees that the NSPS for hydronic heaters furnaces should include a lb/mmBtu heat output emission limit and a g/hr PM limit in the Step 1 standard. Commenter (1503) adds that it is not clear whether sources in subpart QQQQ would continue to be required to meet both a lb/mmBtu limit, and the 7.5 g/hr limit after 2015. Commenter (1503) urges the EPA to require the 7.5 g/hr after 2015 or, if not, explain its reasoning.

Commenters (1382,1543, 1550, 1563, 1633, 1643) state that the EPA has failed to explain why the existing 18.0 g/hr cap under the Phase 2 voluntary program, the NESCAUM Model rule and used by at least 10 states that regulate hydronic heaters is not sufficiently protective and why it proposes to lower it to 7.5 g/hr. Commenter (1382) believes the best measurement is in lb/mmBtu output, and that the addition of a cap on any one test run limits the size of the firebox, thereby limiting the amount of space the unit is able to heat.

Energy-based Format

Commenter (0541) suggests that the particulate emissions limits should be based on MMBtu of input and capped at 0.32 lbs/MMBtu.

While noting the desire of manufacturers of large units for a standard based on units of pollution per quantity of heat input, commenter (1397) recommends an output basis for units at or below 0.5 MMBtu (the high range of residential). Commenter (1397) accepts that mCHP and commercial sizes (greater than 0.5 MMBtu) could be evaluated on an input basis but with appropriate emission rate caps to avoid harmful loading into the airshed.

Alternative formats / restrictions on use

Commenter (0541) states that units designed to meet an emissions limits often cannot meet consumer needs, which leads to exaggerated claims, improper sizing, more frequent loading and poor performance. Commenter (0541) states that the EPA should consider a 24-hour emissions limit to better measure performance and encourage less frequent loading and longer runs. The

commenter (0541) suggests that emissions/fuel input is more meaningful than emissions/BTU output. Commenter (1479) proposes that the test method for central heaters should be based on 24-hour burns. Commenter (1479) supports determining g/BTU/day as that is a number that would be valuable to consumers.

The commenter (1488) opines that the proposed rule lacks efficacy to control health and safety impacts from hydronic heater performance during actual use and argues that preventing installations of high emission hydronic heaters is as easy as setting an appropriate, defensible standard and test method that work in the real world and should not be based exclusively on laboratory emission tests.

Response:

In setting NSPS under section 111 of the CAA, we are required to establish BSER for an affected source and base the standards on those BSER. The BSER for hydronic heaters is different than the BSER for indoor wood stoves. As we note in previous responses, there are two basic approaches to heating a residence with wood fuel – technologies that heat a room or only portion of the house by warming the space immediately surrounding the device ("room heaters") and technologies that heat the entire house by warming spaces other than where the device is located ("central heaters"). We are not giving special exception to any device type, rather we are regulating all devices according to the BSER applicable to that device, as required under section 111.

Regarding suggestions that hydronic heater limits be based on g/hr, we note that including the heat output (Btu) in the standard for central heaters is consistent with how (even non wood-fueled) central heating furnaces are rated in general. It is also consistent with well-established existing regulations developed for wood-fueled central heaters (e.g., EPA Method 28 WHH for hydronic heaters under the voluntary program and CSA B415.1-10 for forced-air furnaces and efficiency) which inform the BSER for this subpart. The form of emissions per heat output takes into consideration the larger output of most central heaters. The use of both emissions per heat output and emission per time takes into consideration both the heat output and the temporal pollution load on the atmosphere.

We maintain that heat output rather than heat input is the relevant information for consumers, therefore we disagree with the suggestion that the standard should be based on units of pollution per heat input. This is especially true because this NSPS is for residential heating. Using heating input might be more appropriate for some commercial heating regulations.

We agree with commenters regarding the utility and importance of a cap, when using a weighted average basis for the standard. The final Step 1 PM emission limit of 0.32 lb/mmBtu (weighted average) includes a cap of 18.0 g/hr at each burn rate, which matches the Phase 2 EPA voluntary program requirements. The change from the proposed Step 1 cap of 7.5 g/hr to the final rule Step 1 PM emission cap of 18 g/hr reduces potential certification delays The final Step 2 limit is 0.10 lb/mmBtu for each run based on crib wood, with an alternative compliance optional limit of 0.15 lb/mmBtu per run based on cord wood. In the Step 2 standard, a cap is unnecessary because all

test runs must meet the limit. However, we note that this rule does not prohibit more stringent actions and some state, tribal and local jurisdictions have their own authority to promulgate more stringent standards and require lower emissions than allowed in this NSPS, if the air quality problems of a region dictate such added stringency. For example, the Washington State Department of Ecology (WSDOE) has wood heater rules (eluded to by a commenter) that apply to all wood heating devices, including hydronic heaters. This is an example of a state promulgating more stringent requirements. However, the comment that WSDOE samples emissions once each minute during the entire burn cycle, to ensure the g/hr cap is not exceeded at any time, is incorrect. The WSDOE uses a weighted four-run average with a not-to-exceed cap required for each completed test run, not each minute.

We appreciate the comments regarding oversize units (suggesting a heat demand analysis) and we require such information be made available to the consumer. We also appreciate the comments regarding a 24-hour emissions limit (e.g., g/Btu/day) and we will consider such during future rulemakings. We note that we are still evaluating test methods representative of actual in-home use for future NSPS and will continue to consider all suggestions which potentially improve such representativeness.

4.3.2 Comment: Level of the hydronic heater standards

Emission Limit and Timing of Implementation

Commenter (1520) supports the EPA's proposal to require all hydronic heaters to meet a Phase 1 standard of 0.32 lb/mmBtu within 60 days of promulgation of the standard and a final standard of 0.06 lb/mmBtu. Commenter (1463) also supports setting a Step 1 standard that meets the 0.32 lb/mmBtu output voluntary program level and then moving beyond this in 5 years to reflect a Step 2 BSER. Commenter (0948) believes the limit should be technology forcing and bring performance up to what is achievable now and in the near-term.

Commenters (1545, 1633) support the proposed PM emission limits of 0.32 lb/mmBtu for Step 1 and 0.15 lb/mmBtu for Step 2 for hydronic heaters (but after 5 years according to commenter 1633). Commenters (1420, 1431) propose delaying the effective date of the Step 1 (0.32 lb/mmBtu with a 7.5 g/hr cap) standards by 5 years and the Step 2 (0.15 lb/mmBtu and 7.5 g/hr cap) standards 5 years after that. Commenter (1420) states this delay is needed to allow manufacturers the time to absorb most of the R&D and testing costs over time.

Commenter (1558) states that commercially available hydronic heaters show that the BSER is achievable today at the 0.15 lb/mmBtu level with a cap of 2.5 g/hr for any individual test run (tested every minute during an 8-hour burn cycle) for Step 1, as shown on the list of Phase 2 qualified hydronic heaters on the EPA's web site. Commenter (1558) asserts that manufacturers have known about this proposed emission level for over 7 years. In addition, commenter (1558) asserts that the EPA's 2012 report shows that using thermal storage and burning at complete combustion temperatures can significantly reduce emissions from hydronic heaters.

Commenter (1559) reports that recent studies have shown that commercial scale wood pellet boiler can achieve PM emissions of 0.06 lbs/MMBtu (includes source document as Appendix A to their comment letter).

Commenter (1062) prefers an intermediate compliance threshold of 0.15 lb/mmBtu at 3 years with a tighter compliance threshold at 5 years under the assumption that the EPA would have compliance methods settled by the time that the intermediate compliance threshold is reached 3 years after the date of final publication; adequate time to transition from EN 303-5 results to whatever method(s) are adopted.

Commenter (0948) states that the core design factors for high performance combustion have been well established and adds that 0.32 lbs/MMBtu with the existing test method is minimally technology forcing with respect to what is available and achievable.

Commenter (1558) adds that the Farm Bureau and others have argued that they need to use hydronic heaters year round to heat water. Requiring thermal storage for all hydronic heaters would address their demands, according to commenter (1558), while significantly reducing emissions. Therefore, commenter (1558) believes Step 2 levels of 0.06 lb/mmBtu with a cap of 1.5 g/hr for any individual test run (tested every minute during an 8-hour burn cycle) is achievable in 3 years based on BSER demonstrated in the 4 models currently available U.S. hydronic heater models and the over 50 European models.

Commenters (0541, 0962, 1387, 1407,1413, 1459, 1467, 1474, 1480, 1481, 1491, 1494, 1507, 1509, 1515, 1563, 1572, 1575, 1592, 1602, 1608, 1613, 1620, 1637, 1650, 1652, 1653, 1655, 1662) request that the EPA remove any requirement that lowers emissions limits for new hydronic heaters below Phase 2 qualified limits. Commenter (1507) adds that with even lower emissions limits, the additional testing and development costs will result in price increases for the newer heaters and could make them unaffordable for those low income customers who rely upon the cost savings of a hydronic heater. Commenters (1543, 1550, 1643) believe that the proposed 0.32 lb/mmBtu Step 1 emission limit is a sensible, achievable limit that constitutes BSER.

Commenters (1503, 1562) state that the 0.06 lbs/MMBtu Step 2 standard may be justifiable for pellet boilers, but many commenters (1062, 1382, 1503, 1563) feel that it may not be achievable with cord wood boilers. Commenter (1562) notes that Table 5 on page 15 of the document "Residential Fuel Wood Assessment State of Minnesota 2007 – 2008 Heating Season" indicates that 96% of the wood burned was in the form of stick wood (cord, split and slab), and only 1% was wood pellets. Commenter (1562) believes that even assuming moderate growth of pellet usage over the last 6 years, setting limits based on a small segment of the actual fuel used is not rational. Commenter (1382) suggests that if the EPA chooses to issue one standard for hydronic heaters regardless of fuel type, the standard be based on the best demonstrated technology available with the dirtiest fuel type (i.e., cord wood).

Commenter (0948) states that a 0.06 lb/mmBtu limit could represent a significant challenge for split wood boilers and might become a challenge for pellet/chip boilers as well depending on

where the test method falls. Commenter (0948) supports a more comprehensive test method to capture all phases of the combustion cycle, however in doing so it is likely that higher emission ratings, albeit more representative, will be realized compared to previous test methods.

Commenter (1466) proposes that small business/small volume hydronic heater manufacturers, defined as producing a maximum of 200 units in year 5 (presumably in year 2020), meet the proposed Step 1 standard and then have 5 years to meet an intermediate standard of 0.19 lb/mmBtu heat output, and the 0.06 lb/mmBtu standard after 7 years. Commenter (1466) notes the suggested 0.19 lb/mmBtu PM threshold is halfway between the proposed Step 1 and Step 2 emission limits in the proposal preamble. Commenter (1466) states that testing procedure currently selected by the EPA is expensive and requires boilers to be shipped long distances to one of a very small number of testing labs. Commenter (1466) states boiler manufacturers cannot predict actual test results and, because of the high cost of testing, a minimum number of tests are possible. Commenter (1466) is concerned that if a boiler meets the Step 1 threshold, but not the Step 2 threshold, some changes, adaptations, or innovations will need to be made. Then, according to commenter (1466), if a small manufacturer were to fall just short of the Step 2 threshold, the market could lose a good innovator, because revenue would dry up. Commenter (1466) stresses this is an issue for a small business, as only so much innovation can be supported because the budget for R&D and testing is limited by the number of units and sale price. The commenter (1466) believes that 5 years are needed between steps 2 and 3 to allow time for innovation and cost recovery.

Commenter (1562) asserts the best their lab is able to attain with a batch burn, full thermal storage, nonmodulating two stage gasification burner averages 0.109 lb/mmBtu using cord wood as the fuel (see www.garn.com**)**. Commenter (1562) believes that the lowest limit attainable for stick wood burners may be 0.10 lb/mmBtu.

Commenter (1562) states that based on the EPA estimates, equipment certified to the 0.06 lbs/MMBtu limit would be 98% cleaner; however, this limit may not be attainable for stick fueled equipment. Commenter (1562) believes a limit of 0.10 lbs/MMBtu would yield equipment 97% cleaner and is probably attainable. Commenter (1562) questions whether a 1% gain is reasonable considering most of this equipment is used in rural areas, what the cost of the additional 1% gain may be and if the cost benefit is reasonable. Commenter (1562) suggests an 8-year phase-in with 0.10 lb/mmBtu as the lowest level, specifically:

- 0.32 lb/mmBtu – year 1 (the EPA estimated this to be 90% cleaner)
- 0.15 lb/mmBtu – year 5 (thus 95% cleaner)
- 0.10 lb/mmBtu – year 8 (thus 97% cleaner)

Commenter (1503) suggests that a 0.15 lbs/MMBtu (alternative Step 2 limit) would be a reasonable 5-year emission limit. Commenter (1544) would support a passing grade limit at 0.15 g/MMBtu.

Commenter (1465) suggests basing the PM emission standards for OHH on the test method used to qualify a given model, recommending the following PM emission standards:

i. Test Method 28-WHH
1. 2015: The standards proposed by the EPA are acceptable. The reduction of the secondary standard to 7.5 g/hr should further reduce the potential for complaints regarding units subject to subpart QQQQ. If the EPA raises the secondary standard from 7.5 g/hr to 15 g/hr, then the primary standard should be reduced to 0.20 lb/mmBtu (heat output) to reward the technological improvements developed for hydronic heaters since the voluntary program Phase 2 limit was established.
2. 2020: Concur with the proposed standard of 0.06 lb/mmBtu (heat output).
ii. BNL Method
1. 2015: The PM standard should be 0.32 lb/mmBtu (heat output).
2. 2020: 0.15 lb/mmBtu (heat output).

Commenter (1558) asserts the EPA has the data for short-term peak emissions from Phase 2 qualified hydronic heaters to set emission levels at a health-protective standard. Commenter (1558) believes that to propose that manufacturers collect this data over the next 8 years and then consider updating the NSPS to a health-protective standard is not in compliance with the requirements of the CAA.

Commenters (1543, 1550, 1643) believe that the EPA lacks sufficient data derived using the required test methods to support an adequate demonstration finding to establish Step 2/3 limits.

Test Method Issues Related to Setting the Level of the Standard

Some commenters point to test method issues related to meeting the proposed 0.06 lb/mmBtu limit. Commenter (1503) cites concerns that use of the BNL method for boilers with thermal storage includes startup emissions, which makes meeting the 0.06 lb/mmBtu limit problematic.

Commenter (1062) states that it is not possible for lambda controlled log wood boilers to meet a 0.06 lbs/MMBtu limit if they are tested at anything other than nominal load in a hot-to-hot test, for example as boilers are tested in EN 303-5 tests. Commenter (1062) has consulted with one of the top engineers for the company Fröling of Austria, Mr. Florian Meindelhumer. According to commenter (1062), Mr. Meindelhumer says that multiple burn rate testing including the low burn rates using EPA Method 28 OWHH make obtaining such strict limits as 0.06 lbs/MMBtu impossible without very expensive back end exhaust filtering or particulate capture. In other words, commenter (1062) states that Mr. Meindelhumer thinks that the 0.06 lbs/MMBtu limit in an EPA Method 28 OWHH type test will eliminate residential log wood boilers from the market.

Commenter (0962) describes his company's experience with acquiring European technology and the costs and efforts of transforming that to work in the U.S. environment. Despite extensive testing, commenter (0962) has never seen 0.06 lb/mmBtu on a cold start, despite the unit's overall success in arriving at 0.04 lb/mmBtu using the old method. Commenter (0962) states that he does not plan to retest these units to try for the 0.06 value on a cold start, thus taking the only product that could meet it with the old test method off the market. Commenter (0962) adds that to take an indoor hydronic heater (that does not become cold between refills) or an outdoor pellet

heater as the basis for an outdoor cord wood hydronic heater is not a reasonable comparison. This commenter (0962) would support a limit of 0.32 lb/mmBtu.

Commenters (1545, 1633) would support establishing an emission limit for a Step 3 as further technology emerges and the EPA has collected sufficient data obtained during Steps 1 and 2 using the single common test method to determine an appropriate final emission limit. Commenter (1545) expects that a boiler tested under different test methods will result in different emissions profiles due to variances in test measurement procedure and setting an emissions limit before there is a set of data from a common test method to determine an appropriate emission limit is arbitrary and unreasonable. Therefore, commenter (1545) believes the final Step 3 limit should be determined based on what would be reasonable for a majority of tested boilers to achieve under the chosen common test method.

Commenter (0960) is concerned that the combination of the Step 2 standard (0.06 lb/mmBtu), the altered test protocol with the g/hr cap and the requirement to test with oak cribs, will put them out of business. Commenter (0960) would support a 90% cleanup requirement using the existing Method 28 WHH.

Commenter (1541) recommends that emissions limits be determined based on the rigor of the test method, i.e., units tested on the more comprehensive BNL test should not be held to more stringent emissions limits than are required by OWBs or the EN 303-5 test. Commenter (1541) states that, from the results of the Fröling tested on the more comprehensive BNL tests and presented at the 2013 Heat Northeast Conference, it is clear that the reported efficiency is lower than the results from the EN 303-5 test having results of 69% and 86% respectively. Commenter (1541) attributes this result to the fact that startup, steady state, and burn out are included in the BNL test and only steady state is included in the EN 303-5 test. Commenter (1541) states that the BNL test is more representative of what the consumer will experience when the unit is installed. Commenter (1541) adds that, due to the more inclusive test, the PM emissions determined in the BNL test were higher than the EN 303-5 test; 0.18 and 0.05 respectively. Commenter (1541) recommends setting the limit at 0 .32 lbs/MMBtu based on the BNL test results.

Level of Emission Cap

Commenter (1503) agrees that the NSPS for hydronic heaters furnaces should include a lb/mmBtu heat output emission limit and a g/hr PM limit in Step 1. Commenter (1503) adds that it is not clear whether sources in subpart QQQQ would continue to be required to meet both a lb/mmBtu limit, and the 7.5 g/hr limit after 2015. Commenter (1503) urges the EPA to require the 7.5 g/hr after 2015, or if not, explain its reasoning. Commenter (1487) does not recommend a limit but believes that it should be no higher than the proposed Step 1 emission cap.

Commenters (1509, 1510, 1543, 1550, 1563, 1633, 1643) do not support the EPA's proposal to cap PM emissions for individual test runs at 7.5 g/hr. According to commenters (1543, 1550, 1643), it makes no sense to deem a model in noncompliance based solely on a randomly established cap where the weighted average emissions meet the 0.32 lb/mmBtu limit. Commenter (1510) gives an example of a Phase 2 qualified model that would barely exceed the

cap under the Category 4 test and asks why a manufacturer's model should be deemed noncompliant solely on one individual test, when it only accounts for 5% of the weighted average. Commenters (1543, 1550, 1643) provide an example of the negligible emissions impact from setting the cap (see 1643, Attachment 15). If the EPA elects to set a cap, it should be set at the current Phase 2 level standard of 18 g/hr according to commenters (1510, 1633). Commenter (1563) states that the EPA should eliminate the Step 1 g/hr cap entirely if the particulate emissions meet the proposed "interim" Step 2 particulate emissions limit of 0.15 lb/mmBtu (in the Proposed NSPS the EPA did not propose any g/hr "cap" for hydronic heaters meeting the lb/mmBtu emissions standard under the proposed "interim" Step 2 and Step 3 standards.)

Commenter (1563) adds that with the modified test method, the EPA is left with no relevant test data establishing that any hydronic heater can meet this more stringent "cap" under the proposed revisions to test method 28WHH. Commenters (1543, 1550, 1643) state that the EPA's imposition of the proposed cap is arbitrary because the EPA apparently selected the cap without any consideration of test method precision.

Commenters (1382,1543, 1550, 1563, 1633, 1643) state that the EPA has failed to explain why the existing 18.0 g/hr cap under the Phase 2 voluntary program, the NESCAUM model rule and used by at least 10 states that regulate hydronic heaters is not sufficiently protective and why it proposes to lower it to 7.5 g/hr.

Commenters (1382, 1633) state that the 7.5 g/hr cap is a penalty on hydronic heaters with a larger output. For example, commenter (1633) explains, a 24,000 BTU indoor wood stove that is designed to heat one room produces only 7% of the BTU output of a hydronic heater designed to produce 360,000 BTU and heat an entire large building. Yet, according to commenter (1633), the wood stove is permitted to emit 4.5 g/hr and the hydronic heater is only proposed to be permitted to emit 7.5 g/hr.

Commenter (1397) asserts Washington State will not accept test results from M28 WHH unless fueled with a softwood species and all emission spikes are kept at no more than 4.5 g/hr. Commenter (1397) recommends a graduated standard based on unit size, thus avoiding inequities for very large and/or very small units, but including an emission rate cap to prevent excessive loading into the airshed.

Response:

We agree that the final Step 1 and Step 2 limits are achievable yet technology-forcing and encourage innovation, especially after full phase-in at Step 2. In establishing the final Step 1 limit, we sought to balance an achievable yet effective emission limit with cost and implementation considerations, in order to allow manufacturers to focus on designing models able to meet the Step 2 standard. The Step 1 emission limit is identical to the EPA "Phase 2" voluntary program lb/mmBtu weighted average emission limit and 18.0 g/hr cap at each burn rate, and is already met by 50 hydronic heater models built by U.S. manufacturers participating in the EPA voluntary program. The change from the proposed Step 1 cap of 7.5 g/hr to the final

rule Step 1 cap of 18 g/hr was to match the Phase 2 emission levels of the EPA voluntary program and reduce potential certification delays.

We also note that we are requiring the use of 1-hour filter pulls in new certification tests.

Those hydronic heaters with valid EPA Phase 2 qualifications under the 2011 EPA voluntary program partnership agreement (e.g., have been tested with Method 28WHH) or hydronic heaters certified by the New York State Department of Environmental Conservation (NYSDEC) that show compliance with the Step 1 emission limits will be automatically deemed EPA certified to meet the Step 1 emission limits under this final rule until the Step 2 compliance date. Also, residential pellet hydronic heaters/boilers that have been qualified under the Renewable Heat New York (RHNY) program will be automatically deemed EPA certified to meet Step 1. No separate EPA certification will be required for these models. We designed the Step 1 standard and implementation considerations in order to allow manufacturers the time and resources to focus R&D efforts on meeting Step 2 and also to reduce potential testing logjam concerns.

The final Step 2 PM emission limit requirement of 0.10 lb/mmBtu based on individual burn rates and crib wood testing is a revision of the proposed Step 2 limit (of 0.06 lb/mmBtu based on cord wood testing) for reasons discussed in other responses (e.g., in *Section 2.8.2*). The Step 2 standard does not include a cap because compliance is required at every burn rate, rather than for a weighted average. For our cost and emission calculations, we estimate that 18% of hydronic heater models can meet the 2020 Step 2 standard. We based this estimate on the fact that 9 of the 50 Phase 2 qualified hydronic heater models – or 18% – emit 0.10 pounds of PM or less per million Btu heat output (lb/mmBtu) for each individual burn rate. This statistic is based on models qualified at Phase 2 under EPA's Hydronic Heater's Voluntary Program as of November 2014; more models can now meet the Step 2 limit.[33]

Regarding the suggestion that small business/small volume manufacturers be given extra years to reach more stringent limits, we note that over 90% of the manufacturers are small businesses and most of these small businesses still produce and market high-emitting devices, despite the fact that the technology exists to producer lower-emitting cleaner devices. As noted above, a good portion of these small businesses produce models already meeting the Step 1 limit and some of these small businesses produce models already meeting Step 2. The BSER is well established and indicates that the final limits are achievable by small businesses and furthermore that the final limits are not only cost effective but also that the monetized health benefits far exceed the costs.

We understand that many commenters support more stringent limits, but under section 111 of the CAA we must balance potential emissions reduction with cost considerations, especially because over 90% of the industry participants are small businesses. Regarding the Washington cap limit

[33] A list of Phase 2 qualified hydronic heater models is available on EPA's Burn Wise website at http://www.epa.gov/burnwise/owhhlist.html. A more detailed spreadsheet is also available in the docket and is entitled *Hydronic Heater M28 Test Data*

of 4.5 g/hr, we note that hydronic heaters cannot currently meet this limit and therefore such a limit does not constitute national BSER for Step 1 (in 2015), according to the criteria in section 111 of the CAA. Nonetheless, the Step 2 crib-based limit in combination with the alternative cord-based compliance option (of 0.15 lb/mmBtu) will result in great progress in bringing cleaner devices to market and in establishing a cord wood-based BSER database which will inform future rulemakings.

We remind the commenters that although these standards will significantly reduce health effects, we are not setting specific health based standards; NSPS under section 111 of the CAA are system and technology-based standards (see *Section 2.1.2*). Nonetheless, this NSPS does result in gathering additional data that state, tribal and local agencies can potentially use to set their own standards, especially as part of their NAAQS implementation plans and minimizing local health concerns. We also remind commenters (as explained in *Section 2.1.3*) that we cannot set different standards for rural versus non-rural areas for NSPS under section 111 of the CAA. We must set national standards, not population-based standards. We note that we have worked with many tribes, states and local jurisdictions to encourage efforts tailored towards the areas with the greatest needs. We also note that this rule does not restrict tribes, states or local jurisdictions from establishing more restrictive standards.

We agree that thermal storage can significantly reduce emissions. While we are not requiring full thermal storage in this NSPS (except as required by RHNY for their qualified models), we are requiring that all models tested and certified with thermal storage must be installed with thermal storage. We will consider requiring full thermal storage in a future rulemaking.

We agree with comments that the M28-WHH-PTS ("BNL test method") is a more stringent method because it considers all phases of the combustion cycle, including cold starts. (We note however that the final NSPS PM emission limit is not as stringent as the proposed limit.) We also agree with concerns regarding test methods covering all of the burn rates (e.g., EN 303-5 does not cover all burn rates, although it often requires thermal storage). However, we are allowing a greater variety of test methods to meet Step 1 than Step 2 because one of our goals in Step 1 is to get cleaner Step 1 models in the marketplace as soon as practicable so industry, laboratories, EPA and consumers alike can all move forward to focus on cleaner Step 2 models as soon as possible.

Note: For additional overarching critique regarding the proposed limit levels for hydronic heaters, see also BSER Sections 2.1.1 and 4.2.1.

4.3.3 Comment: Form of the forced-air furnace PM emission standards

Commenter (0541) suggests the proposed forced-air furnace particulate limits be based on input MMBtu because residential test method data do not exist to support emissions based on MMBtu output for all the different types of indoor and outdoor forced-air models. Commenter (1479) proposes that the test method for central heaters should be based on 24-hour burns. Commenter (1479) supports determining g/BTU/day as that is a number that would be valuable to consumers.

Commenter (1503) agrees that the NSPS for forced-air furnaces should include both a lb/mmBtu heat output emission limit and a g/hr PM limit in the Step 1 standard. Commenter (1503) adds that it is not clear whether sources in subpart QQQQ would continue to be required to meet both a lbs/MMBtu limit, and the 7.5 g/hr limit after 2015. Commenter (1503) urges the EPA to require the 7.5 g/hr after 2015, or if not, explain its reasoning.

Response:

As we noted in *Section 4.3.1*, including the heat output (Btu) in the standard for forced-air furnaces is consistent with how (even non wood-fueled) central heating furnaces are rated in general. It is also consistent with well-established existing regulations developed for forced-air furnaces, such as CSA's B415.1-10, which inform BSER. Furthermore, we maintain that heat output rather than heat input is the more relevant information for consumers, therefore we disagree with the suggestion that the standard should be based on heat input. This is especially true because this NSPS is for residential heating. Using heating input may be more appropriate for some commercial heating regulations.

Regarding requiring a cap after 2015, our proposed Step 1 limit was 0.93 lb/mmBtu (weighted average) and a cap of 7.5 g/hr for any individual test run. In the final rule however, we deleted the proposed 7.5 g/hr particulate emission limit per individual burn rate because the CSA B415.1-10 certifications are based on lbs/mmBTU heat output limits at the higher burn rates, not g/hr limits, and most of these manufacturers do not have sufficient experience with meeting g/hr limits for these furnaces at the higher burn rates. The final Step 2 PM emission limit of 0.15 lb/mmBtu does not include a cap because compliance is required at every burn rate, rather than for a weighted average. We also note that we are requiring the use of 1-hour filter pulls in the new certification tests. Furthermore, we note that this rule does not prohibit more stringent local requirements and some state, tribal and local governments have their own authority to promulgate more stringent standards and require lower emissions than allowed in this NSPS, if the air quality problems of a region dictate such added stringency.

We appreciate the suggestion that the test method for central heaters should be based on 24-hour burns (e.g., g/Btu/day). We would need more time to assess this format but will consider it for potential future rulemakings. We also note in general that we are still evaluating test methods representative of actual in-home use for future NSPS and will continue to consider all suggestions which potentially improve such representativeness.

4.3.4 Comment: Level of the forced-air furnace PM emission standards

Commenter (1520) supports the EPA's proposal to require all forced-air furnaces to meet a Phase 1 standard of 0.32 lb/mmBtu within 60 days after promulgation of the standard and a final standard of 0.06 lb/mmBtu. Commenter (1465) also recommends that the more stringent emission standards for outdoor and indoor hydronic heaters also apply to forced-air furnaces. Further, in the absence of siting requirements such as property setbacks and stack heights, commenter (1465) asserts the EPA should establish tighter standards for forced-air furnaces (i.e.,

0.32 lb/mmBtu output) to protect air quality and public health should these appliances be installed in residences in close proximity to neighbors.

Commenters (1397, 1503) believe the proposed Step 1 PM emission limit is too lenient and that a Step 1 standard of approximately 0.48 lbs/MMBtu should be set to approximate the 4.5 g/hr for wood stoves. Commenter (1503) adds that the Step 2 standard for forced-air furnaces should be the same as the standard for boilers.

Commenter (1551) believes the proposed standard of 0.93 lb/mmBtu is too high, even for a transitory standard and recommends that the EPA revise the Step 1 emission standard for furnaces to 0.40 lb/mmBtu with no test run to exceed 15 g/hr, which is the same standard enacted as a Phase 1 in the model rule used by many states to regulate OWB in their state regulations.

Commenter (1479) supports the proposed Step 1 limit (0.93 lb/mmBtu) and the 3-step alternative approach.

Commenter (1659) identifies a CSA B415.1 certified furnace that is currently being marketed as achieving an average emission rate of 0.059 g/MJ. The commenter (1659) understands that this furnace was tested in the manufacturer's own laboratory and that the test information was submitted to CSA. Skeptical of the marketed average emission rate for that model, the commenter (1659) purchased one of those appliances and had it tested by an accredited laboratory that has experience testing other furnaces to CSA B415.1-10. According to commenter (1659), who also submitted a confidential copy of the test report, the result of that testing was that the weighted average emission rate was 0.20 g/MJ (approximately 0.46 lb/mmBtu), which is well above both the marketed average emission rate for that model, as well as the proposed "Step 2" standard. Based on these test results, the commenter (1659) believes that the EPA cannot rely on the furnace model in question to set the "Step 2" standard at such a low level (0.06 lb/mmBtu) and the EPA should remove that standard from the proposed rule and instead finalize only the proposed "Step 1" standard.

Commenter (1511) believes more emissions data are needed on wood-burning furnaces in order to confirm that the proposed Step 1 emission limit is representative of what current wood-burning furnace models can meet. Commenter (0541) suggest that the EPA should set the Step 2 limits in 3-5 years as the test methods are proven and more data is gathered.

Commenters (1543, 1550, 1643) agree that the consensus-based CSA B415.1-10 is an appropriate reference method and that the 0.93 “passing grade” (Step 1) embedded in that method is an achievable limit that constitutes BSER for smaller warm air furnaces (*e.g.*, <65,000 BTU/hr delivered heat output). However, commenter (1448) states that BSER has not been demonstrated for the proposed Step 1 limit of 0.93 lb/mmBtu for large forced-air furnaces.

Regarding Step 2, commenter (1549) claims that no U.S. manufacturer has a furnace that meets the requirements and limits of B415.1-10, including no catalytic model that meets the proposed Step 2 emissions of 0.06 lb/mmBtu.

Response:

We appreciate commenters' support for the Step 1 PM emission limit. As explained in *Section 4.2.2*, the Step 1 PM emission limit of 0.93 lb/mmBtu (based on cord wood and a weighted average) is the appropriate limit for the Step 1 PM emission limit, while the Step 2 PM emission limit of 0.15 lb/mmBtu (based on cord wood at each burn rate) is the appropriate limit for 5 years after the effective date. We note that the heater tested by commenter (1659) would meet the Step 1 PM emission limit. Regarding suggestions from commenters that the Step 1 PM emission limit should be more stringent (e.g., 0.32 lb/mmBtu, same as the hydronic heater limit), we note that the BSER for forced-air furnaces does not yet support PM emission limits lower than the final rule Step 1 PM emission limit. Currently 6 forced-air furnaces (all small) meet the proposed (and final rule) Step 1 PM emission limit.

Regarding the claim that no U.S. manufacturer has a forced-air furnace that meets the proposed Step 2 PM emission limit of 0.06 lb/mmBtu (based on cord wood testing), we note first that the final limit of 0.15 lb/mmBtu (based on cord wood testing) is less stringent than the proposed limit. Furthermore, for the Step 2 PM emission limit, we continue to maintain that the BSER basis will be adequately demonstrated (by 2020) via technology transfer from hydronic heaters for large forced-air furnaces and via technology transfer from hydronic heaters and room heaters for small forced-air furnaces. Likewise, for some large forced-air furnaces even the Step 1 PM emission limit may require technology transfer from hydronic heaters to meet the standard, if commenter's (1448) claims are correct. Section 111 of the CAA allows future emissions limits to be based on BSER including such system and technology transfer from other applications.

Section 111 of the CAA, does not require that we be able to point to existing present-day appliances already containing precisely all the systems and combinations of technology necessary to meet the Step 2 PM emission limits applicable in 5 years. Rather, the EPA may consider technology and systems to be technically feasible and "adequately demonstrated" if we reasonably expect the systems and technology to be available at the time of the emission limit. Furthermore, under section 111 we may extrapolate from a system's or technology's performance in other applications, for example as applied to hydronic heater and wood stove designs. Thus, we have determined that the technology already existing in hydronic heater and wood stove designs to meet the Step 2 PM emission limit is transferrable to forced-air furnace designs such that forced-air furnace technology will be available by the Step 2 PM emission limit compliance date in 5 years. We continue to maintain that the BSER undergirding the final Step 2 PM emission limit is adequately demonstrated for 5 years after the Step 1 limit and that reliance on such BSER is consistent with established legal precedent, including *Portland Cement and Lignite Energy Council v. EPA* and as presented in Section VI of the EPA's Section 111 proposed rule for new power plants at https://www.federalregister.gov/articles/2014/01/08/2013-28668/standards-of-performance-for-greenhouse-gas-emissions-from-new-stationary-sources-electric-utility.

Note: For additional discussion regarding comments and responses on the proposed limit levels for forced-air furnaces, see also BSER Sections 2.1.1 and 4.2.2.

4.3.5 Comment: Phase-in period for stepped central heater standards

Regarding QQQQ phase-in generally:

Commenter (1397) agrees with the proposed Step 1 and 2 PM emission implementation dates, adding that the rule should seek to capture devices rated at less than 10 MMBtu which are not captured by the Boiler MACT rule. Commenter (1463) strongly supports the Step 1 and Step 2 PM emission standards and also notes that the g/hr cap is important for both stepped standards for hydronic heaters to help limit the overall emissions and exposure of residents living near these units.

Commenter (1487) opines that there is a need for a more expedient transition to Step 2 PM emission standards. The commenter (1487) asserts that a 3-year compliance deadline where Step 2 PM emission standards would take effect in 2018 would increase public health benefits while providing manufacturers with two to three times the average amount of time required to develop a new model. Commenter (1487) opines that an expedient transition to Step 2 PM emission standards would help speed the transition to a cleaner fleet of hydronic heaters.

Commenter (1442) suggests a more gradual phasing in of the new requirements. Commenter (1442) states clean burning wood stove technology has long existed whereas hydronic heaters have been exempt from federal standards up to now, and to make extreme reductions in emissions over a short period of time may not allow manufacturers time to effectively design new models.

Commenter (0541) suggest that the EPA should set the Step 2 PM emission limits in 3-5 years as the test methods are proven and more data is gathered.

The commenter (1643, Attachment 4) notes that it will take significant investment, innovation and implementation time for manufacturers to find the balance between emission reduction performance and the cost that will allow them to survive in the marketplace. Commenter (1643) believes that there needs to be at least a 1-year extension for transitioning from the status quo to subpart QQQQ.

Commenter (1420) proposes that the EPA should set the effective date for the Step 1 PM emission standard in 5 years and the Step 2 PM emission standard 5 years after that.

See Section 4.3.2 for specific commentary regarding the phase-in timing for hydronic heaters.

Response:

The source category listing for this NSPS is residential wood heaters, which does not include commercial units unless the owner combines commercial and residential use (e.g., a wood heater which heats both the residence and an adjacent greenhouse used as a business). The rule would apply to devices rated less than 10 MMBtu, because the rule applies to all residential heaters regardless of size.

We note that some commenters suggest a shorter (more stringent) phase-in period between the stepped standards for subpart QQQQ, while other commenters suggest a longer (less stringent) phase-in period. The final rule will include a 5-year phase-in period between initial standards on the effective date and the Step 2 PM emission limits, and will also deem certain devices (e.g., those that meet the EPA voluntary program Phase 2 requirements or that are certified under CSA B415.1-10) as automatically certified to the Step 1 PM emission limit until the Step 2 PM emission limit compliance date. We maintain that this phase-in period balances achievable emissions limits based on BSER with cost and implementation considerations, as is appropriate under section 111 of the CAA. In setting the final limits and phase-in period we have considered all comments, including especially the comments which have provided data informing BSER and cost and implementation concerns.

Regarding the suggestion that both stepped limits include a g/hr cap, see responses in *Sections 4.3.1, 4.3.2 and 4.3.3*.

Regarding forced-air furnace phase-in:

Commenter (1442) suggests a more gradual phasing in of the new requirements. Commenter (1442) states clean burning wood stove technology has long existed whereas forced-air furnaces have been exempt from federal standards up to now, and to make extreme reductions in emissions over a short period of time may not allow manufacturers time to effectively design new models. Commenter (1442) asserts that if the burden of cost for R&D causes a dramatic price increase for forced-air furnaces, it could cause some manufacturers to close their doors. Commenter (1442) states that dramatic appliance price increases tend to penalize the poor the most.

Commenters (1543, 1550, 1549, 1643) disagree with the EPA's assertion that limited or no R&D is needed to comply with the proposed Step 1 PM emission limits for all warm air furnace manufacturers. The commenters (1543, 1549, 1550, 1643) state that there are currently very few, if any, large warm air furnaces either in Canada or the U.S. that are listed to the 0.93 lb/mmBtu "passing grade" in CSA B415.1-10. Given the absence of data demonstrating that large furnaces can meet the Step 1 PM emission limit, and the invalidity of a technology transfer justification, commenters (1543, 1549, 1550, 1643) state that the EPA must allow manufacturers additional lead time to come into compliance with the Step 1 PM emission limit. Commenters (1543, 1549, 1550, 1643) state the justification for such extension is that these appliances lack a history of regulation and experience with voluntary programs, manufacturers need more lead time to conduct the necessary R&D to achieve the proposed Step 1 PM emission limit on a consistent basis, and additional lead time is also warranted given that very few laboratories have experience testing with CSA B415.1-10.

Commenter (1397) believes a longer compliance timeline for forced-air furnaces to achieve Step 2 PM emission limits is recommended but it should not overlap with the next scheduled NSPS rule review in 8 years from promulgation.

Commenter (1665) includes product information on one of their catalytic indoor furnace systems as an attachment to their comment letter (included under Supportive Documentation for Warm Air Furnaces; information on Model APEX CBT Certified Appliance [using CAN/CSA-B415 1-10, "Performance Testing of Solid-Fuel Burning Heating Appliances."]) that is certified at 0.21 lbs/MMBtu and has an overall efficiency of 82.27%. Commenter (1665) states that two of their other catalytic warm air furnaces will require a large amount of investment to comply with the rule and that they would need a minimum of 5 years for product design and testing to meet standards – that is, 3 full years for product and testing, plus an additional 2 years for real world testing.

Response:

The final rule provides a more gradual phasing-in of standards for forced-air furnaces, consistent with BSER for small and large forced-air furnaces, respectively, and taking into consideration costs and testing feasibility concerns. Step 1 PM emission limits will apply to small (less than 65,000 BTU/hr heat output) forced-air furnaces manufactured or sold on or after 1 year after the rule's effective date (i.e., in 2016). Step 1 PM emission limits will apply to large (65,000 BTU/hr heat output or larger) forced-air furnaces manufactured or sold on or after 2 years after the rule's effective date (i.e., in 2017). Step 2 PM emission limits will apply to all forced-air furnaces manufactured or sold at retail on or after 5 years after the rule's effective date (i.e., in 2020).

The phasing-in of forced-air furnace standards is in response to concerns about the infeasibility of enforcing emission limits for these devices due to the technical and economic impracticability of testing and certifying approximately 50 forced-air furnaces in the 60 days between publication of this rule and the effective date. For example, a typical forced-air furnace certification test takes approximately 1 week in the laboratory after the furnace is shipped to the laboratory and a time is scheduled to begin testing. Typically, the laboratory takes approximately 3 or 4 weeks to prepare a complete test report for the manufacturer to submit to the EPA. A reasonable overall estimate is approximately 1.25 months, not counting potential conflicts with other testing in the laboratories. Currently, there are only 4 laboratories that can test forced-air furnaces. We estimate that approximately 12 small forced-air furnaces and 38 large forced-air furnaces would need to be tested as soon as possible. If those tests were to be divided equally among the 4 laboratories, it would take a minimum of approximately 4 months to submit the 12 certification test reports for the small furnaces and an additional year to submit the 38 certification test reports for the large furnaces to the EPA, far longer than the 60 days between the publication date and the effective date. Thus, on the effective date, we are requiring work practice and operational standards on the effective date as allowed under section 111(h)(2) B) of the CAA. These work practice and operational standards have been adequately demonstrated as BSER, as required by section 111(h)(1), for the immediate time frame from the effective date until the Step 1 PM emissions limits apply. Details on the work practice and operational standards and determination of BSER are in Section 4.2.2.

We have also addressed potential logjams by deeming any forced-air furnace automatically certified (to the Step 1 PM emission limit until the Step 2 PM emission limit compliance date)

that are independently certified under CSA B415.1-10 to meet the Step 1 PM emission level or that are certified by NYSDEC and meet the Step 1 PM emission level.

We also address concerns that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA in the first year by allowing early conditional, temporary approval of the PM emission limit compliance during the first year. We want to encourage early production and sales of cleaner forced-air furnaces that meet the Step 1 PM emission limits by allowing marketing that they comply with the EPA Step 1 PM emission limits early and not have to wait on EPA approval that may be delayed due to limited certifiers and potential resource constraints at the EPA. The conditional, temporary approval by the EPA for forced-air furnaces (based on the manufacturer's submittal of a complete certification application) would be allowed for 1 year or until EPA review of the application, whichever is earlier.

4.3.6 Comment: Proposed versus alternative PM emission limit approach for central heaters

Commenters (1397, 1403, 1423, 1477, 1487, 1640) generally support the proposed approach. Commenter (1403) believes this will maximize health benefits and protect our communities sooner. Commenter (1397) believes the alternative approach offers little advantage since it is probable that manufacturers will skip Alternative Step 2 and aim to achieve Alternative Step 3 as soon as possible. Commenter (1397) adds that the payback period for engineering a device to meet an Alternative Step 2 is too short for cost recovery before additional R&D is needed to meet Alternative Step 3. Commenter (1640) adds that phase 1 emission limits should become effective upon promulgation with no sell-through period.

Commenters (1487, 1423) support the EPA's more protective 2-step PM emission limit approach over the alternative 3-step PM emission limit approach and made recommendations for strengthening the standards. Commenter (1477) suggests the phase-in period be shortened to 3-4 years. Commenter (1477) notes that stricter standards have not hurt the European market, which has seen sales rise.

On the other hand, commenters (0541, 1545) support the 3-step PM emission limit approach for hydronic heaters. Commenter (1562) disagrees that a 2-step program is reasonable for most manufacturers due to cost and time constraints, as well as certified lab testing availability and prefers the 8-year program. Commenter (0541) also supports the 3-step PM emission limit approach for forced-air furnaces.

Commenter (1062) supports either the proposed approach or the alternative approach so long as there is an appropriate test method.

Other alternative approaches

Commenter (1062) prefers an intermediate compliance threshold of 0.15 lb/mmBtu at 3 years with a tighter compliance threshold at 5 years under the assumption that the EPA would have

compliance methods settled by the time that the intermediate compliance threshold is reached 3 years after the date of final publication. Three years would be adequate time to transition from EN 303-5 results to whatever method(s) are adopted.

Commenter (1466) proposes an alternative 3-step PM emission limit approach, different from the EPA's alternative 3-step approach, for small business/small volume hydronic heater manufacturers, suggesting that these manufacturers have 5 years to meet an intermediate PM emission limit of 0.19 lb/mmBtu heat output followed by the 0.06 lb/mmBtu standard in 7 years. Commenter (1466) notes that his proposed 0.19 lb/mmBtu PM threshold is halfway between the proposed Step 1 and Step 2 and clarifies that it is not a request to extend the deadline for conformance with Step 1 PM emissions limits. Commenter (1466) reasons that his proposed approach minimizes the number of expensive hydronic heater tests and allows more years between the Step 1 and the final Step 2 for a manufacturer who just falls short of Step 2 (but who achieves his proposed intermediate limit of 0.19 lb/mmBtu). This accommodation for small businesses allows a good innovator to remain in the market by avoiding depletion of revenue, according to the commenter (1466).

Commenter (1466) provides an example scenario of how his proposed intermediate standard and longer phase-in time until Step 2 would save a small business manufacturer that is just shy of reaching the 0.06 lb/mmBtu standard within 5 years. The commenter (1466) notes that the additional years he proposes are needed to develop "Best Available Technology" in the U.S. that can meet Step 2 without relying on the expensive European designs that can currently meet Step 2. Commenter (1466) notes that Europe took 15+ years to get to where they are on emission limits; thus 7 years to get to 0.05 lb/mmBtu [presumably 0.06 was intended] is an achievable goal in the U.S. Therefore, commenter (1466) suggests that Table 6 in the Preamble "Alternative Approach Subpart QQQQ PM Emission Standards" (FR p. 6344) be revised as follows: Step 1: [keep as is]. Step 2: 5 years after the effective date of the final rule, PM Emissions Limits 0.19 lb/mmBtu heat output. Step 3: 7 years after the effective date of the final rule, PM Emissions Limits 0.06 lb/mmBtu. Commenter (1466) also recommends that the following line in the paragraph immediately following Table 6 be stricken: "For the same reasons, the subpart QQQQ requirements would not include a small volume manufacturer compliance extension. See section V.C. of this preamble for more discussion of this topic."

Commenter (1562) states that based on the EPA estimates, equipment certified to the 0.06 lb/mmBtu limit would be 98% cleaner; however, this limit may not be attainable for stick-fueled equipment. Commenter (1562) believes a limit of 0.10 lb/mmBtu would yield equipment 97% cleaner and is probably attainable. Commenter (1562) questions whether a 1% gain is reasonable considering most of this equipment is used in the rural area, what the cost of the additional 1% gain may be and if the cost benefit is reasonable. Commenter (1562) suggests an 8-year phase-in with 0.10 lb/mmBtu as the lowest level, specifically:

- 0.32 lb/mmBtu – year 1 (the EPA estimated this to be 90% cleaner)
- 0.15 lb/mmBtu – year 5 (thus 95% cleaner)
- 0.10 lb/mmBtu – year 8 (thus 97% cleaner)

Response:

In consideration of the costs and emission reductions of the 2-step PM emission limit versus the alternative 3-step PM emission limit standard, and also in consideration of all comments received, we have determined that the final 2-step PM emission limit approach is superior both from an emission reduction perspective and from a cost effectiveness perspective. We note that our responses in *Section 4.2 and 4.3* are relevant here. For example, as we have explained in previous responses, standards under section 111 of the CAA are based on BSER systems and technology, rather than on attainment of specific health outcomes or approximations of limits as "% cleaner". We maintain that the 2-step PM emission limit approach within 5 years of the effective date is the best balance of achievable emissions reduction (with attendant health benefits) with cost and implementation considerations.

4.4 Implementation and Enforcement Issues – Central Heaters

4.4.1 Comment: Hydronic heater compliance extension / grandfathering

Commenter (0465) asks if January 15, 2015 is the actual cutoff date or if there will be a grace period.

Opposition to compliance extensions:

Several commenters (1397, 1448, 1591) generally oppose a compliance extension. Commenter (1503) does not believe that a small volume manufacturer compliance extension is necessary for either boilers or furnaces. Commenters (1397, 1503) do not recommend a small volume manufacturer compliance extension because these manufacturers currently market products nearly nationwide. Commenters (1397, 1503) believe allowing potentially high emitting hydronic heaters or furnaces into areas already at risk is not advisable. Commenter (1591) opposes the extension especially for hydronic heaters, stating that those manufacturers have already had a 10-year extension with the voluntary program.

Support for compliance extensions with various suggestions as to extension period:

Commenters (1543, 1550, 1563, 1643) state that the EPA must promulgate transition provisions for appliances subject to subpart QQQQ, similar to those proposed in the revised subpart AAA, which would allow for the continued manufacture and sale of other appliances for a specified period of time following the effective date of the rule. Commenters (1543, 1550, 1563, 1633, 1643) suggest that this would include deeming compliant existing hydronic heater models that are qualified under Phase 2 of the voluntary program until the expiration of the 5-year Phase 2 qualification period or 2 to 3 years after the effective date, whichever occurs later. Commenters (1543, 1550, 1643) suggest that to be eligible for the grandfathering period, manufacturers of hydronic heater model lines that meet the foregoing criteria would simply notify the EPA (by the effective date of the final rule) as to what model(s) they intend to continue to manufacture and market during the grandfathering period and provide the necessary supporting documentation to confirm voluntary program qualification and state certification.

Similarly, commenter (1545) recommends that the final rule allow for inclusion of hydronic heaters that have been qualified under the Phase 2 program prior to the effective date of the final rule and that such inclusion extend to the end of the 5-year certification term, or to the end of the Step 1 period, whichever occurs first.

Commenter (1633) states that the EPA must honor the implicit promise in the Phase 2 voluntary standard that industry would be able to manufacture and sell complying products for 5 years. The commenter (1633) states that if it had been known that such certificates would be rendered invalid after 2 or 3 years, the capital decision to invest in R&D and testing would have been significantly different.

Commenter (1563) describes several elements that severely constrains the ability of manufacturers to sell units without a grandfathering provision:

- Likely delays in achieving timely laboratory accreditation due to a probable backlog in the EPA reviewing and approving requests for accreditation after the effective date of the rule (estimated 3-6 months)
- Method 28 WHH and other requirements for testing contained in § 60.5476 are subject to change until the final rule is published
- Time required to conduct hydronic heater testing (2-week minimum, with increases if cord wood is required and/or trouble meeting stricter limits) (another 3-6 months.)

Commenter (1563) states, once models are certified by the EPA, manufacturers still have to order and receive materials and parts, manufacture units and distribute them to retailers. Thus, commenter (1563) states, even if existing model units can meet the 2015 particulate emission limit without requiring R&D and modifications, manufacturers would not be able to begin manufacturing such units until 18 to 24 months after the effective date and retail dealers could not expect to have received units that they can sell until 21-27 months after the effective date. Commenter (1563) states that manufacturers and retail dealers would, therefore, be unable to sell any residential hydronic heaters for 2 years or more after the effective date, resulting in layoffs and business closures. Commenter (1633) supports these comments.

Commenter (1572) supports a grandfathering provision that would take place if any changes to emissions levels or the test method are passed, then all models "currently certified by the EPA" (*sic*) should be grandfathered for at least 3 years or until certification has expired, whichever is longer.

Commenters (0631, 1062) state that having to comply on the date of final publication of the hydronic heater rule without an approved test method available prior to publishing the final rule is impossible. According to the commenters (0631, 1062), this would likely put their companies out of business. The commenter (0631) needs the EPA to give solid direction so that the company can demonstrate to the EPA and to the public that the products they have are acceptable and compliant or even cleaner. Specifically, the commenter (0631) states that the EPA should allow a period of one year after the final rule is published for hydronic heaters to meet the

compliance limits using the chosen test method, whatever it is and, secondly, the EPA should adopt either the European Test Method EN 303-5 or the Brookhaven Test Method or both.

Commenter (1562) strongly supports grandfathering hydronic wood heating units presently tested and "certified" (*sic*) via ASTM E2618-09, EPA Method 28 or EN 303-5. Commenter (1562) asserts not doing so will eliminate jobs in the industry, prevent customers from purchasing cleaner wood heating equipment, and force them to continue to use fossil fuels. Commenter (1562) also strongly supports adding all hydronic wood heating units that comply with the existing 0.32 lbs/MMBtu limit to the EPA "Qualified Hydronic Heater" list that appears on the EPA web site; including all units tested using Method 28XXX, ASTM E2618-09 or EN 303-5 that comply with the existing emission limit.

Likewise, commenter (1545) supports inclusion of complying heaters tested with EN 303-5, Method 28 OWHH, Method 28 WHH-PTS or ASTM 2618 prior to publication of the final rule.

Commenter (1551) supports the use of New York certifications for central heating devices for an interim period of two years; this would save manufacturers money on retesting existing units, allow them to direct investments to make cleaner units for the Step 2 standards and address potential backlogs at testing labs.

Commenter (1509) states that a 6-month minimum grandfathering period is required for small dealers and distributors.

Response:

We considered all certification extension comments that both supported and opposed any certification extension for hydronic heaters. After consideration of concerns expressed by commenters, we have included an automatic certification approval under subpart QQQQ for hydronic heater models if they are already qualified as meeting the Phase 2 emissions level of the EPA's voluntary program, tested with EPA Method 28 WHH. To reduce potential certification delays and unnecessary costs for small businesses, the final rule also allows automatic Step 1 EPA certification for hydronic heater models certified by NYSDEC that demonstrate the models achieve the Step 1 levels and RHNY-qualified pellet hydronic heaters, provided they comply with the RHNY requirements for installation and operation with adequate thermal storage. That is, no additional certification will be necessary for these three groups for Step 1.

This automatic certification for hydronic heaters will allow manufacturers (mostly small businesses) to avoid the costs that would be associated with certifying their hydronic heaters that already meet the required emission Step 1 emission limits. This will allow hydronic heater manufacturers to focus their efforts and resources on developing a full range of cleaner models that meet Step 2 emission levels. This measure should also help avoid potential "logjams" at laboratories conducting certification testing.

We are not allowing a 1-year compliance extension for low volume hydronic heater manufacturers in the final rule. Cleaner EPA-qualified Phase 2 hydronic heaters systems (that

meet the Step 1 emission limit and cap in this final rule) have already been available since 2008, the older systems have caused numerous complaints in many locations nationwide, and the proposed rule provided ample notice to hydronic heater manufacturers that older higher-emitting systems would no longer be permitted under the new rule.

4.4.2 Comment: Hydronic heater sell-through provisions

Commenter (0465) asks if he will be able to sell all boilers in his possession after the cutoff date and if there will be a limit on that number.

Opposition to sell-through provisions:

Commenter (1551) is concerned about the continued sale of high emitting devices and supports the EPA in not providing for any sell-through of any uncertified central heating device upon promulgation of this rule. Another commenter (0948) agrees that there is no need for a grace period for the sale of unsold noncomplying units and the rule should be implemented with a 3-month notice.

Commenter (1640) opposes the sell-through period since these limits are the same as the EPA's existing voluntary program and manufacturers have known about the EPA's plans for at least 5 years. Likewise, commenter (1503) states that unqualified wood boilers/furnaces should not be grandfathered or given any sell-through period.

Commenter (1719) notes that an advertisement by one prominent hydronic heater manufacturer suggests that distributors and dealers are not reluctant to stock units currently (i.e., before the NSPS has passed). According to the commenter (1719) this advertisement claims that "sales of [these] furnaces are rapidly escalating" and that the manufacturer "has recently increased production to fulfill the rising demand". Commenter (1719) requests that EPA consider this contradictory information when reviewing the economic impact of the NSPS on businesses versus the need to protect human health from outdoor wood boiler pollution.

Support for sell-through provisions with various suggestions as to sell-through period:

Commenters (1543, 1550, 1643) urge indefinite sell-through relief for Phase 2 qualified stoves in subpart QQQQ to avoid grievous harm to manufacturers. Similar to analysis provided for the subpart AAA provisions, commenters (1543, 1550, 1643) present the Page Report (1643, Attachment 7), which describes the need to avoid stranded inventory and substantial economic harm. Commenters (1543, 1550, 1643) believe that allowing such relief will have *de minimis* environmental implications.

Likewise, commenters (1382, 1387, 1407,1413, 1459, 1467, 1474, 1480, 1481, 1491, 1494, 1515, 1575, 1602, 1608, 1613, 1620, 1637, 1650, 1652, 1653, 1655, 1662) request that the EPA continue to allow any retailer to sell any Phase 2 qualified hydronic heaters manufactured during and under the voluntary program.

Commenter (1431) proposes a 5-year sell-through period to avoid a situation where there will be no outdoor wood boilers on the market because none currently would meet the new standards. Commenters (1420, 1431) request a 5-year sell-through period to allow them to successfully develop new products that would help them meet the upcoming standards.

Commenters (1543, 1550, 1643) add that the EPA should include a 2-year sell-through provision for uncontrolled models to facilitate the transition to subpart QQQQ regulation. Commenters (1543, 1550, 1643) argue that such units with higher emission rates can have acceptable, NAAQS-compliant ambient impacts with appropriate setbacks and stack heights (based on Maine air dispersion modeling). Commenters (1543, 1550, 1643) point to Attachment 19 and Attachment 20 (of 1643) for more details on relevant modeling analyses. Commenters (1543, 1550, 1643) note that the EPA provided 2-year sell-through provisions in the existing subpart AAA regulations despite the threat of continued sales on noncomplying, pre-NSPS wood stoves in the late 1980s. Commenters (1543, 1550, 1643) believe the same concerns exist for hydronic heaters, and the EPA has arbitrarily failed to explain this reversal of its position. Commenters (1543, 1550, 1643) describes the impact the lack of sell-through provisions would have on the industry in the near-term and believes it outweighs the potential environmental impacts of allowing the sale of uncontrolled units for a period of time.

Commenter (1503) supports a 2-year sell-through period for boilers and furnaces certified under the EN 303-5 standards that are Class 3, 4 or 5, or qualified by the EPA. Commenter (1563) states that the final rule should permit retail dealers to sell all voluntary program Phase 2 units manufactured prior to the expiration of the 5-year qualification period or 2 years after the effective date, whichever is longer.

Commenters (1382, 1572) state that the EPA should allow retailers a 1-year sell-through period for all units not qualified under the voluntary program or for any wood-burning appliance governed by this law. Commenter (1382) states manufacturers need the time to get units tested by independent test laboratories that are certain to be log jammed prior to and after implementation of this proposed rule.

Commenter (1633) recommends a 1-year sell-through period after the certificates expire, because otherwise a 5-year certificate effectively becomes a 4-year certificate. Commenter (1633) also recommends a 1-year sell-through period for any product manufactured prior to the effective date of the proposed rule, even "traditional" hydronic heaters. Commenter (1572) supports sell-through provisions and states that the EPA's justification that they have been warning the industry for 7 years is not justified as an excuse to not have a sell-through period.

See Section 2.18.4 for additional commentary regarding sell-through provisions in general.

Response:

We considered all the comments we received in support of, and in opposition to, allowing for retail sell-through of inventory of heaters manufactured before the compliance deadline. Like the subpart AAA requirements, the subpart QQQQ requirements provide additional time for the sale

of unsold hydronic heaters manufactured before the compliance date. The Step 1 limits will apply to hydronic heaters sold at retail on or after December 31, 2015. The approximately 8-month additional time for the retail sale requirement will allow retailers to sell their inventories of heaters that do not comply with the Step 1 emission limits. (Note that Step 2 emission limits for these sources will apply to each heater manufactured or sold at retail on or after the date 5 years after the effective date of the final rule.) The 8-month additional sell through period is sufficient because (1) cleaner EPA-qualified Phase 2 heater systems (that meet Step 1 emission limits of the rule) have been available since 2008, (2) the proposed rule provided ample notice to persons with remaining inventory of old high-emitting units, and (3) the older systems have caused numerous complaints in many locations nationwide.

4.4.3 Comment: Forced-air furnace compliance extension / grandfathering

Opposition to compliance extension:

Several commenters (1397, 1448, 1591) generally oppose a compliance extension. Commenter (1503) does not believe that a small volume manufacturer compliance extension is necessary for either boilers or furnaces. Commenters (1397, 1503) do not recommend a small volume manufacturer compliance extension because these manufacturers currently market products nearly nationwide. Commenters (1397, 1503) believe allowing potentially high emitting hydronic heaters or furnaces into areas already at risk is not advisable.

Support for compliance extension with various suggestions as to extension period:

For warm air furnaces, commenters (1543, 1549, 1550, 1547, 1643) state, the EPA should grandfather models currently listed under CSA B415.1-10. According to commenters (1543, 1549, 1550, 1643), the quality assurance/control components of the listing by an accredited third-party laboratory would continue to apply throughout the grandfathering period. Commenters (1543, 1549, 1550, 1643) suggest that the grandfathering period would expire 5 years from the date of listing.

Commenter (1448) believes that the effective date should be extended for at least 2 years, combined with a sell-through provision, to avoid a crushing economic impact on the company and industry. Commenter (1448) describes numerous activities required to get currently uncertified lines to certification and UL listing and that they cannot exist based on their only currently certified model line without this relief. Commenter (1657) adds that they need at least 2 years to do R&D for their 13 furnace models.

Commenter (1549) requests that the EPA include a transition compliance extension of at least 1 year after promulgation of the proposed NSPS for small furnaces and at least 3 years after promulgation of the proposed NSPS for large furnaces. Commenter (1549) asserts that this extension as well as their sell-through recommendations (see following comment) are necessary due to (1) Canada's manufacturers' advantage over U.S. manufacturers of forced-air furnaces and because (2) there has been no EPA or state voluntary program for warm air furnaces as there has been for hydronic heaters.

Response:

We considered all certification extension comments that both support and oppose any certification extension for forced-air furnaces. As noted in previous responses (e.g., see our response in *Section 4.3.5*), the final rule does provide for a phasing-in of standards in recognition of the differing available BSER for small versus large forced-air furnaces and in consideration of costs and testing feasibility concerns. The final rule requires a work practice and operational standard on the effective date of the rule, a Step 1 PM emission limit for small forced-air furnaces by 1 year after the effective date (i.e., in 2016), a Step 1 PM emission limit for large forced-air furnaces by 2 years after the effective date (i.e., in 2017) and a final Step 2 PM emission limit 5 years after the effective date (i.e., 2020). The phasing-in of the standards addresses the infeasibility of enforcing emission limits for all forced-air furnaces on the effective date of the rule, due to the technical and economic impracticability of testing and certifying approximately 50 forced-air furnaces in the 60 days between publication of this rule and the effective date.

Further, after consideration of concerns expressed by commenters, we have included an automatic Step 1 PM emission limit EPA certification for new forced-air furnaces that are independently certified (i.e., not self-tested) under CSA B415.1-10 to meet the Step 1 PM emission level or that are certified by NYSDEC and meet the Step 1 PM emission level. No additional certification will be required for these models until the Step 2 PM emission limit. This automatic certification for forced air furnaces will allow manufacturers (mostly small businesses) to avoid the costs that would be associated with certifying their forced air furnace models that already meet the required Step 1 PM emission limits, and would allow them to focus their efforts and resources on developing a full range of cleaner models that meet Step 2 emission levels. This measure should also help avoid potential "logjams" at laboratories conducting certification testing.

We also address concerns that there may not be sufficient third-party certifier capacity and review and approval capacity by the EPA in the first year by allowing early conditional, temporary approval of the PM emission limit compliance during the first year. We want to encourage early production and sales of cleaner forced-air furnaces that meet the Step 1 PM emission limits by allowing marketing that they comply with the EPA Step 1 PM emission limits early and not have to wait on EPA approval that may be delayed due to limited certifiers and potential resource constraints at the EPA. The conditional, temporary approval by the EPA for forced-air furnaces (based on the manufacturer's submittal of a complete certification application) would be allowed for 1 year or until EPA review of the application, whichever is earlier. The application must include the full test report by an EPA-accredited laboratory and all required compliance statements by the manufacturer.

4.4.4 Comment: Forced-air furnace sell-through provisions

Support for sell-through provisions with various suggestions for sell-through period:

Commenters (1543, 1550, 1643) support the addition of a 2-year sell-through provision for warm

air furnace to avoid a devastating economic effect on manufacturers for the same reasons cited above for hydronic heaters. Commenters (1543, 1550, 1643) adds that for grandfathered furnaces (those listed by an accredited third-party laboratory to the 0.93 lb/mmBtu "passing grade" under CSA B415.1-10 as of the date of promulgation of the final rule) there should be an indefinite sell-through period. Commenter (1549) recommends a retail sell-through of at least 3 years after promulgation of the proposed NSPS for small furnaces and 5 years after promulgation of the NSPS for large furnaces.

Commenter (1448) believes that the effective date should be extended for at least 2 years, combined with a sell-through provision, to avoid a crushing economic impact on the company and industry. Commenter (1448) describes numerous activities required to get currently uncertified lines to certification and UL listing and that they cannot exist based on their only currently certified model line without this relief.

Commenter (1657) needs at least a 2-year R&D period combined with a minimum 1-year sell-through provision because of the impact of the selling season on orders. Commenter (1657) explains that distributors order in April/May and take delivery in August/September, dealers buy throughout the fall (Sept- Dec) and then the selling season ends in January. Commenter (1657) states that if the EPA's current proposed timetable does not change, dealers will want $0 unsold inventory when the selling season stops at the end of January 2015, so they will stop buying in September 2014 (when they would normally start buying). There is a similar timing effect for distributors according to the commenter (1657).

Commenter (1521) advocates extending the 6-month sell-through provision to 1 full year for the dealers, and including the 6-month provision applicable to manufacturers, only in order to reduce any significant adverse impacts to the dealerships in Maine (whose wood-burning appliance sales are seasonal).

See Section 2.18.4 for additional commentary regarding sell-through provisions in general.

Response:

We considered all the comments we received in support of and in opposition to allowing retail sell-through of inventory of forced air furnaces manufactured before the compliance deadline. As at proposal, the final rule does not allow sell-through of inventory of non-complying forced-air furnaces beyond the effective date of the final rule. However, we note that the final rule has established work practice/operational standards on the effective date and the Step 1 PM emission limits for small furnaces are 1 year after the effective date and the Step 1 PM emission limits for large furnaces are 2 years after the effective date. The immediately effective standards require the manufacturer to include in the owner's manual best practices that comply with the work practice/operational standards. We have included examples in Appendix I of the rule that manufacturers can quickly tailor to their specific models and add as inserts to their current manuals. Thus, no sell-through provision is necessary.

4.4.5 Comment: Seasonal use restrictions

Concerning the EPA's requested comments regarding establishing a seasonal use prohibition, commenter (1465) recommends that this issue be left to the states. In addition, commenter (1465) believes that since the models subject to the NSPS are cleaner than older models, those new models should not be subject to seasonal prohibition while older models can operate year-round. Commenter (1465) believes such a provision would be difficult to enforce unless there is a tracking mechanism to determine which units would be subject to a seasonal prohibition.

One commenter (0541) suggests that the states regulate and define their heating season. The commenter (0541) adds that all non-Step 2 central heaters should be off between April 1 and October 1.

Commenters (1558, 1591, 1593) strongly urge the EPA to add seasonal restrictions for OHH. Commenters (1558, 1593) state this will cut emissions in half and has the most effect on the amount of particulate and PAH being reduced. Commenter (1593) asserts that seasonal restrictions have been supported more in RI more than any other provision regarding OHH, and that makers of OHH have publicly stated that they also support season restrictions. Commenter (1591) states the NSPS should prohibit use of hydronic heaters in the non-heating seasons and "bumper months."

Commenter (1521) disagrees with the suggested limitation of hydronic heaters to a defined "heating season," as such heaters are often used to provide domestic hot water year-round. The commenter (1521) opines that is not within the authority of the NSPS to regulate constraints on when a homeowner heats their home.

Response:

In this final rule, we are not prohibiting use in non-heating seasons nor are we establishing national curtailment regulations. We have determined that seasonal use prohibitions, including curtailment regulations, are best established locally rather than at the national level. However, users should note that some state, local and tribal jurisdictions have limits, prohibitions and other requirements that must be followed.

The EPA's *Strategies for Reducing Residential Wood Smoke* document (see http://www.epa.gov/burnwise/strategies.html, pages 6-7) states that wood-burning curtailment programs are one of the quickest and most effective ways an air quality agency can reduce wintertime wood smoke and that several communities implement both voluntary and mandatory curtailment programs depending on the severity of their air quality problem. Some states have established seasonal use prohibitions, especially for hydronic heaters. Numerous hydronic heaters have had excessive emissions due to off-heating-season use for heating swimming pools and burning at poor low-heat-demand combustion conditions. The Sacramento Air Quality

Management District also implements a two-stage "Check Before You Burn" curtailment program for November to February (see www.sparetheair.com/burncheck.cfm).

4.4.6 Comment: Hydronic heater siting

Commenter (0952) is pleased that the rule does not pre-empt local siting requirements with respect to hydronic heaters. Commenter (0952) states that local topography, micro-meteorology, and proximity to other homes and structures influence emissions impacts and even the cleanest units can pose problems if the unit itself and its stack are not sited taking these and other factors into consideration. Commenter (0952) adds that existing high polluting units and their pollution impacts generate the most citizen complaints and frustrations to the Lung Association, and state and local regulators. Commenter (0952) recognizes that this is not in the purview of the NSPS, but it is unfortunate that the EPA cannot address these existing units, beyond promoting changeouts.

One commenter (0776) suggests restricting hydronic heater sales to rural areas only and imposing a minimum distance between properties such as 150 feet to 500 feet, regulated by local fire departments.

Commenter (1593) urges the EPA to not just leave out the critical items such as nuisance provisions and setback requirements. Commenter (1593) believes the EPA should implement provisions to be passed down to the states or municipalities for them to enact according to each municipality and provide support in the form of documentation and reports to the municipalities.

Commenter (1507) believes the rule is too broad because almost 100 percent of their customers live on large acreage lots and typically do not have close neighbors. Commenter (1507) states that without close neighbors, the PM emissions are not hurting anyone. Commenter (1507) suggests the NSPS rule simply say that all hydronic heaters are allowed, but only on lots of a certain acreage (say 5 or 10 acre minimum), which would solve a huge part of the problem; or, no hydronic heaters are allowed within 1,000 ft (as an example) of another home. Commenter (1507) suggests anything below these minimums should require EPA approved stoves.

Response:

Location siting, nuisance and setback requirements are site-specific and are best handled by state, tribal and local agencies rather than at the national level. The NSPS requires that no person install or operate an affected residential hydronic heater except in a manner consistent with the instructions on its permanent label and in the owner's manual, including only using fuels for which the unit is certified. The owner's manuals are required to instruct the user on proper operation (including proper draft and prohibited fuels) and follow all state, local and tribal requirements (which may include specifications such as stack height, location and proper operation to avoid nuisance conditions).

We encourage state, local and tribal jurisdictions to use observation of visible emissions as an indicator of potential improper operation.

In addition, we emphasize that operators should note that some state, local and tribal jurisdictions have limits, prohibitions and other requirements beyond the NSPS that must also be followed.

This final rule allows the EPA to approve state requests for delegation of enforcement authority for NSPS requirements.

We expect many state, local and tribal authorities will adopt some of the important and very successful strategies in *Strategies for Reducing Residential Wood Smoke* (http://www.epa.gov/burnwise/strategies.html) including developing site-specific installation and operating requirements to ensure heaters are not over-sized, avoid nuisance conditions, and ensure proper operation (e.g., using EPA Method 22 observations of visible emissions as an indicator of potential poor or improper operation) to help ensure healthy air for all. For example, as noted on our Burn Wise website (http://www.epa.gov/burnwise/pdfs/FAQ04-28-11.pdf), many state and local governments already use nuisance and opacity regulations to regulate hydronic heathers. In addition, some ban new hydronic heaters and/or regulate the minimum distance that can be sited from neighbors or public areas

4.4.7 Comment: Hydronic heater sizing

Commenter (1503) notes that because waste and PM emissions can be dramatically reduced if outdoor wood boilers are professionally sized and installed, the EPA should encourage states to establish certification and professional sizing programs for these devices (where such programs do not currently exist). Commenter (1591) is concerned about how the EPA or the states will monitor installations and ensure that the equipment is right sized and includes water storage to meet any emission standard that is set.

Commenter (1465) is concerned that if an appliance is oversized for the residential application, it will spend greater time in low loads with lower efficiency and much higher emissions. Therefore, commenter (1465) states, if M28 WHH or another method is to be representative of the heater performance, then the EPA should require the owner's manual to state that boilers should not be oversized for the application, citing state or international building codes and reference a recognized method such as Manual J25 of the Air Conditioning Contractors of America (ACCA) or equivalent.

Commenter (1558) recommends a standardized metric, such as the HVAC Manual J, "Residential Load Calculation," be required for sizing all hydronic heaters to prevent vendors from selling oversized units. Commenter (1558) states the EPA must set a date for when it will establish with the DOE standards for residential wood heating devices and on proper sizing.

To reduce the cycling frequency and associated emission spikes, commenter (1423) believes the EPA should implement effective regulatory and non-regulatory approaches with the goal of ensuring that hydronic heaters are sized appropriately for the heat load. Commenter (1397) recommends a standardized metric, such as the HVAC Manual J, "Residential Load Calculation," be required for sizing all wood biomass hydronic heaters and furnaces, enabling

state and local air agencies to address problem emissions through enforcement against vendors who sell oversized units.

Commenter (1541) states that sizing should require that any wood hydronic heaters using auxiliary thermal storage that have nominal ratings more than 20% greater than the Manual J load calculation for a home must have sufficient thermal storage to accommodate all of the heat in excess of 15% of the Manual J value (i.e. Cat I test). Commenter (1541) believes this will prove beneficial as new homes and renovated homes (with better insulation, windows, etc.) have lower Manual J heat-loss calcs. As the production of smaller boilers to accommodate these well-insulated homes, (with Manual-J heat load calcs as low as 30,000), is neither practical, nor desirable from a manufacturing perspective, the proper sizing of the thermal storage tanks will be paramount according to commenter (1541).

Response:

We agree that proper sizing/installation of heaters is important. The final rule (as at proposal) requires the manufacturer to provide sizing and heat demand information to the buyer and include in the owner's manuals sufficient information to provide heater operation and maintenance information affecting emissions to consumers (see Appendix I to subpart 60 in the rule).

To minimize both wood fuel input and particulate emissions, on our Burn Wise website we encourage consumers to contact professionals including hearth product retailers to determine the right size and model for a given residence. Such professionals can appropriately size units to match the theoretical heat demand of the residence (using, for example, HVAC Manual J residential load calculations available at http://www.acca.org/technical-manual/manual-j/). Sizing costs should be calculated as part of the installation process for a specific heating appliance and residence, and heat demand analyses would be model- and site-specific.

We encourage state, local, and tribal authorities to develop site-specific installation and operating requirements to meet local air quality and safety concerns. The EPA, upon request, can delegate enforcement of the rule to state, tribal or local authorities, including enforcement of proper installation and operation in a manner consistent with the owner's manual.

4.4.8 Comment: EPA response to operational violations

Commenter (1593) requests the EPA fine states that do not enforce opacity and nuisance regulations and/or complaints regarding violations. According to commenter (1593), when families complain to the EPA regarding emissions from an outdoor hydronic heater on their property, the EPA directs them to their state agency which refuses to do their duty.

Commenters (1397, 1591) state a mechanism (such as an online form) should be implemented for reporting field violations by hydronic heaters or furnaces. Commenter (1591) states receipt by the EPA of a set number (10 or fewer suggested) reports of excessive field emissions from a specific model should trigger a retest audit of that model and action to reduce these emissions for

those in place hydronic heaters. Commenter (1591) adds the EPA must include a provision for discontinued models, which would require less complaints to trigger an investigation, because many manufacturers continually change model numbers with slight updates to escape legal action.

Commenter (1591) states that ignoring operator error with hydronic heaters creates a very real pollution source that will impact public health. Based upon how poorly the states have been able to implement regulations (even in NY) to protect public health or to stop sales of these consumer nightmares, commenter (1591) believes it is imperative that the EPA really consider how the NSPS can be implemented without passing costs on to consumers, down winders, or state regulators.

Response:

Section 60.5482 of subpart QQQQ clarifies that, although we may delegate implementation and enforcement authority (under section 111(c) of the CAA) to states upon request, (1) nothing in these delegations will prohibit us from enforcing any of the delegated elements, and (2) nothing in these delegations will limit states from using their authority under section 116 of the CAA to adopt or enforce more restrictive requirements. We plan to work with tribes, state and local regulating agencies that are granted delegation of the final rule to ensure understanding of rule monitoring and enforcement responsibilities.

The NSPS requires the owner (user) to install, maintain and operate the hydronic heater properly and follow the instructions in the owner's manuals. The owner's manuals are required to instruct the user on proper operation (including proper draft and prohibited fuels) and follow all state, local and tribal requirements (such as stack heights, location and proper operation to avoid nuisance conditions). We encourage state, local and tribal jurisdictions to use observation of visible emissions as an indicator of potential improper operation. In addition, we emphasize that operators should note that some state, local and tribal jurisdictions have limits, prohibitions and other requirements beyond the NSPS that must also be followed. This final rule allows the EPA to approve state requests for delegation of enforcement authority for NSPS requirements. In addition, we expect many state, local and tribal authorities will adopt some of the important and very successful strategies in *Strategies for Reducing Residential Wood Smoke* (http://www.epa.gov/burnwise/strategies.html) including developing site-specific installation and operating requirements to ensure heaters are not over-sized, avoid nuisance conditions, and ensure proper operation (e.g., using EPA Method 22 observations of visible emissions as an indicator of potential poor or improper operation) to help ensure healthy air for all.

Generally, violations by hydronic heaters and/or forced-air furnaces are best reported to and handled by tribal, state or local agencies that are delegated with the primary responsibility for implementing these rules. Where these rules are not delegated, we will bear the primary responsibility for ensuring compliance and enforcement of these rules. Violation complaints can be submitted to EPA's Enforcement Report Environmental Violations web site (*at* http://www2.epa.gov/enforcement/report-environmental-violations). In all situations, whether

delegation has been granted or not, we maintain authority to revoke model certifications where we believe that a violation warrants revocation.

4.5 Additional Concerns and Suggestions

4.5.1 Comment: Hydronic heaters' contribution to air quality and health concerns

Commenters (1488, 1558, 1591) assert that the proposed rule for hydronic heaters (outdoor and indoor) does not meet CAA requirements to protect human health. Commenter (1488) states that the CAA requires the EPA to regulate any category of stationary sources that, in the Administrator's judgment "causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." Commenter (1488) argues that the EPA's proposed Step 1 hydronic heater standard has been met by the Phase 2 qualified heaters that caused extensive and well-documented harm to neighboring residents. Commenter (1488) states that the EPA's proposed Step 1 standard is, therefore, demonstrably insufficient to protect against new sources that would cause harm to human health. Commenter (1558) believes the EPA's proposed NSPS for hydronic heaters (outdoor and indoor) will not fulfill the EPA's mandate to protect human health under the CAA, asserting that under the law, EPA is required to adopt a health-protective NSPS. Commenter (1558) asserts the EPA is required to set a maximum emission level in the NSPS as a health-protective standard, which should not be exceeded at any time during the 8-hour burn cycle.

Commenter (1591) is concerned that the proposed rule creates another loophole through which states will have to suffer or close with their own legislation since it is titled "residential" and not "commercial." Commenter (1591) recommends the EPA couple the NESCAUM and NY Attorney General studies on OWBs with what it knows about the impacts of increased fine particulate on human health. Commenter (1591) believes the EPA's delay in issuing the NSPS has undocumented public health care cost. Commenter (1591) asserts the NSPS as proposed is not timely for any of the harmed families and will still delay implementation of standards that have been disproved.

Commenter (1488) states that documentation shows that hydronic heaters, including those meeting the proposed 0.32 lb/mmBtu standard, have a track record of causing significant and lasting harm to human health. As an example, the commenter (1488) asserts that the EPA maintains problem files on hydronic heater models qualified in the EPA's Phase 2 voluntary program (including information that brings into question the validity of the qualification). Commenter (1488) states that the EPA should have published these files as part of the public review of the proposed rule. Commenter (1488) opines that the Central Boiler's model 2300 hydronic heater should have an extensive EPA file (e.g., based on the Fairbanks case alone – over 358 public record smoke complaints in a Fairbanks, Alaska neighborhood where two Central Boiler 2300s were operated for more than 4.5 years). According to commenter (1488), even though the two Central Boilers in the Fairbanks case performed (by every indication) as designed by the manufacturer, significant harm to neighbors and the community occurred.

Commenter (1488) opposes what they believe to be an unsafe particulate standard for new residential hydronic heaters. Commenter (1488) reports that, in 2008, the Central Boiler 2300 qualified for the EPA's Phase 2 program with particulate emissions of 0.31 lbs/MMBtu output and 6.4 g/hr (meeting the proposed rule Step 1 standard). Commenter (1488) states that two Central Boiler 2300 hydronic heaters in Fairbanks (across from Woodriver Elementary from 2008 to 2013) led to over $460,000 of documented adverse public health effects (leaving dozens of neighbors, teachers and students damaged and suffering) and other costs (the commenter provides additional background information on the Central Boiler 2300 hydronic heater Woodriver Elementary School experience, including some of the specific adverse health effects that occurred from emissions exposure). Commenter (1488) argues that the EPA is now proposing to certify dangerously unsafe hydronic heaters like the two hydronic heaters in Fairbanks that they believe belong nowhere and certainly not in a densely populated residential neighborhood or near a school. Commenter (1488) asserts that, under the proposed rule, such unsafe models could be certified by the EPA for sale and installation for 5 more years. Commenter (1488) asserts that, at a minimum given the adverse health implications associated with what they believe to be lax standards using an inappropriate unit, the EPA must not certify new hydronic heaters for 5 years.

Commenter (1488) reports that the Fairbanks North Star Borough has a serious $PM_{2.5}$ problem, yet monitors in the City of Fairbanks are consistently cleaner than in outlying areas. Commenter (1488) opines that an important factor is the 2009 City of Fairbanks code prohibiting new installations of all hydronic heaters, including pellet-fueled devices. Commenter (1488) reports that wood smoke sources within the City of Fairbanks consist of the full range of types of wood-fired heaters and approximately 22 grandfathered hydronic heaters installed prior to the 2009 ban. According to commenter (1488), a monitoring study published in 2012 found that wood smoke (likely, residential wood combustion) was the major source of $PM_{2.5}$ throughout the winter in Fairbanks, contributing between 62.7 and 81.2% of the measured $PM_{2.5}$ at four sites. Commenter (1488) reports that, when the two Central Boiler 2300s were shut down in the Fairbanks neighborhood of Woodriver Elementary, air quality improved overnight.

Commenter (1488) states that two studies conclude that outdoor wood boilers release significantly more PAH per unit mass of fuel burned than either domestic firewood or wood stove appliances. Commenter (1488) claims that these two studies link the Central Boiler 2300 to a major 375-page EPA study for NYSERDA on $PM_{2.5}$ emissions.

Commenter (1593) believes the companies making OHH should not get a free ride, adding insult to injury to families suffering, whether they know the impact is from an "EPA phase 2" hydronic heater or not. Commenter (1594) explains the health effects he and his wife have suffered as a result of the emission from a neighbor's hydronic heater located 30 feet from their property line, and claims to have spent tens of thousands of dollars in an attempt to mitigate the harmful effects of the noxious emissions. Commenter (1597) recounts a similar story. Commenter (1594) claims the EPA promoted such pollution by failing to restrict the sale of hydronic heaters and that the result is increased health care costs for millions of Americans.

Commenter (1668) is concerned that the rulemaking fails to address the problem of hydronic heaters and does not require the EPA to stop using Phase 2 voluntary program agreements. Commenter (1668) asserts nothing is being done to prevent hydronic heaters from being misused as garbage incinerators or being installed in nonattainment areas, areas of low dispersion such as confined valleys, or abutting adjacent properties. Commenter (1668) believes the proposed rule should address the inefficiency of Phase 2 heaters. Commenter (1668) also objects to the EPA ignoring pollution from the hundreds of thousands of existing hydronic heaters. The cost of removal of these grandfathered heaters that should have been prohibited years ago has fallen to local communities and the states, according to commenter (1668), and the EPA should be responsible for their failure to properly regulate and be required to reimburse these costs.

Commenter (1667) submits a copy of a letter alleging numerous violations of the EPA hydronic heater Phase 2 voluntary program agreement by partner manufacturers who have agreed to comply with the terms and conditions of this program and asks the EPA to enforce the Phase 2 hydronic heater partnership agreement.

Commenter (1750) requests that EPA not allow hydronic heaters to be installed without setbacks or restrictions or consideration for the health and safety of the surrounding citizens. Commenter (1591) states the EPA must include in the NSPS that no person shall operate a hydronic heater in such a manner as to create a nuisance. Commenter (1591) believes real world use of hydronic heaters varies depending on operator diligence, skill level, fuel choice and moisture content, and maintenance.

Commenter (1591) believes OWBs should not be permitted to be sold in the U.S. For the EPA to ignore this "inconvenient truth" that they cannot control what people burn in these heaters, asserts commenter (1591), is to subject families living downwind to personal incinerators. The commenter (1591) believes burning of household waste is a danger that must be calculated into the EPA's rule. Commenter (1597) notes there are a lot of people that get really angry about losing their income selling these smoke puffers, who refuse to admit there is any problem at all. Commenter (1597) states those of us that live our lives and pay our taxes are at the mercy of mindless, soulless, greedy people trying to make a fast buck, at the expense of others health and wellbeing. Commenter (1597) asks the EPA to protect citizens from being physically assaulted by people with dangerous smoke. Commenter (1597) asserts that using an OWB is a grossly negligent personal choice, while breathing is a mandatory function of life.

Commenter (1591) cites a 2006 CASAC letter that asserts that the EPA ignoring that wood boilers have subjected U.S. families to greater than 8000 µg/m3 when health impacts occur at and below 15 µg/m3 is nothing short of criminal and a clear violation of the CAA. Delaying implementation of the NSPS for so many years and then proposing phase-ins and the use of test methods in this draft NSPS that are not real world and distort emissions will be a death sentence to many more households from these spikes in air pollution, according to commenter (1591). If the EPA has determined that 1.5 g/hr can be met with wood-burning appliances, then commenter (1591) states they do not know why the EPA would propose a dual standard for hydronic heaters, which are also wood-burning appliances, phase-in standards (after decades of no standards already), and use test methods that cover up the real world emissions.

Commenter (1718) provides an August 2014 *Inhalation Toxicology* journal article entitled "Outdoor wood furnaces create significant indoor particulate pollution in neighboring homes." According to the commenter (1718), the $PM_{2.5}$ levels exceeded the 24-hour NAAQS levels in all homes studied, which varied in distance – ranging from 30 to 259 meters – away from the emitting hydronic heater.

On the other hand, commenter (1507) believes the rule is too broad because almost 100% of their customers live on large acreage lots and typically do not have close neighbors. Commenter (1507) states that without close neighbors, the PM emissions are not hurting anyone. Commenter (1507) asserts that it is unfair to make this broad categorization that all hydronic heaters are hurting the environment and that such an overly broad statement hurts too many people and businesses.

Response:

We share the commenters' concern that hydronic heaters contribute significantly to air quality issues and for this reason have added subpart QQQQ, in addition to revising subpart AAA, to this rule, in order to ensure that the best systems of emission reduction today are required now and the best systems of 2020 are required in 2020. In keeping with the CAA, the source category "residential wood heaters" was listed as a source category on February 16, 1987 because, as the commenter notes, emissions from wood heaters "causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." Once listed, this source category was regulated under the NSPS. The original NSPS was issued on February 26, 1988, but did not include hydronic heaters as this final rule does. The primary authority for a NSPS is section 111 of the CAA which means NSPS are system and technology-based not specific health-based standards (such as the NAAQS) and must be based on BSER, taking into consideration costs and emission reductions. The EPA is well aware of the serious health complaints endured by neighbors of hydronic heaters and does not minimize any of these issues. We agree that hydronic heater installations should not be in locations near neighbors. We supported financially and technically NESCAUM's development of a model rule in 2007 for states to use that includes locations restrictions and the final rule requires proper installation to be part of the owner's manual that must be followed. This NSPS does not ban hydronic heaters or require wood stove BSER in lieu of hydronic heater BSER. This hydronic heater NSPS is based on BSER for hydronic heaters. However, we note that we have worked with many states, tribes and local jurisdictions to encourage their efforts tailored towards the areas with the greatest needs. We also note that this rule does not restrict tribes, states or local jurisdictions from establishing more restrictive standards (e.g., the 2009 City of Fairbanks code prohibiting new installations of hydronic heaters).

We agree with the commenters that replacing old uncertified existing heaters can result in very large emission reductions and we continue to encourage such changeouts. The EPA encourages states, tribes, local governments, manufacturers, retailers and consumers to replace as many old heaters as soon as possible. We have conducted workshops and provided changeout education and outreach tools for many years. For example, see the *Strategies for Reducing Residential*

Wood Smoke document on the EPA's Burn Wise website for more details (http://www.epa.gov/burnwise/strategies.html). See our response in *Section 2.1.5* for further discussion regarding changeouts.

While the EPA is not setting specific nuisance conditions in this NSPS, we do mandate under this rulemaking that the owner install, maintain and operate the hydronic heater properly and follow the instructions in the owner's manuals. The owner's manuals are required to instruct the user on proper operation (including proper draft and prohibited fuels) and follow all state, local and tribal requirements (such as stack heights, location and proper operation to avoid nuisance conditions). We encourage state, local and tribal jurisdictions to use observation of visible emissions as an indicator of potential improper operation. In addition, we emphasize that users should note that some state, local and tribal jurisdictions have limits, prohibitions and other requirements beyond the NSPS that must also be followed. This final rule allows the EPA to approve state requests for delegation of enforcement authority for NSPS requirements. In addition, we expect many state, local and tribal authorities will adopt some of the important and very successful strategies in *Strategies for Reducing Residential Wood Smoke* (http://www.epa.gov/burnwise/strategies.html) including developing site-specific installation and operating requirements to ensure heaters are not over-sized, avoid nuisance conditions, and ensure proper operation (e.g., using EPA Method 22 observations of visible emissions as an indicator of potential poor or improper operation) to help ensure healthy air for all.

Generally, it is best to report violations by hydronic heater operators first to state, tribal or local agencies, which may be delegated with the primary responsibility for implementing these rules, followed by reporting to OECA at EPA. We note that nothing in this rule restricts such jurisdictions from establishing or strengthening nuisance laws. Many states and local jurisdictions already use nuisance or opacity regulations to regulate hydronic heaters. A number of local governments ban new hydronic heaters and/or regulate the minimum distance they can be sited from neighbors or public areas. Numerous states have regulations specific to heater use, and additional states are considering regulations. In addition, Utah is currently considering banning all wood burning in the winter heating season because the pollution is so bad. Visit EPA's Burn Wise website under "Where You Live" at http://www.epa.gov/burnwise/whereyoulive.html to learn more about state air programs and regulations for hydronic heaters.

Where these rules are not delegated, the EPA will bear the primary responsibility for compliance and enforcement of these rules. Violation complaints can be submitted to EPA's Enforcement Report Environmental Violations web site (*at* http://www2.epa.gov/enforcement/report-environmental-violations). In all situations, whether partial delegation has been granted or not, we maintain authority to revoke model certifications where we believe that a violation warrants revocation.

Finally, regarding the suggestion that this rule is overly broad and unnecessarily regulates hydronic heaters on large acreage lots, we again note that section 111 of the CAA requires us to set national standards, not population-based standards.

4.5.2 Comment: Alleged understating of hydronic heater emissions

Commenter (1488) accuses the EPA and a state agency of an attempted cover-up of key information relevant to the proposed rule for hydronic heaters. Although commenter (1488) acknowledges that the data that they felt was concealed may have been due to CBI, they believe that in the effort to protect the interests of hydronic heater manufacturers, emissions test data cannot be connected to the hydronic heater model that generated the emissions. Commenter (1488) opines that the significance of being able to connect the testing with the model is to show that the EPA's proposed initial standard for hydronic heaters places the public at a higher risk because of bias in the proposed testing method leading to lower emission concentrations. [Commenter (1488) provides their documentation of their assessment leading to their alleged cover up accusation.]

Commenter (1668) asserts that nowhere in the hydronic heater rulemaking has the EPA once plainly stated that the proposed rules would "certify" Phase 2 hydronic heaters under NSPS. Commenter (1668) claims the EPA has hidden vital information relevant to assessing the efficiency (or lack of) of Phase 2 hydronic heaters and failed to state the proposed regulations would adopt Phase 2 as the certified standard for hydronic heaters. Commenter (1668) further believes the EPA has done nothing but impede the public's ability to connect the dots between a particular Phase 2 heater and the wrath of smoke it would reasonably be expected to emit. Of greatest concern, per commenter (1668), is that the EPA has sought to conceal the connection between the Phase 2 device and its 30% thermal efficiency at the same time as the EPA is recommending certification of these devices.

In an EPA report (Gullett, Wood 2012), commenter (1668) asserts the EPA concludes that the tested 3-stage hydronic heater has only 30% thermal efficiency. The model tested was clearly EPA Phase 2, states commenter (1668), yet, because the EPA obscured the make and model, the EPA is unable to relate its own test of a Phase 2 heater to its current proposal to include Phase 2 in the certified residential wood heater standard.

Commenter (1668) asks that OMB ensure that Phase 2 not be included in the proposed rule that goes forward to public comment. Commenter (1668) states that obscuring the manufacturer's label, failing to disclose the model, omitting that the device tested was EPA Phase 2, and then packaging a draft rule that inarticulately but specifically certifies Phase 2 under the NSPS is deceptive and injurious. Commenter (1668) asserts that the EPA proposed Phase 2 standard, based on incomplete information with clear evidence to the contrary, is malfeasance and harmful to the public interest and that the cost to public health from Phase 2 hydronic heaters far exceeds any benefit. Commenter (1668) strenuously objects to the EPA's lack of transparency and states the EPA appears to have pursued a predetermined goal of certifying Phase 2 regardless of the evidence of harm and inefficiency.

Response:

The EPA has engaged in no cover-ups of emissions data or of any other information relevant to hydronic heaters or to any technology we are regulating under this rulemaking. While we strive

for transparency as an agency, we do note that CBI claims by manufacturers require careful handling by the EPA in general and in response to FOIA requests specifically. The EPA makes every effort to protect CBI and therefore honors CBI claims. CBI claims are unnecessarily laborious and time consuming, however, when information and data is improperly claimed as confidential by manufacturers or laboratories – and this has occurred not infrequently under the current rule. Accordingly, many comments stressed the importance of easy public availability of certification test reports (especially electronically), limited CBI claims, and more details on the EPA websites. We agree with these comments and the final rule incorporates this transparency and consumer-friendliness. For example, we have clarified the test data submittal process, including requiring clear separation of CBI information from non-CBI, and we will require manufacturers to post complete non-CBI test reports on their websites. We have also emphasized that emission data are not CBI under section 114 of the CAA and this rule clarifies that the manufacturer cannot claim such as CBI.

We assure the commenter that the EPA did not have a predetermined goal of certifying Phase 2 hydronic heaters. Rather, the Step 1 standard followed by the Step 2 standard 5 years later was set after a full review of the industry, including especially the BSER and the cost to develop cleaner models. We also again note that the final standard is stepped, with the NSPS Step 2 standard being significantly more stringent than Step 1 and reflective of BSER anticipated in 2020. The final stepped standards reasonably balance achievable emission reductions with cost and implementation considerations, as is appropriate for NSPS under section 111 of the CAA.

4.5.3 Comment: Existing model modifications

Commenter (0467) states they have an older Heatmor outside wood stove (2006) that they would like to modify to keep up with the standards. Commenter (0467) understands it is not subject to the new standards but would like to make it as pollution free as possible. Commenter (0467) asks if there are technical specifications for the adaptations needed to upgrade the stove, or if they are a for sale item by manufacturers. Commenter (0467) believes there should be some way that a stove owner/engineer can make their own upgrades.

Commenter (1549) states that the NSPS would require that modifications to existing non-affected facilities be made to comply with the NSPS. According to commenter (1549), if modifications are made to an existing safety listed appliance, verification that an appliance is safe for the end user through a manufacturer's life testing protocols and retesting to a safety standard would be required. Commenter (1549) asserts that this adds to the burden on the manufacturer of bringing a product to the market under the proposed timeline.

Response:

We appreciate consumer operator's interest in and intention to minimize wood heater emissions. We encourage homeowners to replace existing uncertified heaters with cleaner and more efficient devices, certified under this final rule. We also encourage homeowners to contact their state and local governments to determine if any financial assistance is available for such a changeout. Regarding modifying an existing device, we strongly discourage owners making their

own upgrades to existing wood heaters. In fact, if the existing wood heater in question was certified under the 1988 rule, this rule prohibits any person from operating a wood heater that has been physically altered to exceed the tolerance limits of its certificate of compliance unless it can be shown to reduce emissions. Not only is this prohibited under the existing NSPS, emission reduction technology on wood heaters is specialized, requires expertise to design well, and moreover presents significant safety concerns if not designed and tested properly. EPA is assessing some retrofit technologies, such as smart catalysts, and we recommend that you visit the EPA Burn Wise website for updates on our progress.

It is incorrect that this NSPS requires modifications to "existing non-affected facilities". This NSPS applies to newly manufactured wood heaters only, not to existing wood heaters. It is true that manufacturers may choose to redesign existing technologies in order to develop technologies to meet the Step 1 and Step 2 PM emission limits. Safety testing is part of the cost of doing business, but has been included in our cost estimates, which have been developed based on industry estimates, and are available in the background technical supporting documentation in the docket to the final rule. We have made every effort to include all NSPS-attributable costs in our cost estimates in order to reflect the burden of manufacturers of bringing a product to market under the final phased-in timeline.

5.0 Response to Comments Regarding Subpart RRRR

NOTE: The EPA is not taking final action at this time on proposed subpart RRRR for new residential masonry heaters. Our reason for taking no action at this time is to allow additional time for the Masonry Heater Association (MHA) to finish their efforts to develop revised test methods, an emissions calculation program and an alternative dimensioning standard. The MHA believes these efforts are critical because most masonry heaters are custom built on-site and testing each custom model would be difficult. The nationwide emission reduction impacts of delaying regulating this category are small relative to the impacts of regulating subparts AAA and QQQQ. Fewer than approximately 1,000 masonry heaters are manufactured each year and a total of less than 10 tons per year of $PM_{2.5}$ are currently emitted. In comparison, wood burning appliances covered by subparts AAA and QQQQ currently emit more than 11,000 tons per year of $PM_{2.5}$.[34] After we receive additional information from MHA and others, we will consider taking final action for new residential masonry heaters in a future rulemaking. The EPA has reviewed all comments related to subpart RRRR and includes their summary below for informational purposes. The EPA appreciates these comments, which may be useful for a future rulemaking, but offers no specific responses to comments at this time.

Chapter 5 presents comments specifically related to masonry heaters and the NSPS requirements that the EPA proposed to regulate masonry heaters (40 CFR part 60, subpart RRRR). Refer to Chapter 2 for additional overarching comments, generally applicable to all subparts of the proposed rule. Refer to Chapter 6 for comments regarding test method procedures.

5.1 Emission Reduction and Benefit Estimates

5.1.1 Comment: Masonry heaters as clean burning devices

Commenters (1397, 1405, 1426, 1503, 1519, 1525, 1528, 1537, 1556, 1568, 1574, 1579, 1627) discuss the clean burning attributes of masonry heaters and how they contribute to low emissions compared to other wood heating devices. Commenters (1519, 1528, 1537, 1556, 1568) assert that compared to wood stoves, hydronic heaters or fireplaces, masonry heaters are very clean burning because there is minimal user input and they deliver heat when not burning. Commenter (1426) reports that their heaters use open air burn and with no adjustments, burn cleanly.

Commenters (1397, 1503, 1574) stress the different characteristics of masonry heaters as compared with other wood-burning appliances. Specifically, the commenters (1397, 1503, 1574) report that differences in characteristics such as long residency time of combustion gas, high burn rate temperature and high turbulence result in clean burns and limited operator input which they report helps to ensure good real life emissions numbers.

[34] Memo to USEPA, from EC/R, Inc. Residential Heater Manufacturer Cost Impacts. January 2015.

5.2 Benefit, Cost and Economic Impact Estimates

5.2.1 Comment: Cost of R&D and certification

Commenters (1397, 1503, 1574) assert that many masonry heater manufacturers are switching from underfire air to overfire air designs. The commenters (1397, 1503, 1574) state that this design change has a significant impact on production costs. The commenters (1397, 1503, 1574) report that if certification tests had to be conducted on every masonry heater, the cost impact would be around $15,000 ($10,000 for the test itself and about $5,000 for building the heater at the lab and taking it down). According to the commenters (1397, 1503, 1574), the total cost impact on the industry is unknown but they predict that the sales volume would severely drop.

Commenter (1560) estimates that it would cost $40,000 per unit to go through the certification process and that it would drain resource staff as the staff would need to work on the certification process as a result of the proposal. The commenter (1560) asserts that this would result in a loss in sales. The commenter (1560) states that the masonry heater market is marginal and they cannot afford those expenses in the proposed 6-month time frame for compliance.

5.2.2 Comment: Cost of masonry heater construction

Commenters (1405, 1519, 1525, 1528) note that the preamble states that contractors profit an average of $5,000 per heater. According to commenters (1405, 1519, 1528), this is inaccurately high. The commenters (1405, 1519, 1528) state that they are contractors and that their project costs cover materials, labor, and maintenance of equipment and that competition from other builders and alternative appliances limit profit. Commenter (1525) adds that they believe that the EPA's proposed regulations will put masonry heaters at a disadvantage from a cost consideration compared to other heating appliances that are produced in factories.

5.2.3 Comment: Economic impact versus benefits

Commenter (1646) expresses disappointment with the proposed regulation for masonry heaters in subpart RRRR because the details of the regulation have not yet been worked out and manufacturers face a limited 60-day period in which to certify product(s) after the rule is promulgated. According to the commenter (1646), under these conditions, their small installation company will have to leave the market in all but limited cases of installing products of manufacturers large enough to meet the costs. The commenter (1646) adds that even larger manufacturers may not be able to bear such costs.

Commenter (1496) notes that masonry heaters are an extremely small part of the market for residential wood heaters, and that the 730 units sold in 2008 represent less than two-thousandths of 1% of sales that year (according to Frost & Sullivan data). The commenter (1496) also notes that although the EPA is unable to produce a net benefit estimate for subpart RRRR, the "weight of the evidence suggests that regulation of masonry heaters under subpart RRRR will likely produce little benefit; will almost certainly not produce benefits in excess of the costs of compliance; and may disadvantage independent domestic artisans relative to larger foreign

manufacturers whose economies of scale are more adaptable to an entirely-new regulatory regime".

5.3 Appliances Subject to Subpart

5.3.1 Comment: Inclusion of masonry heaters in NSPS

Supports inclusion of masonry heaters in the NSPS:

Commenters (1397, 1469, 1503, 1560, 1574, 1584) support the inclusion of masonry heaters in the NSPS and welcome the EPA's efforts to include the industry into the fold of certified solid fuel burning devices. Commenters (1469, 1584) note that state and local regulatory agencies throughout the Western U.S. are progressively regulating solid fuel burning devices and that, consequently, non-certified devices can be left out of these regulations resulting in them being squeezed out of the market.

Commenter (1365) commends the EPA for certifying masonry heaters under a discrete subpart so that states/local agencies will not have to rewrite their rules for nonattainment areas in order to continue to prohibit their sale and installation. Commenter (1365) states that it is critical to maintain this distinction in the final rule so that certification is not used to reintroduce the sale of masonry heaters in areas of the country that currently prohibit them.

Opposes inclusion of masonry heaters in the NSPS:

Commenter (1405) states that if outdoor fireplaces and bread ovens can be exempt from the NSPS, so should masonry heaters. Commenters (1519, 1528, 1556) assert that there is no need to regulate masonry heaters as strictly as other wood heating appliances which only burn clean in a narrow window of operation.

Commenter (1646) is troubled by existing Washington and Colorado state regulations and pending regulations in other jurisdictions. Commenter (1646) states that the net effect of regulation has been to limit builder's entry into these markets because of the high cost of certification and the impossibility of testing/certifying masonry heaters because of their differences from other regulated products such as fireplaces and metal wood stoves. According to the commenter (1646), the number of available consumer options is severely curtailed. Finally, commenter (1646) notes that the added costs to the consumer for tested/certified products has also limited the market for masonry heaters in these jurisdictions.

Commenters (1519, 1528, 1537, 1569) add that masons cannot be regulated in the same way as factories and that masonry heaters are custom constructions that cannot be regulated as mass produced wood stoves. Commenter (1525) agrees that they should be able to follow a pattern of design with known materials, meeting tolerances defined by specific codes and fabricated by highly skilled tradesman that meet clean air standards regularly. According to commenters (1519, 1528, 1568), a few simple guidelines defining the firebox and its air distribution system should be enough to guarantee clean burning.

Commenter (1496) recommends "without reservation that the entirely subpart RRRR be discarded, and not adopted alongside the remainder of the proposed rules".

According to commenter (1525, 1537, 1569), it would be a "tragedy" and a "shame" if masonry heaters were regulated out of existence because of limits imposed by subpart RRRR. Commenter (1537) reports that they would stop offering masonry heaters to customers if they are required to certify or lab test their heaters. Commenter (1569) states that the limitations of subpart RRRR would put them out of business, which they opine is a "shame" because masonry heaters benefit the environment and are a good use of the abundant wood resources in their state.

Commenter (1521) opines that, given the small population of masonry heaters in the U.S. and the considerable efficiency of such units, regulation at the local level, either by states or communities may be more appropriate than at the federal level.

5.3.2 Comment: Definition of "residential masonry heater"

A few commenters (1397, 15774, 1646) recommend changes to the definition of "residential masonry heater":

- Commenter (1397) recommends a definition of masonry heater that includes reference to their heat storage capacity to distinguish these devices from some forms of masonry fireplaces. The commenter (1397) notes that a test method for rocket stoves, which are essentially a variant of masonry heater, is under current development. Commenter (1397) believes these devices are likely to increase in popularity and application so it may be wise to include them within the masonry heater category.
- Commenters (1397, 1503, 1574) suggest updating the definition so it includes some performance criteria and ensures adoption of BSER. The commenter (1574) provides suggested text on p. 16 of their comment letter as well as an additional definition of "masonry materials" on p. 17.
- Commenter (1646) suggests that a lower weight limit of perhaps 800 pounds could be established in the definition of masonry heaters. The commenters (1397, 1503, 1646) report that masonry heater technology is amenable to lighter units and today's smaller and tighter houses are demanding them.

5.3.3 Comment: Definition of masonry heater "manufacturer"

Commenters (1397, 1503, 1574) state that the current "manufacturer" definition in subpart RRRR would result in distributors and dealers of manufactured masonry heaters qualifying as large manufacturers as well as suppliers of pre-fabricated elements of refractory cores. To avoid this, the commenters (1397, 1503, 1574) recommend extending the definition to clarify that for site-built appliances, manufacturer means any person who constructs or imports into the United States a residential masonry heater and for factory-built appliances, manufacturer means any person who constructs or imports into the United States the pre-fabricated components of a complete masonry heater.

5.4 Best Systems of Emission Reduction for Masonry Heaters

5.4.1 Comment: Data supporting BSER

Commenter (1646) states that the vast majority of the masonry heaters installed have never been emissions tested. According to the commenter (1646), only representative samples by a few individual and well-financed builders have been tested and it must be assumed they were the most rigorously designed and manufactured. Commenter (1646) believes that there is no current acceptable standard for determining masonry heater efficiency and no there is no data that such a standard would generate to determine what Best Demonstrated Technology (BDT now BSER) is for masonry heaters.

Commenter (1646) believes the BSER must be based on testing at least close to the EPA's final required testing and account for great uncertainty. Commenter (1646) describes the available test data that is based on limited testing with ASTM E2817 (and those tests likely do not conform with the final version of the standard) and data submitted by the Masonry Heater Association (EPA-HQ-OAR-2009-0734-0110 and -0156) based on a testing methodology that the EPA rejected in the original NSPS (Oregon Method 46 or Condar) and conducted under sub-par conditions (tests conducted in the non EPA-accredited facilities to unknown rigor and tests conducted by manufacturers on their own products in "labs" they claim to own). Commenter (1646) adds that testing results are of unknown variability, especially due to limited data. Commenter (1646) opines that the best analysis of the state of existing masonry heater test data is presented in a paper submitted by HPBA (see Docket ID No. EPA-HQ-OAR-2009-0734-0058).

5.5 Particulate Standards – Masonry Heaters

5.5.1 Comment: Form of the standard

Supports an efficiency format:

Commenter (1479) suggests that the test method for masonry heaters be based on 24-hour burns. Commenter (1479) supports determining a g/BTU/day standard as that is a number that would be valuable to consumers.

Commenter (1579) states that the emissions tests should reflect the efficiency masonry heaters exhibit when heat is emitted after the fire is out.

Supports a g/kg (lb/kg) of pollutant/fuel fired format:

Commenters (1000, 1469, 1521, 1542, 1556, 1574, 1577, 1584, 1627, 1646) recommend measuring emissions from masonry heaters in g/kg (lb/kg) of pollutant/fuel fired as per current Colorado and Washington standards. Commenter (1577) states that a g/hr limit is not suitable for masonry heaters because a wood stove only provides heat while it is actively burning, but a masonry heater is burned for a small portion of the day and provides heat for extended periods of

time long after the fuel is fully combusted, resulting in a low daily g/hr average. Commenters (1542, 1556, 1574) recognize that reporting PM emissions in pounds per MMBtu is technically the best choice because it relates emissions to the actual heat output of each appliance, meaning that its efficiency is taken into account. However, commenters (1574, 1577) assert that there are three issues with this reporting format:

- ASTM E2817 only recognizes grams of particulate per kilogram as a reporting unit.
- An efficiency testing method still needs to be specified for masonry heaters.
- There is very little original data reported in lb/mmBtu as most test data is reported in g/kg.

The commenter (1574) adds that conversion from grams/kg is only possible if the fuel load and the efficiency during the test run are known. The commenter (1574) states that information regarding the fuel load and efficiency is available for all models tested to meet the Washington emission standards. Commenters (1574) suggest that the EPA require the g/kg as an emission reporting format until an efficiency testing method is specified for masonry heaters and that ASTM E2817 be revised accordingly. Commenter (1574) adds that if the emission reporting formats are different, the EPA should provide a simplified conversion.

Commenter (1542) recognizes that an efficiency testing method (e.g., the Condar Method) will either have to be adopted in the future, the CSA B415.1-2010 method will need to be modified to accept masonry heaters, or a new method will need to be created through ASTM, which they state is a long and arduous task.

Commenters (1546, 1647) state that there have been some preliminary efforts to develop an efficiency test method for masonry heaters, but there currently is no recognized test method for determining the useful heat output of a masonry heater in either North America or Europe. Commenter (1647) notes that the EPA proposes to use ASTM E2817-11 "Standard Test Method for Test Fueling Masonry Heaters" for masonry heaters and there are not any procedures specified in ASTM E2817-11 that would enable a person to determine the useful heat output of a masonry heater. Commenter (1546) notes that ASTM E2515-11 measures emissions in grams of particulate per hour while ASTM E2817-11 measures emissions in (1) grams of particulate per kilogram of dry fuel, (2) grams of particulate per hour of heating cycle and (3) grams of particulate per hour of test run. Commenter (1546) states that ASTM E2817-11 stipulates that the builder or manufacturer of a masonry heater shall provide the minimum and maximum designed heating capacity in kilowatts (BTU/hr) but does not provide a method for measuring heat output. Thus, commenters (1546, 1647) conclude, the g/kg emission factor format is the only option available for an emission standard and there is substantial amount of data available that uses this format.

Commenter (1397) believes that while there is some confusion within the general public about these differing metrics, it is hoped that a future NSPS will restructure emissions from all classes of wood-burning devices into a pounds of particulate per MMBtu of delivered heat output basis and thus eliminate confusion. This, according to commenter (1397), coupled with mandatory efficiency reporting, will create the basis for easy comparison of devices based on environmental

impact or efficiency or both. Commenter (1397) asserts the masonry heater industry is amenable to a lbs/MMBtu format but the EPA will need to establish or recognize an efficiency method to enable that option. Commenter (1521) states that in their consultations with masonry heater manufacturers, a standard expressed that units of pounds of pollutant per kilogram of fuel fired would take into account the efficiency of the unit and the unique burn profile of a masonry heater.

Supports a g/hr format:

Commenter (1513) believes the EPA should establish an emission limit based on g/hr. Commenter (1513) states that unlike the standards for non-masonry wood heaters, the proposed allowable emission rate for masonry heaters is based on the mass of fuel burned, which allows very high hourly emission rates for large capacity units which contributes to very significant short term spikes in ambient concentrations of PM. In addition, commenter (1513) asserts very large masonry units may have a lower effective efficiency when smaller charges of fuel are used.

Commenter (1513) recommends that if the EPA retains an emission rate based on lbs/BTU output, the EPA should establish tighter limits on larger units, or establish a supplemental standard that caps the total mass emissions. Commenter (1513) notes the Northern Sonoma County Air Pollution Control District has restricted the installation of all masonry systems (heaters and fireplaces) since 1995 to those that meet an emission limit of 7.5 g/hr and if the EPA does not cap the hourly mass emissions from masonry heaters it would undermine the District's long-standing regulation and potentially allow installation of dirtier units. At a minimum, commenter (1513) requests that the emission standard for masonry heaters (§ 60.5486(b)) explicitly state the basis for demonstrating compliance, and opines that it should be based on the combustion cycle.

Commenter (1513) asserts the circular references in the test methods make it very difficult to determine whether compliance is based on the combustion cycle emission rate or the heating cycle emission rate, noting that the difference in allowable emissions is considerable, with the heating cycle rate being much higher. Further, commenter (1513) states the heating cycle emission rate is based the manufacturer's recommended fueling rate, which is arbitrary and may have little bearing on how the device is actually used. Commenter (1513) believes compliance should be based on an objectively determined time period that corresponds to the sampling period - the combustion cycle. Commenter (1513) recommends requiring compliance calculations to be based on the mass emissions during the sampling period as determined by flue gas oxygen levels relative to prestart conditions.

5.5.2 Comment: Level of the standard

Supports EPA's proposed limit:

Commenter (1520) supports the EPA's proposed PM emission limit of 0.32 lb/mmBtu heat output.

Support setting a limit based on g/kg:

Commenters (1469, 1556, 1574, 1577, 1584) recommend setting the g/kg emission limit at 4.5 g/kg. Commenter (1574) states that the rate of 0.32 lb/mmBtu is not based on test data or test methods specific to masonry heaters; it is the emission limit set for hydronic heaters and forced-air furnaces. The commenter (1574) adds that masonry heaters are already clean burning and the majority of tests done by Lopez Labs since 2008 are under the proposed limit. The commenter (1574) states that these tests show that operator-related factors such as sizing of the fuel, the way it is loaded in the firebox and the way it is ignited (bottom, side or top ignition) have a considerable effect on emissions and this is why manufacturer's instructions are critical at ensuring the appliance will be clean burning.

According to commenter (1574), when it comes to design factors, emissions are mostly affected by the air distribution system and three main configurations:

- Underfire air (large central grate on which the fuel load is placed): 4.5 g/kg
- Overfire air (small grates near the edges of the firebox floor and/or an air frame): 1 to 2 g/kg
- Eco-labelled firebox (no grates, air injected through slits in walls): 0.5 to 1 g/kg

According to commenter (1574), most builders are in the process of moving away from the underfire air design, overfire air is current BSER and the eco-labelled firebox design is a promising innovation from the Austrian Kachelofen Association and it will be compulsory in Austria in 2015. The commenter (1574) states that this third design is in the early stages of being adapted by MHA to North American heaters, which are larger than European ones. According to commenter (1574), test data from Lopez Labs is currently limited to two heaters and it is too early to be considered BSER. The commenter (1574) adds that Tulikivi has received approval for 50 models in the State of Washington and these include some older designs that fall in the 2 to 3.8 g/kg range. The commenter (1574) states that if the emission limit was set at 2 g/kg, only 13 models could be grandfathered while at 4.5 g/kg, the tally would be 29 models. For this reason, the commenter (1574) proposes 4.5 g/kg as the emission limit, at least during the early stages of regulation.

Commenter (1577) adds that a compliance margin of at least 30% should be factored into the testing standard for masonry heaters. Commenter (1577) states that emission testing using current methods regularly varies by 25-33% and the new ASTM E2817-11 standard is likely to demonstrate similar variability. Citing the 2012 Ferguson & Menotti paper, the commenter notes that "The in-situ, Colorado/Washington State ESS and Lopez Cooperative Labs Condar® datasets show a range of emissions performance from 0.5 to 6.2 g/kg. [This] data can't be used quantitatively, because the methods are too dissimilar to ASTM E2817-11 and ASTM E2515. However, they do provide a qualitative insight into the possible range of PM emissions performance that might be expected in a more comprehensive E2817-11 data set." According to commenter (1577), this proposed standard could disqualify many of Tulikivis current models in North America.

Commenter (1646) states that a final standard of 4.5 g/kg is a significant drop from Washington (7.3 g/kg) and Colorado (6.0 g/kg). Commenter (1646) adds that the existing usable data cannot support a lower limit because better than half of masonry heaters sold and installed in the U.S. have never been tested by model or design; they are custom site built and the tested units have been almost all manufactured units. Also, commenter (1646) states that the tested units have been tested by a variety of methods and with fueling (cribs) which EPA has indicated will not be that in the final regulation. Finally, commenter (1646) notes that, given masonry heater intermittent firing, it will be very low compared to allowable wood stove emissions.

Commenter (1000) supports the use of EPA Phase 2 qualified (emit less than 5.1 g/kg of particulates as measured by ASTM E-2558), clean-burning masonry fireplace technology as a best management practice for improving air quality in nonattainment areas and encourages air quality regulators to include these fireplaces in implementation plans to reduce particulate emissions.

5.5.3 Comment: Phase-in of compliance timeline

Commenters (1469, 1560, 1574, 1584) request that the EPA extend the compliance dates to meet new regulations for large manufacturers from 60 days to 5 years. Commenters (1560, 1577) are concerned that average testing turnaround times are more than 60 days. The commenters (1560, 1577) opine that, because of the testing turnaround time combined with the limited number of EPA accredited testing facilities, there could be possible delays of data analysis, laboratory log jams and the time associated with formatting and submitting tests to the EPA using the Electronic Reporting Tool (ERT). According to the commenters (1560, 1577), if the compliance dates are unchanged before promulgation, this proposed rule will create a significant barrier to the commenters' (1560, 1577) ability to sell their products. Commenters (1560, 1577) request that the EPA allow large manufacturers a 5-year implementation timeline, similar to the requirement for small manufacturers (§ 60.5486(a)(2)). Commenter (1574) states that large manufacturers will need 5 years to comply with the standards if they are unable to grandfather models that were already tested.

Commenter (1646) states that the masonry heater industry is new to the NSPS and is facing a proposed regulation that will change (final test method, final emission limits), uncertain impacts on their product lines and the need to conduct potential R&D, certain certification testing, labeling, marketing, etc. The commenter (1646) concludes that EPA should allow a much longer compliance timeframe.

5.6 Certification of Masonry Heaters

5.6.1 Comment: Clarification of "small manufacturers"

Commenter (1646) describes three scenarios for building a masonry heater design in their commenter letter. The commenter (1646) requests that the EPA clarify the conditions that qualify a manufacturer as "small" based on the source of materials (local brick from a local supplier, using manufactured refractory core materials combined with other local materials or using an

entire manufactured kit), and how manufacturers are to keep track of whether they meet the < 15 units per year requirement. Commenter (1646) opines that the EPA must identify the producer for the purposes of the" < 15 units per year requirement" as the actual installing contractor and to create market value for the certified product enough to enable manufacturers to provide it.

5.6.2 Comment: Certification process

Certification testing notification waiver for small manufacturers:

Commenter (1574) states that § 60.5488 (e) requires a 30-day notification period prior to testing. The commenter (1574) asserts that this requirement adds another 30 days to an already lengthy certification process which they state is not compatible with the way small manufacturers of masonry heaters conduct their business. The commenter (1574) suggests this requirement be waived for small manufacturers.

Support for model line certification approach:

Commenter (1171) concurs with the proposal for initial certification of masonry heaters. Commenter (1171) believes initial evaluation of the manufacturer's QA system, and evaluation of the heater itself (either through testing or computer simulation), gives a reasonable assurance in the quality of the certification system for these types of products. Likewise, commenters (1469, 1584) request that the EPA allow certification of a model from a 'model line' to be representative for that entire model line.

Commenters (1574) describe the basis for the model line approach in the 1988 NSPS and why that should apply to masonry heaters in the present day. The commenter (1574) states that having to test each heater would put the industry at risk because the masonry heater manufacturers would face a competitive disadvantage as certification costs would be higher than in the other industries regulated by the NSPS, the cost of certification would be incompatible with sales volumes and the length of the certification process is not compatible with the way small manufacturers operate.

Opposition to model / model line certification approach:

Commenters (1426, 1521, 1542, 1556, 1574) do not support the testing of individual models for compliance. Commenters (1426, 1521) state that the individual testing of each masonry heater is unacceptable based on the huge expense of such a test and the inappropriateness of conducting such testing at private residences. The commenter (1521) suggests that the EPA consider approving models based on a computer simulated design.

Commenter (1405) reports that they only build four to five heaters per year and do not have the monetary resources or time to certify every heater they build.

Certification based on "substantially similar" models:

Commenters (1397, 1579) suggest including a provision to allow for the complimentary certification of units found to be substantially similar.

Commenters (1574) propose use of an alternative certification approach similar to the "substantially similar" approach used in Colorado and Washington states, which would allow construction of a unit with a small percentage variation (i.e., ±20%) from the certified model/design without re-certification. The commenter (1574) notes that existing test data for several Tulikivi heater models, which are all similar scaled versions of essentially the same design, show similar emission levels despite of the size differences, and in-house test data on one of Tulikivi models with standard and extended heat exchange portion shows that larger size does not have negative effect on emissions. The commenter (1574) adds that verification of dimensions of site-built masonry heaters under a "substantially similar" method can be put in the hands of independent third party inspectors such as certified chimney technicians or certified home inspectors, which would expedite timely certification and reduce costs of the certification process. The commenter (1574) reports that they have developed sample spreadsheet computer programs that could be used for such field verification. Commenter (1574) adds that such spreadsheet programs can calculate compliance automatically, according to entered measurements, and provide results, which cannot be influenced by the inspector.

Commenter (1574) proposes a provision to allow the certification of a "family of units" if successful performance of heaters within the proposed higher percentage of variation and within extremes of the family of units is proven by testing at an EPA-accredited laboratory. The commenter (1574) states that this would provide additional tools for alternative certification, while stimulating development of the better technology.

Commenter (1577) notes that the Tulikivi product range consists of model lines with similar firebox designs. According to the commenter, of the 55 models, many are identical to other models within the model line, differing only in cosmetic changes to the exterior soapstone veneer. The commenter (1577) adds that other models within a model line have small variations in firebox size and heat exchangers, yet maintain a close resemblance to other models in that model line, including identical combustion air intake inlets and exhaust outlets.

According to commenter (1577), previous European and U.S. testing has shown that firebox design is the overriding factor in controlling emissions of masonry heaters. Commenters (1519, 1528, 1566, 1569) believe that the fireboxes should become the defining factor for certification, not the whole unit. Commenter (1542) states that the main thing that differentiates the major styles of heaters is in the heat exchange channels or basically everything after the firebox. According to commenter's (1542) test data, what happens in the firebox is what effects emissions, while the length and configuration of the heat exchange channels is what affects the efficiency of the unit. Commenter (1542) notes that it is possible to change the size and configuration of the heat exchangers using the "substantially similar" approach in Washington and Colorado and not adversely affect emissions. Commenter (1542) stresses that it is also important that manufacturers' instructions are necessary because you can get two times the emissions by starting the kindling on the bottom of the wood stack as opposed to the top or the side.

Commenter (1577) argues that Tulikivi Custom models, which comprise up to 30% of North American sales, using established fireboxes from approved model lines should be accepted as EPA approved models, much like what the states of Colorado and Washington have done with their 'substantially similar' allowances for masonry heaters that are similar to tested models. Commenter (1646) also supports the Washington and Colorado "substantially similar" provisions because they allow variation in construction dimensions within defined limits and only if the original model tested was enough below the tested limit to allow variation.

Certification requirements for licensed model lines:

Commenter (1574) objects to the requirement that if one entity licenses a model line to another entity that each model line must be certified and that if an entity changes the name of the entity or the name of the model, the manufacturer must apply for a new certification. Commenters (1542, 1574) state that small masonry heater manufacturers will need to be able to license certified designs without being required to recertify them. According to commenters (1542, 1574), this will allow the spreading of certification costs and let MHA and/or large companies carry most of the burden of certification. Commenters (1542, 1574) describe the collaborative nature of the masonry heater industry and concludes that most masonry heater designs in North America are open source (except certain Austrian "calculated" designs) and the licensing of certified designs is needed to ensure it stays that way.

Commenter (1405) states that if they must adhere to a handful of pre-certified heater designs that are tested and licensed, they should be allowed to use licensed designs as small independent contractors, even if a guild or trade organization is the one who holds license to the design. Otherwise, commenter (1405) states that small contractors like themselves will be driven out of business. Commenters (1519, 1525, 1566, 1568, 1579) stress that they cannot function without being able to license models that were certified by another build or the MHA without having to recertify. Commenter (1542) opines that it would be inconceivable to require each unit be lab tested and certified or recertified if the same unit is built by a different mason.

Design tolerances allowing model line certification:

Commenter (1574) proposes several regulatory changes to ensure the feasibility of "model line" testing of masonry heaters. First, the commenter (1574) suggests that the definitions of "model line" and "representative affected masonry heater" in § 60.5485 be amended so that a model line becomes a group of units that have enough in common to be certified only once and that the representative affected masonry heater becomes truly representative of a model line (suggested revisions included on page 5 of 1574). The commenter (1574) explains that this can be accomplished by acknowledging that, in a masonry heater, emissions are affected by the way the firebox is designed and built and that it would be the only component that would need to be subject to the "similar in all materials respects" clause and stay within the "design tolerances" of § 60.533(k)(2).

Commenter (1574) provides the following comments and additional changes to facilitate the goal that a model line becomes a group of units that have enough in common to be certified only once and that a representative affected masonry heater becomes truly representative of a model line:

- Support the exclusion of heat exchangers and heat storage components from the § 60.533(k) list of design changes that would result in a need to recertify a model line when certain tolerances are exceeded. The commenter (1574) agrees with the EPA that changes to these components "may not reasonably be anticipated to cause wood heaters in the model line to exceed the applicable emission limits". Commenter (1574) provides an example of a Tulikivi model line that relies on a single European certificate of conformity because all variations are based on the same firebox. The commenter (1574) provides suggested definitions to implement this change (p. 5-6 of comment letter).
- Revise § 60.533(k)(2)(i) "[f]irebox: dimensions" to include "internal" (i.e., "[f]irebox: internal dimensions"). According to the commenter (1574), this change creates an advantage in testing when a draft inducer is used, where a representative firebox of a masonry heater model line could be tested for emissions without having to completely build the heat exchanger and the facing. The commenter (1574) reports that this practice is becoming more common in Austria and Germany.
- Increase the design tolerances to ± 0.5 inches in order to take into account the tolerance customary to masonry construction.
- Ensure that firebox doors are not on the list of key components. The commenter (1574) explains that emissions are not affected by the size of firebox doors as heat losses are under 5% of the total heat output of a masonry heater and air inlets built in doors are declining in use.

Commenter (1577) notes that the ¼" tolerance articulated in § 60.533(k)(2)(i-xi) was clearly written with factory produced metal stoves in mind and it cannot be realistically applied to hand built and site assembled masonry heaters constructed with masonry and refractory components. Commenter (1577) suggests that masonry heater model lines and model definitions be based on the much more applicable part § 60.5485 of the proposal which states that a "model line means all residential masonry heaters offered for sale by a single manufacturer that are similar in all material respects…" Commenter (1577) recommends that the tolerance for the door dimension be ±10% and that the tolerance for firebox dimension be allowed to vary by ±10% in area and ±15% in volume within a model line.

Commenter (1525) states that to suggest that every heater must match a certified dimension within a ¼" tolerance disregards one of the most basic attractions of such heaters in that they are customizable to the purchaser's specific application. Commenters (1519, 1525, 1528, 1566, 1568) are concerned if the 0.25 inch tolerance requirement stands, they would be required to certify every single heater they build, which they assert is not realistic and that they would need to stop building masonry heaters. Alternatively, commenters (1542, 1556) are also concerned that they would have to resize each brick, which would increase the cost of construction beyond the realm of most projects.

Commenter (1646) notes that the standard 2.5 x 4.5 x 9” firebrick sold around the country may vary as much as a half an inch per brick from manufacturer to manufacturer. Therefore, according to commenter (1646), a standard industry firebox design of three bricks wide means significant variation for the same design built from them even though the ultimate emissions will not vary. Commenter (1646) asks for flexibility in working with the laboratories to develop quality analysis/quality control programs. Based on commenter’s (1405) experience in building masonry heaters and variations in firebricks, the commenter (1405) suggest that tolerances be adjusted to 0.75 inches, which is not enough to significantly change the efficiency and cleanliness of combustion with the heater. Commenters (1519, 1528) suggest that the allowed tolerance for masonry work be increased to 0.5 inches to address variability in firebrick thickness.

Commenters (1519, 1528) state that changes in the firebox often exceed the allowed tolerance (even if increased to 0.5") without affecting its performance: using a different door implies a change of about 4", adding a second firebox door requires changes over 16", a taller firebox because the client burns softwood instead of hardwood requires an additional course (4.5"). The commenters (1519, 1528) assert that there is a need more variability than simply the allowed tolerance.

Commenter (1405) is concerned that the regulations do not take into account how frequently they have to make minor, but important changes in the practice of applying tried and true heater designs to homes, especially when the homes are preexisting and the project is a retrofit. Commenter (1405) states that there needs to be allowances for the flexibility needed to make these projects work in the spaces available.

Testing provisions:

Commenter (1579) states that all manufacturers should be on the same playing field with real world, third party testing.

Commenter (1646) asserts that there is a need to make masonry heater testing costs as streamlined as possible to keep certified products affordable. Commenter (1646) suggests that the EPA allow the emissions number to be based on one accredited testing run as done in the Washington and Colorado testing. Commenter (1646) states that using the average of three runs would triple laboratory costs and provide no additional benefit because masonry heaters in place burn pretty consistently.

Commenter (1646) stresses the need for masonry heater manufacturers to be able to get emissions testing services from laboratories from which they can also get R&D information. The commenter does not have his own lab and does not want to be put in the situation of having to pay two labs when they are not even sure they can pay for one.

Commenter (1627) states that test procedures for masonry heaters should include the burn method that works best for masonry heaters. Commenter (1627) has found that a top-down burn

is the most efficient and the most effective, and the commenter (1627) believes that the Masonry Heater Association and other experienced bodies would agree.

Length of certification period:

Commenter (1577) notes that the 5-year model line certification lifetime (§ 60.5487(d)(2)) does not take into account the complexity and time line of the R&D process necessary for the development of new technologies. The commenter's (1577) North American sales to model ratio (~300/year: 55 models) is so low, as to make such a requirement unattainable. Commenter (1577) advises that the certification lifespan be extended to 10 years, which would be more appropriate given the high cost of unit testing and the small volume of units shipped annually.

Quarterly audits by certifying entities:

Commenter (1646) states that for masonry heater manufacturers, required visits by lab representatives to manufacturers need not be often given that most units are site built and that the largest masonry heater manufacturers make at most a few dozen units. Commenter (1646) adds that they do not believe that there is any purpose accomplished beyond what photo documentation and reporting would entail.

Commenter (1646) supports the EPA's proposal that initial certification for small custom unit manufacturers is sufficient and no further quality control is needed because each unit is a unique model and subject to certification.

5.6.4 Comment: Computer model simulation program as alternative certification process

Commenters (1469, 1584) request that the EPA allow industry to continue the development of expanded 'alternate certification' through computer modeling.

Commenter (1574) agrees that allowing an alternative certification process based on software simulation instead of performance testing is ideal for appliances that are site-specific, because software simulation allows the testing of unique designs in specific conditions so that proper function is ensured and guarantees their performance in terms of emissions. However, the commenter (1574) expresses concern about the requirement that the results of each simulation test be submitted to both a lab and the EPA, which they believe would result in a long and costly procedure. The commenter (1574) states that the length of the software certification process is not compatible with the way small manufacturers operate and waiting several weeks for approval of an installation would jeopardize their activity. Commenter (1574) points to Austria, where eco-labelled fireboxes will be compulsory in 2015, the use of a simulation program is optional and a three-page document is all it takes to describe the rules of these new fireboxes. Commenter (1574) proposes the following procedure:

- Manufacturers submit individual simulation results to a single accredited lab with purposely trained personnel (MHA is currently discussing this with an EPA accredited laboratory) for review, certification and label deliverance.

- The centralizing EPA accredited lab submits a summary of simulation results and a list of certified heaters on a regular basis (e.g., quarterly, semi-annually).

According to the commenter (1574), the benefits of this approach would be a shorter waiting time for manufacturers, a single stop procedure for manufacturers and reduced workload for the EPA.

Commenters (1542, 1556) state that EN 15544 is a great start, but will not work with the majority of popular North American models. According to commenters (1542, 1556), other alternative calculations need to be allowed that will encompass all masonry heater types. Commenters (1405, 1519, 1525, 1566) state that most of the heaters they build are Finnish Contraflow designs and other designs not supported by the current software and the proposed computer program will not be applicable to them until it is adapted to work with this design. Even then, commenter (1405) states, the costs of the program could be prohibitive.

Commenter (1646) states that EPA should accept conformance to tested mathematical models if a lab approves. Representative models were tested in Europe to ASTM E2778 (limited testing here to U.S. criteria supports their results) to verify the method and units can be approved without ever physically testing them because they are verified to be within the parameters of the model. Commenter (1646) states that the Austrian masonry heater builders can thus continue building affordable custom heaters with the regulators ensured they meet Europe's strictest emissions limits. Commenter (1646) believes that the EPA should accept this group of masonry heaters as certifiable even though only a smaller percentage of American masonry heaters will conform to this model.

Commenter (1646) notes that other mathematical modeling is possible and there are groups working to replicate what the Austrians have done but for North American practice. Commenter (1646) recommends that the EPA allow such groups or manufacturers to work with their accredited labs to test and verify such models and then certify if the lab finds a new design conformable. Commenter (1426) reports that they have built a program that they believe is built to a higher standard than the Austrians' program. According to the commenter, the two programs (the Austrians' and theirs) are similar ant they hope that their program (the Biofire program) could also be accepted.

Commenter (1574) notes that § 60.5487(a)(3) states that "an applicant may choose to submit a computer model simulation program for review...", which implies that it is the simulation program itself that has to be sent for review when what must be sent are the results of the simulation as specified in paragraph (b)(2). The commenter (1574) believes that the fact that the administrator will post the certified model on the EPA Burn Wise website means that no such submittal is required. The commenter (1574) requests clarification.

Commenter (1574) notes that § 60.5488(c)(2) states that "If the Administrator approves an alternative computer model simulation program pursuant to § 60.5487(a)(3), the approved simulation program also may be used as an alternative to certification testing as specified in paragraphs (a) and (b) of this section." Because § 60.5488(c)(1) specifies ASTM WK26558 as

the dimensioning standard approved for alternative certification, the commenters (1397, 1503, 1574) states that the purpose of (c)(2) is to allow for another dimensioning standard than WK26558. The commenter (1574) states that there is a confusion in the language as the term "alternative computer model simulation program" is used when "alternative dimensioning standard" would be more accurate.

Commenter (1397) opposes use of the proposed EN 15544 model.

5.6.5 Comment: Recertification requirements

Commenter (1574) notes that § 60.5487(e)(2) states that "[i]f the manufacturer qualifies as a small manufacturer as defined in § 60.5486(a)(2) and the model line was certified using the procedure defined in paragraph (a)(3) of this section, the recertification provisions of paragraph (e)(1) of this section do not apply." The commenter (1574) states that one way to interpret this point is as follows: small manufacturers that use alternative certification are exempt from the re-certification requirements in § 60.533(k) i.e. +/-0.25" allowed tolerance. The commenter (1574) requests that the EPA confirm whether this interpretation is correct or rephrase paragraph (e)(2).

Commenters (1469, 1584) request that the EPA extend the proposed recertification deadlines.

Commenter (1577) notes that the 5-year model line recertification lifetime (§ 60.5487(c)(1)) does not take into account the complexity and time line of the R&D process necessary for the development of new technologies. The commenter (1577) reports that their North American sales to model ratio (~300/year: 55 models) is so low, as to make such a requirement unattainable. Commenter (1577) advises that the recertification lifespan be extended to 10 years, which they believe would be more appropriate given the high cost of unit testing and the very small volume of units shipped annually. Commenter (1577) also suggests augmenting the proposal to allow for safety-testing agencies to also be authorized to perform the recertification process as defined by this section, which could greatly reduce the overall recertification cost.

Commenter (1646) states that masonry heaters are centuries old, their design does not change much and they should not be required to retest every 5 years.

5.6.6 Comment: Compliance extension for small volume manufacturers

Support for proposed 5-year small volume manufacturer compliance extension:

Commenter (1503) supports the proposed 5-year small volume manufacturer compliance extension for masonry heaters, because these devices are already sufficiently clean-burning. Commenter (1397) believe the 5- year extension for small volume masonry heater manufacturers is reasonable, especially if the modeling software proposed by MHA is available to establish modeled emissions from units built/used in the U.S.

Commenter (1560), who sells approximately 20 to 25 units per year, proposes that they and other similar businesses may find it acceptable to increase the number of allowable masonry heater

installations to 30 heaters per year (over a 5-year period). The commenter (1560) asserts that this way they would have 5 years where they could certify 2 models per year (they currently manufacture 8 different models). The commenter (1560) reports that they believe that this change would allow them to work with the labs' turnaround time and relieve financial pressure without stopping their production.

Optional compliance for small manufacturers:

Commenter (1574) suggests that compliance should be optional for small manufacturers until the next revision of the NSPS. The commenter (1574) is concerned that much of subpart RRRR is so much geared toward mass produced appliances and, even if heavily amended, will be excessively constraining to custom built operations. The commenter (1574) believes that the effect on emissions for doing so would be minimal because this class of appliances is already clean burning and the process of adopting current BSER is well engaged.

5.6.7 Comment: Compliance extension / grandfathering for Washington- and Colorado-approved models

Commenter (1574) recommends that masonry heaters already approved by states (Washington, Colorado) be allowed the same 5-year compliance extension as small volume manufacturers. Commenter (1574) adds that if the emission reporting formats are different, the EPA should provide a simplified conversion.

Commenters (1469, 1574 1584) recommend grandfathering existing test results of masonry heaters from Colorado and Washington and approving those models that meet the new standard as EPA certified. Commenter (1574) states that this will allow manufacturers to retain the benefits of investment, maintain sales and ease the pressure on accredited test labs. Commenters (1469, 1584) clarify that grandfathering should include models recognized by Colorado and Washington as 'substantially similar.'

Due to the investment made in testing to the EPA standards, the commenter (1577) requests that the EPA 'grandfather' existing model lines & models that have previously been accredited to Colorado and Washington state standards by OMNI as "substantially similar". According to the commenter (1577), as proposed, the cost of this regulation is not feasible for them to meet.

Commenter (1577) has performed preliminary testing at its laboratory in Juuka, Finland following ASTM E2817-11 and E2515 and has compared these results (see Table 1 of the comment letter) to that of tests performed to the state standards of both Colorado and Washington. The commenter (1577) views these data as evidence that Tulikivi masonry heaters meet or exceed those states' current emission standards and that the company's previous investment in emission testing should be honored.

Commenter (1646) requests that the EPA grandfather models with emissions certification from the states of Washington and Colorado for a period of at least 5 years. Commenter (1646) states that this provision would get them past the 60-day deadline with certified product to sell.

5.6.8 Comment: Voluntary verification program

Commenter (1513) urges the EPA to continue to work with state and local air agencies to address confusion about how the voluntary masonry verification program relates to the regulatory certification program, especially in regards to the websites and the characterization of emissions, verifications, and certifications in marketing materials.

5.7 Labeling and Owner's Manual Requirements

5.7.1 Comment: Initial labeling

Commenter (1574) notes that § 60.5490 (b)(2) requires small manufacturers to label their appliances during the period when they are exempt from compliance. The commenter (1574) acknowledges that this requirement is to avoid non-certified appliances being sold once the exemption period is passed. However, the commenter (1574) believes that, since masonry heaters are permanently installed in a building and cannot be moved, this requirement should not apply to this class of appliances and it should be removed.

5.7.2 Comment: Exempt masonry heaters notification

Commenter (1513) states EPA should require clear labeling of all regulated devices and include labeling of exempt masonry devices. Commenter (1513) believes that, while maintaining the exemption from emission standards for masonry fireplaces, the EPA should add a formal notice requiring manufacturers of exempt masonry systems to explicitly state in all written materials that the system has not been found to be in compliance with any EPA regulatory standard and that its installation may be restricted or prohibited by state or local jurisdictions. The commenter (1513) states that the notification should also acknowledge any voluntary verification received from the EPA, that voluntary programs should not be confused with regulatory certification, with escalating financial penalties and loss of voluntary verification for failure to comply with this requirement.

5.8 Recordkeeping Requirements

5.8.1 Comment: Storing sealed appliances tested at laboratories

Commenters (1405, 1469, 1542, 1556, 1574, 1577, 1579, 1584, 1646, 1647) request that the EPA remove or revise the requirements for storing masonry heaters at test laboratories. Commenters (1405, 1519, 1566, 1566, 1577) request that, in lieu of the requirement to storing sealed appliances tested on site at test laboratories, that the EPA allow the detailed construction drawings (CAD drawings) of a particular tested masonry heater in the EPA testing files as adequate for future reference. The commenters (1574, 1577, 1646, 1647) provide the following support for their requests:

- Commenter (1647) notes that it is generally impossible to impose this requirement (sealing of tested appliances) on masonry heaters which are typically constructed

on the test stand, may weigh several thousand pounds and cannot be moved without dismantling or damaging them.

- Commenter (1646) states that units must be stored very near the lab as they break down when moved, which results in additional rent for storage. Commenter (1646) adds that moving masonry heaters is dangerous and expensive because of their weight and that they would require repairs before retesting. The commenter (1646) reports that one unit has been rebuilt from new components and tested in an EPA accredited lab at least five times, and the emissions numbers have not been significantly different.
- Commenter (1577) adds that the sealed storage of masonry heaters for inspection and third party testing, as described in part § 60.5491(c), would add up to an immense financial burden for the commenter. Commenters (1574, 1577) explain that masonry heaters weigh thousands of pounds, are site assembled out of hundreds of pieces of stone and ceramics using special heat resistant mortars, resulting in an appliance that is very expensive to physically assemble, move and store. Commenter (1577) adds that an additional burden is the fact that the skills to assemble and possibly reassemble for third party verification, requires an authorized installer, adding another layer of expense that will restrict their ability to maintain their current product line.
- Commenter (1574) notes that ASTM E2817 (12.1) states: "the products involved are custom built and not moveable from one lab to another and the construction of several models in multiple laboratories is deemed to be cost prohibitive."

5.9 Implementation and Enforcement Issues

5.9.1 Comment: Sell-through provisions for masonry heaters

Commenter (1577) states that the 6-month timeline for the sale of affected masonry heaters (§ 60.5486 (a)(1)) should take into account both the small annual sales and the large product range Tulikivi U.S. maintains to appeal to the heating needs of a broad customer base.

Commenter (1577) states that the 6-month timeline (§ 60.5492(b)(1)) is not adequate for the resale of affected masonry heaters. The commenter (1577) notes that the delivery time for a Tulikivi container of masonry heaters to its North American distributors is typically 2-3 months, and it may take a distributor or retailer 6-12 months to turn over inventory once it is received. According to commenter (1577), those facts, along with construction delays, can add 12-24 months to the sale and installation of a masonry heater from the date it was ordered.

Commenter (1577) asks for 3 years to sell an affected masonry heater after the effective date of final rule.

6.0 Response to Test Method Comments

Chapter 6 contains general comments on proposed test methods as well as detailed comments on specific test methods.

6.1 Test Methods – Overarching Concerns

6.1.1 Comment: NTTAA obligations to use consensus-based test methods

Commenters (1543, 1547, 1549, 1550, 1632, 1643, 1647) assert that the EPA has not satisfied its obligation to use consensus-based test methods under section 12(d) of the NTTAA and related guidance from OMB. Specifically, commenters (1543, 1549, 1550, 1643) state, the EPA improperly abandoned key components of several relevant test methods developed by ASTM and substituted government unique components in their place. According to commenters (1543, 1549, 1550, 1643, 1647), the EPA did not make either of the required NTTAA findings with respect to the components of the ASTM methods that it proposes not to use (i.e., that use of ASTM voluntary consensus-based method components would be "inconsistent with applicable law or otherwise impractical").

Commenters (1543, 1549, 1550, 1643) add that, even setting NTTAA concerns aside, the EPA's proposal to substitute government specific components in place of consensus-based test method components finds no basis in the record for this rulemaking, nor are its proposals technically sound. These shortcomings are explained in detail in comments by (1647), which commenters (1543, 1550, 1643) support in full and hereby incorporates by reference.

Commenter (1643) states NTTAA compliance requires agency adoption of relevant voluntary consensus test methods in full, except where deviations are supported by one of NTTAA's exceptions. Specifically, commenter (1643) states test methods are the sum total of a number of discrete components, with each component being an integral part of the whole, with "illegality" or "impracticality" findings implicated for each discrete test method element than an agency seeks to substitute a government-unique component for. Commenter (1643) asserts that agency participation in voluntary consensus standard (VCS) development is intended to promote agency use of VCS, and agencies must adequately justify decisions not to use applicable portions of relevant VCS.

Commenters (1543, 1549, 1550, 1643) add that the EPA is obligated to ensure that its proposed test methods support and do not interfere with its identification and subsequent implementation of BSER under section 111. Commenters (1543, 1549, 1550, 1643) assert that, to the extent that its test methods would do so, those methods are perforce illegal and cannot be justified under the CAA. Commenters (1543, 1549, 1550, 1643) state that the EPA also must ensure that its test methods are technically sound, practical and cost is reasonable to implement. Commenters (1543, 1549, 1550, 1643) assert that the relevant ASTM methods—developed through an established consensus-based, data-driven process involving the EPA, states, and industry—are fundamentally more sound than unilaterally-developed, untested alternatives proposed by the

EPA for certain appliance categories, and these ASTM methods further are fully consistent with the EPA's standard-setting obligations under section 111. Commenters (1543, 1550, 1643) assert that the ASTM and CSA methods were rigorously developed in conformance with NTTAA's expectations.

Commenters (1543, 1549, 1550, 1643) note that the EPA participated in the development of all relevant ASTM methods, as required by the NTTAA and that the EPA's position that lack of participation by states or other parties in the ASTM and CSA proceedings warrants the effective reopening of those proceedings in this rulemaking is unfounded. Commenters (1543, 1549, 1550, 1643), note the concern some states expressed regarding ASTM's Intellectual Property Policy and their subsequent resignation from the ASTM's Subcommittee E06.54 on Solid Fuel Burning Appliances, which oversees the development of ASTM test methods relevant to this rulemaking. Commenters (1543, 1550, 1643) note that states in many cases have played and continue to play a role, including agencies that formally resigned from ASTM's Subcommittee E06.54. Commenters (1543, 1549, 1550, 1643) add that one of the relevant ASTM test methods (the dilution tunnel method) was finalized before any concerns about state participation ever arose, and yet others may not have even been of interest to state regulators (i.e., masonry heater method). Commenters (1543, 1550, 1643) add that the lack of participation by states in the development of the original ASTM test method for cycling hydronic heaters (ASTM E2618), was rendered entirely moot by the recent revision of that method to conform it to EPA Method 28 WHH, a method that was developed with robust state agency (and industry) participation. Commenters (1543, 1549, 1550, 1643) assert there was key stakeholder involvement in the development of CSA's method for measuring the overall efficiency of hearth appliances, and for emissions testing of warm air furnaces (B415.1-10).

Commenters (1543, 1549, 1550, 1643) agree with the EPA's proposal to incorporate ASTM E2515-11 and CSA procedure B415.1-10 in its methods for each of the hearth appliances covered by the proposed rule. Commenters (1543, 1549, 1550, 1643) believe these methods are well supported under NTTAA and from a technical standpoint.

Response:

Section 12(d) of the NTTAA directs agencies to use VCS unless to do so would be inconsistent with applicable law or otherwise impractical. VCS are technical standards (e.g., materials specifications, test methods, sampling procedures and business practices) that are developed or adopted by VCS bodies. The NTTAA directs agencies to provide Congress, through OMB, explanations when the agency decides not to use available and applicable VCS.

As discussed in the proposal preamble, the rule incorporates some VCS by reference, including some ASTM methods and CSA B415.1-10. We could not use some ASTM test methods and other VCS because they were not applicable. The inapplicable VCS did not fully achieve the

intent of this rule or the primary mission of the Agency and many tribes, states and local agencies to protect human health and the environment.

We received a full range of comments on this issue, from complete support to adamant disagreement with our determinations. Some comments claimed that the EPA cannot take portions of VCS but rather must only use the whole VCS. We have determined that that position is inconsistent with the NTTAA goal of reducing duplication of effort. Using valuable portions of VCS helps reduce potential duplicative efforts.

Some commenters suggested that because the EPA unofficial participants in some ASTM test method development efforts did not submit official negatives, then the EPA approved all of the details of the draft methods. The EPA participants often orally expressed that the draft test methods were not fully applicable to the needs of the EPA and states but since the draft test methods may meet some of the immediate needs of the industry participants, the EPA did not want to stop the ASTM efforts to develop improved drafts. Further, the NTTAA guidance specifically states that agency participation does not indicate agency approval or endorsement.

Some commenters assert that the content of the VCS methods is inherently superior to agency-developed test methods. We disagree. Most of the wood heater test methods of today have their technical origins in methods developed by Oregon and the EPA for the 1988 NSPS that preceded a final ASTM test method. More recently, as the commenters noted themselves, in some cases the today's ASTM methods were revised after the EPA and states conducted robust analyses. The EPA test methods included in the final rule use ASTM approaches where applicable, but also include features designed to further the objectives of the final rule. The final EPA test methods have been subject to notice and comment rulemaking. For more information on the final test methods and comments on those methods, see *Sections 6.2 – 6.14* of this chapter.

We have also made changes to the list of test methods that can be used for certification under subpart AAA and subpart QQQQ under the final rule to align the BSER databases for each rule with the emission limits/test methods. We note that sources always have the option to request, on a case-by-case basis and with justification, use of an alternative test method under the part 60 General Provisions, § 60.8. Sources would use this process in the case where an approved version of a listed VCS has been updated by the consensus body, but is not yet in the list of approved test methods. In this case, the EPA collates all approved requests in an annual update to the list of approved methods and conducts rulemaking to finalize the latest versions of the methods.

6.1.2 Comment: ASTM process issues

Support for ASTM process:

Commenter (1422) asserts that preamble statements misrepresent ASTM, the ASTM standards development process, policies and the current legal environment in which they operate. Commenter (1422) asks that any concerns about ASTM policies be addressed directly with the organization and not through the rulemaking process. Commenter (1422) notes that ASTM

standards are developed through an open and consensus process by over 30,000 volunteer members, including several hundred state employees who actively participate in the process, some of whom have served in leadership positions in recent years.

Commenter (1422) is unaware of any specific state laws or policies that prohibit state government personnel from participating in ASTM standards development processes. In fact, commenter (1422) adds, OMB Circular A-119 and the NTTAA of 1995 require representatives from federal agencies to participate in the development and use of private sector VCS when it is in the public interest and practical, given the agencies' missions and needs. Regarding the EPA's comment alluding to ASTM's copyright, commenter (1422) states that ASTM's Intellectual Property Policy (IP Policy), readily available on ASTM's website, specifies ASTM's intellectual property rights and is written pursuant to the Federal Copyright Law contained in Title 17 USC. Commenter (1422) states that ASTM's IP Policy is consistent with OMB Circular A-119 which recognizes the rights of the copyright holder in standards incorporated by reference in regulations and further directs that "an agency must observe and protect the rights of the copyright holder." Commenter (1422) states that this policy enables ASTM to protect vital intellectual property and carry out ASTM's not-for-profit mission that has served the public and private sectors for over 100 years; it does not serve to create barriers of participation from any interested stakeholders.

Commenter (1527) asserts that the EPA provides no support in the docket for the preamble statement that any state's attorney general has offered any option regarding the participation of state employees in VCS development or that the process in any way requires states to give intellectual property to a standards development organization (SDO). Commenter (1527) explains that all major SDOs provide for open participation of any interested parties, including the common and extensive participation of state and local government employees. Commenter (1527) cites examples of SDOs that have public officials as key members of their board of directors as well as standards development committees.

Commenter (1527) adds that SDOs such as ASTM International, ASME, ASCE, the International Code Council (ICC), Underwriters Laboratories (UL) and the Canadian Standards Association (CSA) create standards through the voluntary consensus process through committees and technical panels that include many state, local and federal public employees. Commenter (1527) states that all of these SDOs are accredited by ANSI and follow procedures that ensure openness, transparency and broad participation by any interested stakeholders.

Commenter (1527) notes that all of these SDOs copyright and sell copies of the codes and standards they develop and the commenter provides two attachments describing this process: Attachment A is a document prepared by National Fire Protection Association that provides a further discussion of the value of the VCS process and Attachment B is a list of state and local "Organizational Members" of ASTM. Commenter (1527) states that ASTM organizational members voluntarily pay higher annual dues to support ASTM's mission.

Commenter (1527) asserts that, as chairman of the ASTM E06.54 subcommittee that developed the ASTM standards cited in the EPA proposal, commenter (1527) attests to the fact that state air

quality representatives as well as EPA officials were involved in the process and were provided with full access to working documents, meeting announcements and the ability to submit proposals, comments and votes.

Concerns with ASTM process:

Commenter (1397) believes acceptance of ASTM methods must at least be evaluated on a device-by-device basis. Commenter (1397) states, for example, that ASTM WK26558, which references EN 15544 for masonry heaters, is problematic because it does not align with the designs or fuels used in North America; and the current ASTM test method for hydronic heaters, E2780, is also inadequate because it fails to capture startup and cycling emission spikes, and only a specific hardwood test fuel.

Commenters (1397, 1427, 1551) believe the ASTM standards process is problematic for many states because of its proprietary ownership of test methods published under that process. For some states, commenter (1551) asserts it will be impossible to participate because ASTM's intellectual property requirements maintain that information developed under this process becomes the property of ASTM, precluding some states from participating due to state requirements that all work conducted with public dollars stay in the public domain. Commenter (1397) states using an ASTM method renders the testing protocol inaccessible to the public and the air quality regulatory authorities who have to rely on it for the integrity of their regulatory work and may need to revise, adapt, or amend the method. This has the potential to seriously compromise the method and the entire NSPS, asserts commenter (1397), and the EPA must address these issues and maintain transparency.

Commenters (1394, 1551) suggest some states could possibly participate in relevant ASTM processes on a representative and rotating basis, with selected state personnel reporting to all interested states regarding ASTM provisions and collecting feedback. If the EPA plans to use ASTM test methods for regulatory purposes, commenters (1397, 1551) believe it imperative that there be sufficient representation and resources to support participation by state and federal agencies. Commenters (1397, 1551) suggest the EPA solicit further input from states and serve to veto items or processes that could weaken the rigor of test methods.

Commenters (1397, 1551) suggest the EPA seek a legal agreement with ASTM allowing the publication of documents that parallel the ASTM test method but that will reside in the public domain and reflect any changes enacted by EPA, allowing states ready access to review the emissions data used to certify test results. Commenter (1397) states that if an acceptable compromise with ASTM cannot be reached, EPA should fund a qualified third party to prepare improved test methods, likewise, if EPA does not have staff with sufficient knowledge of combustion science to provide meaningful input to ASTM committees.

Commenter (1505) requests that the EPA publish all of the test standards that it is incorporating in the NSPS and restart the public hearing and comment period so that all affected persons may provide informed testimony. According to commenter (1505), contrary to the EPA's proposal statement that ASTM is allowing public review, for no charge, of the ASTM methods and draft

work products relative the proposal, the link provided includes a copyright notice declaring that the information was not to be downloaded or printed. Commenter (1505) complains that persons affected by the regulations are faced with the choice of paying a fee to see the methods or not be able to address any concerns they might have. Commenter (1505) opines that a law that is not public is not constitutional and the licensing fee required by ASTM must therefore be considered a tax upon the most fundamental right of the governed. Commenter (1505) asserts that, since the ASTM is allowing free public review of their standard, there is no reason why the EPA cannot publish them on the web or in the FR. Commenter (1505) suggests that, if due to the proprietary interest of the ASTM organization it cannot publish these methods in the FR, then the EPA should have the National Institute of Standards and Technology develop testing procedures independently.

Commenter (1397) asserts consensus-based method development does not guarantee that resulting methods comply with state or federal laws and rules but rather requires thorough regulatory participation or review to ensure that resulting methods do not weaken or violate environmental protection.

Commenter (1640) is concerned about the ASTM process for developing the test method, considering that ASTM has not yet finalized the test method. Commenter (1640) urges EPA to remain an active participant in these discussions, continue to gather input from states, and veto any processes that could weaken the test method. Additionally, because the decision process is consensus based and the majority of participants are from industry, commenter (1640) is concerned whether they will put forward a robust method. Commenter (1640) hopes the proposed cord wood test method can be finalized quickly and without substantial changes, otherwise, the EPA should develop its own improved test method so that states are not forced to develop and require a separate testing protocol.

Response:

The commenters are correct that the proposal preamble raised concerns regarding the overall ASTM process, including the intellectual property provisions. We continue our discussion with ASTM regarding process issues raised by some states. As evidenced by comments received on the proposed rule, some states maintain concerns about their ability to fully participate in the ASTM process and the implications that raises for accepting the resulting test methods. Further, some commenters expressed concerns that the ASTM process is dominated by manufacturers and laboratories that are paid by manufacturers and thus have financial interests in the outcomes.

We recognize the value of SDOs and, as explained in the final rule, have adopted several of their recommendations. However, ASTM alone is inadequate to address the full needs of the NSPS, which is why we added other methods and adjusted some ASTM methods. For example, the consensus process is not designed to meet EPA timelines for rulemaking in every instance and version updates also occur. We have approved some rules ASTM (and other SDO) methods in the final rule, and await further developments and the opportunity to review new and revised SDO test methods as potential VCS.

We agree with the commenter (1397) that acceptance of ASTM methods must be evaluated on a device-by-device basis. The commenter (1397) raised concerns regarding masonry heater test methods, but this rulemaking has been deferred. Regarding the comment that the ASTM test method E2780 is inadequate because it fails to capture startup and cycling emission spikes, we note that we have added EPA Method 28 WHH-PTS as an approved method, which does include startup and cycling emissions. In general, we note that moving forward, we are committed to developing test methods that better reflect in home use conditions, especially related to cord wood tests.

Regarding the comment expressing concerning that ASTM test methods are proprietary and not available for free download at proposal, we note that we worked with ASTM to develop a compromise to allow for the review of test methods at no cost during the NSPS public comment period. This compromise was consistent with the NTTAA and the Administrative Procedures Act. Of course, this does not extend to after the comment due to the ASTM IP policy and copyright. The commenters are correct that this in effect means that state and the public must pay ASTM in order to continue to see or use ASTM methods required by this final rule. The issues of purchase costs, membership costs and full public participation in development and review of voluntary consensus standards (VCS) encouraged by NTTAA are being discussed as a separate overarching effort regarding NTTAA..

6.1.3 Comment: Improving repeatability and variability

Commenter (1427) believes that variability and uncertainty are inescapable realities of all measurements but is confident that refinements to testing can be made to better represent real world conditions as well as improve reproducibility, accuracy and statistical significance. To reduce variability, commenter (1427) recommends requiring more replicate test runs to be conducted at the key burn rate (e.g., four replicates would reduce the variability by a factor of 2). Commenter (1427) believes this method could be modified so this can be accomplished with a minimal increase in cost.

Commenter (1632) opines that the test method variation is greater than the emissions limit proposed which makes no sense to pursue.

Commenter (1521) recommends that the EPA promulgate new or revised test methods that include changes to the testing processes which reduce the variability inherent in those processes, including a process by which to verify that test results are not within the noise or background of the variability of the test method.

Commenter (1521) states that the precision of any test method is extremely important in understanding the limitations of the data generated from the method. Commenter (1521) recommends that the EPA include elements to account for measurement imprecision associated with the wood heater database, including method detection level (MDL) data. Commenter (1521) states that the MDL is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte (the substance being tested for; in this case PM) concentration is greater than zero and is determined from analysis of a sample in a

given matrix containing the analyte [40 CFR, Appendix B to Part 136]. Commenter (1521) states that the EPA has used a value equal to or three times greater than the MDL in other rulemakings as the emissions limit. Commenter (1521) has reviewed the Curkeet-Ferguson study on test method variability and concludes that the testing and emissions sampling and quantification methodologies required under the proposal are not capable of yielding reproducible results at the limits being advocated. Commenter (1521) asserts there is a lack of reliability and precision (repeatability, reproducibility) of data resulting from the following two sets of procedures required to demonstrate compliance with emission standards for residential stoves:

- Procedures for fueling and operation for emissions testing, including set-up, test fuel properties, test fuel load configuration, loading and startup time periods,
- Allowable air and fuel adjustments, stove specifications, etc., as provided by Method 28; and
- The sets of procedures used to sample and quantify emissions as specified in the analytical Methods 5, 5G, 5H and their equivalents.

Response:

Commenters raise some suggestions that should be considered fully in developing future cord wood methods that are more representative of in-home/residential use such as requiring more replicate test runs and other steps to improve reproducibility, accuracy and statistical significance. As we have explained previously, while changes to methods used in Step 1 are limited at this time by BSER constraints and cost impacts, such changes should be considered in developing future test methods and standards.

We disagree that that the current methods are incapable of detecting emissions at the level of the standards. As noted by commenter (1427), Washington State is "living proof" that industry can and does flourish and innovate with stricter emission standards. Commenter (1427) notes that they have had stricter emission standards (equal to Step 1 of the proposal) in place for 17 years, with thriving wood stove manufacturing and retail industries. In fact, commenter (1427) asserts, their manufacturers have led the industry and the nation in developing low emission stoves.

In addition, data show that precision issues are not an overwhelming concern based on the final Step 1 and Step 2 standards. For example, according to commenter (1427), the existing woodstove test method was developed to differentiate old stoves, which had essentially no emissions controls (a.k.a. "uncertified" stoves), from a first generation of stoves with basic emissions mitigation, (a.k.a. EPA certified at 7.5 g/hr). The commenter (1427) notes that at that time it would have been unnecessary and wasteful to develop and refine a test method for levels that were significantly lower than the NSPS (i.e., differentiating a 1 g/hr stove from a 2 g/hr stove). We agree with commenter (1427) that objections to tightening the standards are based on arguments from a biased set of data and overly simplistic and incomplete analyses. As commenter (1427) notes, a reanalysis of the data set presented by industry shows that even using the existing test method, the mean emission factor of stoves certified at < 3 g/hr is significantly lower than stoves certified at 5-7 g/hr ($p<0.01$) (see December 5, 2012 PSCAA Letter to Stephen

D. Page, EPA and the attachment). This difference in emission factors between these groups is 2.5 g/kg, which is already substantial enough for Step 1 emission standards to differentiate for regulatory purposes and results in critical in-home emissions reductions.

We can also point to data provided in the NODA. For example, one commenter notes that, based on the provided data and their experience, unlike the proficiency test database, the results of their hybrid stove tests are usually clustered around the original certification results. Furthermore, the commenter states that QA and more frequent audit testing may provide a more realistic opportunity to look at whether test variability truly exists, and if so, to what extent.

We also note that a number of improvements to the test methods are in this final rule and we expect the changes will also improve the reliability and precision (repeatability, reproducibility).

An MDL/analyte approach has been used in several recent NESHAP standards (health-based standards), however, no National Institute of Standards and Technology (NIST) analytes are available for wood heater testing.

Moving forward, using an updated database with tests of recent models, more transparency in data reporting and updated test methods, we could explore implementation of approaches that place a more frequent and more rigorous emphasis on audits and proficiency testing with penalties for laboratories that do not perform well. As noted above in this section, we could consider requiring more replicate test runs and other steps to improve reproducibility, accuracy and statistical significance, especially if the updated test methods are less expensive.

6.1.4 Comment: Hydronic heater test method selection

Commenters (1387, 1407,1413, 1459, 1467, 1474, 1480, 1481, 1491, 1494, 1515, 1547, 1563, 1575, 1602, 1608, 1613, 1620, 1637, 1650, 1652, 1653, 1655, 1662) request that the EPA keep current testing methods, already developed and approved by shareholder parties, to certify new hydronic heater models.

Commenter (1545) recommends that the final rule allow for the use of multiple test procedures as described during Step 1, but then transition to the use of a single test procedure during Steps 2 and 3. Commenter (1545) recommends that the single test procedure either be Method 28 OWHH, Method 28 WHH-PTS or ASTM 2618 for Steps 2/3. Commenter (1545) concludes that whichever method is selected for Steps 2/3, it should allow for (or be adapted to allow for) testing of pellet, chip, and cord wood fuel types.

Commenter (1465) states EPA should use test methods that closely approximate how the hydronic heater will perform in-use with cord wood, including measuring cold-start emissions as well as steady-state, cycling, and end (burn out). Commenter (1465) adds that emissions during cold-start, high-load steady-state operation and end should be reported separately, and the EPA should not allow for the dropping of low load categories as in CSA B415. The commenter (1465) is concerned about the significant differences among test load categories, methods of determining thermal efficiency and the metrics for PM and CO measurements and reporting.

Commenter (1463) requests that the EPA clarify which testing method applies to hydronic heaters utilizing full thermal storage.

Commenter (0541) asks what the suggested method is for manufacturers that include a mixing or buffer tank, partial heat storage or non-integrated water tank as a bundle with the heater because the storage unit will not handle the full load (or less than 60%) of fuel. Commenter (0541) asks for clarification if the unit is sold with an integrated solar thermal panel.

Response:

We have finalized an expanded list of test methods for Step 1 in the final rule (see § 60.5476(c)) for hydronic heaters: Method 28 WHH, Method 28 WHH PTS, ASTM E 2618-13 and the test method in EN 303-05, with some specified modifications and limitations. The final rule allows the test method in EN 303-5 (with adjustments and limitations) for Step 1 in order to help reduce concerns about potential availability of clean models on the effective date. However, the final rule does not allow the test method in EN 303-5 for Step 2 because it does not consider the low burn rates as does EPA Methods 28 WHH and 28WHH-PTS and ASTM 2618-13. We have also clarified the applicability of the various test methods, including requirements related to adequate heat storage.

6.1.5 Comment: Test methods to address new technology and/or improved testing procedures

Commenters (1397, 1486, 1551, 1640) suggest ensuring that as test methods are improved they also provide a pathway such that the new technologies and types of stoves being developed in the industry can be tested. Commenter (1640) recommends adding a protocol for testing automated stoves or appliances containing an oxygen sensor. Commenter (1551) adds that as the market moves to more advanced designs that incorporate the use of fans and sensors to modulate air flow, the EPA will need to ensure that there are clear methodologies to test these devices. Commenter (0432) supports more accurate testing, as long as it is not cost prohibitive, bearing in mind that the actual use of this equipment will always result in different emissions based on the quality of the fuel used.

Commenter (1551) states acceptance of any alternative method must be evaluated on a device-by-device basis, and the related emission standard must be correlated to the base emission standard. For example, commenter (1551) states some test methods, such as the one developed by BNL (cited in the EPA proposal), use a test protocol that includes measurement of emissions when no coal bed exists (known as a cold to hot test). Commenter (1551) asserts the cold to hot tests are more rigorous tests as they measure startup emissions as well as steady state emissions. Commenter (1551) recommends inserting language in § 60.534 to clarify the process for obtaining test method alterations that facilitate the testing of very large, very small, hybrid, or other unique designs or designs utilizing new technology.

Commenter (1397) states the proposed rule should allow for the addition of other improved

testing methods that may lie outside the ASTM process. Commenter (1397) hopes future test methods will eliminate the need for expensive and cumbersome dilution tunnels as a means of collecting particulate samples and believes advanced, cleaner technology should enable direct sampling. Commenter (1397) also recommends BNL's work on a proposed emission testing method for hydronic heaters and wood heaters that utilizes real-time sampling, a portable dilution tunnel and captures emission spikes. Commenter (1551) believes the proposed rule should allow for the addition of new and potentially improved testing methods from a variety of entities, including ASTM, EN testing, and national lab methods outside the current proposed rule.

Commenter (0541) states that the EPA should support the use of updated digital and analog technology (e.g., improved sensors, variable controls, wireless operation) to strengthen the test methods and monitoring and collection of data.

Commenter (1479) proposes that the use of variable speed pumps be taken into consideration regarding current test method issues. Commenter (1453) proposes that the EPA strengthen the test method to reflect the fact that some models use active controlling to regulate burning.

Commenter (1479) also proposes the use of suitcase type in-stack testing technology to allow manufacturers to reduce the burden and time for manufacturers to complete the testing process, as this will allow manufacturers to evaluate emissions on units during the R&D process and before testing.

Commenter (1550) specifically opposes modified test methods associated with Steps 2 and 3 of the subpart AAA regulation.

Response:

We agree that test methods will evolve over time as testing technology and wood heater technology evolve and support reductions in the burden and time for manufacturers to complete the testing process and still achieve supportable certification results. We support efforts to develop automated wood heaters that reduce operator error and improve performance under all residential operating scenarios. As described above, sources always have the option to request that the EPA, on a case-by-case basis and with justification, allow the use of an alternative test method under the part 60 General Provisions, § 60.8. In this case, we would collate all approved requests in an annual update to the list of approved methods and conduct rulemaking to finalize the latest versions of the methods.

We note that approval of an alternative test method is not necessarily based on a strict definition of equivalency, e.g., we may allow use of alternative methods based on practical reasons where exact equivalency has not been established. Of course, we are more likely to approve alternatives that are more rigorous and better for the environment than otherwise applicable methods, such as methods that incorporate cold starts and cycling.

Regarding the comment about the elimination of "expensive" dilution tunnels, we find they have critical value now to better measure the organic gases that quickly condense in the air. However, as tested appliances get cleaner, i.e., emit less organic compounds, the concern regarding organic emissions may diminish and cheaper test methods may be considered.

6.1.6 Comment: Testing representative of "in-home" conditions

General

Commenter (1551) states concern about a variety of issues related to the current test method, including lab versus field performance and test manipulation. Commenter (1551) asserts the use of appropriate test methods that challenge a unit to perform its best under a variety of conditions is critical to ensuring clean burning units in field operations.

Commenter (1640) strongly supports changes and improvements to the test method to be more indicative of in-use home operation. Commenter (1640) asserts they have heard from laboratories and manufacturers that stoves are designed to the test method, not for actual home operating conditions.

Commenter (1570) states the EPA should require testing with wood that more closely resembles what typical homeowners would use. By requiring testing under more real world conditions, commenter (1570) believes variations of performance and associated emissions will be better understood and quantified, allowing for better estimation of overall emissions and associated reductions if cleaner equipment is put in place.

Commenter (1465) strongly supports the non-involvement of the manufacturer after the pretest burn has begun so the test be more representative of real world conditions where the manufacturer will not be present when the consumer uses the appliance in regular use.

Including lowest burn rate

Commenter (0952) supports developing and using compliance test methods that reflect real world usage and that ensure standard compliance at both the lowest burn rate and the maximum burn rate. Commenter (0952) states that use of cord wood in the compliance test, along with incorporating a low burn rate in the test procedures are critical components of a test that better reflects real world use. Commenter (1423) also supports low burn rate testing at the current threshold. Commenter (0952) concludes that the resulting emissions need to be compliant with the more stringent emission limits.

Regarding ASTM changes to burn rate categories, commenter (0948) feels strongly that the lowest burn rates should not be eliminated or eased in anyway. Instead, commenter (0948) feels that their weighting should be increased. Commenter (0948) describes the difference between sizing a unit for design day heating and real world heating, which leads to boilers that operate at part load for most of the year. Commenter (1427) states low burn rates must not be omitted or down-weighted as the ASTM method proposes. Likewise, commenter (1514) is opposed to

eliminating the low burn category and notes that current technology such as catalysts exist that allow cleaner emissions at low burn rates and most consumers desire longer burn times.

Commenter (1570) states the EPA should ensure that test methods adequately quantify emissions that occur under all normal operating conditions, including at low burn rates when emissions can be high. Commenter (1570) believes test methods should account for any increased emissions when proper operation can be easily defeated by the end user (for example, when wood stove doors are left open or proper draft specifications are not met). Commenter (1570) asserts that the majority of emissions from devices occur when operated in ways that do not represent normal operating conditions (e.g., complete "throttling" during late night hours resulting in smoldering) or as proper operation is defeated but expected to occur (e.g., operated with doors opened). Commenter (1570) asserts that state and local agencies may have little choice but to require equipment such as pellet stoves, whose operating cycle is predictable and well quantified by the test methods and whose proper operation cannot be easily defeated, to ensure compliance. Having different equipment requirements from jurisdiction to jurisdiction, commenter (1570) notes will make it much more difficult for industry and the public to know what can be installed in any given area. Such confusion is likely to result in frustration and misunderstandings by both industry and the public, states commenter (1570), threatening the success of state and local programs.

Commenter (1397) believes it is vital that stoves produce low emissions over the full range of their operating capabilities and be manufactured to permanently prevent alteration of this low burn setting. Commenter (1397) adds that low burn rate sampling should always be required although, as we move to cord wood testing, a slight elevation of the low burn rate may to be necessary for the best real world performance of wood heaters using cord wood fuel.

Commenter (0541) believes that the various categories of burn rates should be based on an 8-, 12- and 16-hour burn because the goal of building a heater or furnace should be based on providing steady heat at the lowest emissions. According to commenter (0541), customers turn down the stoves when they go to sleep or leave for work because the firebox is usually too small to provide heat until they wake or return home from work. Commenter (0541) states that this scenario results in peak emissions at 6 am and 6 pm when people reload their cold stoves.

Role of startup emissions in testing

Commenters (1365, 1587) appreciate that the EPA will now be collecting data during the startup phase of wood heating devices, but request that a timeline for inclusion of startup emissions into overall emissions calculations be explicitly stated in the rule.

Commenter (1559) states that the atmosphere does not discount the startup and shutdown periods, but integrates the entire burn interval from startup to shutdown. Commenter (1559) recommends that more comprehensive tests such as developed at BNL for 2-stage low mass boilers should be designated as the basis for testing. Commenter (1559) states that a more comprehensive testing approach would better reflect the impacts of wood combustion on air quality and force the use of improved technologies such as thermal storage that can provide

lower emissions even at lower loads by only using the combustion appliances at full load.

Effects of high altitude

Commenter (0473) proposes that because the number of residences at high altitude is increasing, and it is known that natural gas, propane and wood heaters are much less efficient at higher altitudes, wood heater manufacturers should test their new 2015 products at high elevations to ensure that every consideration has been addressed to meet the new regulations. Commenter (0473) suggests that, at over 10,500 ft ASL, Alma, Colorado is the highest incorporated town in North America and many permanent and second-home residents use wood as the primary heat source – if the new products are efficient here, they should pass with flying colors elsewhere in the U.S.

Response:

As previously described, our short-term approach is to maximize the use of currently available test methods for Step 1 to allow us to construct a robust BSER database and allow for automatic certification of a significant number of models to avoid logjam concerns and provide market conditions that allow manufacturers and test labs to focus on developing models and test methods that are more representative of in-home use. Similarly, we plan to work with a comprehensive group of stakeholders (industry, test labs, states, local agencies and tribes) to develop future required certification test methods that are more consistent with measuring a variety of in-home operation conditions. For now, we have included a variety of methods that collectively measure emissions per several different burn rate, require measurements for the lowest achievable burn rate, include cold starts and cycling and short term peak emissions and varying heat demand loads. In addition, we are providing a cord wood alternative test option and are particularly invested in creating improved cord wood testing provisions and addressing other parameters indicative of in-home use such as longer burns and treatment of low burn rates.

We note that developing appliances that perform well in a certification test and in the home depends on both good design and engineering of the appliance to preclude "tampering" or improper operation by the homeowner as well as test methods that better reflect actual emissions in the home. The proposed (and final) rule prohibits tampering and the certifications consider the degree to which potential tampering could occur.

Regarding the comment about altitude testing, the suggestion to conduct all testing at high altitudes is impractical. Further, previous detailed testing studies by the EPA in 1990 show that although altitude (and less available oxygen) affects maximum burn rate, it does not significantly affect emission per burn rate.[35]

[35] Wood Heater Test Method and Fuel Comparison at Higher Altitudes Emission Test Report, RTP, NC and Crested Butte, Colorado. EPA Emission Measurement Technical Information Center Document P-91-01.4. May 1990.

6.1.7 Comment: Testing should address emission spikes

Commenter (1551) asserts a significant public health issue from wood combustion is high-level, short-term particulate emission exposures, and the current test method does not capture these spikes because it averages emissions over a full fuel charge; these can last from 2 to 40+ hours and include in the average what is referred to as the "charcoal tail" (a long period where the unit operates at very low emissions).

Commenter (1465) notes one source of information on peak emissions testing is research sponsored by NYSERDA with the EPA's Office of Research and Development that measured hydronic heater emissions of $PM_{2.5}$, CO and other hazardous air pollutants during all portions of the burn cycle, including high-emitting conditions. Commenter (1465) believes emissions testing should be representative of conditions likely to be used by appliance owners and operators, thus, the EPA should conduct emission testing for all phases of the combustion process, including peak emissions.

Commenter (1488) notes that the EPA methods need to be revised to better reflect real world conditions and prohibit harmful emission spikes. Commenters (1488, 1591) state that the EPA's proposed test method hides short-term (< 8 hours) emission spikes correlated with degrading ambient air quality and damaging health effects. Commenter (1488) suggests that the EPA's test method require once per minute particulate sampling throughout the entire burn cycle from startup to finish for each individual test. Commenters (1488, 1591) state that the emission standard should apply to the highest emission spike recorded during any minute of any individual test as a cap so that no emission spike exceeds their suggested 1.3 g/hr (or 2.5 g/hr interim) standard. Commenter (1488) further suggests that the highest emission spike of any individual test run be published online and shown on the permanent hangtag. Commenters (1488, 1591) report that the State of Washington requires minute-by-minute sampling and that no sample shall exceed the state emission cap.

Commenter (1465) states test methods should account for peak emissions because the proposed emission limits do not characterize those combustion conditions most likely to cause elevated emissions of $PM_{2.5}$, CO and other smoke components. Without the measurement of emissions during these critical time periods, commenter (1465) asserts manufacturers have no incentive to improve performance. Commenter (1465) adds that evaluation of high emission scenarios is also important from a public health standpoint as health effects can result from exposures of short duration.

Commenter (1558) believes that EPA must base NSPS testing on a method that captures emission spikes during cycling of hydronic heaters. Commenter (1558) adds that if the EPA does not develop this test, the EPA should not permit hydronic heaters that cycle to be sold. Commenter (1558) states the EPA must measure short-term spikes by sampling emissions every minute during a full 8-hr burn cycle from cold start to finish. Commenter (1558) asserts the proposed sampling requirement does not provide the statutorily required health-protective standards. Commenter (1558) adds that the highest emission spike of any individual test run should be published on EPA's website and available to consumers prior to purchase.

Commenter (1397) states that method changes are needed to capture emission spikes from cycling units and prefers a revised test method that offers continuous sampling, field test options and reduced cost.

Response:

The proposal (and final) already measure potential emissions spikes, particularly the 1-hour filter change requirements and requiring continuous CO and CO_2 testing. (Even Method 28 used in the 1988 NSPS includes the short–term spikes as requested by commenters (1551 and 1465), although it does not give a separate PM emission value for the short-term spikes.) The proposed (and final) Method 28 WHH-PTS also has features to assist in looking at the emissions pattern throughout the operating cycle and separating the emissions into periods of start-up, steady state and end phase. The commenters' assertions that the State of Washington requires "minute-by-minute sampling and that no sample shall exceed the state emission cap" is misleading because Washington State actually uses the EPA certification test results from EPA Method 28 which do include the short-term spikes as part of the continuous sampling per each of the four specified burn rates but both the Washington State and EPA standards are based on the weighted average of the four burn rates. As we develop new methods to better represent in-home operating conditions, we will explore the other ideas commenters present to better discern short-term emission spikes and charcoal tails versus longer-term averages and develop emission standards that encourage better emission performance at all operating conditions. As discussed previously, NSPS are based on demonstrated BSER and having robust emission data is important for those demonstrations.

6.1.8 Need for in-field measurements

Commenter (0948) supports in-field measurements as well as capturing emission and energy performance across all phases of combustion. Commenter (0948) would like to see the manufacturers held accountable for in-field performance, e.g., if the owner is operating the boiler according to the user manual and impacting neighbors, the manufacturer should be involved in a resolution.

Commenter (0541) believes that a real time field emissions test method that measures cold or warm startup emissions and emission peak is viable through several inexpensive "suitcase" in-stack testing devices. According to commenter (0541), these devices are very popular in Europe and can help regulators to better quantify field output. However, commenter (0541) adds, devices from different manufacturers do not operate the same and results will be different.

Response:

We encourage the development and comparison of in-field measurement methods and the acknowledgement of manufacturers that they are responsible for manufacturing products that perform well in actual use and providing technical assistance to operators to ensure proper performance. The proposed (and final) rule emphasizes that by requiring adequate owner's

manuals and warranties. Also, the final rule preamble notes that state and local use of EPA Method 22 to measure visible emissions is a valuable tool to help characterize improper design or improper operation.

6.1.9 Comment: Conformity to EPA's Stack Testing Policy

Commenter (1551) believes any test performed by a third party lab for certification purposes must conform to the EPA's stack testing policy and the EPA must ensure the rule includes a test method that captures the highest emission rate under normal operating conditions, regardless of its frequency, and determines whether compliance with the emission standard is continuous. However, commenter (1551) supports the EPA's efforts to move away from emission standards that average across burn rates because having devices comply with the standard across all burn rates will ensure that compliance is continuous rather than intermittent, as required by the EPA's stack testing policy. Commenter (1397) notes that it is important that devices show compliance with the proposed standards throughout the entire burn cycle to align with the EPA's stack testing policy.

Response:

The EPA stack testing policy is primarily intended to apply to industrial sources that demonstrate compliance with individual sources versus a certification program like wood heaters and automobiles. However, we agree that it is important to align the certification test burn cycles with in-home operation conditions and this rule has done so. As noted earlier, we will continue to consider this as a focus of future test method development and standards development.

6.1.10 Comment: Crib wood versus cord wood test method issues

Support for cord wood testing:

Commenter (1520) recommends that EPA require that test methods require the use of cord wood from a variety of wood species rather than solely crib wood or dimensional lumber. The commenter (1520) states that the sole use of crib wood or dimensional lumber misrepresents the emissions that households will likely experience as they rely on local wood that is often less dense and produces greater emissions.

Commenter (1640) supports the proposed test method for cord wood, as it is critical a method be adopted and utilized as soon as possible for the EPA to start gathering test information. Commenters (1462, 1570, 1591) believe cord wood should be used in all testing because it more resembles what a homeowner would use. Commenter (0952) states that use of cord wood in the compliance test, along with incorporating a low burn rate in the test procedures are critical components of a test that better reflects real world use.

Commenter (1632) supports moving to a cord wood standard that can better correlate to real world performance and states that it does not make sense to test and report for both crib and cord

wood (and acknowledges that crib fuel performs differently than cord wood fuel). Commenter (1176) also supports certification of a product based solely on cord wood testing.

Commenter (1647) adds that some downdraft gasification units have had issues when 4 x 4 cribs are used as the structure of the cribs can bridge the grate and allow the coal bed to burn out from under the fuel load. According to commenter (1647), this can result in the fire going out (and no valid tests) or poor combustion and high emissions for extended periods. Commenter (1647) states that this does not typically happen when cord wood is used.

Commenter (1487) supports EPA's proposal that hydronic heaters be tested using cord wood rather than specially-cut crib wood under Step 2. Commenter (1545) recommends that the final subpart QQQQ rule require only the use of cord wood, rather than crib wood, and that the species and loading of wood shall be in accordance with manufacturer instructions. Commenter (1633) adds that the EPA should allow use of either Method 28 WHH (oak cribs) or E2515-11 (cord wood).

Opposition to cord wood testing:

Commenters (1436, 1521, 1544) state that cord wood testing would be a less consistent indicator of a repeatable result and believe that crib wood testing would be easier to reproduce. Of the variables, fuel dimensions, fuel consistency, fuel density, operator interface, and operating conditions, commenter (1436) believes we need to eliminate as many as possible to get repeatability. Commenter (1436) suggests considering a "manufactured" fuel that is 100% consistent to remove at least some of the variables. Commenter (1544) adds that wood stove safety testing does not use cord wood, but rather a safety testing fire brand that represents worst case conditions, to determine the safety of a wood-burning product and its installation. Commenter (1544) concludes that it is clear that fuel realism should not be the objective, but rather a fuel which stresses the appliance for the conditions for which it is being tested.

Commenter (1436) states the proposal to require two Step 1 tests, one using crib wood and one using cord wood and reasonable additional non-binding tests with a range of fuels for which the appliance is designed for warranted and/or advertised operation is unproven and that different fuels may have different oxygen requirements. Commenter (1436) suggests coming up with a hybrid fuel and making it the standard.

Crib to cord transition issues:

Commenter (1521) states that the EPA's proposal to use both crib wood and cord wood during 2015 Phase 1 testing, but only cord wood for 2020 Phase 2 testing does not contain a plan or method to correlate test results using the two different fuels. Commenter (1521) reports that crib wood was required as the test fuel in the original residential wood burners NSPS to decrease testing variances due to fuel variability, because crib wood is a more consistent fuel from test to test than cord wood.

Commenter (1508) encourages the EPA to work with the residential wood-burning appliance industry to develop a testing methodology that reflects actual operating conditions, which includes establishing an emissions factor for cord wood, and which would ensure that the transition from the crib test method to the cord test method results in an equivalent Phase 2 emission standard. Commenters (1417, 1561, 1580) urge EPA to establish an emissions factor for cord wood ASAP and ensure the transition from crib to cord results in an equivalent Phase 2 standard.

Commenter (1397) states the option for using an alternate test method should be mentioned in the updated rule. Commenter (1397) adds that alternate cord wood test method(s) must demonstrate close correlation with the particulate samples collected with Method 28R, and prefers that any such methods used can be economically conducted in situ (to verify real world emissions).

Commenter (0541) has seen the impact that wood geometry can have in emission performance, e.g., larger pieces of cord wood will need less oxygen than smaller pieces and moving from cribs to cord wood will also increase the amount of ash content. The commenter (0541) asks whether sufficient data exist to make the move to cord wood under the current method or should alternative methods be considered. The commenter (0541) adds that older cord wood methods use kindling where some newer heaters have propane ignition.

Commenter (0541) would like to know more on the cord wood method in areas such as the proposed selection of the wood, percent of fuel with bark, center split allowed, geometry guidelines, changes in ash content (how this affects coals), old growth vs. new growth, etc.

Commenter (1479) proposes establishing a surface area per square foot or burn space adding testing with split versus un-split wood.

Response:

We agree with commenters supporting use of cord wood testing. The final rule allows crib wood testing for both Step 1 and Step 2 (for all appliances except forced-air furnaces) to reflect that the bulk of our emission database is based on crib wood tests. (Note that forced-air furnace certification tests are conducted according to CSA B415.1-10 which has specified cord wood as the test fuel since 2010.) The Part 60 General Provisions have always allowed EPA to approve test method alternatives. This final rule provides specific alternative cord wood testing compliance options immediately. As noted earlier, we intend to continue efforts to develop cord wood test methods that better reflect in-home use conditions and eventually require all certifications to be based on cord wood testing. The alternative cord wood compliance option provides an opportunity to obtain an “EPA certified” label for cord wood testing now and will help develop a robust database of cord wood performance to inform development of improved cord wood test methods and emission standards.

When the 1988 NSPS was initially developed, most stakeholders supported use of a crib-based standard for test reproducibility, but we have learned that an unintended consequence of this

approach was that some appliances that were tuned to pass the certification test with cribs, often did not perform as well under in-home conditions using cord wood. This result seems to be implicated in the BNL test data presented in the NODA where a new cord wood test shows that the tested appliance exceeds its previous certification test level if it is not re-tuned to burn cord wood cleanly. Two commenters suggest development and use of a hybrid or "manufactured" fuel for testing, but this also moves us away from representative, in-home test conditions and undercuts the continuing obligation of manufacturers to develop devices that perform well under a variety of approved operating conditions and fuels.

We agree that issues for consideration in development of improved cord wood test methods include the impact wood geometry can have in emissions performance adding testing with split vs. unsplit wood, kindling vs. propane ignition, etc. We urge commenters to participate in development of improved methods.

6.1.11 Comment: Hard woods versus soft woods

Support for soft wood testing:

Commenter (1551) states the use of oak as the test fuel for hydronic heaters can significantly underestimate emissions from other, less dense fuels as testing data indicate that emission rates on a mass over time basis can be 200 to 400% greater for soft woods than those of hard woods (e.g., oak). Commenter (1551) recommends that the EPA support the development and use of an alternative test method that measures high emitting periods with use of real world fuels, and standardize procedures to the greatest extent possible across all devices.

Commenter (1488) requests that the EPA's test method should include soft wood species to better predict emissions from actual use. Commenter (1488) states that it is widely recognized that soft wood species such as fir, spruce and pine typically result in higher emissions than hardwood species such as oak. Commenter (1488) reports that the State of Washington requires stick wood devices to be tested with Douglas fir.

Commenter (1427) states that room heaters should be tested with either Douglas fir or alder, not red oak as in the proposed ASTM method as these are the most widely used wood types in the northwest.

Opposition to soft wood testing:

Commenter (1562) opposes forcing manufacturers to test with Douglas fir as it is the preferred wood fuel in only two states – WA and OR. Commenter (1562) claims both enjoy a much milder climate than the other representative "heating" states, defined by a higher design temperature and lower heating degree days, both of which mean much lower fuel consumption. Commenter (1562) believes it is reasonable to assume that the bulk of the wood heating in those two states would be via an indoor wood stove, not a central hydronic heater. Commenter (1562) asserts that to force a hydronic heater manufacturer to test with a hard wood and Douglas fir is not reasonable as it doubles the cost of testing for a slight increase in sales with essentially no profit

incentive to do this—if a manufacturer did desire to enter this market, they could complete additional testing with Doug fir and submit the data to the respective state.

Addressing regional differences in wood types:

While supporting the transition to cord wood, commenter (1462) recommends that the EPA require emission testing with different types of soft and hard woods to ensure the emission standards can still be met. Commenter (1462) notes that wood stove users in their region burn many types of wood such as oak, madrone, eucalyptus and pine and this choice is typically based on cost.

Commenter (1465) believes Douglas fir should be an optional fuel in addition to red oak. Commenter (1465) adds that the EPA should consider requiring units be tested on both fir and oak for subpart QQQQ. This is a national rule, commenter (1465) states, but oak is not used as a fuel nationwide.

Commenter (1062) supports testing with hard woods and soft woods, but not specific species unless burning a specific species is a requirement of the operator's manual. Commenter (1062) suggests that if testing with hard woods and soft woods is required, that there is only one test for each type of wood at the lowest test burn rate and that the results are averaged between the two types of wood to keep test cost and complexity down. Commenter (1062) notes that the testing with specific species provision does not work for wood pellet fuel because in many parts of the country, wood pellets are made with a blend of woods. Commenter (1062) thinks that different wood species do impact the pellet fuel because even premium wood pellets can perform differently from one batch to another.

According to commenter (1551), surveys of wood-burning homeowners across the U.S. indicate about a 50-50 split between soft wood and hard wood burners; however, one or the other usually dominates in local areas depending on the local woody flora. Commenter (1551) asserts data show that different wood fuel species produce different qualities and quantities of emissions; independent studies have shown that burning softwoods produces higher emissions than hardwoods. As the EPA moves from a crib-based test to a cord wood test, commenter (1551) recommends that the EPA adopt a single fuel for testing residential wood heating devices that specifies allowable species and densities. At a minimum, commenter (1551) states the EPA should require reporting of fuel density in the test reports made publically available.

Commenter (1423) states the EPA should require a density range for the test wood used in the method. Commenter (1423) asserts that, in the Northwest, soft woods are more commonly used in wood-fired appliances and test results by the EPA and the State of Washington exhibit particulate levels (using soft wood) more than 3x higher than hardwood fuels. Commenter (1397) asserts the use of red or white oak as test fuel (in Method 28 WHH) should be replaced with a density range requirement.

Commenter (1538) encourages the EPA to consider how to account for differences in emissions that result from different types of wood from different areas in the country. Likewise, commenter

(1514) notes that transitioning to cord wood begs the question "what is cord wood?", explaining that softer woods such as firs and pines are less dense and "gas" out much more quickly, while harder woods such as oak and ash "gas" out more slowly, and these differences affect the fundamental stove design.

Response:

As described earlier in this document, we are maintaining Step 1 standards to be as consistent as possible with the robust BSER data base, including wood species to be tested. We also note that as technology-based standards, the NSPS test methods may not perfectly represent emissions in homes in various parts of the country where different wood species may be prevalent. There are also historical reasons for the current species selection. The original wood heater test method was developed by the state of Oregon, where Douglas fir is the most common species. The voluntary hydronic heater test program was influenced by the fact that the one major manufacturer and several smaller manufacturers are based in Minnesota, where oak is the most common fuel. We note that individual states might address concerns over the representativeness of wood species by requiring additional tests with other species and the NSPS does not prohibit that. We also reiterate that manufacturers should work to develop appliances that perform well with a variety of species.

Going forward, we recognize that wood species is an important variable and we encourage commenters to provide information to help us evaluate the impacts (both in terms of practicality and emissions) that species selection has and help us consider appropriate solutions. Reporting fuel density and/or requiring a specified fuel density range is a possible answer to some of these concerns, but it still does not address the facts that the predominate fuel species used in Minnesota and Washington are quite different and that heaters tuned to one fuel species may not perform as well on the other. Multiple tests on multiple fuels may provide the necessary information but what will be the costs of testing and how will the information be conveyed to potential customers and will it lead to the necessity of different models for different fuels in different locales? We agree with commenters that consumer education via Burn Wise, manufacturer materials and other sources are important to educate consumers about the impact their selection of wood species has on the performance of their wood burning appliances.

6.1.12 Comment: 1-hour filter pulls

Support for 1-hour filter pulls:

Commenter (1640) agrees with the test method requirement for 1-hour filter pulls to capture any emission spikes for hydronic heaters. Commenter (1463) supports the EPA's efforts to require more frequent filter pulls for PM during testing, noting especially the cyclic nature of the burning process in hydronic heaters. Commenter (1463) notes that the frequency of testing should be sufficient to better characterize the burn run without adversely affecting the accuracy and precision.

Commenter (1551) supports the EPA's proposal to measure short term PM emissions and

recommends that the EPA require filter samples be taken every 60 minutes for the first 2 hours for room heaters and 3 hours for central heating devices. Commenter (1551) adds that these measurements must be reported independently for all devices tested.

Commenter (1397) believes the requirement for 1-hour filter pull should be applied only to hydronic heaters and furnaces and limited to the first several hours of testing; filter catches from room heaters and other small devices would be too small to be accurately weighed. Similarly, commenter (1503) would apply the 1-hour filter pull requirement only to hydronic heaters and furnaces and no further than the first 5 hours of testing. Commenter (1503) believes that requiring additional filter catch from room heaters and other small devices would not be beneficial.

Opposition to 1-hour filter pulls:

Commenters (1396, 1510, 1562, 1632) oppose the proposed requirement for 1-hour filter changes. Commenter (1396) is opposed because it would drive testing and certification costs up even further with the necessary addition of more test equipment, materials, and time needed to perform each test run. Commenter (1396) states they are not opposed to gathering additional data that might be used to further the goal of emissions reduction, but thinks 1-hour filter changes would be better suited to separate research projects not added to the already stringent and costly certification process simply to gather data. Commenter (1632) states that adding the 1-hour filter changes would add to costs with little benefit given that the greatest emissions occur during the startup phase of a run. Therefore, according to the commenter (1632), changing the filter throughout the run would not provide any real additional information.

Commenters (1509, 1562) disagree with the requirement for 1-hour filters for the following reasons:

- Difficult to change filters during operation; involves shutting down the vacuum pump, removing both dirty filters, installing two new clean filters, retesting for vacuum leaks while using white gloves and tweezers to handle the filters; since there are two separate sample streams, this is replicated twice. Inaccuracy can easily creep in during this process.
- Process takes about 12 minutes, during which there is no emissions sampling; which is 20% of the time between proposed filter changes.
- Extremely difficult to document the particulates attached to the sample probes because of the additional handling, thus encouraging further inaccuracy.
- Startup emissions are automatically included in the testing of units with thermal storage (full or partial) during the cold start procedure.
- The option to the above is to double the sampling streams from two to four, easily doubling equipment and labor costs.

Commenter (1546) notes that there is no PM limit for mid-test emissions peaks and the emission rate gathered from a full test run is a sufficient measure of heater performance. Further, commenter (1546) adds, the particulate catch gathered on a 1-hour filter from a unit capable of

passing the emission limit will be too small to accurately measure given the current measurement uncertainty. Commenters (1546, 1647) add that operating one sample train for the duration of the test and using the other for 1-hour filter changes will destroy sampling pro-rates and will ensure that the agreement between the two trains will be greater than the 7.5% deviation from average allowed. Commenter (1647) provides examples showing the adverse impact this change has on the practicality of the test protocol and costs and how such data collection increases rather than decreases uncertainty and will not provide the EPA with the data it seeks (see pp. 2-3 of the comment letter, 1 hr Filter Changes). Finally, commenters (1546, 1647) state, operating the two sample trains in the manner proposed conflicts with the requirements of ASTM E2515-11. Under the requirements of the NTTAA, commenters (1546, 1647) assert the EPA cannot modify the proposed ASTM procedure absent a finding the standard is inadequate or illegal for the purpose of sampling wood heater emissions. Given that the EPA explicitly requires the use of this ASTM method in future testing, commenter (1546) assumes the method has been deemed adequate and legal.

Implementation issues:

Commenter (1647) states that the proposal is unclear how the 1-hour filter change requirement would be implemented. Commenter (1647) states that the EPA does not declare whether these 1-hour filter changes will be required for all products being tested and either for just one or both of the PM sampling trains required in ASTM E2515-11. Commenter (1647) adds that there is no information in subpart AAA § 60.534(c) that these filter changes will be required or if they will be required for just one or both PM sampling trains used in ASTM E2515-11 and the same is true for subpart QQQQ, § 60.5476(b) and subpart RRRR, § 60.5488(b).

Commenter (1546) notes that lower emission rate standards (e.g., 1.3 g/hr) will mean much less catch on filters, which will in turn increase the relative impact of measurement uncertainty. Commenter (1546) states that sample rate and/or tunnel flow rate ranges may need to change in order to increase particulate catch on filters to compensate for this.

Response:

We have clarified our intent regarding filter pulls. Our intent is that a 1-hour filter pull in burn rate category 1 is needed to address concerns regarding short term emission spikes associated with start-up conditions, particularly for hydronic heaters, in nonattainment areas where additional tools may be needed to address PM emissions. We agree with commenters that such requirements are less useful for wood stoves, which are smaller and "cleaner" than hydronic heaters and forced air furnaces. Our concern is that test methods that employ hot starts may not adequately measure emission spikes that may occur at the start of the test. Therefore, we note that this requirement applies to heaters tested with the following methods: Method 28 WHH and ASTM E-2618 for hydronic heaters and CSA B415.1 for forced-air furnaces.

We have clarified the final rule to specify that the 1-hour filter pull requirement only applies to one filter train during a hydronic heater or forced-air furnace certification test and that it only applies during the first hour of the test. This should ease concerns about the difficulty of

changing two filters at a time, and we would expect any concerns associated with working with a single filter would also decrease with practice and experience. This change also decreases costs compared to a two-train approach.

We disagree that that requiring a single 1-hour filter pull will pose significant issues regarding proportionality. For the 1-hour filter pull, the PM catch must be added to the filter PM that replaces the 1-hour filter for a total PM catch for that sampling train. For example if sampling train A is the 1-hour train, it will have two filters associated with a test run (the 1-hour filter and the second filter that replaces the 1-hour for the remainder of the test run. The PM on these two filters must be added to represent a total PM catch for the entire test run for train A. Sampling train B will be unaffected because it will only have one filter, but the total filter catch from both sampling trains still must agree within 7.5 % of each other. The only proportionality issue comes up with replacing the 1-hour filter sampling train with a new filter that must be leak checked before that sampling train can resume testing. For this amount of time, there will be proportionality mismatch between the sampling trains, but it should still be within the 10% allowance over the entire test run. It should not take long to change out a filter holder if the lab has one ready to install standing by at the changeout time.

As we move to improved test methods that incorporate cold starts, these methods should be better equipped to measure the impact of emission spikes. Also, if the commenter (1546) is correct that as the emission limit is reduced and performance improves, such that the filter catch is too small to be meaningful, that would be welcome news from an emissions perspective and we would consider deleting the requirement to conduct the filter pull.

6.1.13 Comment: Moisture content

Impact on emissions:

Commenter (1647) states that a review of existing data from the EPA proficiency test program data has shown no evidence of a correlation between fuel moisture content within the currently specified range and emissions performance. Commenter (1647) agrees that wood moisture content does have an effect on the combustion process that would affect emissions, it appears that the effect is relatively small and the many other variables involved in the testing and combustion process result in too much variability to allow for determination of the magnitude of the effects of moisture.

Moisture content issues with the BNL method

> *Proposed Method 28WHH-PTS would require use of BNL moisture content procedure. In addition, the preamble for the Proposed Method 28-WHH requests comment on use of this BNL method as an alternative to the procedures described in the proposed Method 28-WHH. This section contains comments related to use of the BNL method in either instance.*

Commenter (1397) believes the BNL method to determine moisture is more precise than proposed Method 28 WHH procedures and should be allowed as an alternative but not required. Commenter (0948) supports the alternative oven drying method in Method 28 WHH, but has a minor concern with the additional time this would take. However, commenter (0948) feels that it is justified as it will yield a more accurate value for moisture content.

Regarding the proposal's request for comments on the BNL alternative approach in Method 28 WHH, commenter's (1475) research shows that this approach is not especially accurate. According to commenter (1475), although its results were more precise than measurement with a moisture meter, with a standard deviation of 0.6 instead of 1.3, the method tended to over-predict true moisture by about 4%. Commenter (1475) adds that this method also kills a specimen for actual test burning and assumes that other pieces will have comparable moisture, which due to many unknown variables can actually have a high degree of uncertainty. Commenter (1475) adds that a subsequent review of data available from this work has shown much greater accuracy can be achieved with this wafer method if just two sample wafers are taken: one from the center and one from the end.

Commenters (1396, 1632) oppose the alternate procedure developed by BNL to determine moisture. Commenter (1396) asserts that the drying time of 24 hours would further delay the wood heater testing and certification process, and significantly increase certification costs. Commenter (1632) argues that the BNL method takes moisture readings of fuel that are not used in the test and therefore not representative of the test fuel load (nor representative of real world moisture levels of fuel used by consumers) and that it would increase testing costs and time without benefits.

Commenter (0541) believes that cord wood fuel moisture testing will be difficult in large pieces because selecting large pieces (+- 1.0 lb) may not be reasonable or reproducible and heating them in an oven for 24 hours will add a day to the test and more expense with an uncertain benefit. Commenter (0541) suggests that if wood moisture is a concern that the wood moisture levels accepted would be representative of what is found in the states. Commenter (0541) proposes that a default moisture level, such as 22%, be added to the method since the commenter has not normally seen oak at <18%.

Commenter (1647) states that accuracy in the moisture content measurement relates primarily to the determination of the actual dry wood weight, and the dry wood weight is only used to calculate the burn rate and the actual heat input which is used to calculate efficiency. While there is variability within and between pieces of fuel used in any test load, according to commenter (1647), the moisture content value used in the calculations is the average of a large number of individual measurements. Commenter (1647) provides an example of how taking multiple readings (e.g., 12-40) and calculating an average reduces the variability within and between pieces of fuel used in any test load. Commenter (1647) concludes that this is a far more accurate method of determining fuel moisture content than the proposed BNL method, which requires no measurement of the fuel actually burned in the test.

Commenter (1647) states that the BNL method would not ensure that all the pieces in the batch are at the specified moisture content, especially considering that all of the accredited laboratories have reported that maintaining adequate fuel stock in the required moisture content range is very difficult with sawn lumber and certainly with cord wood, where even pieces cut from a single tree can vary in moisture content from less than 15% to well over 50%. Commenter (1546) agrees, that these method changes would be inconvenient for crib fuel testing, and they are expected to be exponentially more difficult (and costly) with cord wood.

Commenters (1546, 1647) state that it will take too long to determine fuel moisture using the BNL method because by the time a final moisture number has been determined, several test runs may already have been conducted and if the fuel moisture is determined to be outside the proposed 21.5 – 23.5% range those runs will be invalidated for a test run that typically costs thousands of dollars.

Commenter (1562) disagrees with the BNL oven drying moisture content test procedure for several reasons: 1) Drying time is seldom 24 hours; many times it extends for a couple of days; 2) Not knowing the moisture content for a day or two, means an emissions test burn may be invalid because the moisture content was unknown (and out of range) until after the test was completed; and 3) Selecting three pieces, of the same weight as the average fuel load log, for testing is not accurate. Commenter (1562) states that if the log is smaller in physical size, but of the same weight, its moisture content will be higher than the average, skewing the test results to a more efficient point and making this ripe for abuse. Commenter (1562) suggests measuring the moisture content of each piece of the fuel load per the ASTM E2618-13 Standard and determining the weighted average for the entire fuel load.

Commenter (1546) states that EPA's proposal to use the BNL procedures developed for hydronic heating devices with partial thermal storage results in a method that is not representative of the fuel actually being consumed during testing, especially with nonhomogeneous fuel like cord wood. Commenter (1546) adds that the argument in favor of testing with cord wood seems to be that it will better represent real world heater use, but selecting three pieces of cord wood – which will never be burned in the heater – to determine the moisture content for the other pieces of wood to be used in testing runs counter to this argument. Commenter (1436) agrees that precision is not helped by discarding the tested sample and the BNL method only adds complexity.

Commenter (1465) suggests that hydronic heater tests use cord wood and measure fuel moisture content by the method described by the State University of New York College of Environmental Science and Forestry (SUNY ESF), or an equivalent method because this is what consumers use and test results will more closely approximate in-use performance. Commenter (1465) states the SUNY ESF evaluated the feasibility of using kiln-drying for developing a cord wood test-fuel and instrument performance over the range of moisture contents specified in the test method and developed a measurement method representative of the moisture gradient in a piece of cord wood. Commenter (1465) asserts the project demonstrated that "controlled drying in a lumber kiln can bring moisture content to desired levels in a period of just several days which greatly facilitates production of consistent and uniform wood fuel for both test and general consumer

heating purposes." Commenter (1465) adds that a simplified method for measuring moisture content was also developed and requires averaging four moisture meter values, taken in the shell and core of the wood at the end and middle of the piece of cord wood being measured.

Commenter (1632) does not agree with tightening the fuel moisture and weight specifications because this would greatly increase fuel costs. Commenter (1632) adds that the moisture meters that are currently used cannot measure this precisely and they have not seen that fuel moisture has a great impact on emissions. Also, commenter (1632) states that the current method is representative of real world moisture levels in wood that has been properly seasoned.

Commenter (1355) states that the moistness of wood can affect adversely the efficiency of wood heater operations.

Response:

As commenter (1647) indicated, the precise moisture content may not make a large difference in the emissions within the specified narrow range. Thus, we did not further narrow the range as we proposed for EPA Method 28R. However, moisture content outside the specified range can make a large difference in emissions and efficiency. For example, a study conducted by the EPA's Office of Research and Development shows that moisture content has a significant effect on emissions (1,2 to 2.2 times).[36] High moisture wood clearly wastes more of the energy value of the wood to drive out the moisture than for dry wood and thus decrease efficiencies that are important to consumers.

The BNL slice moisture content method has been used successfully and is approved for the voluntary hydronic heater program, the NYSDEC hydronic heater emission regulation and the NYSERDA Renewable Heat New York grant application program. While the commenters point to some difficulties with use of this approach, we do not find them insurmountable. Nevertheless, we agree that the measurement method described by SUNY ESF using kiln-dried wood is a reasonable alternative and will also be allowed, as will use of the traditional "pin prick" method described in Method 28 WHH-PTS. Good laboratory wood fuel inventory management practices for all of the methods include allowing the wood moisture content to stabilize for at least several weeks before the certification tests are conducted. In addition, manufacturers always have the option to request approval to use an alternative method under § 60.8.

We agree that the issue of determining moisture content is an evolving topic and will be considered as we develop test methods that better reflect in-home use.

[36] Evaluation of Methods for the Physical Characterization of the Fine Particle Emissions from Two Residential Wood Combustion Appliances. John S. Kinsey, U. S. Environmental Protection Agency, Peter H. Kariher, ARCADIS and Yuanji Dong, ARCADIS. 2009.

6.1.14 Comment: Procedure to incorporate updated test methods

Commenter (1646) states that the rule should create room to modify the testing standards as updates are available. Commenter (1646) states that citing a publication year (example: ASTM E2817-11) confines the test method to the one published that year (e.g., 2011) regardless of later discovered problems. Commenter (1646) adds that the rule (subpart RRRR) is using a brand new testing standard and it would be foolish to think that there will be no issues as it is used more broadly. Commenter (1465) believes the EPA should make clear that the ASTMs referenced in the regulation are the ones to be used, and not ASTMs that are updated subsequent to this rulemaking and prior to revisions to any of the affected regulations. For example, commenter (1465) notes the rulemaking references ASTM 2515-10, but the ASTM website reference in the rulemaking has ASTM 2515-11. Commenter (1465) adds that any changes to methods used for regulatory purposes need to have the opportunity for public comment.

Response:

The final rule references the currently available version of the applicable methods. As new versions are developed, we expect that sources will request to use them under the § 60.8 approval process on a case-by-case basis. We expect to continue our years-old practice of regularly (e.g., annually) preparing a rulemaking proposal package for public comment to update the list of approved test methods in the CFR to include new versions, as appropriate, so that case-by-case approvals are no longer needed for those specific methods.

6.2 Method 5G and Method 5H Issues

6.2.1 Comment: Conversion between Method 5G "Determination of particulate emissions from wood heaters from a dilution tunnel sampling location" and Method 5H "Determination of particulate emissions from wood heaters from a stack location"

Commenter (1551) states the EPA should provide a publicly accessible data set that includes information on emission rates for all devices in the format that the new rule will use. Commenter (1551) asserts that the EPA requires space heating units tested with Method 5G utilize a correction factor to meet the current emission rate known as Method 5Gadj, which inflates emission rates. Should the EPA remove this correction factor in the new rule, commenter (1551) believes the EPA must provide to the public all emissions data clearly identifying whether the emission rates presented are Method 5G or Method 5Gadj. Commenter (1551) also believes the EPA must revise the data set for central heating units to ensure that emission rates for hydronic heaters reflect load side measurements, as proposed in the rule, as opposed to supply side data.

Commenters (1546, 1647) state that the EPA statements in the rule and preamble regarding the 5G and 5H conversions are confusing and appear to contradict one another (see pp. 5 and 6 of the 1546 comment letter). Commenters (1546, 1647) support the use of Method 5G(3) values as tested, without a correction factor, for heaters prior to the effective date. Commenter (1397) suggests close examination of the available dataset of test results converted to 5G equivalents for

preparing emission estimates, including all items tested from 2010 to present. Commenter (1397) notes the conversion of the HPBA database to 5G equivalents shows the top 20%, a mix of both catalytic and noncatalytic stoves, are already below 2.5 g/hr.

Response:

As part of the NODA comment responses, commenter (1700) analyzed the HPBA database of 147 certified stoves, including the impacts of removal of the 5G correction factor. The result is clearly annotated in the comment in the docket. In general, the result is that overall reported emissions in the data set are lower by a gram or two; consequently more stoves will meet the final standards.

6.2.2 Comment: Method 5 series unreliable below 5 grams/hour

Commenter (1521) asserts that Method 5 series and their equivalents are being used to determine emission concentrations at levels below what they are capable of reliably reporting based on the available QA/QC data. According to commenter (1521), based on the data collected through the EPA required Accredited Laboratory Proficiency Test Program, it appears that the analytical methods currently in place are neither reliable nor valid below 5 g/hr at best, and more realistically not valid below 10 g/hr. Commenter (1521) states that, in this regard, they concur with the findings documented in Curkeet-Ferguson and comments on the proposed Boiler MACT rule as provided by Mary Sullivan Douglas of the National Association of Clean Air Agencies (NACAA) (EPA-HQ-OAR-2002-0058-3525-A1; included as an attachment to the commenter's letter):

> No rigorous assessment of the precision of the test methods contained in the wood stove NSPS [40 CFR Part 60, subpart AAA, originally promulgated in 1988 and amended in 1996] and required to be used to certify model lines under that NSPS has ever been performed, despite the fact that the NSPS was promulgated over 25 years ago, more than 700 wood stoves have been tested and certified under it, and a large data base of proficiency test data from accredited laboratories has been assembled.

Response:

As described in the *Section 6.1.3* response, we have determined that the precision of the test methods is not an obstacle for reliably demonstrating compliance with the final standards. Moving forward, however, we agree that this is an issue for additional test method development, especially as we consider more stringent standards in the future.

6.3 Method 28R for Certification and Auditing of Wood Heaters

6.3.1 Comment: Overall support and concerns regarding Method 28 and revisions

Commenter (1487) provides specific support for the EPA's proposed revisions to Method 28 and encourages the EPA to preserve them in the final rule.

Commenter (1551) states that while the precision of Method 28 is not as high as desired, the current data do not allow for analysis to determine if the variability is due to technical capacity of lab personnel, fuel, or method. Commenter (1551) suggests the EPA analyze the data based on similar burn rates, fuel moisture content, and fuel density. Additionally, commenter (1551) states the EPA should ensure that comparison of test results is an apples to apples comparison; test results from certification testing should not be compared with tests used for research and verification testing or field testing that utilized different measurement techniques.

Commenter (1505) states that the EPA Method 28 does not specify the use of any other biomass fuel like corn. According to the commenter (1505), this means that the EPA does not certify the use of other biomass fuels and effectively bans the combustion of alternative biomass in these heating systems.

Commenter (1642) provides a summary of testing (in a slide presentation) (under the Colville, WA Wood Stove Low Burn Rate Project) done that compared crib and cord wood fuel tests in two identical noncatalytic stoves run in several series of comparison tests in order to show the impact of the EPA M28 minimum burn rate requirement. According to the testing, the Colville project showed the following:

1) To achieve a cleaner burn more consistently, there are significant differences in the minimum combustion air settings required for EPA crib fuel compared to cord wood.
2) The current minimum burn rate requirement in EPA M28 is negatively impacting real world low burn rate performance.
3) Modest increases in the minimum combustion air setting will allow homeowners to achieve better, more consistent performance.
4) Wet wood performance was worse than drier wood even when given a longer start time.

Response:

One commenter's (1551) suggestions are most applicable to the Step 2 emission standards and beyond. For Step 1, as explained previously, we have allowed a broader range of test methods to apply in order to achieve a robust number of models that quality for automatic certification. As we move forward, the number of acceptable methods decreases and, eventually, we plan to develop methods targeted to measuring emissions under conditions that are more representative of in-home performance. As we develop more refined methods, we anticipate that the resulting database of certified models will be more easily comparable than is currently the case.

It is correct that Method 28 cannot be used to certify biomass like corn. Instead, sources are directed to use ASTM 2779 for pellet fuel. If a manufacturer wants to label a stove capable of burning both wood and corn pellets, the stove would have to be tested using each fuel type. Both results would have to be reported, but it would only be subject to the PM standard for the wood fuel. However, if a stove is only capable of burning non-wood pellet fuel and it is labeled and marketed as non-wood only, it is not subject to subpart AAA or QQQQ emission standards, as applicable. Therefore, the final rule does accommodate biomass combustion.

We disagree with the suggestion to reduce the minimum burn rate requirement. While we agree that combustion air settings differ between crib wood tests and cord wood tests, the burden is on the manufacturer to design stoves that function well at low burn rates to accommodate their customers' needs. The EPA and state and local agencies are concerned about high emissions in low burn rate models and it is important to keep these conditions as part of the certification test to ensure good in-home performance. As we move to a cord wood standard in the future, the certification test should more easily align with in-home performance.

6.3.2 Comment: NTTAA issues with Method 28R's use for wood stoves

Commenters (1543, 1549, 1550, 1643, 1647) believe that the EPA's proposal to used Method 28R is contrary to the NTTAA because it omits or modifies important specifications and procedures included in ASTM E2780-10. Commenters (1543, 1549, 1550, 1643, 1647) state that these departures cannot be justified under the NTTAA. Commenters (1543, 1549, 1550, 1643, 1647) cite the following deviations as being particularly important:

- Different low burn rate and failure to include procedure for an alternative low burn rate that is in ASTM
- Four burn rates in Method 28 vs. three burn rates in ASTM method
- Different startup procedures
- Method 5G to Method 5H conversion equation
- Inclusion of prohibition of firebox loading instruction in Method 28 but not ASTM method
- Different test fuel specification (fuel moisture content, fuel load range and test-initiation coal-bed weight specification.

See comment 1647 for an extensive discussion of these differences and their impacts on test method results (pp. 3-14, Method 28R).

Commenter (1647) states that many of these exceptions appear to have been proposed to improve the precision of the method. However, commenter (1647) states that no data have been offered to support the proposition that any of them would or could achieve this objective, and, in fact, the comprehensive precision study conducted using the EPA's extensive data base from the accredited laboratory proficiency program concluded that further specification of the method in these ways would not improve precision, and that the major factor contributing to imprecision was the inherent variability in the process being evaluated – burning wood. (See: EPA Wood Heater Test Method Variability Study Analysis of Uncertainty, Repeatability and Reproducibility based on the EPA Accredited Laboratory Proficiency Test Database, Rick Curkeet, Robert Ferguson, October 6, 2010.) In addition, commenter (1647) states, the proponent of many of these changes himself candidly admitted that he did not have data to support the proposition that these changes would improve precision. Commenter (1647) concludes that all of these changes would, even if they did improve precision, make the method even less

representative of real world operating conditions, and thereby increase the degree to which lab certification test results do not correlate with real world emissions performance.

Commenters (1543, 1549, 1550, 1643) conclude that the EPA has failed to justify its departures from the ASTM method under NTTAA and further, that each departure must be justified. Commenters (1543, 1549, 1550, 1643) claim that the EPA has failed to demonstrate a clear conflict between application of the particular test methods and the CAA's BSER standard or some other statutory or regulatory requirement. Similarly, commenters (1543, 1549, 1550, 1643) claim that the EPA has no basis for the claim that the ASTM standards are impractical or that there are any data quality concerns or other such circumstances that would warrant application of Method 28R or any other government-unique standard here. Commenters (1543, 1549, 1550, 1643) add that the EPA has expressed reservations about the low burn rate specifications, but did not cast any negative ballots or present data or analyses supporting its reservations. Because there are no grounds to support any possible finding that the provisions for which the EPA proposes substitutes are contrary to law or otherwise impractical under the circumstances here, commenters (1543, 1549, 1550, 1643) assert that the EPA's proposal to deviate from E2780-10 in this rulemaking violates NTTAA. Commenters (1543, 1549, 1550, 1643) add that, in any event, even if NTTAA compliance were not at issue here, the Lab Coalition's comments demonstrate why EPA's proposed substitutes are technically unsound and impractical.

Response:

As described in response to comment 6.1.1, we reject the NTTAA arguments raised by the commenters and assert that we have complied with the intent of the NTTAA. As discussed in the proposal preamble, we accepted some ASTM test methods as written but we also determined under the NTTAA that some portions of some of the ASTM test methods were not applicable or impractical for this rule because they did not achieve the Agency's mission, goals and objectives. (The NTTAA directs agencies to use voluntary consensus standards whenever applicable methods are available unless they are impractical.) For example, as discussed in the proposal preamble, the rule incorporates some voluntary consensus standards (VCS) by reference, including some ASTM methods and CSA B415.1-10. We could not use some ASTM test methods and other VCS because they were not applicable. That is, the inapplicable VCS did not fully achieve the intent of this rule or the primary mission of the Agency and many tribes, states and local agencies to protect human health and the environment. This was especially true for the ASTM changes to Method 28 or Method 28R that would result in a different number of burn rates, different required minimum low burn rates, different start-up procedures and different fuel specifications. All of these differences would make the ASTM test method easier for lower-performance models and less environmentally protective. (The comment about 5G to 5H conversion is not relevant because the proposal did not include that requirement.)

Some comments claimed that the EPA cannot take portions of VCS but rather must only use the whole VCS. That position is inconsistent with the intent of the NTTAA goal for reducing duplication of effort. That is, using valuable portions of VCS helps reduce potential duplicative efforts.

Some comments suggested that because the EPA unofficial participants (the EPA employees who were not ASTM members but participated in some of the calls) in certain ASTM test method development efforts did not submit official negatives on the standard, that somehow that meant that the EPA approved all of the details of the draft ASTM test methods. The EPA participants often expressed that the draft test methods were not fully applicable to the needs of the EPA and states; but since the draft test methods may meet some of the immediate needs of the industry participants, the EPA did not want to stop the ASTM efforts to develop improved drafts. Further, the NTTAA guidance explicitly states that Agency participation does not indicate Agency approval or endorsement.

As noted earlier, we have determined that ASTM E2780-10 does not meet the needs of subpart AAA unless we make certain exceptions as we noted at proposal. For example, the emissions profile of these appliances is not as uniform as the use of three burn rates in the ASTM method would suggest and the four burn rate structure that Method 28R requires is needed. However, we considered each concern individually. For example, we have decided not to eliminate the 5-minute startup period before closing the doors during a test. In general, however, information provided by the commenters has not revised our reasons for the other adaptations to the ASTM method. This combined with the fact that it is important to include Method 28 certifications in the Step 1 BSER data base to ensure that a robust number of models are available to automatic certification, means that we are retaining Method 28R in the final rule. Finally, as we develop a cord wood standard in the future, we can consider changes to address some of the concerns raised by commenters.

6.3.3 Comment: Use of Method 301 to correlate other test methods to Method 28

As the EPA analyzes other test methods, commenter (1551) urges the EPA to use Method 301 or a similar process that develops correction factors to ensure that different methods are correlated to the emission standard based on Method 28. As an alternative to Method 301, commenter (1551) states the EPA could exercise its section 114 authority to fully inform the Step 2 standard. Commenter (1551) states that although manufacturers claim a cord wood test will yield higher emission results, data show that results could move in either direction.

Response:

The commenters' suggestions are among the options available to EPA as we develop new methods.

6.3.4 Comment: Addressing burn rates

Commenter (1397) asserts Method 28 precision could be improved by addressing the determination of burn rates, which were based on the Automated Woodstove Emission Sampler (AWES) test data set and because AWES used "100°F at one foot above the flue collar" as the endpoint, test run times were overestimated beyond the current "scale equals zero" endpoint and, thus, the burn rates derived were artificially lowered. For accuracy, commenter (1397) supports

test lab suggestions that Method 28 burn rates be adjusted upward to account for the overemphasis on low burn rate in the AWES data.

Commenter (1632) states that increasing the low burn rate from 1.0 kg/hr to 1.15 kg/hr will greatly improve how appliances perform in the real world. Commenter (1632) believes that the market will still demand long burn times and the market place will drive the performance and not the standard. Commenter (1632) adds that their consumers do not burn appliances on high all the time and to set an emission limit at only one burn rate is not realistic.

Response:

As described in response to comment 6.3.2, we are retaining the current burn rate requirements, but the commenters' suggestions will be considered as we develop new test methods more representative of in-home performance. We are not setting an emission limit for only a single burn rate, but rather we agree that heaters should be designed to perform well at all burn rates that may occur in actual use. As in 1988, we and the states are still very concerned about the typically poor combustion and higher emissions that occur at low burn rates and thus certification tests should include the lowest burn rates that would occur in actual use.

6.3.5 Comment: Method 28 stack height

Commenter (0541) notes that Phase 2 heaters and Phase 2 furnaces are engineered to operate with a stack height 15' from the ground as in the Method 28 test specification, but that some states have been concerned about emissions from unqualified heaters and furnaces and have regulated to increase stack heights as a result. Commenter (0541) suggests that Step 2 units not be subject to increases in stack height because it causes the creation of increased (faster rate) drafts, decreased efficiency and higher emissions performance. Commenter (0541) notes that in some U.S. climates where temperatures are often below freezing for long periods of time, the heaters with extended stacks will have problems with condensation and moisture freezing in the exhaust or traveling back into the heater causing corrosion.

Response:

We are retaining the Method 28 stack height specifications for the certification tests, but recognize that the states have the authority to require increased stack heights. In all cases, the responsibility is on the manufacturer to ensure that the heaters are designed to perform well for all conditions expected in actual use.

6.3.6 Comment: Fuel load weight

Commenter (1647) notes that the ASTM subcommittee concluded that the fuel load weight of 7.0 lb/ft^3 ± 10% was reasonable for the crib loading procedure and that tighter restrictions on the load weight would result in more variability of fuel piece length, and perhaps the number of fuel pieces based on fuel density variations. Commenter (1647) states that this is a particular issue with Douglas fir which has an especially wide density range and such differences in fuel were at

least as likely to result in variable emissions performance as the allowable variability in load weight. Commenter (1647) states that the Curkeet-Ferguson EPA proficiency test variability analysis clearly indicated that there was no evidence of an association between actual load weight and emissions performance.

Commenter (1436) states that the allowed range for fuel load under Method 28 will make testing more difficult and only add complexity. Commenter (1436) believes that having a consistent fuel would be better. Commenter (1632) does not agree with tightening the weight specifications because this would greatly increase fuel costs.

Commenter (1647) states that manufacturers are best positioned to specify fuel load sizes based on the design of the individual stoves. Commenter (1647) adds that European test methods for wood stoves and boilers specify the use of cord wood fuel loads sized based on the manufacturer's operating instructions or declared heating capacity with no reference to firebox size. Commenter notes that the ASTM subcommittee concluded that the test method should evaluate emissions and efficiency of these appliances when operated as reasonably intended and instructed by the manufacturer and that it is inappropriate to require compliance with emissions performance regulations when the appliance is misused or abused.

Commenter (1397) states the proposed fuel bed restriction is reasonable but may need to include adjustments based on firebox size. Commenter (1397) adds that the firebox size used for testing should be the maximum volume used by a consumer, not a smaller subset specified by a manufacturer.

Response:

In order to minimize the number of differences versus existing test methods and emission databases, the final rule retains the fuel bed loading restrictions, but if a manufacturer requests permission to use a higher loading weight for the certification test, we would approve it as this would be a more stringent test condition. The EPA and the states disagree with the commenter that there is no association between actual load conditions and emission performance and thus the final rule does not allow manufacturers to specify a smaller volume of the firebox for certification testing than the full usable firebox volume. However, we welcome additional data and will consider such variables in development of a future cord wood standard.

6.3.7 Comment: Coal bed weight

Commenter (1397) states that coal bed weight restrictions seem reasonable but input from test labs is needed. Commenter (1647) states that the proposal to reduce the specified coal-bed size to 22% ±1% of the test load weight was rejected by the ASTM Subcommittee as too narrow for practical application. For example, commenter (1647) describes, for a typical 2 cubic foot firebox (average of currently certified models) stove, 1% of the test load weight is 0.14 lbs, which is a very small weight change that cannot be reliably measured with a scale that has a 1000 lb capacity and a 0.1 lb resolution. Commenter (1647) notes that the time that the coal-bed weight remains in such a narrow range can be very short and present a narrow time window for

initiating a test. Commenter (1647) adds that if the window is missed, the process of reestablishing a coal-bed can take several hours. Commenter (1647) states that 20 to 25% of load weight represents a realistic and workable specification and this is also consistent with real world use where fuel is added when it is convenient for the user, not when the coal bed is a specific size (consumers do not have their stoves on scales). Commenter (1632) notes that the tighter coal bed range could result in days and money wasted.

Response:

We appreciate the feedback on this issue for which we requested comment in the proposed rule. In order to minimize the number of difference versus existing test methods and emission databases, the final rule does not tighten the coal bed restrictions. We agree that practical applications should be considered and we will further consider these suggestions as we develop the future cord wood test method. As always, we are continuing to allow manufacturers an opportunity to request the use of alternative testing on a case-by-case basis, especially where emissions reductions are improved.

6.3.8 Comment: Unburned fuel and validity of test run concerns

Commenter (1551) notes that under the current rule, unburned fuel may remain in the device even when the test has officially ended; as shown in a hydronic heater test witnessed by the EPA and the commenter in which unburned wood remained in the firebox even though the test had officially ended based on the scale weight returning to original weight before loading the test fuel charge. While valid under Method 28, commenter (1551) states this highlights an issue that the test method does not require the full fuel charge to be burned in order to be a valid test run. Thus, commenter (1551) recommends that the EPA include a requirement for visual confirmation of fuel charge consumption in the final rule. To be a valid test run, commenter (1551) recommends only coals and ashes remain in the firebox and if any material recognizable as wood remains in the device chamber upon completion of the burn, the test should be considered invalid.

Response:

The commenter raises an interesting point and we have changed the test report requirements to include justification for test method validity in cases where there is unburned wood in the firebox at the end of the test. We have made this change to test reports for all applicable methods. We note that future test method development efforts will consider this issue further.

6.4 Method 28 WHH for Measurement of Particulate Emissions and Heating Efficiency of Wood-Fired Hydronic Heating Appliances

6.4.1 Comment: General concerns with Method 28 WHH

Commenter (1572) states that there should not be any changes to EPA Method 28 “OHH” until the EPA has been able to collect enough data to verify its hypotheses. Commenter (1572) states

that the EPA needs to work with industry to collect enough data to make sure that the method is sound and that it will not adversely affect manufacturers by making the cost of testing prohibitive. Commenter (1509) is appalled that the EPA would change the test procedure that all parties agreed to under the voluntary program and eliminate all model qualifications that their company did in good faith to support the voluntary program.

Commenter (1488) states that the EPA's proposed test methods are similar to an earlier method, Method 28 OWHH, developed in 2006. Commenter (1488) states that, according to a 2012 NYSERDA study by the EPA, "[t]the EPA method tends to somewhat under-predict" emissions from three of the four hydronic heater models in the study.

Commenter (1488) states that the EPA's proposed test method for hydronic heaters is biased downward by weighting and averaging, testing outdoor models in unrealistically warm conditions, does not account for misuse such as wet wood and prohibited fuels, and relies on a standard irrelevant to information that can help protect public health.

Commenter (1488) expresses concern with the hydronic heater test method and its reliance on calculated emission values rather than actual $PM_{2.5}$ emission rates.

Commenter (1465) states the EPA should explain why Method 5G is not being used or improved for use under Method 28 WHH.

Commenter (1465) supports maintaining the four burn rate categories and weighting factors for Test Method 28-WHH.

Commenter (0948) states that Method 28 WHH does not accommodate their thermal storage systems, which have small boiler water volumes (i.e., low mass), and operation in low outputs is greatly reduced therefore cycling is similarly reduced. Commenter (0948) is concerned that the ASTM committee process cannot objectively result in a thermal storage method that encompasses technologies such as theirs because the committee is largely made up of representatives of the incumbent technologies who may not be familiar with or chose not to adopt the latest technology know how.

Commenter (1591) notes that the current test method states "the appliance operation and fueling protocols and the appliances themselves produce variable amounts of emissions and cannot be used to determine reproducibility." Commenter (1591) asserts this underlines the key problem with the current test method - the public may not reproduce the emissions each time but there needs to be some certainty that the emissions are always within the maximums set by the EPA.

Commenter (1397) suggests modifying M28 WHH to allow the testing of devices with advanced technology (either analog or digital). Commenter (1397) also prefers a shortened test that is capable of field testing and believes domestic gasification units should be included under the standard.

Commenter (1397) recommends adding "or an alternate test method approved by the EPA administrator" to the requirement at § 60.5476(a)(1).

Response:

Our intent in the final rule is to ensure that Method 28 WHH is consistent with the test method requirements in the current voluntary hydronic heater partnership agreement. In developing that method, we worked closely with states, industry and the testing labs, and the resulting method has been used successfully since 2010. As part of our effort to ensure a robust number of hydronic heater models that are able to be automatically deemed certified for Step 1, we are preserving the validity of the partnership agreement tests for Step 1. We recognize that the current test methods are laboratory tests and from a practical standpoint cannot separately measure emissions form all potential actual use conditions, including misuse conditions. As we move forward toward developing new cord wood test methods more representative of the varying in-home operating conditions, we will fully consider the issues and suggestions provided by commenters. We note that, in the meantime, the final rule continues to require proper operation and prohibits improper fuels such as unseasoned wood.

Regarding the request to clarify that manufacturers may request approval of alternative methods, we note that this is already allowed under the General Provisions § 60.8, but we will add a cross reference to § 60.8 in each subpart.

6.4.2 Comment: Startup emissions

Two commenter (1487, 1591) support startup emissions testing. Commenter (1487) states the proposed test method utilizes a "hot-to-hot" test cycle and, therefore, omits measurement during the startup phases. Commenter (1487) opines that, given hydronic heaters have been shown to emit at the highest rates during startup, it is important that the test cycle include measurement of startup emissions.

Commenter (1591) states the test method must use a cold start and must modulate heat demand to simulate an indoor thermostat cycling on and off so as to replicate real world operation. Commenter (1591) asserts hydronic heaters have exceeded the NAAQS for the 24-hour period in real world testing and the EPA must ensure that no family has to endure multiple times per day of spikes of PM and other emissions. Commenter (1591) believes the EPA must ensure hydronic heaters are held to the same standard as wood stoves.

Response:

We agree with commenters that test methods that use a cold start and address cycling are more representative of emissions occurring as models are actually used in the home. We note that Method 28 WHH-PTS includes cold starts and cycling, and we hope that manufacturers seriously consider using this method to conduct their certification tests. Once again, this is an issue we will fully consider in developing future methods.

Regarding the comment that we should hold hydronic heaters to the same standard as wood stoves, we note that under section 111 of the CAA, NSPS are to be technology-based standards.

6.4.3 Comment: Heat output specifications

Commenters (1510, 1647) note that the proposed Method 28 WHH test method differs from that used in the EPA Phase 2 voluntary program by changing the requirement for the average heat output rate from 10 to 5%. The commenter (1647) notes that there are many factors that result in significant variability in output rate during a test run that limit a laboratory's ability to maintain a tight tolerance, including a substantial variation in the burn rate and heat production from the fuel as it goes through the ignition and burning process. Commenter (1647) adds that appliances with relatively low mass and lower volumes of onboard water may make it impossible to maintain such tight control on the output rate throughout the entire test cycle. The commenter (1647) states that, as the test method requires readings and calculation of output rate every minute and the time required to adjust test equipment as the appliance goes through changes in heat production can take as long as 10-20 minutes, it is likely that a very high proportion of output capacity verification tests would fail to meet this criteria. For these reasons, the commenter (1647) states, it is necessary to allow the original ±10% tolerance on the average output and not place any limit on short-term variations. The commenter (1647) notes that the procedure allows for the manufacturer to revise their output capacity claim based on the actual average output measured when the ±10% tolerance is not met, which ensures that output capacity claims and the category 1, 2 and 3 tests are based on a realistic and reasonably accurate output rating. Commenter (1510) adds that the change results in a significant difference that is unjustified and without logic.

Response:

As described above, our intent in the final rule is to ensure that Method 28 WHH is consistent with the test method requirements in the current voluntary hydronic heater partnership agreement. We have changed the proposed method to be consistent with the heat output specifications included in the voluntary program.

6.4.4 Comment: Test fuel specifications

Commenters (0541, 1423) support changes to improve the reproducibility and repeatability of the test procedures. Commenter (1423) specifically supports tightened parameters for fuel weight, fuel moisture and limitations on operation at test startup. However, commenters (0541, 1546, 1647) point to specific changes proposed by the EPA that will decrease reproducibility and repeatability in the test procedures. For example, commenter (1546) states that the EPA provides no empirical evidence that tighter restrictions on moisture content, fuel load density, and coal bed weight will "improve the reproducibility and repeatability of the certification tests." Commenter (0541) does not support tightening of fuel and water flow to +/- 1%. Commenter (0541) states that in small fireboxes with low flow we should round to +/- 1 lb and +/- 0.1 gallons. Commenter (0541) states that measurement to a fraction of a pound and flow measurement to a one hundredth of a gallon will be hard to reproduce.

Response:

As described above, our intent in the final rule is to ensure that Method 28 WHH is consistent with the current test method requirements in the voluntary hydronic heater partnership agreement. We have changed the proposed method to be consistent with the test fuel specifications included in the current voluntary program. We note that these issues are still of concern to commenters and we welcome emission test data that would help inform us as we consider future test methods that better measure the varying conditions that occur in actual in-home use.

6.4.5 Comment: Test fuel including load length

Commenter (1397) states the proposed changes in M28 WHH are not fully acceptable. For example, commenter (1397) asserts the use of red or white oak as test fuel should be replaced with a density range requirement.

Commenter (1558) states testing must be done with the real world practice of a fully loaded firebox of typical cord wood using a variety of species with a moisture content of 20-25%.

Commenter (1591) states that unless the EPA is going to stipulate fuel box size, then the fuel charge must replicate the worst case, not best case scenario. Commenter (1591) notes the current method of testing uses the optimal wood determined by the fuel box size and manufacturer's instructions but states real world testing should assume owners will load an OHH w/fresh cut large logs intended to avoid frequent reloading. Commenter (1591) asserts that if the EPA watches any of a number of videos posted by manufacturers they clearly show that their boilers are made to use large pieces for long burn.

Commenter (1591) states the test method must be load and go. Commenter (1591) asserts that allowing adjustments to the coal bed to dislodge fuel pieces from positions of poor operations is not real world operation and should not occur. Commenter (1591) states that real world operators are not going to stand outside in the freezing cold and babysit their OHH, they load and go.

Commenter (1591) opposes use of Method 28 WHH, stating that it vastly under reports emissions. Commenter (1591) recommends using the State of Washington Test Method. Commenter (1591) asserts use of kiln-dried red oak vastly under reports emissions and notes that the current test method requires that the wood be free of fungus, decay, and loose bark. The reality, states commenter (1591), is that OWBs by their location eliminate the operator's fear of building creosote in their chimney and so wood is often cut and burned, stored outside without benefit of cover, or includes treated wood or other hazardous materials. If the EPA really believes that OWBs can and should be allowed to be sold in the U.S., then commenter (1591) states they must account for "operator error" when calculating the impact upon our air. For the EPA to not recognize that people run out of wood and proceed to burn whatever is available, commenter (1591) states is a head in the sand approach to regulation. Commenter (1591) suggests that the EPA view the 11 videos posted on line by Mr. O'Hara to view how OWBs

operate and how difficult it is to get them to not smoke (https://www.youtube.com/watch?v=uwOrdaHVkEE).

Commenter (1562) asserts that requiring the fuel load to be 80% of the firebox length is contrary to known scientific "volumetric heat release rates" used in the design of furnaces and boilers, whether fired by gas, oil, wood or coal. Commenter (1562) recommends not requiring the fuel load to be 80% of the combustion chamber length and letting the manufacturer determine the appropriate length and list that length in the manual and on equipment labels. Commenter (1562) suggests that is burning other fuel lengths would be a violation of the emissions certification.

Commenter (1562) states that by not providing sufficient heat release volume one of two results will occur:

- Severely restricted combustion process resulting in incomplete, dirty combustion
- Highly-localized combustion temperatures resulting in significant NOx formation.

Commenter (1562) adds that setting a specific fuel load length does not guarantee complete or clean combustion and that ignoring volumetric heat release issues may well guarantee poor performance and excessive emissions. Additional reasons commenter (1562) gives for not requiring the fuel load to be 80% of the combustion chamber length are:

- The vast majority of available log splitters are only capable of splitting 24" long logs. Where does one obtain a splitter that can split 36" wood per the EPA example?
- Is a certified test lab expected to maintain test fuel that can comply with the 80% rule for every combustion chamber length? Who absorbs this cost?
- Handling 36" oak fuel is not easy, especially if it is fabricated into cribs as required per EPA Method 28XXX.
- Commercially available wood fuel is only available in 16" and 24" lengths.

Response:

As described above, our intent in the final rule is to ensure that Method 28 WHH is consistent with the test method requirements in the current voluntary hydronic heater partnership agreement. We have reviewed the method to ensure consistency with the test fuel requirements included in the current voluntary program and *made changes where needed.* We note that the 80% requirement is not new, but rather is in the current (circa October 12, 2011) voluntary hydronic heater partnership agreement.

We disagree with the commenter that certification testing should replicate worst case (including non-compliant scenarios such as using fresh cut wood) and/or "operator error" conditions. Because of testing cost considerations and existing emission database considerations, we are not setting an emission standard based on worst case testing at this time. We may consider approaches in the future encompassing multiple tests that include both worst case testing along with more typical testing for BSER comparisons. In the meantime, with better consumer

awareness and education, with good designs to limit tampering and improper operation and with potential enforcement of the NSPS and state prohibitions against improper operation, the problems cited by commenter (1591) should be addressed in most cases.

We appreciate the concerns expressed in the comments and will consider changes in the test fuel requirements as we develop future cord wood test methods that better represent actual in-home use. For example, on-going EPA test method discussions are considering mixes of fuels and densities and lengths and moisture content. We note that the State of Washington plans to continue to require Douglas fir for current certification tests in Washington but is open to discussions with the EPA regarding the NSPS potentially requiring mixed fuels and densities. We also note that the EPA, states and neighbors are still concerned about improper operation, including improper fuels and overloading and how EPA and the states can best stop improper operation. The final NSPS continues to prohibit improper operation but we recognize that enforcement is a challenge. As discussed in the preamble, we encourage states to use observation of visible emissions as an indicator of potential improper operation.

We note that the proposed test methods did not include use of kiln-dried red oak, but rather prohibited its use in the certification tests.

6.4.6 Comment: Indoor versus outdoor testing

Commenter (1479) suggests that the EPA consider the difference in measuring efficiency between indoor and outdoor units under the current Method 28. The commenter (1479) states that radiant heat loss in an indoor unit is measured as used heat applied to the space in which it is heating, while it would be considered lost heat in an outdoor unit and this puts the outdoor units at a disadvantage and causes confusion to consumers. According to commenter (1479), the same unit can have two different efficiency ratings based on whether it is an indoor or outdoor unit. The commenter (1479) states that the fact that a higher efficiency rating allows for a high output in emissions because the current methods are measured as lb/mmBtu output encourages units to become indoor units with a higher rated efficiency in order to meet an emissions limit.

Response:

The certification test measures heat output directly. Thus, there is no NSPS PM emission limit advantage for units to label themselves as indoor units with a higher efficiency. For now, our intent is to measure efficiency consistently across units in a laboratory setting, but we are open to considering other additional ideas for the future. There are several variables that can affect efficiency in actual use and we would expect manufacturers to address them in the owner's manual. We will also update the EPA's Burn Wise website to address these issues. For example, location of the installed hydronic heater, the outdoor temperature range an outdoor model typically sees and the degree of insulation on the unit can all vary and result in differing efficiencies.

6.4.7 Comment: Moisture content range

Commenter (1397) supports improvements to moisture sampling techniques but feels the proposed narrower tolerance for fuel load moisture content appears unworkable for labs managing wood supplies and recommends a compromise moisture range. Commenter (1397) recommends the expanded guidelines developed by Ben Myren for more precise readings from moisture probes, particularly when applied to cord wood testing. Commenter (1503) supports the comments from Washington State (1397) on moisture sampling techniques.

Commenters (1558, 1587) support the specified use of wood with at least a 22% moisture content during testing to more closely approximate real world conditions.

Commenter (1436) states it is nearly impossible to keep wood at 5% variation and impossible to manage +/- 1% and this would not simulate "real world" wood.

Commenter (1396) believes the proposed reduction to a 22.5% ±1% wood moisture range is far too limiting, especially when using cord wood. Commenter (1396) states drying and preparing standard grade Douglas fir 4x4s is time consuming yet fairly straightforward but that managing and attempting to uniformly dry cord wood is a major undertaking, requiring a huge amount of labor, space, and time to procure, sort, store, and dry enough cord wood to supply repeated emissions tests. Commenter (1396) asserts that having a 2% moisture range to work with will make it far more difficult and ultimately end up creating a great deal of wasted cord wood, with additional burdensome costs to manufacturers. Commenter (1647) also describes the space and resources that would be required to maintain a supply of fuel at the specified moisture content, which would increase testing costs and result in test program postponements it fuel supplies in the proposed moisture content range cannot be obtained.

Commenter (1475) explains that it is not only practically difficult but scientifically impossible to achieve the precision necessary to tighten the allowable wood moisture content to 22.5%±1% (from the current range of 19 to 25%). Commenter (1475) explains the research performed at SUNY College in Syracuse, New York including an example in which 24 pieces of wood were specifically prepared by careful and controlled drying to target moisture level of between 19 and 25% resulting in an average close to 20% actual predicted moisture, while individual values ranged from 10 to more than 30%.

Commenter (1546) states that the EPA's proposal of tighter specifications on test fuel moisture content poses problems. Commenter (1546) states that the speed with which some cord wood can fall in and out of the narrow moisture range will produce scheduling difficulties and will require a large wood stockpile to be maintained at all times. Commenter (1546) states that the EPA provides no empirical evidence that tighter restrictions on moisture content, fuel load density, and coal bed weight will "improve the reproducibility and repeatability of the certification tests."

Commenters (541, 1647) oppose the EPA proposal to limit test fuel Moisture Content to 22.5 ± 1% in part because fuel moisture content is measured with electronic moisture meters that have a stated accuracy of ± 2% and so it is not possible to even verify the fuel moisture content is within

the specified range. Commenter (541) adds that experience shows that the top end should be higher to allow for a more reproducible test.

Commenter (1647) states that a review of existing data from the EPA Proficiency test program data has shown no evidence of a correlation between fuel moisture content within the currently specified range and emissions performance. While it is almost certain that wood moisture content does have an effect on the combustion process that would affect emissions, the commenter (1647) states that it appears that the effect is relatively small and the many other variables involved in the testing and combustion process result in too much variability to allow for determination of the magnitude of the effects of moisture.

Response:

As described above, our intent in the final rule is to ensure that Method 28 WHH is consistent with the test method requirements in the current voluntary hydronic heater partnership agreement. Thus, we have changed the proposed method to be consistent with the moisture content specifications included in the current voluntary program.

We note that commenters are correct in stating that there are a number of practical challenges in meeting the proposed moisture limits, however, many of the challenges can be overcome by using the standard practice of EPA-accredited laboratories keeping the test fuel in humidity-controlled storage when it is near the target range. We agree with commenters that the proposed tighter wood moisture range would not likely make as large a difference as looking at other reasonable worst case moisture ranges that often occur in actual use but we do not agree that the effect of moisture are not measurable. For example, EPA research laboratory tests have shown significant effects using wet wood.[37] We welcome emission test data that will help inform our future development of improved test methods.

6.4.8 Comment: Proposed changes to 1. Heater (aka Boiler) Temperature Range

Commenter (1562) agrees with the 120°F minimum return water temperature.

Commenter (0541) does not believe that testing units with return water temperatures below 150°F is best practice; it should not be suggested to consumers as a viable operating range. Instead, commenter (0541) supports using a thermal valve to achieve best practices. Commenter (0541) adds that increasing water flow can achieve the same amount of BTU as widening the delta T. Commenter (0948) agrees that there should be a minimum return temperature during the certification test, but believes this should be increased to 125°F.

[37] Evaluation of Methods for the Physical Characterization of the Fine Particle Emissions from Two Residential Wood Combustion Appliances. John S. Kinsey, U. S. Environmental Protection Agency, Peter H. Kariher, ARCADIS and Yuanji Dong, ARCADIS. 2009.

Commenter (1591) notes that the current test method requires the water temperature to be a perfect 120°F degrees, which is not real world operation. Commenter (1591) believes tests of emissions must account for the cold water coming into the system.

Response:

As described above, our intent in the final rule is to ensure that Method 28 WHH is consistent with the test method requirements in the current voluntary hydronic heater partnership agreement. We have changed the proposed test method to be consistent with the heater temperature range included in the current voluntary program. We welcome best practices information and emission test data that will help inform our future development of improved test methods.

6.4.9 Comment: Proposed changes to 2. Efficiency Calculations

Commenters (0948, 1487) support the EPA's proposal to test and report the efficiency of hydronic heaters. One commenter (0541) has used digital flow meters that also provide water temperature as an integrated solution. According to commenter (0541), if they are properly calibrated they should be allowed to be used to calculate the delta T. Commenter (0541) adds that they have witnessed as much as a 40% change in flow rates between the inlet and outlet based on the spread of the delta T with the cooler water running at a higher rate.

Commenter (1479) understands that wood-burning central heaters which are combined heat and power units, and units which also make biochar, fall under the definition of central heaters which heat entire residences. Commenter (1479) suggests that within 5 years, these types of units will be a common type for heating residences. Commenter (1479) states that, under the current method, the efficiency of central heaters is determined based on heat loss out of the stack (CSA B415-1.10). Commenter (1479) explains that in a combined heat and power unit, the heat loss out of the stack is captured to create electricity and in a unit producing biochar, the combustion process is not complete in order to create biochar (output), causing more heat loss out of the stack. Commenter (1479) states that biochar output can be up to 25% of the feedstock, and there is no current way, as part of Method 28, to compensate electrical energy output or biochar output, as a credit towards the emissions limits. Current CHP systems that have the BTU output that fall into the NSPS guidelines would be at a disadvantage and commenter (1479) would like a consideration to make it equal, specifically for areas like New England where power is frequently lost. Commenter (1479) adds that solar thermal input is also neglected through the method, and recommends that a credit would be given to take into account this solar thermal input. Commenter (1479) concludes that the EPA needs to pick a method that will be fair to all, and at this time it should be based on input, and the thermal output should be kept separate from the emissions.

Response:

We are open to the use of alternative test methods as already provided in the General Provisions, § 60.8. We are not aware of any devices of the sort described by commenter (1479) that are

seeking EPA NSPS certification at this time, but welcome future justification and rationale for the testing of such devices.

6.4.10 Comment: Proposed changes to 3. Time Period for Recording Temperatures

Commenter (0948) supports the proposed option. Commenter (0541) states they can record sensor data, such as temperature, in sub-second intervals, which can result in very large files during a 50-hour hour test. The commenter (0541) asks what is the maximum data file or time interval that should be submitted with the report.

Response:

We have considered this comment and clarified the data file and/or time interval requirements in the final rule to state that the test reports must record all water temperatures, differential water temperatures and water flow rates at time intervals of one minute or less. We do not need sub-second intervals.

6.4.11 Comment: Proposed changes to 4. Test Fuel Moisture Content

Commenter (1486) believes the proposed moisture content sampling scheme will not work very well because it will skew the moisture reading locations towards the center of the fuel piece. Commenter (1486) asserts that many EPA M28 test fuel cribs have piece lengths that are substantially less than 16", the nominal cord wood fuel piece length. As proposed, according to commenter (1486), the moisture content would only be measured in roughly the center 7" of a 13" fuel piece, leaving 46% of the piece unmeasured. If the end reading locations were to change to 2" in from each end, then commenter (1486) states the moisture readings would be taken in the center 9" still leaving about 4" unmeasured. Commenter (1486) believes a sliding scale for determining these measurements would be much more appropriate because very small stoves have been certified with fuel pieces that were in the 6-7" range.

Commenter (1475) describes how the natural moisture gradient in a piece of cord wood, due to actual piece size, geometry, grain orientation, presence of bark and anatomical structure, can be quite unpredictable, especially with split cord wood because primary direction for moisture movement is likely longitudinal, parallel to the grain, from the piece ends. Commenter (1475) states that this is in specific contrast to rectangular shaped slender lumber, where drying is primarily from surfaces, not ends. Of particular importance and interest is that commenter's (1475) research has found good moisture predictability that is able to account for the three-dimensional moisture gradient in split cord wood by averaging four values, shell and core measurement from the center of a piece and shell and core measurement from an end. Commenter (1475) notes that accuracy has been shown to be quite good, within 1 to 2% moisture content, especially when averaging sets of several pieces that would typically be included in a fuel charge.

Commenter (1541) supports use the State University of New York College of Environmental Science and Forestry method for accurately measuring fuel moisture content, which has been published by NYSERDA under the title "Evaluation of Wood Fuel Moisture Measurement Accuracy for Cordwood-Fired Advanced Hydronic Heaters. (April 2014, web-link http://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/wood-fuel-moisture-accuracy.pdf)

Commenter (1551) supports efforts to use robust methods that codify moisture sampling techniques to increase testing accuracy but is concerned about the impact of moisture content test variability and that proposed procedures are not robust enough to accurately measure moisture content; especially on oak fuel, given the difficulty in obtaining uniform moisture content throughout the fuel piece. According to commenter (1551), preliminary tests suggest that an increase of 4% moisture can increase emissions by 6 to 18%. As regulatory emission limits become more stringent, commenter (1551) believes the effect of fuel moisture content on the variability of measured emissions will become more critical.

Commenter (1475) believes that the proposed restriction of the use of kiln-dried material (per section 12.2 of the test method) is problematic for no discernable reason. Commenter's (1475) research has shown that controlled drying in a lumber kiln can bring moisture content to desired levels in a period of just several days, which greatly facilitates production of consistent and uniform wood fuel for both test and general consumer heating purposes. Commenter (1475) adds that phytopathology regulatory restrictions on movement of cord wood will require heat treatment, which for practical purposes might as well include drying.

Response:

As described in *Section 6.4.1* above, our intent in the final rule is to ensure that Method 28 WHH is consistent with the test method requirements in the current voluntary hydronic heater partnership agreement. We have changed the proposed test method to be consistent with the specifications included in the current voluntary program and to also allow the procedures suggested by commenters. We welcome additional best practices information and emission test data that will help inform our future development of continually improved test methods. For example, as discussed in *Section 6.4.7* above, we are considering allowing kiln-drying for future test methods provided that the test fuel is appropriately stabilized for an adequate period in humidity–controlled storage when it is near the target range, as is the current standard practice of EPA-accredited laboratories.

Regarding additional moisture content concerns and our response, see *Section 6.1.13*.

6.4.12 Comment: Proposed changes to 5. Water Density

Commenter (0541) suggests that many flow meters can also accurately measure the water temperature in order to calculate water density.

Commenter (0948) supports the proposed option.

Response:

We appreciate the comments.

6.4.13 Comment: Proposed changes to 6. Calculations

Regarding the 10-minute averaging requirement, commenter (0541) believes that equipment such as variable speed pumps, variable speed blowers and variable speed feed augers may affect the accuracy of 10-minute reading calculations and they can be programmatically controlled to ensure a favorable value at the 10-minute reading. Commenter (0541) asks what frequency granularity is appropriate to ensure the integrity of the results.

Commenter (0948) supports the proposed option. Commenter (0948) adds a recommendation to consider requiring plots of the data if this is not already required.

Response:

Use of such programming techniques would invalidate the certification test. We will be mindful of such possibilities. As discussed above, we expect to see 1-minute input data for some values.

Regarding the suggestion to include plots of the data, we will consider this as we develop the future cord wood test methods.

6.4.14 Comment: Proposed changes to 8. Wood Loading

Commenter (0541) suggests that manufacturers' operation instructions for cord wood loading will favor larger pieces of fuel or smaller loads to balance the fuel/air mixture. Commenter (0541) states that the introduction of cord wood will make the testing more realistic but it will also increase the needed skill and experience level of the test operator to ensure the cleanest burn. Commenter (0541) states that the consumer will be best served by a smarter heater vs. a skilled tester or an educated consumer to achieve equal performance in the home.

Commenter (1551) states that current test methods used to determine the amount of fuel used in a test by calculating the usable combustion chamber volume in cubic feet and multiplying by 7 lbs of wood for cord wood stoves and 10 lbs for cord wood central heating devices, in many cases do not lead to a full chamber and may underestimate emissions in field operations. Commenter (1551) states this could be addressed in the central heating category by requiring the use of full thermal storage for cord wood-fired devices as required in Northern European countries.

Commenter (0948) supports the proposed option.

Response:

Regarding issues raised for consideration in development of a future cord wood standard, we agree that our focus should be to develop ways to better measure more realistic in-home

operation. In-home operation benefits from both educated consumers and good heater designs that minimize negative consequences of variability in owner operation and heater performance variability. Thus, we encourage manufacturers to both better inform consumers and develop smarter designs that better compensate for operational variables.

We note that the final rule requires of manufacturers that any unit tested with heat storage be sold and installed with such storage.

6.4.15 Comment: Proposed changes to 9. Drawing of Test Apparatus

Commenter (0948) supports the proposed option.

Response:

We appreciate the comment.

6.4.16 Comment: Proposed changes to 10. Aquastat Settings

According to commenter (0541), many new biomass controllers enable the user to change the settings through a dedicated or wireless user interface, and some control technologies, such as NEST, will learn and adjust settings through learning algorithms. Commenter (0541) believes that the ability to change settings for burn categories is BSER and that the requirement for settings to be the same in Section 10 should be modified to support best practices to achieve the lowest emissions.

Commenter (0948) supports the proposed option.

Response:

The rule allows automatic systems to make adjustments. If the manufacturer can show that this type of controller cannot be tampered with by the owner, we would allow its use on a case-by-case basis using General Provisions § 60.8.

6.4.17 Comment: Proposed changes to 11. Narrative

Commenter (0948) supports the proposed option

Response:

We appreciate the comment.

6.4.18 Comment: Proposed changes to 12. Test report summary page

Commenter (0948) supports the proposed option.

Response:

We appreciate the comment.

6.4.19 Comment: Proposed changes to 13. Range of fuels

Commenter (0948) supports the proposed option.

Commenter (1558) states the test must include other commonly used wood species other than oak, such as birch, pine and Douglas fir. Commenter (1558) asserts that testing data show that emissions from these less dense fuels can be 200 to 400 times higher than oak.

Response:

The Step 1 BSER database for this method is based on oak and we will retain the requirement to test with oak at this time. However, we expect that some states may add requirements to test with additional fuels based on typical fuels in their region. We note that EN-303, which can be used in Step 1, allows for a variety of species. As we develop the cord wood standard in the future, we will discuss selection of species and density issues. As always, § 60.8 of the General Provisions allows EPA to approve alternative test methods on a case by case basis upon request with adequate justification.

6.5 Method 28WHH-PTS for Certification of Cord Wood-Fired Hydronic Heating Appliances with Partial Thermal Storage and for Measurement of PM, CO, and Heating Efficiency

6.5.1 Comment: NTTAA issues with Method 28WHH-PTS

Commenters (1543, 1549, 1550, 1643) assert that the "BNL method" fully qualifies as a government unique standard for purposes of NTTAA. Commenters (1543, 1549, 1550, 1643) state that because EPA has not shown that either of the NTTAA's exceptions applies with respect to use of Annex A2 and each of its method components, the EPA cannot use the BNL method or any of its specifications. Commenters (1543, 1549, 1550, 1643) add that excusing the EPA from NTTAA compliance in this situation would set a dangerous precedent that would significantly undermine the purposes and objectives of NTTAA, if allowed to stand. Commenters (1543, 1549, 1550, 1643) believe that the BNL Method was developed behind closed doors in a non-transparent "shadow" process concurrent with the ASTM proceedings—in which BNL had actively participated. Commenters (1543, 1550, 1643) believe that we should not read NTTAA as condoning such conduct, much less the blatant misappropriation of VCS and their component specifications. Commenters (1543, 1549, 1550, 1643) add that, in any event, even if NTTAA compliance were not at issue here, the Lab Coalition's (1647) comments demonstrate why the EPA's proposed substitutes are technically unsound and impractical.

Commenters (1543, 1549, 1550, 1643) state that the proposed testing requirements for hydronic heaters with external heat storage are unclear and that the proposed BNL Method

misappropriates significant parts of the ASTM Method, resulting in a methods that deviates from [ASTM E2618-13] Annex A2 in several important ways, including:

- Fuel moisture content specifications
- Test fuel specifications
- Scale specifications
- Filter changes
- Test equipment specifications
- Heat output capacity validation procedures

Commenter (1647) states that the proposed method has numerous deficiencies that could be remedied by adopting ASTM E2618-13. For example, commenter (1647) states that the fuel moisture content measurement process is inappropriate and provides no actual determination of the moisture content of the fuel burned.

Response:

As explained in our *Section 6.1.1* response, we have properly exercised our authority under the NTTAA regarding our use of VCS. We are allowing use of ASTM E2618-13 as one of the approved hydronic heater test methods for the final rule, with the stipulation that sources must use the four burn rate categories specified in Method 28 WHH. This change is necessary because using only three burn rates as specified in the ASTM is insufficient to represent the full range of hydronic heater operation and would otherwise make ASTM E2618-13 an inapplicable test method for the purposes of the environmental protection mission of EPA and the states.

The allegation of "misappropriation" of parts of the ASTM methods is puzzling. Development of the hydronic heater test methods and the other heater test methods has clearly been an iterative process. The actual roots go back to the pre-1987 Oregon Method 7, then the 1988 EPA Method 28 and now such updated methods as EPA Method 28R, ASTM E2618-13 and Method 28 WHH-PTS (also known as the BNL method). Various ASTM methods have actually copied significant portions of the Oregon and EPA test methods. We anticipate further adjustments to these methods in the future and are focusing our attention and resources on new and improved cord wood methods that are more representative of in-home use and are more applicable to the environmental protection mission of the EPA and the states.

We disagree that the "BNL method" was developed "behind closed doors" and note that EPA Method 28 WHH-PTS was actually proposed in the Federal Register for public comment, not just for review by ASTM members.

Regarding the moisture content measurement process, see our *Section 6.1.13* response.

6.5.2 Comment: Support for Method 28WHH-PTS

Commenters (0631, 0948, 1062, 1397, 1465, 1541, 1558, 1585) support the "BNL" test method. Commenter (1465) states that the EPA should require that indoor hydronic heaters be tested using the BNL test method to minimize smoke impacts and adverse health effects should appliances be installed in residences in close proximity to neighbors. Commenter (1465) notes that this is especially important in the absence of siting requirements such as property setbacks and "Good Engineering Practices" stack heights.

Commenter (1465) believes the BNL test method closely approximates how these units will perform in-use, and captures and reports cold-start, steady-state, and burn-out phases separately in multiple emissions units including lb/mmBtu, mg/MJ, and g/hr for each category and the annual weighted average for PM. Commenter (1465) notes this method also measures thermal efficiency and CO and a realistic AFUE, which is important to consumers because it is a better representation of how the appliance will perform once installed. Commenter (1465) adds it is also a valuable tool for raising the technology floor in an ENERGY STAR type program, and CO information is critical to consumer health and safety.

Commenter (1585) states Method 28 has a number of limitations for assessing the emissions and efficiency of residential hydronic heaters and does not consider the entire cycle of the burn from cold-start to cold-boiler and therefore, does not capture the high emissions generally associated with refueling or cold-starting. Furthermore, commenter (1585) asserts the test method does not consider the performance of hydronic heaters using external storage. Commenter (1585) believes the Partial Thermal Storage Test method developed by BNL is an example of a test method that better mimics the real world operation of these devices; furthermore, the BNL test method calls for the use of cord wood as opposed to crib wood or a high-density wood fuel.

Commenter (1640) has concerns regarding the EPA's proposed test methods for hydronic heaters, particularly, 1) the long-term emissions from these devices, 2) the test fuel used to certify them, 3) the 10-minute delay during startup because this is typically where the highest emission spikes can occur. Commenter (1640) states a study conducted by OMNI (and sponsored by EPA and Washington Department of Ecology) showed at least a threefold increase in emissions using softwoods (Douglas fir) versus hardwoods (oak). The former, according to commenter (1640) is extremely common in the Pacific NW and any credible hydronic heater certification program should include the testing of softwoods. Unless EPA addresses these serious concerns in the hydronic heater test method, commenter (1640) believes states may be forced to develop their own test requirements. As an alternative, commenter (1640) encourages EPA to consider the separate hydronic heater test method being developed by BNL, which appears to include continuous sampling and would capture any emission spikes that occur during the testing process.

Commenters (0948, 1541) believe the BNL test method that has been accepted by the NYSDEC will address many of their concerns. Commenters (0948, 1541) strongly support the approach of capturing and identifying the performance during various phases of combustion such as startup, steady state, and shut down and the use of cord wood. Commenter (1541) notes that the BNL

method includes a cold-to-cold test for categories I and II and hot-to-hot tests for categories III and IV. Commenter (1541) believes these factors provide a more comprehensive test that is more inclusive of the entire firing cycle and more representative of how the unit is actually used by the consumer. While the test method is tailored to cord wood, commenter (0948) strongly supports its adaptation to wood pellet and chip boilers. However, commenter (0948) is concerned with multiple certification methods as the results of each are not readily comparable making it difficult for consumers to gauge performance of each product.

Commenter (1541) adds that in terms of emissions measurements, the BNL test measures PM and also includes CO emissions and the sampling provides a way to isolate the startup, steady state, and end portions of a typical firing cycle, which provides better understanding of the emissions profiles and allows assessment of the local, short-term environmental impacts. Another advantage of the test according to commenter (1541) is that the BNL test is a rigorous test method that was developed with strong consideration of the cost of implementation – the test can be completed in 1 day. Commenter (1541) notes that the method can determine the emission rate of both PM and CO in grams/hour, grams per kg of fuel, as well as on an output basis (lb/mmBtu), which allows determination of a representative annual efficiency, essential for consumers when selecting heating systems. Finally, commenter (1541) states, the method also incorporates quality control procedures. Commenter (1541) believes the BNL test is better than the EN 303-5, CSA and ASTM test methods.

Commenter (0948) also states that the BNL test method is good for capturing some of EN 303.5 shortcomings, mainly by evaluating all phases of the burn, and this method should provide a comprehensive evaluation of performance. Commenter (0948) concludes that Option 4 (other test methods) comes into play with respect to the test method that is being developed in Europe to better capture performance across all phases of the combustion process and improve upon EN 303.5. Commenter (0948) states that this method would simulate a heat load that the boiler would have to meet and it would provide a more representative evaluation of real world performance. Commenter (0948) states that it is important to find a balance between testing cost and the accuracy of the evaluation both from a testing standpoint and with respect to real world operation. Commenter (0948) supports a test method that is developed by a neutral party where the top priority is to objectively evaluate performance.

Commenter (1062) also supports the BNL method, but is concerned that if too many methods are offered for compliance testing, the consumer will not be able to compare results from appliance to appliance. For instance, according to commenter (1062), the BNL test method captures start up emissions when other proposed test methods do not. Commenter (1062) states that this real world emissions capture could be considered more authentic, but causes appliances tested with this method to appear dirtier than hydronic heaters tested in a hot to hot test. In order to give consumers the ability to compare hydronic heaters tested with different methods, commenter (1062) proposes that in addition to product specific tests for hydronic heaters, EPA also adopt a single additional test run, call it a comparability run, based on the EN 303-5 nominal output test that will allow *all* hydronic heaters to be compared for at least the high fire. Commenter (1062) states that this same test could build a database that could support or refute the sensibility of a 0.06 lb/mmBtu compliance threshold for hydronic heaters 8 years after final publication.

Commenter (0948) also supports the test method development occurring at BNL, but they have immediate concerns with the lack of a test method that is applicable to high performance wood pellet and wood chip boilers. According to commenter (0948), the BNL method can be adapted to pellets and chips but timing is a concern and the commenter (0948) supports interim approval of the EN 303.5 results for systems designed to be installed with thermal storage and those operating on pellets and chips.

Response:

We agree with commenters that the "BNL" method offers many improvements in terms of measuring representative in-home emissions than Method 28 WHH. Regarding one commenter's concerns regarding underestimating emissions, this is one reason we are requiring the 1-hour filter pulls (see *Section 6.1.12* response). Also, the test laboratory is already required to begin sampling as soon as the test fuel is added so there is no 10-minute "delay" and thus these emissions will be measured.

We agree with the comment that the BNL method should be adapted to allow certification of units burning pellet fuel instead of cord wood. We have made this change in the final rule to allow use of the applicable fueling portions of the ASTM pellet method. In addition, we anticipate additional improvements to the BNL method in the future as we further develop cord wood test methods that are more representative of in-home use.

We agree that the number of methods allowed under the standard could lead to some confusion on the part of consumers. Rather than increasing test costs by adding additional comparative runs at a time when we are looking forward to new methods, information on the comparability and rigor of the various test methods will be highlighted in Burn Wise.

6.5.3 Comment: Scale specification

Commenter (1647) disagrees with the scale specification requirement (section 6.1) as the commenter (1647) is not aware of scales with the capacity to handle large weights (over 2000 lbs in many cases) and have resolutions as low as 0.2 lbs. Commenter (1647) states that the typical resolution of the scales that are suitable are 1 lb or 0.5 kg. Commenter (1647) asks what the justification is for requiring higher resolution if the accuracy required is ± 1.0 lb.

Response:

Our intent in requiring higher resolution is to tighten the precision of the methods, and allow quality control checks versus CSA B415.1-10. Weight is a key factor. BNL uses such a scale that they obtained commercially at reasonable cost. Nevertheless, we have adjusted the test method to allow for alternative ways to perform the necessary quality control checks.

6.5.4 Comment: Fuel specification

Commenter (1647) states that the fuel specification (section 12.2) requirement for fuel length to be 80% of the firebox dimension is inappropriate and conflicts with other requirements of this section. Commenter (1647) states that the cross sectional dimensions and weights specified in CSA B415.1 are based on piece lengths of 16 to 24 inches and pieces within the specified cross sectional dimension range and significantly longer than 20-24 inches would be well above the specified piece weight range. Commenter (1647) adds that for fireboxes with large dimensions (30 inches or more), the piece length required would be unmanageable for practical application because laboratories would have to stock cord wood cut to lengths of at least 3-4 feet so that it could be cut to the specified length at the time of testing, but such long pieces cannot be readily split (too long for commercial hydraulic wood splitters) and would take a much longer time to dry to the specified moisture content range. Commenter (1647) explains that the vast majority of cord wood used in real world is cut to lengths less than 24 inches to facilitate handling, splitting and stacking, and the proposal would require fuel that is not typical of normal consumer operation.

Response:

As described in the *Section 6.4.5* response, our intent in the final rule is to ensure that Method 28 WHH is consistent with the test method requirements in the current voluntary hydronic heater partnership agreement. Similarly, we intend for the Method 28 WHH-PTS fuel length specification to be consistent with the current voluntary program. We note that the 80% length requirement is not new, but rather is in the current (circa October 12, 2011) voluntary hydronic heater partnership agreement

6.5.5 Comment: Heat output capacity validation

According to commenter (1647), section 12.5.4, heat output capacity validation, has the same issue described above in Method 28 WHH resulting in the decrease in allowable average heat output rate. Commenter (1647) states it is unclear whether the alternative that allows "reduced rating" in the Category IV run would be based on the output during the 15-minute interval or the average for the test run. The commenter (1647) asks what the 15-minute interval requirement refers to – a deviation of greater than 5% of the rated output that lasts for 15 minutes, or if it means that the appliance must produce the rated output for at least 15 minutes.

Response:

As described in the response to comment 6.4.3, our intent in the final rule is to ensure that Method 28 WHH is consistent with the test method requirements in the voluntary hydronic heater partnership agreement. We have revised that method to be consistent with the heat output specifications included in the voluntary program and have made the same changes to Method 28-WHH-PTS.

6.5.6 Comment: Filter change requirements

Section 12.5.9, filter changes, breaks up emissions measurement into three phases with no justification or rationale according to commenter (1647). Commenter (1647) states that compliance is determined only by the total emissions results obtained from each test category, so the three phase approach that is proposed is essentially irrelevant in the regulatory context that is proposed. Commenter (1647) adds that changing filters for one sample train will increase the measurement uncertainly by spreading filter catches over more filter sets and reducing the catch on each set, which in turn amplifies the effect of weighing error on the outcome. Commenter (1647) states that because precision problems with the current wood stove test method have been well documented, there is no reason to believe that precision issues will not also be a concern with this method, and it makes no sense to propose unnecessary procedures that will contribute to greater uncertainty. Commenter (1647) adds that it would also introduce a difference in process between the two required sample trains which must meet a tight deviation limit, and no data or analysis has been provided on how significant this affect might be. Commenter (1647) believes it could significantly increase the number of tests that are determined to be invalid. Commenter (1647) adds that this process would also complicate the testing process as changing filters during a test run is not simple process, additional filter trains would need to be set-up and leak checked prior to running tests and each change would result in a disruption of sample flow rates and necessitate control adjustments to maintain the proper conditions.

Response:

As stated in the preamble, the EPA, state, local and tribal air agencies and downstream neighbors are very concerned about higher emissions that occur during start-up and cycling and the degree to which these emissions vary and the degree to which some heaters perform better than others throughout the cycle. Some air agencies and neighbors have expressed the desire for emission limits for start-up and other short-term peaks rather than just the longer averaged periods. The purpose of section 12.5.9 is to give the EPA, state, local and tribal air agencies and downstream neighbors a tool to better understand and potentially address the impact of startup emissions from hydronic heaters. This information will be important in discussing future revisions to the NSPS and state standards and may help inform manufacturers' R&D to find ways to minimize excess startup emissions.

As we discussed in the *Section 6.1.12* response (regarding 1-hour filters), it is important to collect these data and we have clarified the final rule to specify that the 1-hour filter pull requirement only applies to one filter train during a hydronic heater or forced-air furnace certification test and that it only applies during the first hour of the test. This should ease concerns about the difficulty of changing two filters at a time, and we would expect any concerns associated with working with a single filter would also decrease with practice and experience. This change also decreases costs compared to a two-train approach.

As also discussed in the *Section 6.1.12* response, we disagree that that requiring a single 1-hour filter pull will pose significant issues regarding proportionality. For the 1-hour filter pull, the PM catch must be added to the filter PM that replaces the 1-hour filter for a total PM catch for that

sampling train. For example, if sampling train A is the 1-hour train, it will have two filters associated with a test run (the 1-hour filter and the second filter that replaces the 1-hour for the remainder of the test run). The PM on these two filters must be added to represent a total PM catch for the entire test run for train A. Sampling train B will be unaffected because it will only have one filter, but the total filter catch from both sampling trains still must agree within 7.5 % of each other. The only proportionality issue comes up with replacing the 1-hour filter sampling train with a new filter that must be leak checked before that sampling train can resume testing. For this amount of time, there will be proportionality mismatch between the sampling trains, but it should still be within the 10% allowance over the entire test run. It should not take long to change out a filter holder if the lab has one ready to install standing by at the changeout time.

As we move to improved test methods that incorporate cold starts, these methods should be better equipped to measure the impact of emission spikes. Also, commenters are correct that as the emission limit is reduced and performance improves, such that the filter catch is too small to be meaningful, that would be welcome news from an emissions perspective and we would consider deleting the requirement to conduct the filter pull.

6.5.7 Comment: Plumbing set-up

Commenter (1647) states that the plumbing set-up shown in figure 1 of M28WHH-PTS will not work (the heat storage tank and expansion tank are isolated from the appliance weigh scale but the water in the system is not). Commenter (1647) states that as the water in the appliance changes temperature, its density and volume also change so that water would be allowed to move into and out of the appliance as the water temperature changes. Commenter (1647) states that this will appear as a weight change on the scale which cannot be distinguished from the weight change due to fuel consumption, thus, corrupting the stack loss efficiency measurements which are weighted at each measurement interval by the fuel mass consumption. Commenter (1647) adds that it will also be impossible to accurately determine when the test should end – a critical issue for efficiency determination. Commenter (1647) explains that ASTM E2618-13 test method addresses this problem by incorporating a heat exchanger and expansion tank on the scale so that the appliance and the water it contains remain on the scale at all times, and the expansion/contraction that results from temperature change have no effect on the weighing process to determine fuel consumption and end of test.

Response:

We note that the required plumbing set-up was used successfully in the BNL test for the NODA. The BNL PTS includes a simpler, single heat exchanger piping system. As the boiler heats and water expands away from the boiler into the off-scale expansion tank, the scale mass reading changes due to the lower on-scale water mass. This is addressed in the BNL PTS in section 13 by calculation in which the scale mass reading is corrected for the water expansion.

6.5.8 Comment: Flow meter placement

Commenter (1479) proposes that the placement of the flow meter be reconsidered as the GPM will be higher when the water is cooler and slower than when the water is warmer.

Response:

Regardless of location, the flow meter should provide an accurate measure of volume flow if correctly compensated for temperature. Volume flow, in the calculation procedure, is converted to a mass flow using density at the meter temperature. Heat output, then, is not affected by meter location. In the BNL PTS sketch, the flow meter is placed on the cooling water inlet side simply because the temperature will change less over time in this location.

6.5.9 Comment: Weighting factors

Commenter (1488) states that they were unable to review the basis for the weighted average emission rate of ASHRAE bin data from several cities located in the northern U.S. used to calculate the weighting of emission samples. Commenter (1488) states that, even if Fairbanks were included in the bin data represented by variable F_i, bin data is an average, so at best would reflect considerations for an average northern city, but fail to estimate heating emissions from communities that are colder than average cities. Commenter (1488) requires that the testing method be adjusted to reflect heating needs of the U.S. city with the highest heating needs, such as Fairbanks.

Commenter (1488) objects to using unidentified cities to determine the proportion of emissions from the four different test runs that are weighted to calculate annual average emissions, which they state is further compounded by annualizing. Commenter (1488) asserts that human health exposures are most highly correlated with short-term exposures of hours and days, not annual averages.

Response:

The weighting factors were developed for the hydronic heater voluntary program and are still appropriate for use in the technology-based section 111 NSPS, especially emission standards that are based on emissions per BTU. The Step 1 weighting factors are weighted more heavily to the low burn rates that typically result in higher emissions per BTU output. The Step 1 weighting factors are used as a testing requirement to allow for determination of certification levels, not necessarily the same as short-term actual emissions. Heat demand varies across the country and by day, season and year and obviously affects total emission levels per time period. State, local and tribal air agencies are allowed to develop more precise estimates of hydronic heater emissions in their specific regions per time period and for different parts of the heater performance cycle. Moving forward, we agree it is important to consider test methods that better reflect actual in-home use and to consider local potential variations. Note that Step 2 emission limits are for each individual burn rate, not weighted averages.

6.6 ASTM E2515-10 Standard Test Method for Determination of Particulate Matter Emissions Collected in a Dilution Tunnel

6.6.1 Comment: Suggested modifications to ASTM E2515

Commenters (1436, 1546) support the use of ASTM E2515, without modification or addition, for the measurement of wood heater emissions after the effective date. Commenter (1436) adds that this method also addresses larger fireboxes.

Commenter (1486) supports the use of ASTM E2515 with one caveat—the EPA should also allow testing to be done using the 110 mm (4") filters that are used in EPA M5G-1. Commenter (1486) notes the PM sampling trains used in ASTM E2515 are the same trains as are used in EPA M5G-3 and the operation of the dilution tunnels used in ASTM E2515 and EPA M5G is basically the same. Since the test results from EPA M5G-3/ ASTM E2515 and EPA M5G-1 are deemed equivalent in the present NSPS, commenter (1486) asserts this should be an easy revision to make, i.e., the EPA could just include the language for M5G-1 in the present NSPS in the new NSPS without any impact on data quality. Commenter (1486) gives three reasons for this recommendation: 1) labs and manufacturers have been using M5G-1 PM sampling trains for years and could avoid a substantial expense if both methods could be used because the cost of calibrating operating and maintaining a M5G-3/ ASTM E2515 system is considerably higher than that for a EPA M5G-1 system with no change in data quality; 2) a 26- year history of these methods being used side by side without test results issues and the EPA has certified stoves that were tested with both methods; 3) every PM sampling method has its limitations and one of these 2 methods could end up with an issue that would make the other more attractive, e.g., as units get cleaner and cleaner the PM sample catch will get smaller and smaller, so any system that has a limited low sampling rate will end up with very small catches where measurement uncertainty becomes an issue.

Response:

The final rule has clarified that we intend to still allow 4-inch filters. Our understanding is that ASTM, EPA-accredited laboratories and states do not have any concerns on the use of 4-inch filters, but rather it was just not a point of discussion in ASTM 2515-13.

6.7 ASTM E2779-10 Standard Test Method for Determining Particulate Matter Emissions from Pellet heaters

6.7.1 Comment: Appropriateness for use with pellet appliances

Commenters (1543, 1549, 1550, 1643) believe that the EPA's proposal to incorporate the ASTM method for testing of pellet heaters, ASTM E2779-10, is compliant with NTTAA. Commenter (1640) recommends a separate method be adopted, such as the current ASTM method specifically designed to test pellet stoves.

Commenters (1549, 1632) support using ASTM E2779-10 for testing pellet heaters. However, responding to the proposed restrictions in use of the method as it is incorporated into Method 28R, commenter (1632) does not support the proposed changes to the method (e.g., burn rate and weighting changes). See responses to comment 6.3, Method 28R, and 6.1.13, Moisture Content, for more information.

Response:

We are retaining the cross reference to ASTM E2770-10 in Method 28R in the final rule.

6.8 ASTM E2618-13 Standard Test Method for Measurement of Particulate Matter Emissions and Heating Efficiency of Outdoor Solid Fuel-Fired Hydronic Heating Appliances

6.8.1 Comment: Use of ASTM E2618-13 for cycling, partial thermal storage and full thermal storage hydronic heaters

Commenter (1562) recommends using ASTM E2618-13 because it uses cord wood, requires cold starts for equipment with thermal storage and requires testing at all 4 levels of output. Commenter (1562) asserts that contrary to the NSPS document, ASTM did complete Appendix A2 (incorrectly referred to as Appendix X2 in the proposal) covering Partial Thermal Storage. It is part of ASTM Standard E2618-13 issued in late 2013. E2618-13 covers all three types of Hydronic Wood Heaters: full modulating (base document); full thermal storage (Appendix A1) and partial thermal storage (Appendix A2); no other test standard (EPA, BNL or EU) covers all three types. Commenter (1562) suggests requiring all testing per this standard with cord wood as using a single standard allows easy comparison of heater models without the consumer, state regulator or local air quality officer having to dig through various procedures to see if the results are truly comparable. Commenter (1562) adds that that testing and reporting is at four levels of output: 100%, 50%, 25% and less than 15% (incorrectly listed at 3 levels in this FR document).

Commenter (1647) provides detailed comments on specific requirements of Method 28WHH and Method 28WHH-PTS as examples of the many deficiencies in these proposed test methods. Commenter (1647) believes that replacing these with a reference to ASTM E2618-13 as EPA is required to do under NTTAA would render these issues moot. Commenter (1647) adds that it is clear that these methods were written without input or review from experienced and qualified experts in actually conducting these tests, including the EPA accredited independent laboratories. According to commenter (1647), several of the deficiencies discussed above were the subject of debate, research testing and consensus resolution in which the EPA participated in the development of ASTM E2618.

According to commenters (1543, 1550, 1643), the proposed rule appears to specify that hydronic heaters equipped with full thermal storage are to be tested at Step 1 using the same test methods as models with partial thermal storage. Commenters (1543, 1550, 1643, 1647) state that the proposed rule does not specify any test method for hydronic heaters with full thermal storage at

Step 2/3, when it should have specified the only test method that has been developed for testing hydronic heaters with full thermal storage: ASTM E2618 Annex A1. Commenters (1543, 1550, 1643) state that the EPA's failure to propose that method for full thermal storage models is indefensible under NTTAA.

Response:

As we explain in the *Section 6.1.1* response, we have correctly used the NTTAA in adopting EPA Method 28 WHH and EPA Method 28 WHH-PTS and in not adopting some of the ASTM test methods that are not applicable without modifications to meet the environmental protection mission of EPA and state, local and tribal air agencies. The ASTM "consensus" resolution referred to by commenter (1647) did not include all significant affected parties.

We have revised the final rule to correctly reference all applicable ASTM methods, including ASTM E2618 Annex A1, to be consistent with the hydronic heater voluntary program.

We note that ASTM 2618-13 does not include cold starts for the base method.

We also note that development of EPA Method 28WHH did include the EPA-accredited laboratories, all the manufacturer signatories to the EPA voluntary partnership agreement and numerous state air agencies.

Further, we note that having 3 different test methods included in the same ASTM test method title heading is not the same as having only one test method to allow easy comparisons for the consumers and regulatory agencies. This is an area of concern for which EPA seeks input from all significant affected parties as we consider future improved test methods.

6.8.2 Comment: Support for ASTM E2618 over Method 28 WHH for cycling hydronic heaters

Commenters (1543, 1549, 1550, 1643) state that the proposed testing requirements for cycling hydronic heaters are unclear. Commenters (1543, 1549, 1550, 1643, 1647) note that the current version of ASTM E2618 is nearly identical to EPA's proposed Method 28 WHH, with two major exceptions:

- Oak crib testing in Method 28 WHH vs. cord wood in ASTM E2618
- Different procedures to determine heat output capacity validation.

Commenters (1543, 1549, 1550, 1643) believe the first exception for crib testing is supported because the EPA's data base to establish BSER is based on such data, so the EPA's proposal to require testing with cribs for these models can be supported under NTTAA, under the 'illegality" exception. To address potential BSER concerns, commenters (1543, 1549, 1550, 1647) suggest that EPA specify ASTM E2618-13, but include an allowance for manufacturers to choose to test with either cord wood as specified in E2618 or 4 x 4 oak cribs as specified in Method 28 WHH.

Regarding the second exception, commenters (1543, 1549, 1550, 1643) note that the change in heat output capacity violation was not discussed in the preamble and relying on the rule language alone constitutes "no notice, much less adequate notice" of changes to existing provisions. In addition, commenters (1543, 1549, 1550, 1643) state that the EPA has not made the requisite exception findings under NTTAA for failing to use the ASTM heat output capacity validation procedures, especially considering these are the same procedures currently being used in the EPA's voluntary program (existing Method 28 WHH). As described elsewhere, commenters (1543, 1549, 1550, 1643) believe the ASTM procedures are more technically sound as they better account for known variability in output rates over the course of any given test run. Commenters (1543, 1549, 1550, 1643) conclude that because of the extreme similarity in the ASTM and EPA methods, it cannot be the case that ASTM E2618-13 is either contrary to law or otherwise impractical.

Response:

As we explain in the *Section 6.1.1* response, we have correctly used the NTTAA in adopting Method 28 WHH and Method 28 WHH-PTS and not adopting some of the ASTM test methods that are not applicable without modifications to meet the environmental protection mission of EPA and state, local and tribal air agencies. We disagree with the implied premise that just because two methods are similar in many regards, that no differences are significant enough to make one of the methods inapplicable to the mission. Further, we note that the "consensus" resolution referred to by one commenter (1647) did not include all significant affected parties.

We agree that there should be an allowance for manufacturers to choose to test with either cord wood as specified in E2618, or 4 x 4 oak cribs as specified in Method 28 WHH. We have made this change in the final rule. As stated above, we have corrected our oversight regarding inclusion of full thermal storage and have revised the final rule to correctly reference all applicable ASTM methods, including ASTM E2618 Annex A1, to be consistent with the hydronic heater voluntary program.

6.8.3 Comment: Efficiency issues

Commenter (1562) asserts that the changes proposed to efficiency calculations are already an integral part of ASTM E2618-13. Commenter (1562) adds that one point in OHH testing is not covered by any test to date: typical OHH are tested within a lab at 70 - 80 degrees, but are actually used outdoors in much colder temperatures. Commenter (1562) states while the shell loss of a typical OHH is taken into account in the lab during the test, it is not an accurate measure of the actual outdoor operating conditions. Commenter (1562) states their calculations (based on BIN data for four US locations (Minneapolis, MN; Pittsburg, PA; Portland, ME and Bemidji, MN) and Central Boiler model CL5648 with 385 gallons of water capacity) indicate that a typical outdoor unit will consume approximately 1 full cord of additional fire wood per year to offset the shell losses of the hydronic heater sitting outdoors during an average heating season, representing about 8% of the load for the heating season. Commenter (1562) believes the efficiency number for outdoor heaters should be adjusted to reflect this additional loss.

Response:

We appreciate the concerns expressed by commenter. We considered requiring an adjustment calculation in the final rule but we could not develop a simple national adjustment equation because of variations with location, temperature, seasons, years, insulation and other factors. The final rule requires the manufacturer to discuss the potential magnitude of these effects in the owner's manual to help inform consumers and operators. Also, we will discuss these effects on the EPA Burn Wise website.

6.9 ASTM E2780-10 Standards Test Method for Determining Particulate Matter Emissions from Wood Heaters

6.9.1 Comment: Support

Commenter (1549) supports the use of ASTM E2780-10 in its entirety for compliance testing of single burn rate appliances. Likewise, commenter (1632) supports the use of ASTM E2780-10 cord wood standard.

Response:

We appreciate the comments.

6.10 EN 303-5: 2012 European Union Test Method for Heating Boilers ≤ 500 kW

6.10.1 Comment: Appropriateness of EN 303-5

Support for use of method:

Commenters (1488-A2, 1520) support the use of EN 303-5 for hydronic heaters.

Commenter (0631) states that the EPA should adopt either the European Test Method EN 303-5 or the BNL Test Method or both methods.

Commenter (1062) is concerned about boilers that must be installed with thermal storage because there is no component of EPA Method 28 WHH that allows for voluntary testing of wood boilers with thermal storage. Commenter (1062) says that until the EPA accepts the BNL method as an official compliance test method, the commenter requests that EN 303-5 emission data be accepted during the proposed Step 1 compliance period (0.32 lb/mmBtu).

One commenter (1062) supports using EN 303-5 because it is a test method that with a wealth of test data and experience and it is relatively simple, well understood, easily reproducible, and will result in consumer friendly compliance data. Commenter (1062) asks that the EPA consider adopting EN 303-5 test results as an interim step for determining compliance while other test methods are contemplated and adopted.

Commenter (0948) cites work overseas to develop a test method to better capture all phases of the combustion cycle; it is generally seen as an improvement to EN 303-5. Commenter (0948) is generally supportive of such methods and see this comprehensive approach as a valuable resource for test development here in the US.

According to commenter (1062), EN 303-5 currently requires a test of log wood boilers with a low demand draw of 50% of the heater's rated output and for automatically fired boilers such as pellet boilers, 30% of the heater's rated output. In both cases, commenter (1062) states, if the manufacturer specifies a lower burn rate is possible, the appliance must be tested at the claimed burn rate. In the effort to simplify procedures and to have comparable data, the EN 303-5 method should be adopted without modification and the amount of thermal storage required should match the way the boilers are tested according to commenter (1062). Commenter (1062) states that this means that log wood boilers should have a requirement that they be used with thermal storage capable of absorbing a minimum of 50% of the maximum output and automatically fired units would have 30% or greater requirement.

Commenters (0948, 0995) state their support for the use of EN 303-5 with conversions to US values. Commenter (0948) states that efficiencies should be converted to those based on higher heating value and $PM_{2.5}$ evaluation should include condensables. Commenter (0948) recognizes this method does not capture all phases of combustion, but it could provide an interim evaluation until a more comprehensive method is developed.

Commenter (0948) supports use of EN 303-5 for pellet and wood chip boilers that are required to be installed with thermal storage so long as results are converted to US norms, i.e., efficiency on higher heating value and addition of VOCs to $PM_{2.5}$ as a surrogate for condensable $PM_{2.5}$. Commenter (0948) adds that it is important to note that EN 303-5 has efficiency and emissions caps that are tighter than the US standards and these should be applied for any boiler certified under this method. Commenter (0948) notes that the BNL method can be adapted to pellets and chips but because of timing issues supports interim approval of the EN 303-5 results for systems designed to be installed with thermal storage and those operating on pellets and chips.

Commenter (0995) strongly urges the EPA to accept laboratory results, from recognized European testing labs, based on EN 303-5 testing protocols, for conversion to adequately approximate EPA test results and to accept the conversion processes developed by Louis Fontaine of the Maine DEP. Commenter (0995) states this would remove an unnecessary hurdle for those who would bring clean technologies to market in the U.S. for the good of our citizens and our environment, and would help reduce any bottleneck associated with the EPA testing of many products following promulgation of these rules.

Commenter (1551) also supports acceptance of results from EN 303-5 tests only for pellet units and cord wood boilers that mandate the use of full thermal storage if those tests have been conducted in the U.S. and emission values are recalculated based on a formula that incorporates a correction factor similar to the one currently used by state agencies. Commenter (1551) adds that, before accepting any new method, the EPA should require robust comparability testing to

ensure that a revised test does not represent backsliding or eliminate high emission periods.

Opposition to use of method:

Commenters (1543, 1549, 1550, 1643) believe that use of EN 303-5 is inconsistent with BSER and unsound from a technical standpoint. According to commenters (1543, 1549, 1550, 1643), EN 303-5 does not require appliances to be tested under reasonably worst-case test conditions that reflect consumer use patterns. In particular, commenters (1543, 1549, 1550, 1643) note that the emissions profile from EN 303-5 overlooks common use patterns that result in high emissions (e.g., cold starts) and for partial thermal storage models, the EN 303-5 test method does not even include the heat storage tank in the testing apparatus. Commenters (1543, 1549, 1550, 1643) conclude that by failing to account for emissions under representative worst case operating conditions, use of EN 303-5, thwarts meaningful evaluation of emissions performance capabilities consistent with BSER.

Commenter (1562) states that although EN 303-5 does require a cold start and uses cord wood as the test fuel, it essentially measures emissions only at peak burn (the cleanest portion of any burn cycle). Commenter (1562) states many European units require some form of thermal storage. Commenter (1562) believes ASTM E2618-13 is a much more rigorous test standard as it requires testing at four levels of output; thus accounting for actual usage during a heating season.

Commenter (1647) provides several reasons why EN 303-5 should not be used as an alternative test method. Commenter (1647) states that EN 303-5 requires relevant emissions measurement only at the nominal or rated maximum heat output rate and it requires no tests at low or medium low outputs which constitute two-thirds of the weighted average in the EPA and ASTM versions of the test process. Commenter (1647) states that requiring heat storage with 60% of the appliance's heat output capacity does not ensure that emissions performance will be equivalent to that which would be obtained in the ASTM or EPA tests. In addition to not making any provision for testing of hydronic systems at lower heat output rates, according to the commenter (1647), the material collected and classified as particulate ("dust" in EN 303-5 terminology) is substantially different and would clearly collect far less material than is collected in the ASTM or EPA methods. Commenter (1647) states that this results in emissions ratings that are significantly lower than would result from the ASTM E2618 or EPA methods. Commenter (1647) describes several factors that create this disparity including higher filter temperatures, different sampling and emission capture systems, use of draught regulators, sampling smaller periods, exclusion of "cold start" emissions and failure to require emissions measurements at outputs lower than normal in some cases (see pp. 2-3 of the comment letter, EN 303-5.)

Commenter (1541) states that the EPA should not accept test reports for boilers tested by EN 303-5 as this will put undue duress to the American manufacturers. The commenter (1541) states that EN 303-5 includes build/design testing in addition to emissions, but U.S. Manufacturers build for the requirements of the North American market, not the European market. Commenter (1541) adds that this test method, and any future changes to it, should be in the public domain and listed in the Federal Register or other easily accessible public domain location. Also, commenter (1541) asserts, this test method should require the use of cord wood.

Commenters (1543, 1549, 1550, 1643) add that it is improper for the EPA to propose to condition the use of EN 303-5 as a preferred reference method testing to models with external heat storage exceeding specified minimum levels. Commenters (1543, 1549, 1550, 1643) believe that the EPA cannot lawfully impose such a condition because it amounts to the promulgation of a design or equipment standard under CAA Section 111(h)—something the EPA can only do upon a finding that "it is not feasible to prescribe or enforce a standard of performance."

Commenters (1543, 1549, 1550, 1643, 1647) note that the EPA cannot use EN 303-5 as a preferred reference test method in lieu of ASTM E2618-13 because it faces NTTAA hurdles.

Response:

As described in the *Section 6.1.4* response, we have finalized an expanded list of test methods in the final rule (see § 60.5476(c)) for hydronic heaters to include EN 303-05, with the added requirement to include organic compounds as part of the PM reported values. We agree with commenters that in the long run, without the changes or improvements to EN 303-05 being discussed, other test methods may be preferred over EN 303-05. Until that point, given that we are committed to develop a method that better represents in-home use, we see practical value in allowing the emission testing portions of EN 303-05 as one of a suite of available test methods for Step 1.

Although one commenter stated that EN 303-05 includes cold starts, we note that the current version of EN 303-05 does not include cold starts.

As described in *Section 6.1.1*, we find that inclusion of this method, with modifications, is compliant with NTTAA and the mission of EPA and state air agencies.

Regarding comments that may be interpreted as suggesting that EN 303-05 itself constitutes a design standard, we note that we are only adopting the emissions measurement portion of EN 303-05, not the efficiency or construction or QA requirements in EN 303-05. For example, the NSPS does not affect the ASME welding quality requirement for boilers.

Regarding comments that may be interpreted as questioning EPA's existing authority to issue test methods and emission standards that distinguish heaters that include thermal storage under CAA Section 111(h), we note that Section 111(b)(2) authorizes that EPA "may distinguish among classes, types and sizes." Further, Section 111(h)(1) allows EPA to issue "a design, equipment, work practice, or operational standard, or combination thereof" when it is "not feasible to prescribe or enforce a standard of performance" and requires EPA to "include as part of such standard such requirements as will ensure the proper operation and maintenance of any such element of design or equipment." In Section 111(h)(2)(B), "not feasible to prescribe or enforce" is defined to include "the application of measurement technology to a particular class of sources is not practicable due to technological or economic limitations." We find that requiring hydronic heaters that are sold, installed and operated with adequate thermal storage to avoid the low burn rate conditions normally required in EPA Method 28 WHH to then be tested under

those conditions is impractical due to technological and economic limitations. We believe it is better for the environment for hydronic heaters to be designed to avoid those poor operating conditions than to be redesigned to operate at those poor conditions just to meet the requirements of a test developed to ensure measurements of emissions from heaters that do include operation at those poor conditions.

6.10.2 Comment: Conversion issues

Commenters (0948, 0995) state their support for the use of EN 303-5 with conversions to U.S. values. Commenter (0948) states that efficiencies should be converted to those based on higher heating value and $PM_{2.5}$ evaluation should include condensables.

Commenter (0948) supports use of EN 303-5 for pellet and wood chip boilers that are required to be installed with thermal storage so long as results are converted to U.S. norms, i.e., efficiency on higher heating value and addition of VOCs to $PM_{2.5}$ as a surrogate for condensable $PM_{2.5}$.

Commenter (0995) strongly urges the EPA to accept in its rules laboratory results, from recognized European testing labs, based on EN 303-5 testing protocols as an acceptable basis for conversion to adequately approximate EPA test results and to accept the conversion processes developed by Louis Fontaine of the Maine DEP.

Commenter (1647) believes the Maine "conversion" formula, which purports to convert EN 303-5 emissions results to EPA M28 WHH/WHH-PTS/ASTM E2618 equivalents, is based on subjective judgment and assumptions. Commenter (1647) states, for example, there is no evidence cited for the assumption that the fraction of condensable particulates is reversed in standard wood boilers (90%) compared to efficient wood boilers (10%), which ignores the potential for the condensable and solid proportions of emissions produced to change substantially within a fueling cycle – particularly when cold starts are involved or when appliances go into "slumber" modes to prevent overheating in partial thermal storage systems. Commenter (1647) adds that it is not true that EN 303-5 requires manually fired wood boilers to be connected to heat storage. Commenter (1647) asserts that particulate emissions are not required to be measured in the reduced heat output test, which is clearly a lower bar than required by U.S. test methods that require a low output test at less than 15% of the rated output. Nor has the Maine DEP document established the magnitude of the difference between the European and North American tests through physical testing, according to commenter (1647). Commenter (1647) provides an example of testing per CSA B415.1, which cites ASTM E2618, showing a European boiler rated at <0.06 lb/mmBtu output was testing with the category 4 nominal output results over 3 times the EN 303-5 certified value.

Commenter (1479) does not support a conversion of units tested to EN 303-5 to units tested to Method 28 and CSA B415.1-10 due to differences in exhaust temperatures at the points of collection, including dilution with air because these factors can affect the amount of organic and inorganic compounds that condense out of the exhaust onto the filter.

Response:

We agree with commenters that it is important to add condensables to the PM results and use the higher heating value of the wood fuel to obtain valid test results compared to other allowable test methods.

We note that the Maine DEP "conversion" formula is not purported to be "equivalent" to EPA Method 28WHH. Also, we note that Maine DEP only intended for it to be allowed for an interim.

We note that Maine DEP did have emission test results to show much lower condensables for high efficiency boilers, although that is not relevant since Maine DEP included all the organic gases as condensables rather than ignoring them.

We agree that this method would be improved with the addition of cold starts but, as we have stated earlier, we view this as an interim method pending development of improved future methods. We note that the main method in ASTM 2618-13 does not include cold starts either.

Although EN 303-05 itself does not require manually fired wood boilers to be connected to heat storage, some European countries do, the Renewable Heat New York program does and the final NSPS does.

6.11 CAN/CSA B415.1-10 Performance/Efficiency Testing

6.11.1 Comment: Availability of standard for review

One commenter (0948) states that he was unable to review the method without purchasing it. Commenter (0948) believes many of the same incumbent manufacturers and associates from the ASTM method development played a significant role in the development of this standard. Commenter (0948) states this raises red flags as their product is distinctly different and much more advanced than most of the incumbents, leading to concerns about representation for their technology class.

Commenter (1465) states that he cannot support use of CSA B415.1-10 because the link to the method does not allow review of the method.

Commenter (1505) opines that the requirement that persons purchase standards from the Canadian Standards Association (CSA) constitutes the grant of taxing authority to a foreign entity and requests that the EPA publish all test standards in the Federal Register and that the EPA re-propose.

Response:

We followed the procedures of the NTTAA and the Administrative Procedures Act in docketing the proposed proprietary test methods for public review. The issues of purchase costs,

membership costs and full public participation in development and review of voluntary consensus standards (VCS) encouraged by NTTAA are being discussed as a separate overarching effort regarding NTTAA.

6.11.2 Comment: Concerns regarding the efficiency test method

Commenters (0948, 1436, 1543, 1549, 1550, 1551, 1632, 1640, 1643) support the use of B415.1. Commenter (0948) supports the proposed option and would like to see stronger language on what happens if the stack loss method efficiency is lower than the thermal efficiency. Commenter (1632) opines that using CSA B415.1-10 for reporting efficiencies will make it easier for consumers in their purchasing decisions as all manufacturers would be using the same test method.

Commenter (1448) cites the lack of evidence of precision of B415.1-10 for the proposed forced-air furnace standard, and believes that compliance will effectively be a game of chance. Commenters (1543, 1549, 1550, 1643) support the EPA's proposal to use CSA B415.1-10 for warm air furnaces because it is the only existing method for testing them at this time and, as such, complies with the NTTAA.

Commenter (1551) supports implementation of robust efficiency testing and states the EPA's proposal to use CSA B415, while a move in the right direction, must address several outstanding issues with CSA B415 related to unspecified fuel moisture, fuel species, and cycling units. Commenter (1397) asserts CSA B415 has some issues related to unspecified fuel moisture and fuel species that should be addressed to comport with other EPA approved methods. Commenter (1551) states CSA B415 does not specify a moisture content range and that for hydronic heaters it specifies different burn rate categories than in Method 28; the lowest burn rate is < 35%, considerably higher than in EPA Method 28 WHH. Commenter (1551) is concerned about the use of CSA B415 with units whose operations cycle, as the method calls for determination of average stack gas conditions and fuel use over 10 minute averaging periods. With cycling units, commenter (1551) asserts this is long relative to "on" periods when cycling and the key parts of the operation are often missed. Commenter (1551) suggests it may be reasonable to consider adapting this method but the data collection frequency would need to be modified.

Commenter (0541) states that in addition to CSA B415, heater/furnace thermal output should not exceed theoretical stoichiometric calculations for fuel and air input.

Commenter (1463) recommends that the EPA evaluate the need to require additional test runs at intermediary burn rates beyond Category 1 and Category 4 (in Step 2) in order to achieve a more representative efficiency test result and provide more credible information to consumers. Commenter (1463) notes this is especially needed for hydronic heaters.

Commenter (1551) is concerned that the efficiency method proposed will overestimate efficiency for devices that cycle as it measures maximum theoretical emissions and does not penalize for periods when the unit is in smolder mode. Commenter (1551) requests that the EPA work with the DOE to create minimum efficiency standards for residential wood heating devices using the

Canadian Standards Association (CSA) standard to expedite implementation.

Commenter (1541) states that the EPA should not allow for the CSA method to be used because the low load category is unreasonably high and, when combined with chronic oversizing, will defeat the purpose of the testing. Commenter (0541) does not believe that a sufficient inclusive method exists for the calculation of efficiency across the various designs of indoor and outdoor central heaters. Commenter (0541) adds that expected growth of micro combined heat and power (mCHP), combined heat and biochar (CHaB) and condensing technology will make the current methods obsolete.

Commenter (1551) believes some provision for averaging fuel burn rate based on longer time periods would need to be developed. To ensure accurate and comparative efficiency values, commenter (1551) adds the EPA must create testing guidelines and recommends that efficiency and emissions testing be conducted simultaneously. If EPA requires that testing be conducted at four additional burn rates for efficiency testing, then commenter (1551) recommends that the EPA require inclusion of this testing for emission purposes as well.

Commenter (1546) states that there are fundamental issues with the CSA B415.1-10 stack loss method with regard to hydronic heaters. Commenter (1546) adds that these issues should be acknowledged and B415 efficiencies must not be treated as the "true" values and all else suspect. For example, commenter (1546) states, the cycling inherent at low burn rates without thermal storage means there may be numerous test intervals where there is no change (or even an increase) in scale weight. Commenter (1564) states that this phenomenon causes enormous error in the B415 calculations. Commenter (1546) concludes that, like any other form of measurement, both thermal efficiency and stack loss efficiency are subject to measurement uncertainty and the proposed rule should not imply that either method is inherently more accurate than the other.

Response:

We agree with commenters that support use of CSA B4125.1-10 for efficiency testing with some additional specifications, *e.g.*, four burn rates that match the final rule PM emission testing requirements. As discussed earlier, the final rule requires PM emission testing for all four burn rates rather than just the maximum and minimum in the proposal.

We agree with commenter (1546) that CSA B415.1-10 results are not necessarily the true values and all else are suspect. We agree with commenter (0541) that heater/furnace thermal output should not exceed theoretical stoichiometric calculations for fuel and air input. The final rule requires manufacturers and EPA-approved test laboratories to fully discuss any anomalies in the test reports for all tests and we expect this especially for cycling units that do not have full thermal storage. The final rule also requires manufacturers to include discussions of efficiencies and potential variations in the owner's manual.

We agree with commenter (1551) that the EPA should consider working with the DOE to create minimum efficiency standards for residential wood heating devices (potentially) using the

Canadian Standards Association (CSA) standard to expedite implementation. We have offered to work with DOE but this is not a priority for DOE at this time.

6.11.3 Comment: Masonry heater testing issues

We appreciate the concerns raised by commenters on the masonry heater test methods. We are waiting for additional developments from the Masonry Heaters Association and have deferred rulemaking on proposed subpart RRRR at this time.

Commenter (1397) states CSA B415 may not be applicable to all solid fuel burning devices, specifically masonry heaters and similar devices. Noting that Canadian firms can self-certify under the CSA standard, commenter (1397) believes this process should not be honored for devices marketed in the U.S. Commenter (1397) adds that B415 lacks a cap on emission spikes but this may not be relevant for efficiency testing.

Commenter (1574) states that using CSA B415 to determine efficiency is untested on masonry heaters and appears problematic for the following reasons:

- The heater must be tested on a scale that is impractical, especially for particularly large two-story units;
- The specified precision of the fuel weight measurement (B415 - 6.1.1) is not attainable with large scales;
- The method requires the fuel load to be placed on a live coal bed which is contrary to the procedure described in E2817 (9.1.1 and 9.5.1);
- Using a live coal bed is the equivalent of bottom ignition which has been demonstrated to produce higher emissions than top ignition (recommended by typical manufacturer's instruction);
- Bottom ignition is contrary to typical manufacturer's instructions which stipulate top or side ignition and therefore does not simulate consumer operation;
- Test completion criteria (B415 - 8.5.10) are different than per E2817 (9.5.7).

Commenter (1574) proposes two options:

- Use the efficiency calculation formula in the spreadsheet supplied by OMNI with the Condar dilution tunnel or
- Add an efficiency method to E2817 through the ASTM process.

6.12 ASTM E2817-11 Standard Test Method for Test Fueling Masonry Heaters

We appreciate the concerns raised by commenters on the masonry heater test methods. We are waiting for additional developments from the Masonry Heaters Association and have deferred rulemaking on proposed subpart RRRR at this time.

6.12.1 Comment: Appropriateness of ASTM E2817-11

Commenter (1397) does not recommend ASTM E2817-11 because it is costly and copyrighted. Commenter (1513) recommends the EPA provide a separate review of potential test methods for masonry units before proposed ASTM Method E2817-11 is approved because it was developed without broad input from air regulators and public review and has to be purchased from ASTM.

Commenter (1577) supports the ASTM E2817-11 test method along with its use of the ASTM E2515 standard test method for collecting $PM_{2.5}$ using a dilution tunnel. However, commenter (1577) notes that the accuracy and precision of this method is still largely untested and until more data can be generated using this method, commenter (1577) asks that the EPA accept previously gathered testing data, which was performed at OMNI Testing Laboratory. Commenter (1577) has performed preliminary testing at its laboratory in Juuka, Finland following ASTM E2817-11 and E2515 and has compared these results (see Table 1 of the comment letter) to that of tests performed to the state standards of both Colorado and Washington State. Commenter (1577) views these data as evidence that Tulikivi masonry heats meet or exceed those states' current emission standards and that the company's previous investment in emission testing should be honored.

6.12.2 Comment: Cord wood versus crib wood

Commenter (1647) recognizes that that EPA participated in the development process of ASTM E2817 and made helpful comments and suggestions aimed at improving the final test method that were incorporated into the final ASTM test method. Commenter (1647) adds that a number of different masonry units were tested using one of the last drafts of this test method and the crib fuel and cord wood procedures specified in the draft at that time. A Colorado Regulation Number 4 test was also done as part of the "test series" for comparison purposes, and the tables on p. 2 of the comment letter (1647, Masonry Heater Requirements) summarize the test data for all of the units tested.

Commenter (1647) states that the resulting data show that masonry heaters tend to burn cleanly no matter what fuel type is placed in the firebox. According to commenter (1647), the average emission factor for the 9 runs is 1.26 g/kg (note that a wood stove operating at 4.5 g/hr at a low burn rate of 1 kg/hr would produce a 4.5 g/kg emissions factor), in two units the cord wood test was the cleanest and in the third unit the cord wood test had the highest emissions. Commenter (1647) concludes that this data would support the use of cord wood fuel as specified in "Annex A1. Cordwood Fuel" in ASTM E2817. Commenter (1647) states that it is still necessary to determine the number of test runs needed for compliance and what the emission units and

passing grade will be, since there is no test method to determine compliance with the proposed standard of 0.32 lb of PM per MMBtu heat output.

Commenter (1397) recommends that masonry heaters be required to test with cord wood, within a density and moisture range that aligns with other cord wood methods.

6.12.3 Comment: Calculating PM emissions

Commenter (1574) states that ASTM E2817 does not specify the number of test runs to calculate the test emission results. Commenter (1574) proposes to use the average result from two test runs if the second run is within 25% of the first one and the average results from three test runs otherwise. Commenter (1574) states that this is proper lab procedure that takes into account the variability associated with emissions testing.

6.12.4 Comment: Test fuel moisture content

Commenter (0541) suggests that the stick wood moisture definition and requirement for testing is not representative of wood aged 1 year in a covered shed found in many parts of the U.S. According to commenter (0541), ASTM method E2817-11 calls for stick wood with a moisture level between 18% and 28%. Commenter (05410 states that it is sometimes challenging to find fuel that meets the requirement and requests that the moisture levels be increased to be more representative of actual fuel. Commenter (0541) adds that moisture levels also have an effect on visible emissions since the release of water vapor and the release of hydrogen can often appear to look like smoke, but as condensing technology improves this will not be a long-term concern.

6.13 ASTM WK26558 for Site Built Masonry Heaters

We appreciate the concerns raised by commenters on the masonry heater test methods. We are waiting for additional developments from the Masonry Heaters Association and have deferred rulemaking on proposed subpart RRRR at this time.

6.13.1 Comment: Appropriateness of ASTM WK26558

Commenter (1397) does not recommend ASTM WK26558 since it merely points to a European test method that is not designed for units built or fueled in North America. Commenter (0948) does not support selection of this method because it appears the ASTM committee is strongly influenced by manufacturers of the incumbent technologies and is unable to objectively evaluate performance of all technologies that can be developed from this committee.

Commenter (1574) proposes several changes to develop a revised and extended standard to address the limitations of EN 15544 (the basis for ASTM WK26558):

- Allow the use of North American made refractory materials (firebricks, refractory concrete, soapstone) which are ruled out by EN 15544 which stipulates conductivity < 0.90 W/mK

- Allow larger sized glass firebox doors (EN 15544 limits glass door surface area to 1/6 of firebox surface area). The commenter (1574) adds that recent Austrian testing has shown the heat loss through a 11”x15” single pane glass door to be only in the 5% range, but prior to this testing, losses were assumed to be in the 20% to 30% range
- Allow the use of a prefabricated or partly prefabricated core (covered by standard 15250 in Europe)
- Make the burn rate variable to allow the simulation of firing with large firewood pieces (EN 15544 sets firing duration to 77 minutes, whatever the fuel load, meaning that the larger the load, the smaller the pieces have to be, which is not how masonry heaters are typically operated in North America)
- Base the dimensioning of the firebox on burn rate instead of on fuel load (EN 15544
- Make the air factor variable (set to 2.95 in EN 15544)
- Make the air speed and gas speed variable (set at 4mN3/kg and 4.8 mN3/kg, respectively in EN 15544)
- Make the temperature at the top of the firebox and at the entrance of the heat exchanger
- variable (set to 700°C and 550°C, respectively in EN 15544)
- Allow the coefficient of heat transfer to vary with the cross section area of each channel
- Allow the coefficient of heat transfer to vary with the orientation of the gas flow (horizontal, upward, downward) in each channel
- Allow the coefficient of heat transfer to vary with the gas flow velocity in each channel.

Commenter (1574) states that these last three changes are instrumental in making the standard accurately calculate thermal transfer in units where most transfer happens when the gas flow is descending (Contraflow and Bell heaters) and in units where the gas flow is very slow (Bell heaters). Commenter (1574) states that EN 15544 is not designed for these situations because in Austrian style heaters gasses mostly flow horizontally or upward and through channels where the ratio between height and width is no more than one in three. According to commenter (1574), these developments are very important because Finnish Contraflow heaters have been the most popular type of masonry heaters in North America in the last 25 years and Russian Bell heaters have become increasingly popular in the last 5 years.

Commenter (1577) welcomes the addition of computer simulations as an alternative certification pathway for masonry heaters. Commenter (1577) notes that the proposed simulation method ASTM WK26558, based on European standard EN 15544 is limited in its application to heaters that use fireclay or chamotte, both of which greatly differ from soapstone (the primary building material of a Tulikivi) in density and heat conductivity. Commenter (1577) adds that this method does not take into account the gas flow direction and therefore underestimates the heat transfer coefficient of a down drafting heat exchanger, a design element present in all Tulikivi heaters. Commenter (1577) states that ASTM WK26558 is inappropriate to Finnish contra-flow masonry heaters such as those Tulikivi manufactures, making the proposed methodology ineffective for Tulikivi until a more comprehensive simulation program is developed.

6.14 EN 15544 Masonry Heater Testing

We appreciate the concerns raised by commenters on the masonry heater test methods. We are waiting for additional developments from the Masonry Heaters Association and have deferred rulemaking on proposed subpart RRRR at this time.

6.14.1 Comment: Adapt EN 15544 to North American Masonry Heater Types

Commenter (1574) describes steps taken by the MHA working with Damien Lehmann, a French engineer who has spent 6 years developing an open source masonry heater software simulator based on EN15544 and EN 13384. Commenter (1574) describes the results of initial validation testing with four masonry heaters for which the model predicts values well and is developing other coefficients to address other model designs (Contraflow and Double Bell). Commenter (1574) states that once the calibration work has progressed sufficiently, MHA is prepared to submit the calculator to vetting by a suitable certifying authority. Commenter (1574) provides an example of how the certifying authority vetting process might work.

7.0 Response to General & Miscellaneous Comments

Chapter 7 presents comments regarding concerns that do not fit neatly within any of the proposed rule's subparts because they are more general in nature. Chapter 7 also contains suggested corrections for typographical errors, as well as suggested changes for future revisions of the NSPS.

7.1 Concern regarding Unintended Consequences

7.1.1 Comment: Rule will cause people to keep older more polluting wood heaters

Commenters (0650, 0947, 0954, 0958, 0961, 1140, 1393, 1396, 1402, 1436, 1437, 1456, 1472, 1484, 1490, 1514, 1522, 1543, 1544, 1546, 1547, 1550, 1554, 1562, 1573, 1586, 1632, 1636, 1643, 1664) state that the rule will not have a meaningful improvement in air quality or may in fact reduce air quality, with many stating new stoves will become more expensive and difficult to operate, resulting in people hanging on to their old stoves even longer, perhaps beyond their life span. Another alternative is that consumers will purchase, or even fabricate themselves, the lowest technology means to burn wood as a heating fuel, resulting in higher emissions, according to commenters (1573, 1633). Commenter (1562) states that price increases are a major burden for the rural user who will then continue to use an existing polluting unit, contrary to the goal of this NSPS document. Commenter (1664) acknowledges that the current regulations are out of date (as evidenced by many stoves exceeding the current standard by more than 100%, but that improvements in air quality will only increase under the new standards if consumers do not embrace the new units (and their associated costs). Commenter (1436) states we have reached a point of diminishing returns on these regulated heaters and draconian measures will drive customers to fix and repair old dirty ones to keep them in service. Commenter (1543) asserts that the EPA must recognize that, according to the U.S. Census Bureau, most of the households that use residential wood heat are lower income or lower middle income households and that affordability and ease of operation are critical to these households in order for them to replace uncertified high emission wood heaters with cleaner burning lower emission wood heaters.

Commenters (1543, 1550, 1643) summarize concerns related to the EPA's failure to address many of the issues raised by members of the Small Business Advocacy Review (SBAR) Panel including that the Small Business Administration (SBA) and Office of Management and Budget (OMB) panelists were concerned that "it was unclear whether adoption of a more stringent standard for new sources would slow the adoption of new, cleaner burning heaters, potentially delaying improvements in air quality." According to the commenters (1543, 1550, 1643), the proposed rule and preamble barely acknowledge the changeout implications of EPA's proposed standards (much less consider them in the course of standard-setting).

Commenters (1543, 1550, 1643) summarize the level of continued ownership and use of uncertified models based on studies by Dr. James Houck showing that certified wood stoves emit an average 54% less than uncontrolled, uncertified appliances and that homeowner use of

uncertified wood stoves is a critical factor in PM wood stove emission inventories. The commenters (1543, 1550, 1643) describe the positive emissions and air quality impacts resulting from the Libby, Montana changeout program. The commenters (1543, 1550, 1643) note that the economic implications of policies affecting consumer changeout are explored in NERA's economic analysis, and NERA's modeling plainly demonstrates that any tightening of the current NSPS limit is certain to carry demand impacts, with fewer consumers willing to changeout ("scrap") their old, uncertified appliances for new, lower emitting, but less affordable ones. According to the commenters (1543, 1550, 1643), this reduction in sales would be accompanied by an increase in the number of uncertified, high-emitting wood stoves which would otherwise have been "scrapped" but would instead remain in use. The commenters (1543, 1550, 1643) conclude that while aggregate emissions still would be reduced, the total reduction is considerably offset by the adverse scrappage effect. The commenters (1543, 1550, 1643) add that, as the uncertified wood stoves still in homeowner use continue to age, their emissions may only get worse. According to the commenters (1543, 1550, 1643), under an overly stringent emission limit, incremental emissions reductions are significantly neutralized due to the significantly diminished incentives for the elimination of existing uncertified wood stoves responsible for the vast majority of total emissions.

Commenters (1554, 1573) submit an attachment that contains the results of the "Wood Stove/Fireplace Emissions Study: Impact on Product Replacement & Consumer Opinion" that summarizes work by The Stevenson Company in response to a request from the Wood Heat Coalition. The study presented by commenter (1573) represents a market analysis of the existing U.S. wood stove/fireplace/insert market to determine if consumers are likely to replace their current units with lower emission units and includes the following findings:

- Very few noncatalytic system owners are interested in purchasing a product with the new (1.3 g/hr) technology given the price premiums.
- Exposure to the EPA mandate slightly erodes purchase likelihood (price seems to be the biggest detractor).
- Existing owners are likely to fix their current product or find a used "previous technology" product.
- When purchasing a new product, "price" is the most important attribute, followed by "efficiency ratings" and "user-friendly controls."
- About half of owners do not know if their product is EPA certified.
- Most owners do not have their products professionally serviced.
- Stoves are more likely to be used as a primary heat sources, are used more frequently, and burn more wood than fireplaces.

Commenter (1543) asserts that the level proposed would maintain or increase, not decrease, the fine particulate from residential wood heaters in many localities. Commenter (1543) points to a report, based on their work with the Washington State Legislature, as support for the need to reduce the number of existing uncertified residential wood heaters to reduce fine particulate emissions, www.cleanairpiercecounty.org/taskforce/CleanAirTaskForceRport_FullReport.pdf. Commenter (1543) opines that Step 2 of the proposed approach (Step 2 and 3 of the alternative approach) would effectively stop the changeout of the old, high emission, uncertified residential

wood heaters by eliminating affordable appliances to replace the old wood heaters.

Commenter (1514) notes that prior to 1988 the average wood heater emitted 50-60 g/hr (based upon early studies such as the Klamath Falls Study), that the current NSPS represents a reduction by a factor of nearly 10, and yet poor air quality remains 25 years later. The commenter (1514) sees this as "proof that the direction of air quality management regarding wood smoke is misguided", maintaining that requiring manufacturers to produce yet cleaner stoves is counter-productive as the increased appliance cost will cause consumers to keep their older, dirtier stoves longer and air quality will decrease. Commenter (1514) concludes that the 6 to 8 million older, non-certified stoves currently in operation is the pollution problem.

Commenter (1521) believes that new regulations that cause stoves to be prohibitively expensive and/or operated incorrectly may not result in the expected air quality and health benefits being realized. Commenter (1581) notes that wood heaters last for decades and progress in improving air quality will depend on consumers embracing the new clean-burning units and being ready and able to voluntarily swap out their older appliances. Commenter (1581) believes the new rules should not reduce the availability of compliant residential wood heaters or delay their voluntary acquisition by consumers because this would prolong the lifespan of dirty-burning older stoves and take many years for air quality improvement.

Commenter (0659) sees an increased market for outdated appliances. Commenters (0934, 1456) express concern that consumers will not only hang onto old stoves, but will make their own stoves as the prices of commercial stoves increase. Commenter (0961) adds that about 40% of new stove sales are replacements, but increasing the price and diminishing the fire viewing experience removes the two main incentives for people to upgrade their old dirty burners. Commenter (1586) believes the standards will discourage replacement, leaving older, less efficient products in use. Commenter (1586) states the regulatory cost for the manufacturer to meet the proposed emissions limit mandates and testing procedures can trickle down and make it harder for retailers to market and sell these products because consumers avoid higher first costs, and cites energy efficiency standards implemented by the DOE on regulated HVAC equipment. Commenter (1436) supports revisiting the 1988 rule but is concerned that the proposed rule contains assumptions and unsupported ideas and will have the undesired effect of increasing emissions.

Commenter (0653) notes that the demand for wood burning is way up while stove sales are way down, which means that consumers are more attracted to savings on their heating costs and are using cheaper and older less efficient stoves. According to the commenter (0653), energy costs and the price of stoves remain key factors in influencing demand. Other commenters (0945, 1573) agree that consumers buy wood stoves to pay less for home heating. The effect of the proposed limits will be less clean burning units and the continued concentration of older non-certified units, according to commenter (1472). Commenter (1472) maintains that emission limits should be set in a range that will allow manufacturers to economically get clean units into the marketplace and that will give consumers the economic incentive to retire the older units.

Commenter (0653) adds that as use of older stoves increases due to the high cost of purchasing a new technology stove (estimated at a 25% increase in price), more creosote will be deposited in chimneys creating the potential for dangerous chimney fires.

Commenter (1396) states that higher costs associated with wood heaters certified to the 1.3 g/hr Step 2 (and 3) limit could predictably have the unintended consequence of convincing people to decide not to replace higher-emitting pre 1988 wood-stoves or driving them to fabricate their own uncertified wood heater. The commenter (1396) believes the ultimate goal should be to reduce and eventually eliminate high-emitting uncertified wood stoves resulting in significant reductions in PM emissions overall.

Commenter (1657) believes forced-air furnace cost increases resulting from the rule, which the commenter estimates to be on the order of 30 to 40%, will result in a drop in changeouts of old appliances. Likewise, regarding pellet stoves, commenter (1543) reports that, according to changeout program data from their member retailers, less than 10% of the participants in wood stove changeout programs are replacing an uncertified wood heater changeout to a pellet stove using the monetary incentives provided by the changeout program. According to the commenter (1543), their members state that the primary reason for not purchasing a pellet stove is the higher cost of the heater and fuel.

Commenter (1554) anticipates that the cost to meet the proposed Step 2 standards would result in an increase in stove prices in the triple digits and states that the EPA has not considered the economic impacts of such price increases or the adverse environmental impacts that would result from people holding onto their old/dirtier stoves for longer periods of time.

Commenter (1544) states that the only effective way to address the primary cause of wood-burning PM emissions is to remove noncompliant wood-burning appliances from the airshed with the EPA, state regulators and industry joining to craft a well-funded legislative solution which removes the persistent installed base of old high emission wood-burning product.

Response:

We disagree with the suggestion that the rule will not have a meaningful improvement in air quality or may reduce air quality. The reductions in emissions as a result of the NSPS issued in 1988 have been dramatic and likely more than would have taken place over time in the absence of the NSPS. In a 2006 study for MARAMA, James Houck estimates that the PM emission reductions due to the 1988 wood stove NSPS were approximately 35%. While some manufacturers may temporarily increase their suggested prices, competitive market pressures will temper those increases. Furthermore, some lower-emitting models currently sell for less than some higher-emitting models. While one commenter suggests that the primary reason for not purchasing a pellet stove is the higher cost of the heater and fuel, this issue would remain regardless of this NSPS. As we noted previously, most wood stoves are purchased by the middle class, not the poor. According to an industry-funded survey submitted in response to the proposed rule, approximately 80% of the families who purchase wood stoves are in the middle

class or higher.[38] As for impacts to consumers, the EPA presents some estimates of elasticity of demand in Section 5 of the RIA. The elasticity of demand has a magnitude close to that of a potential price increase in affected appliances, though the magnitude may be higher for wood stoves compared to other appliances. We do not have any information on the impact of higher prices on household income, though the estimated price increases do not suggest a significant impact on the income of wood heater appliance users interested in a new appliance.

Furthermore, wood-fueled appliances compete with other biomass forms as well as more traditional oil, electricity, and natural gas. Robust data are not available for us to be able to determine the potential for consumers to choose other types of fuels and their associated appliances if the consumer costs of wood-fueled appliances increase and at what level that increase would drive consumer choice. Similarly, robust data are not available for us to determine the degree to which better information on the energy efficiency of the NSPS appliances will encourage consumers to choose new wood-fueled appliances over other new appliances.

Although the NSPS is not the regulatory vehicle for changeouts, we disagree with the suggestion that we have barely acknowledged changeouts. The EPA continues to encourage state, local, tribal, and consumer efforts to changeout (replace) older heaters with newer, cleaner, more efficient heaters. We agree that changing out all pre-1988 NSPS wood stoves with qualifying stoves would amount in a significant improvement in air quality, however, NSPS are technology-based standards. Consumer changeouts are outside the scope of NSPS and the monetary cost of implementation of such a program is significant. Where regional air quality issues are identified, we encourage state and local government agencies to establish and implement changeout and/or tax incentive or other financial incentive programs to encourage the replacement of older higher-emitting wood-burning stoves with newer lower-emitting stoves. (For example, as with other states that have regional concerns, Oregon has established changeout and tax incentive programs that encourage the replacement of older higher-emitting wood-burning stoves with newer lower-emitting stoves.) The continued requirement for permanent labels will help to determine a unit's applicability to any future changeout programs. Changeout programs can use financial incentives to encourage the replacement of older wood-burning appliances with cleaner home heating options. EPA's Burn Wise website (at http://www.epa.gov/burnwise/how-to-guide.html) presents guidance on "How to Implement a Wood-burning Changeout Program." Other financial incentives (including tax incentives) can also be used to encourage households to replace or retrofit old wood-burning appliances. The EPA's *Strategies for Reducing Residential Wood Smoke* document (http://www.epa.gov/burnwise/strategies.html, pages 21-24) outlines financial incentives that can be used, including discounts/vouchers, tax credits, property assessed clean energy and federal program incentives. Wood stove changeout statistics vary from campaign to campaign. It is true that it often takes significant discounts or rebates to persuade current stove

[38] Comment on the proposed rule to Docket EPA-HQ-OAR-2009-0734 from HearthStone Quality Home Heating Products available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-1436

owners to give up their currently operating wood stoves if the owners were not already intending to do so anyway.

As stated at proposal, we do expect that most NSPS-compliant hydronic heaters and forced-air furnaces will likely cost more than non-compliant models. Also, as noted in other responses (e.g., in *Section 2.5*), after considering comments from HPBA and their member manufacturers, we have increased our estimates of costs and potential prices increases. The revised estimates of costs and potential price increases are presented in the RIA for the final rule and in technical memoranda, all of which are in the public docket for the rulemaking (e.g., see citation in *Section 2.5.2* to Manufacturer Cost Impacts Memo). Hydronic heaters have historically been marketed on the basis of saving fuel costs versus other heaters. We note that old hydronic heaters were often marketed as "good for the environment", "free heat" or "100% efficient" even though their actual emissions were very high and their actual efficiencies were very low (e.g., actual efficiencies were often less than 30%). Many commenters strongly believe that consumers need to know the actual emissions and efficiencies and fuel costs in order to make better informed choices. The NSPS Step 2 compliant hydronic heaters and forced-air furnaces are often over 80% actual efficiency and often the potential reduced fuel costs can offset the price increases in 1 or 2 heating seasons. (See citation in *Section 2.5.3* to NESCAUM comment.)

Regarding catalytic devices, with more than 25 years of development experience, manufacturers have demonstrated that the performance of these heaters typically remains consistently good over the course of proper operation because of changes manufacturers have made to improve heater design to protect the catalysts from flame impingement and other factors that previously caused catalysts to degrade significantly. (See discussion in *Section 3.3* regarding catalytic stoves.)

We do not agree with one commenter that the EPA failed to address issues raised by the SBAR Panel. A detailed discussion of the Panel's advice and recommendations is found in the final Panel Report (Docket ID No. EPA-HQ-OAR-2009-0734). A summary of the Panel's recommendations and how we incorporated those recommendations is also presented in the preamble. In the final rule, we have included provisions consistent with several of the Panel's recommendations. We have attempted to follow the Panel's recommendations to the degree we can while also ensuring that the options are practicable, enforceable, environmentally sound and consistent with the CAA. For those recommendations not adopted by the EPA, we included an explanation for why we rejected them. We have considered Panel input and comments received under the SBREFA process and on the proposal with regards to small business implications. We note again that the final rule includes several measures to minimize impacts on small businesses in the final rule, including easing the transition to the more stringent Step 2 standards. See our response in Section *2.19.4* regarding the SBREFA process and our responses in numerous other sections of this RTC regarding how the final rule has balanced cost considerations with achievable emission limits.

7.1.2 Comment: Promoting versus discouraging wood burning compared to other heat sources

Commenters (0374, 0386, 0388, 0410, 0413, 0427, 0476, 0484, 0489, 0514, 0571, 0602, 0606,

0618, 0648, 0929, 0939, 0941, 0972, 0991, 1010, 1013, 1130, 1144, 1275, 1372, 1381, 1439, 1507, 1529, 1626) claim that wood burning is environmentally friendly compared to fossil fuels because it is a renewable form of energy which is carbon neutral, according to these commenters. Commenter (0648) believes that "wood decomposition in the forest releases as much CO_2 as burning that same wood". Commenter (1507) claims that very few of their customers cut live trees, so this wood is going to rot and emit CO_2, if it is not burnt, and that we might as well get some energy out of the wood before it rots. Commenters (0960, 1592) cite a March issue of *Popular Mechanics* that published facts about how wood-burning appliances are carbon neutral and do not have a carbon footprint as do fuel oil furnaces, propane heaters and even electricity which uses approximately 70% coal for production.

Commenters (0368, 0427, 0991, 1439) state that burning wood for residential heating helps clear the forest of fuel and therefore helps prevent destructive forest fires. Commenter (0368) states that EPA should find a good balance between ecology and industry, including supporting programs to remove dead fall from the forest floor and to selectively thin forests. Commenters (0571, 0618) also note that wood is a local form of energy which does not require transportation (like oil or propane) and therefore doesn't incur the environmental impact of that transportation. Commenter (1507) states it takes more energy to harvest a natural resource (like gas) and transport it to distributors and to end-user consumers, noting that burning wood saves this energy. Commenter (1137) believes that especially in rural areas it is far more efficient to burn locally cut wood and wood by-products then to pipe and truck fossil fuels to the homes and farms.

Commenters (0368) states that "big oil" is a far worse polluter than the wood-burning appliance segment, and the proposed rules will "destroy" the wood stove industry, leading more fracking, drilling and spilling. The commenter (0368) asserts that, properly done, wood burning is cleaner than fossil fuel burning (e.g., the Alberta Tar Sands project.). Likewise, commenter (0776) states that the total emissions of wood-burning stoves and heaters in the U.S. produce fewer emissions than the production of one oil tanker. Commenter (0514) states that the EPA should consider the repercussions and alternatives that will be forced, including more natural gas drilling to heat homes, and the commenter claims they would rather see wood smoke than the air pollution from the coal plants generating electricity.

Commenter (1507) believes the NSPS rule will force many Americans back to energy dependence on LP gas, natural gas, oil or electricity. Commenters (1546, 1562) assert the additional appliance cost (e.g., to test with both crib and cord wood) will be passed on to the customer, who may opt to stay with a non-renewable fuel such as oil, coal or gas. Furthermore, numerous commenters (0373, 0377, 0379, 0386, 0400, 0405, 0412, 0426, 0427, 0446, 0479, 0483, 0487, 0500, 0511, 0519, 0520, 0525, 0532, 0533, 0561, 0562, 0587, 0590, 0592, 0594, 0600, 0630, 0767, 0775, 0950, 0974, 0986, 0989, 0991, 1008, 1014, 1039, 1117, 1124, 1131, 1136, 1174, 1261, 1278, 1366, 1373, 1530, 1716 plus others) note the high cost of fossil fuel compared to wood and express concern that the rule will increase the cost of wood heating to make it no longer affordable. (*Note: see also Section 7.2.5 for commentary regarding concerns that the rule will have a disproportionate impact on the rural poor who may rely on wood heat as an affordable heat source.*)

Commenter (1137) is disappointed that the EPA has not accepted wood as a viable, carbon-neutral biofuel that should be acknowledged in the same way as most of Europe has acknowledged this fact. Likewise, commenter (1503) urges the EPA to recognize the important contribution that wood heating can make to reducing residential fossil fuel use and to ensure that EPA's updated wood heating regulations support continued innovation in the wood heating industry that will lead to more efficient, cleaner, and more customer-friendly wood heating options in the future. The commenter (1503) adds that, with the right regulations, wood heating can become an important renewable, environmentally sound, and homegrown substitute for fossil fuels. The commenter (1503) urges the EPA to acknowledge this in the preamble to the NSPS, and to reflect the contribution that wood heating can make to reducing GHG emissions in other EPA publications and materials.

On the other hand, commenters (1093, 1200, 1218, 1221, 1260, 1276, 1284, 1285, 1289, 1291, 1317, 1321, 1322, 1323, 1327) contend that wood heating is not environmentally-friendly and a green form of heat, but rather is detrimental to the environment even when compared to fossil fuels, taking issue with the contention by some that wood heating is carbon neutral. Commenter (1260) believes that burning wood gives out even more CO_2, methane and soot per unit of heat than fossil fuel and, thus, it is no better for global warming. Commenter (1218) concludes that a solution to air pollution and global warming is to stop burning wood because burning is actually neither renewable nor sustainable, contrary to what most environmentalists think. Likewise, commenter (1327) claims that:

> "Wood's 'zero-carbon' status, while fictitious as a matter of physics, helps persuade wood burners that they are helping greenhouse gas emission reductions. The trouble with this romance lies in the fact that while plants do regrow, capturing carbon back out of the air as they do, it takes decades for today's emissions to be safely sequestered in the future's trees. Meanwhile, the carbon released from burning biomass has the same climate-change impact as carbon from oil, coal or natural gas. Except that more wood has to be burned to meet a given energy demand than a fossil fuel. On a CO_2 per kilowatt basis, wood fuel actually releases nearly half again as much carbon pollution as coal."

Furthermore, commenter (1323) notes that:

> "The Intergovernmental Panel on Climate Change confirmed the inference in a 2006 document that evaluated carbon dioxide releases compared to energy produced for 53 different fuels. It determined that wood and wood wastes had a greenhouse emission factor roughly 20 percent higher than coal. Even after biomass is 'densified' in pellets, the DOE's Biomass Energy Data Book, determined, 'the bulk density (and hence energy density) of most biomass feedstocks is...between about 10 and 40 percent of the bulk density of most fossil fuels.' As a result, according to one study by the Manomet Center for Conservation Studies for the Massachusetts Department of Environmental Conservation, burning wood to produce electricity produces 46 percent more emissions (kilowatt-hour-for-kilowatt-hour) than burning coal."

Commenter (1365, 1587) understand that it will be useful to have a certification process for hydronic heaters and forced-air furnaces but is concerned about the potential unintended consequences of the certification of these devices. Specifically, commenters (1365, 1587) assert device manufacturers and retailers may tout and market the EPA certification as a "seal of approval." As a result of industry marketing, commenters (1365, 1587) state consumers may be given the idea that these devices are an environmentally wise home heating choice, when in fact they emit orders of magnitude more pollutants than heating devices that burn natural gas, propane, oil, or that use electricity. For example, commenters (1365, 1587) cite the Alliance for Green Heat includes the following statement in the Policy Goals section of its website: "By 2014, indoor boilers and furnaces are expected to be regulated by the EPA, which will ensure that particulate levels are within set limits. Once that occurs, it will pave the way for programs to provide incentives for these whole house systems aimed at switching 100% of home heating needs from fossil fuels to renewable biomass." Commenters (1365, 1587) further believe the final rule should expressly prohibit the use of EPA certification in any marketing, advertising, merchandising, or point-of-sale materials for these devices, in addition to a prohibition on federal funds from being used to subsidize the sale of these devices. Commenter (1488) also asserts that it is critical to ensure certification is not used to open the door to the sale of hydronic heaters and forced-air wood-fired furnaces in areas of the country that currently prohibit them.

Response:

We disagree with the commenters' suggestion that the EPA does not understand the importance of and is discouraging wood burning in favor of other sources of home heating. The EPA's mission is to protect human health and the environment and NSPS do this by ensuring that emission control technologies are up-to-date, based on BSER. With this rulemaking, we are not favoring one heating source/option over another. Wood heating remains an important option for many residential users, but devices need to be cleaner and lower emitting. This rule applies updated emission limits that reflect the current BSER, eliminates exemptions over a broad suite of residential wood combustion devices, strengthens test methods as appropriate and streamlines the certification process. As stated in the preamble, to the degree that older, higher emitting, less efficient wood heaters are replaced by newer heaters that meet the requirements of this rule, these requirements for cleaner new stoves will result in substantial reductions in emissions, and thus in exposure, producing reduced health impacts. Health benefits associated with these regulations are valued to be much greater than (over 100 times) the cost to manufacture cleaner, lower emitting appliances.

As noted in the preamble and in response to a previous comment, wood-fueled appliances compete with other biomass forms as well as more traditional oil, electricity, and natural gas. Robust data are not available for us to be able to determine the potential for consumers to choose other types of fuels and their associated appliances if the consumer costs of wood-fueled appliances increase and at what level that increase would drive consumer choice. Similarly, robust data are not available for us to determine the degree to which better information on the energy efficiency of the NSPS appliances will encourage consumers to choose new wood-fueled appliances over other new appliances.

Regarding the additional appliance cost due to testing, the final rule requires testing with crib or cord wood, not both, as one commenter claimed.

7.1.3 Comment: Shift toward catalytic models and potentially higher overall emissions

Commenters (1283, 1365, 1587) believe the proposed rule may have the unintended consequence of shifting the marketplace toward catalytic models. The commenters (1283, 1365, 1587) state performance of these catalytic devices degrades over time and the net effect of the proposed rule will be to increase rather than decrease wood smoke pollution. Commenters (1365, 1587) assert there is no economic incentive or functional reason for the user of the stove to replace the catalytic components or maintain them properly: the negative consequences of degraded catalytic components, which are primarily increased emissions, occur outside the user's home and have little effect on them while they are inside operating the device. Commenters (1365, 1587) state that even using the industry's most optimistic claims, the maximum lifespan of a wood heater's properly maintained catalytic components is 8–10 years, while the EPA states that the lifespan of a wood heater is greater than 20 years. Therefore, commenters (1365, 1587) conclude that after a few years of use, wood smoke emissions from catalytic devices will potentially be as high as those from an uncertified conventional wood heater. In addition, commenters (1365, 1587) believe the proposed rule will drive manufacturers to more widely adopt catalytic or hybrid catalytic technology in an effort to meet the more stringent emissions standards of the proposed rule.

Commenter (1468) contends that the proposed NSPS may require manufacturers to shift significantly to catalytic emissions control methods and that this shift may reduce overall emission reductions from wood stoves. Commenter (1468) notes that while catalytic technology is effective, it may also require multiple replacement catalysts throughout the lifetime of the stove and if the operator does not replace the catalyst, emissions from the unit may be substantially higher than expected. Commenter (1468) requests that the EPA consider this in the context of actual lifetime emissions reductions.

Commenter (0650) states that the over 90% of stoves shipped by manufacturers in U.S. are of the noncatalytic type, but that the EPA's proposal and subsequent changes to test methodology would eliminate from the marketplace virtually all of the stoves included in that 90% figure. Commenter (0650) states that this would also eliminate consumer choice. Commenter (0650) states that stoves need draft to operate efficiently and that the 1.3 g/hr limit, while possibly achievable in the lab, may result in a stove that is too complicated for the consumer to operate. Commenter (0650) adds that the more complicated the stove, the more likely the consumer may circumvent the optimal way of using them. Commenter (0653) states that catalytic stoves are run in the open mode 40% of more of the time (citing the "Stevenson Survey"), producing more particulates that a noncatalytic EPA Certified stove based on field studies of homeowner behavior. Likewise, commenter's (1573) products are designed to be simple to operate based on a single air control system, which is what will result in cleaner emissions once installed and used in a consumer's home, according to the commenter. The commenter (1573) states that allowing the consumer to not engage the very controls that were needed to generate the EPA required

emissions is not going to reduce the wood smoke emissions that is the goal of EPA and industry. The commenter (1573) cites the Stevenson's report (see 1573-A3, in the project docket for more detail) that documents how consumers circumvent devices to lower emissions, resulting in higher emissions. The commenter (1573) concludes that it seems better to have simple controls producing 4.5 g/h or better emissions than products with devices not engaged producing 8 g/h.

Commenters (1554, 1573) submit an attachment that contains the above-referenced "Stevenson Survey", entitled *Wood Stove/Fireplace Emissions Study: Impact on Product Replacement & Consumer Opinion*. The study by The Stevenson Company in response to a request from the Wood Heat Coalition and represents a market analysis of the existing U.S. wood stove/fireplace/insert market to determine if consumers are likely to replace their current units with lower emission units and includes the following findings (among other findings):

- Most consumers are not very familiar with catalytic type products.
- Most catalytic fireplace owners "sometimes" run the unit with the bypass damper opened and about a third of catalytic stove owners do.

Commenter (0653) is also concerned that homeowners that are not engaging the combustor or using their catalytic stove properly creates more creosote and risks a chimney fire. Instead, the commenter (0653) states that a noncatalytic EPA certified stove is "passively active" and is much less prone to error because the system is engaged immediately. Commenter (1436) believes that catalysts or any "technology" added will require maintenance and upkeep and that, without a clear benefit to the consumer, this will not be performed and air quality will suffer.

Commenter (0961) states that consumers open the bypass to improve their fire viewing experience. Commenters (0659, 0961) agree that customers want to "see fire" and showed pictures comparing a roaring flame at 3.5 g/h to smoldering coals at 1.5 g/h. Commenter (0961) adds that the ability to heat one's home and enjoy a beautiful fire at the same time is one of the primary reasons people buy EPA stoves and taking away the beautiful fire will decrease stove sales even more.

Commenter (1521) states that, based on a survey of wood heating appliance owners and operators, as well as dealers, installers and stove and chimney maintenance professionals, a major hurdle to overcome for wood-burning appliances meeting low standards – such as catalyst-equipped stoves – is that they only run for a short period of time (the duration of the burn once the unit is fueled and closed) compared to older stoves. The commenter (1521) states that this is because the manufacturers "plug the firebox with excess air in order to meet the standard." According to the commenter (1521), because the new compliant designs would not maintain a fire overnight, owners will be less likely to follow manufacturer's specifications and will do whatever they need to do to maintain heat in their homes overnight. The commenter (1521) believes that this could lead to pollution levels greater than the EPA-certified noncatalytic stoves because of improper use (not waiting until the flue gases are up to temperature before engaging the catalyst, bypassing the catalyst, not properly maintaining and replacing the catalyst, as necessary, etc.).

Response:

This NSPS is not an attempt to eliminate noncatalytic appliances from the market. Manufacturers have had ample time to prepare in advance of this rulemaking. Many noncatalytic appliances already meet the Step 1 limit, which is the 1995 Washington State standard; and 18% of noncatalytic stoves already meet the Step 2 limit.[39]

It is important to provide choices to manufacturers and consumers. The EPA is concerned with emissions from all stoves, not the technology itself. Our preference is not to separate or distinguish by control technology but rather give manufacturers the choice in how they wish to design their stoves to meet the NSPS and consequently to give consumers maximum choice as well. Promulgating different standards based on control technology unnecessarily inserts the EPA's influence into the innovation and design process and therefore into the marketplace. The choice of catalytic vs. noncatalytic stove will be decided by the manufacturer and in the marketplace.

Regarding degradation, both catalytic and noncatalytic devices degrade over time. However, catalytic combustors are better today than in 1988. (See discussion in *Section 3.3* regarding catalytic stove technology.) As noted in the Interim Wood Stove Catalytic Combustor Longevity Study (prepared for the Catalytic Hearth Coalition by L. Pitzman et al, OMNI Environmental Services. January 4, 2010), manufacturers of catalytic stoves have made substantial improvements to heater design to increase longevity of the combustor. As stated in our previous responses to comments, catalysts today usually last over 10 years, while we used 20 years for the emitting lifespan of the stove. Thus, the catalyst will likely need to be replaced only once. This catalyst replacement cost is counterbalanced by the fact that catalytic stoves tend to have greater heating efficiencies and thus lower fuel costs than noncatalytic stoves. We also note that, contrary to one commenter's concern regarding the "fire viewing experience", catalytic stoves are capable of producing a robust fire as well, as shown, for example in videos available for viewing on the Blaze King Industries website.

We disagree with one commenter's suggestion that there is no economic incentive or functional reason for the user of the stove to replace the catalytic components or maintain them properly. The incentive is increased efficiency and less wood needed to provide heat, hence lower cost in addition to cleaner air. We agree that homeowner behavior is important and that all stoves need to be properly maintained and operated. We disagree with the comment that catalytic stoves may be so difficult to operate that users may shun them or circumvent/misuse their controls; again, we stress the importance of proper consumer education. Information provided to consumers by the EPA (e.g. Burn Wise), delegated authorities and manufacturers (e.g. via information posted on websites and in owner's manuals) will serve to inform proper operation.

[39] Memo to USEPA from EC/R, Inc. Derivation of wood heater model percentages meeting Step 2 standards. November 2014.

7.1.4 Comment: Trend toward smaller fireboxes and increased overall emissions

Commenter (0541) states that, as emission limits increase, room heater fireboxes will become smaller to meet the requirement. The commenter (0541) suggests that, if multiple room heaters are installed in a building, the emissions impact can be greater than a central heater. The commenter (0541) asks if a benefit analysis exists for these tradeoffs.

Likewise, commenter (1479) has found that lower burn rates will be very hard to manage and will drive the manufacturers to develop units with smaller fireboxes. According to commenter (1479), the lower standard will drive manufacturers to build units that are smaller in order to comply with the g/hr limits and lower burn rates, which will drive consumers to install multiple units to heat their residence as opposed to one unit that can meet their need.

Commenter (1397) strongly recommends that future NSPS replace the current parsing scheme with one based on "units of targeted pollution per quantity of delivered heat" to include a sliding scale based on size but including emission rate caps.

Response:

We note that section 111 of the CAA is a system and technology-based standard resting on BSER and directed at each unit/device or "affected facility". The g/hr format of the standard is based on the level of emission reduction achievable for these technologies and is the form of the standard that the states use for their SIPs.

Regarding lower burn rates, we note that the EPA and the states continue to be concerned about emissions at low burn rates and the weighted average basis of the final standard covers low burn rates. Specifically, the final rule maintains the low burn rate category of EPA Method 28 rather than a low burn rate of 1.5 kg/hr (as some stakeholders have suggested) – that is, we are maintaining the requirement for a Category 1 burn rate of less than 0.80 kg/hr or at least one test run with an average burn rate of 1.00 kg/hr or less. Note that the rule also requires testing at the lowest burn rate the heater can achieve in actual use.

We appreciate the suggestion that future standards be based on "units of targeted pollution per quantity of delivered heat", incorporating a sliding scale for size, and will consider this suggestion for future NSPS.

7.1.5 Comment: Manufacturers will consider direct selling

One commenter (0650) states another potential unintended real world consequence of the EPA's proposal is that it may force manufacturers to consider selling direct to end consumers thereby opening up significant safety concerns as far as proper and safe installations by do-it-yourselfers.

Response:

We appreciate the commenter's concern but the commenter provided no data to support this contention. However, there is no restriction on factory direct selling to consumers and some manufacturers offer this. We encourage professional installation and all appliances are required to be installed as per the installation instructions in the appliance's owner's manual and must meet all applicable codes, federal, state and local.

7.2 General Support and Opposition

7.2.1 Comment: Support for reducing health effects

Commenters too numerous to list cite concerns for the health effects of wood smoke as driving their support of the rule and, in many cases, their criticism that the rule is not stringent enough to address the health effects of wood smoke. *See Sections 2.1.2 and 2.2.1 for examples of such comments.*

Response:

The EPA appreciates the many comments and concerns regarding the health effects of wood smoke and thanks commenters for their support of this rule. We agree that particulate pollution from wood heaters is a significant national air pollution problem and human health issue. We have also highlighted the health effects of wood smoke in the rule's preamble under especially section I.A. of the preamble's executive summary and section II.B. entitled "Why is Residential Wood Smoke a Concern?"

7.2.2 Comment: Concern that proposed changes are not possible

Commenters (0659, 0961) ask how the EPA can justify putting into law a standard that no known products or technologies current meet and nobody has any idea can be met at all. Similarly, commenter (0934) adds that the EPA should not adopt any changes unless it has demonstrated that they will improve emissions in real homes, on real chimneys. Another commenter (0954) strongly supports meaningful reductions to improve air quality, but not with regulations that impossibly lower the emissions limit, change the analytical methodology, and change the fuel to be used simultaneously – all without having the data needed to show that all three simultaneous changes are physically possible.

Commenter (1412) asserts that the problem is that this proposal is attempting to do what should have been done over the last 30 years and cram it into 5 years and there is no way the manufacturers, test labs, and dealers can handle the testing costs, design/warranty issues, marketing changes- the list is staggering. Commenter (1412) believes the EPA is not prepared to handle the volume of testing and changes that will need to happen and is not capable of enforcing the proposal they have come up with. Commenter (1412) predicts there will be a huge bottleneck at the test labs, and manufacturers will wait months (or more) for EPA Phase 2 approval on models, and small manufacturers will give up and go out of business. Commenter

(1412) adds that spotty enforcement will create tremendous headaches for dealers and the public will be confused. Commenter suggests going back to the Phase 1 standard but making it a national standard (not voluntary) to see how the industry reacts. Commenter (1412) states the proposal as it is now is a nightmare for a small business owner and predicts sudden large shifts in the market and supply chain will put most small dealers under - you can't run a business not knowing what the final ruling will be and then have 60 to sell down. In closing, commenter (1412) states this situation would become much less complex if the proposal would change to a less stringent but user-friendly one.

Response:

After careful consideration, we have determined that the final standards can be met, reflect BSER and are a good balance of achievable emissions reduction with cost considerations, as is appropriate under section 111 of the CAA. To the degree that older, higher emitting, less efficient wood heaters are replaced by newer heaters that meet the requirements of this rule, or better, setting these new requirements for cleaner stoves will result in substantial reductions in exposure and improved public health. As indicated by commenters in other sections of this document, there is broad recognition that the Step 1 standards are imminently achievable for most of the industry. We anticipate that manufacturers will focus on existing models that already meet the Step 1 limits in order to focus attention on designing heaters capable of meeting the Step 2 limits.

We have revised the proposed Step 2 standards for both subparts AAA and QQQQ. The final standards reflect BSER and consider cost and feasibility concerns, related not only to the stringency of the limits, but also to the compliance algorithm (weighted average versus individual burn rate compliance) and certification fuel (crib versus cord wood). The rationale for the revisions from proposal reflected in the final rule are discussed at length in the preamble and throughout this document. As noted in other responses, we have determined that 89% of catalytic/hybrid stoves, 70% of pellet stoves, 18% of noncatalytic stoves and 18% of hydronic heater models can already meet Step 2 of the final rule.[40] Thus, not only are the emission levels clearly demonstrated, the percentages of current heaters that already meet Step 2 are quite reasonable, especially considering that Step 2 is 5 years after the rule's effective date.

Furthermore, as noted in other responses (e.g., in *Sections 2.12, 2.13, 3.2, 3.4, 4.2 and 4.4*), we include several elements in the final rule to facilitate regulatory flexibility and reduce potential resource issues on manufacturers and laboratories. These elements include the incorporation of an ISO-accredited third-party certification process, automatic compliance certifications to the Step 1 limit, and conditional approval of certification applications by the EPA during the first year (for most appliances). In addition, to ease the transition to the third-party certification process, the final rule does not require ISO-accreditation of certifying entities until six months

[40] Memo to USEPA, from EC/R, Inc. Derivation of wood heater model percentages meeting Step 2 standards. November 2014.

after the effective date of the rule (for most appliances) and current EPA-accredited laboratories may retain their accreditation until 3 years after the effective date of this final rule.

7.2.3 Comment: Support for technology-forcing and innovation-spurring effect of regulation

Commenter (1551) agrees that BSER incorporates Congress' intent in the CAA to promote implementation and further development of technologies beyond what may currently be available. Commenter (1551) states regulatory drivers have led to technology advances that otherwise would not have occurred, noting Vermont's experience with implementing outdoor wood boiler regulations showing that industry can achieve cleaner standards when required to do so. Commenter (1551) states the EPA should ensure that BSER represents the technology development potential for the covered sources, and not break with its own previous interpretation of BSER, promulgating emission standards that reflect the technology innovation opportunity rather than the technology status quo in existence for decades.

Likewise, commenter (1559) states that the EPA cannot be timid in persuading manufacturers to employ staged combustion and a variety of advanced technologies to provide high efficiency and low emissions while bringing the benefits of lower cost wood fuels to the public. The commenter (1559) opines that the EPA needs to require technologies that have been demonstrated to be better and that technology-forcing regulations need to be developed to protect public health. The commenter (1559) opines that the currently proposed standards do not reflect anything close to the state of the art in combustion technology and do little to promote the use of proven technologies that would improve the efficient use of woody biomass fuels. The commenter (1559) refers to field demonstrations at the Alliance for Green Energy's wood stove competition for examples of the kind of improvements already available in the appliance market. Furthermore, the commenter (1559) reports that recent studies have shown that commercial scale wood pellet boiler can achieve PM emissions of 0.06 lbs/MMBtu (includes source document as Appendix A to their comment letter).

Commenter (1430), representing over 4,385 petitioners, notes overall support for the NSPS as the "right thing to do" and contends that implementation of lower emission standards will lead to technology improvements and help clean up numerous dirty airsheds. Likewise, commenter (0963) states that in addition to the health benefits provided by the proposed rule, wood heaters meeting the new standards would be more efficient than older ones.

Commenter (0963) asserts new technologies are available that significantly reduce these emissions and enable homeowners to heat their homes using less wood, saving time and money. Commenter believes health-protective emission standards for these devices would broaden the market for these technologies and spur even more innovation.

Commenter (1453) supports the proposed NSPS for Residential Wood Heaters because the standards for residential wood stoves are achievable and can be achieved without an increase in production costs. The commenter (1453) is developing technology (thermoelectric generation) that has been tested to be capable of meeting and exceeding the proposed standards.

Commenter (0946) states the current standards are obsolete and many categories of residential wood-burning devices have no emission limits at all under the current NSPS. Commenters (0908, 0937, 0938, 0946) assert that cost-effective clean technologies exist. Commenter (0946) states devices using these technologies are on shelves and in use today, including devices meeting the EPA's proposed "Step 2" standards, and several wood boilers on the market have emission rates significantly lower than those in the proposed NSPS. Commenter (0946) believes that given the right regulatory signals, American manufacturers are fully capable of shifting the market towards devices that are cleaner and efficient - reducing harmful emissions and saving consumers money.

Response:

The final standards balance well achievable emissions reduction with cost considerations, as is appropriate under section 111 of the CAA. The phasing of the final standards allows for the rule to be technology-forcing for much of the industry, while allowing the industry time to innovate. The rule encourages testing and certification via cord wood, which will inform BSER for future rulemakings. In addition, the required reporting of efficiency and CO and the improvements to the test methods (including capturing of emissions across the burn cycle) will also strengthen and inform BSER for future rulemakings. Furthermore, the simplicity of the rule – with most standards being applied across-the-board to room heaters and to central heaters helps EPA avoid favoring one technological solution over another.

7.2.4 Comment: Concern for rule's detrimental impact on businesses

Commenters (0520, 0594, 0659, 0770, 0929, 0934, 0939, 0941, 0954, 0956, 0960, 1115, 1116, 1124, 1129, 1261,1140, 1392, 1388, 1399, 1400, 1402, 1431, 1432, 1456, 1470, 1476, 1490, 1507, 1514, 1522, 1539, 1547, 1549, 1560, 1562, 1569, 1582, 1592, 1621, 1632, 1636, 1651, 1664 plus others) oppose the proposed new rules due to a concern that the rule will have a detrimental impact on businesses involved in the residential wood heating industry, including putting many of them out-of-business and causing job losses. Commenter (1261) states that the businesses will suffer because of increased upfront costs to comply with the proposed rules and that with increase appliance costs, demand for heaters will drop. If consumers stay with their older, less efficient heaters, commenter (1261) is concerned that manufacturers will be forced to reduce capacity in the form of lost jobs or other reductions. Commenters (0960, 1592) cite results from the NERA analysis regarding a very costly incremental cost effectiveness and states that these costs will kill the industry and the possibility of change outs of old generation units. Commenter (1116) states that the EPA has not learned from the first round of standards set back in the 80s, which put some 50% of the stove manufacturers in the U.S. out of business. Commenter (1116) asserts the NSPS will have a miniscule effect on reversing the current pollution being produced by pre-EPA heaters and the only accomplishment achieved by this proposed regulation will be reduction in jobs due to manufacturers not able to meet the new standards and stove shops closing their doors due to the unaffordability of heating products.

Likewise, commenters (0956, 1431, 1547, 1560) state many will go out of business, and they are worried that residents will not be able to rely on wood heating for their homes and businesses. Commenter (1115) states that having a good selection of products is not only good for the consumer, but encourages businesses to improve and compete on their own free will. Commenter (0934) adds that the rule changes will keep any other small innovators from trying to enter this industry. Commenter (1456) is concerned that companies may go out of business and the amount of consumer offerings will be radically reduced.

Commenters (0650, 0941, 0954, 0956, 0957, 1115, 1116, 1261, 1392, 1399, 1400, 1402, 1431, 1490, 1514, 1522, 1582, 1621, 1632, 1636) are very concerned about the impact the proposed rules will have on manufacturers and especially for small manufacturers. Commenters (0650, 0957, 1514) state that the proposed rule will particularly impact small business and could put dozens and possibly hundreds out of business. Commenter (1514) claims that the economic impact of the proposed rule – in particular the additional costs associated with designing, testing and producing wood-burning heaters that could meet the proposed emission limits – would be "insurmountable". Commenter (0957), a chimney sweep, states that passing a 1.3 g/hr regulation will significantly affect his business' bottom line in stove sales, installation and service. Commenter (1261) cited concerns of the Small Business Advocacy Review panel about the testing changes in the proposed rule, especially specific costs related to using either in-house or outside labs that are prohibitive and could push small businesses to the brink of financial viability.

Commenter (1572) describes the uncertainty inherent in the proposed subpart QQQQ rule due to changes in the test methods, uncertainty in testing accuracy, doubts that the proposed Step 2/Step 3 emission limits and cap can be met, and reliance on European methods to justify a lower limit. According to the commenter (1572), these factors all create an environment where no business can know whether they will be allowed to continue operations until it is too late. The commenter (1572) states that they will not know the final ruling until 90 days before the law comes into effect but, because the testing and approval time frames are much longer than this, the entire industry would effectively be shut down.

Commenter (1382) states they do not have any units that meet the limits imposed in the proposed NSPS and feels they are in a position where it is difficult to test units at this time due to uncertainty regarding proposed emission limits and test method changes. Commenter (1382) is concerned that dealers will only order units that are retailed, thus keeping their field inventory at zero, essentially shutting their production down until the final rule is effective in May 2015; this will significantly affect their viability.

Commenter (1562) states the wood heating industry is small with small profit margins and does not have thousands of engineers and technicians working for many years, as the automotive industry did in developing clean IC engines. Commenter (1562) asserts that unless significant funds are made available through government agencies, the 1.3 g/hr limit may well eliminate the bulk of the wood heating industry, a renewable fuel industry.

Commenter (1621) reports that many pellet fuel manufacturers are not able to run anywhere close to capacity because there is not enough consistent demand annually. The commenter (1621) states that this results in keeping prices low while costs increase to produce pellet fuels. According to the commenter (1621), more regulations and expensive certification programs could be detrimental to many businesses as well as the industry.

Commenter (0657) states that the rule should be implemented in a manner that both ensures clean, healthy air and allows sufficient opportunity for manufacturers to adapt and implement the new requirements.

Response:

We appreciate the commenters' concerns regarding the impact of the rule on businesses and carefully considered these comments – especially those providing data – in revising our proposed rule and preparing the final rule. As noted in more detail in *Section 2.5*, The EPA used the best information available at the time of proposal. For the final rule we have updated our estimates, based on data provided in the comments. Our final rule RIA has incorporated much of the relevant cost data submitted by HPBA and manufacturers and our estimated costs are higher than at proposal. To the degree that typical manufacturer costs are lower (e.g., closer to the much lower costs submitted by the manufacturer, Woodstock Soapstone) than HPBA's estimated costs, the final rule's impact on manufacturing businesses will be much lower. And to the degree that the number of manufacturers' distinct models are less than the manufacturers indicated (e.g., through model consolidation), the actual NSPS costs will be lower. For clarity, the proposal RIA (and the final rule RIA) included full R&D costs for all models that do not currently meet the revised NSPS levels. Thus, we based our cost assumptions on the current percentages of models that need to finish their R&D, regardless of when they started R&D, and assuming no model consolidation.

The EPA's economic impact analysis presented in the RIA provides estimates of increases in costs as a percent of sales across the industries identified as impacted by the rule and also provides these estimates for particular sized firms based on their employee size. Increases in costs as a percent of sales can be interpreted as a proxy for the maximum price increases needed for a firm to recover its costs associated with the rule. These costs to sales estimates were up to about 6% for firms in affected industries, but the Agency's estimates for particular sized firms showed much higher impacts, especially for establishments with 20 employees or fewer. These results are one reason that EPA could not certify there was not a SISNOSE (significant economic impact on a substantial number of small entities) for this rule. We also note that insufficient information was available on each affected business to allow EPA to conduct an analysis at that level that would include estimates of business closures. Clearly, some very small businesses could experience some substantial stress based on the results shown in our economic analysis..

In response to the data received in the comments (and due to other factors related to the cord wood test method and testing to-date), we have revised the proposed Step 2 standards for both subparts AAA and QQQQ. The final standards reflect BSER and consider cost and feasibility concerns, related not only to the stringency of the limits, but also to the compliance algorithm

(weighted average versus individual burn rate compliance) and certification fuel (crib versus cord wood). We have also provided automatic certification provisions for the Step 1 standard, conditional approval of certifications for the first year, extended the proposed sell-through for heaters regulated under subpart AAA and provided compliance extensions for laboratories and certifying entities. The rationale for the revisions from proposal reflected in the final rule are discussed at length in the preamble and throughout this document. The revisions from proposal reflected in the final rule considerably reduce uncertainty for potentially impacted businesses.

We maintain that EPA's rulemaking provides a balance that allows manufacturers to adapt to the phased-in standards, while making significant gains to reduce wood smoke emissions.

7.2.5 Comment: Concern regarding disproportionate impacts on the rural poor

Commenters (0401, 0402, 0438, 0454, 0651, 0776, 0903, 0947, 0961, 1140, 1155, 1402, 1437, 1470, 1476, 1500, 1629) believe the rule will create residential wood heating appliances that are priced too high for the middle-to-lower income folks, including especially the rural poor, who need and value the appliances the most. Commenters (0610, 1155, 1392, 1393, 1399, 1400, 1402, 1490, 1500, 1514, 1522, 1539, 1543, 1549, 1562, 1582, 1621, 1632, 1636, 1651, 1664, 1666) express concern that the new regulations will lead to increased costs of wood stoves needed by consumers to heat their homes and that these price increases will impact especially the elderly, the middle class and rural poor. Commenter (1562) asserts most wood appliances are used in the rural area where wood is readily available and the only fossil fuels are pricey propane or oil. Commenter (1562) adds that rural incomes are below urban incomes and many rural residents are poor, making appliance price increases a significant burden to these consumers. Commenter (1470, 1476) expresses concern that the new requirements could result in reduced production, making it difficult for the traditional wood-burning resident to purchase the needed product. Commenter (1402, 1500) state that the proposed rule does not adequately address rural area concerns. Commenter (1500) requests that the EPA reconsider any proposal that would appear to discriminate against rural areas, which use a much greater proportion of wood heat as compared to urban and suburban areas.

Likewise, commenter (1140) states that reducing pollution from heating devices is laudable but believes the new rules will increase costs to consumers with only marginal benefit. The commenter (1140) states that solid wood and wood pellets are lower cost alternatives to fuel oil and propane, which is of concern for low income consumers who use wood out of necessity. The commenter states the proposed rule would create real hardship as wood heaters are expensive and many homeowner insurance policies require conventional oil or gas appliance backup, an additional expense. Commenter (0776) also notes the increased cost of propane and cost impacts on cash-strapped consumers.

Commenter (1437) questions the EPA's estimate that the rule will have a minimal impact on the cost of production and notes that heating costs make up a larger proportion of low-income individual's income relative to higher-income individuals, resulting in a potentially disproportionate burden on the poor. Commenter (1437) provides a graph showing that although a greater fraction of high-income households use wood as a fuel for heat, low-income households

actually consume more wood than high-income households (citing U.S. Energy Information Administration, "Increase in Wood as Main Source of Household Heating Most Notable in the Northeast," March 17, 2014, http://www.eia.gov/todayinenergy/detail.cfm?id=15431). Commenter (1437) also provides data that rural residents consume more cords of wood per year than urban residents (citing U.S. Energy Information Administration, 2009 Residential Energy Consumption Survey. Graph created by Heated Up! blog, accessed April 10, 2014, http://forgreenheat.blogspot.com/2012/10/us-government-winter-fuels-outlook.html). The commenter (1437) cites recent academic research that regulations such as the proposed rule are often more in line with the risk preferences of wealthy households [Thomas, Diana, "Regressive Effects of Regulation," Mercatus Working Paper, Mercatus Center at George Mason University, (November 2012)], and contends that it is unlikely that poor households are worried about the risks posed from $PM_{2.5}$ and CO_2 when they face much larger risks elsewhere in their lives. The commenter (1437) notes that wood heaters are a reliable source of heat and energy to especially rural customers (who are often the last to have their power restored) during power outages and that wood heaters are especially important to the poor because wood does not require the same level of cash flow as other forms of heat. Commenter (1437) concludes that the income and insurance the rural poor would lose in complying with the proposed rule may be better utilized towards other risk mitigation.

Commenter (1522) notes that the burden that appliance manufacturers will carry to certify their stoves will add upwards of 50% to the cost of wood pellet industry stoves, which, according to the commenter, ruins the return on investment for consumers. The commenter (1522) opines that this will impact the fastest growing segment of renewable heating potential for the largest demographic in America (the middle class and the poor).

Commenter (1442) states that dramatic hydronic heater price increases resulting from proposed rule will tend to penalize the poor the most. Commenter (1472) contends that the proposed emission limits are unreasonable and will limit the number of companies willing or able to address the standard as well as making new stoves beyond the reach of many in rural America.

Commenter (1549) reports that single burn rate heaters are referred to as "utility heaters" and are used as a source of heat for those that would otherwise be unable to afford a heater in their home. The commenter (1549) expresses concern that the elimination of the "utility heater" category would place an additional cost burden on the consumer.

Commenter (1581) urges that new standards be implemented in a way that allows certified residential cord wood heaters and pellet stoves to be a viable energy efficient home heating choice for rural populations across the country. Commenter (1581) notes that firewood is a very important home heating option for Vermonters, especially low and moderate income residents in the state's most rural communities.

Commenter (0454) believes the EPA is trying to ban wood burning in poor, rural areas. Commenter (1155) wonders if the EPA wants "the poor people to freeze to death".

Response:

This rule does not ban wood burning in any area, rural or otherwise, nor will it cause "poor people to freeze to death". These are national standards and as such do not discriminate against any areas, including rural areas. New wood heating appliances, in general, are improved products with higher efficiency, lower emissions and lower fuel costs, which benefit all consumers. Areas which rely most on wood heating will also benefit the most from reduced wood smoke pollution.

Inexpensive wood heating appliances are available for purchase now and the cost differential between devices is often driven by cosmetics rather than performance. While some manufacturers may temporarily increase their suggested prices, competitive market pressures will temper those increases. Furthermore, some lower-emitting models currently sell for less than some higher-emitting models. We do not have any information on the impact of higher prices on household income, though the estimated price increases do not suggest a significant impact on the income of wood heater appliance users interested in a new appliance. Robust data are not available for us to be able to determine the potential for consumers to choose other types of fuels and their associated appliances if the consumer costs of wood-fueled appliances increase and at what level that increase would drive consumer choice.

The Agency prepared the economic impact analysis that was appropriate nationally for the data that was available on producers and consumers of affected appliances. We have revised the analysis based on additional data received from commenters and have included the revised analysis in the RIA for the final NSPS. We considered impacts on household income and rural consumers of wood-burning appliances to the extent possible in the rule and the economic analysis. We show information on the distribution of appliances and wood-burning in different regions of the U.S. in our RIA.

We have not "eliminated" single burn rate heaters (referred to by one commenter as "utility heaters") but rather have broadened the applicability of wood heaters subject to the 1988 NSPS to specifically include all single burn rate wood heaters/stoves (and pellet heaters/stoves). Regulating these devices will help drive manufacturers to produce cleaner, lower-emitting and more efficient single burn rate stoves, which will benefit the users of single burn rate stoves.

7.2.6 Comment: Contention that the market alone will drive cleaner devices

Commenters (0391, 0428, 1129, 1175, 1437) believe that regulation of wood heaters is not necessary because the market alone will drive cleaner devices. Commenter (1129) suggests "letting the market decide" by keeping the existing regulation, and also requiring that manufacturers test each model of wood stove in order to publish – and thereby advertise – the emission rate of fine PM (in g/hr). Commenter (1175) contends that the EPA has "bigger battles to fight" and states that the EPA appears to think consumers voting with their own dollars is not an adequate incentive for manufactures of wood stoves to put out their best. Commenter (0391) believes the rule is "anti-free market".

Commenter (1437) notes that EPA failed to account for consumers' demands for lower emitting and more efficient wood heaters. The commenter (1437) reasons that because the user of a wood heater is much more likely to bear most, if not all, of the cost of emissions (compared to other types of environmental costs), wood heater users are likely to search for ways to reduce emissions and increase efficiency. Commenter (1437) believes that consumers are independently seeking both improved efficiency and reduced emissions and that this is an example of the market driving cleaner devices (citing as evidence the invention and growth of pellet stoves during the period of no federal regulation since 1988). Commenter (1437) concludes that emission improvements will continue without any new regulations.

On the other hand, commenter (1496) notes that Executive Order 12866 stresses "material failures of private markets" as a criterion for regulation and explains why it is unlikely that the private markets will work in "Coasian" fashion (referring to the Coase economic theorem) to resolve the issue of PM emissions without government regulation. Commenter (1496) concludes that it is highly unlikely that private markets will work to control PM emissions and therefore regulation in principle is justifiable (see pp. 6-7 of comment for reasoning).

Response:

While markets may drive producers to meet the demand of consumers for cleaner and more efficient wood stoves when cleaner devices are offered, we note that the reductions in emissions as a result of the NSPS issued in 1988 have been dramatic and far quicker than would have taken place in the absence of the NSPS. Regrettably, many wood heater manufacturers were slow to meet the demand. We agree with the commenter that many consumers are seeking both improved efficiency and reduced emissions and we expect the NSPS to be of significant benefit to consumers in regard to both. However, we also agree with another commenter that private markets are unlikely to resolve PM emission concerns without government regulation. For example, the market penetration for cleaner hydronic heaters is still only approximately 15% despite the EPA voluntary partnership program efforts initiated in January 2007.

Finally, we note that the EPA has attempted, in this rule, to maximize the potential influence of market choice by regulating emission standards applicable to all room heaters and to all central heaters, rather than promulgating a myriad of different standards by appliance type. This allows industry to choose to develop more choices of cleaner systems and technological solutions and devices to meet the emission limits and let the consumers choose which of these cleaner choices to purchase.

7.2.7 Comment: Miscellaneous comments

Commenter (0956) attached information that he states provides the truth that climate change is not manmade. The commenter (0956) does not trust the EPA's interaction with environmental groups on this issue. Other commenters (0481, 0548, 1152) also register their disbelief in global warming.

Commenters (0399, 0470, 0862, 1006, 1020, 1184) wonder why anyone would expend precious energy, money, and lives on trying to fix wood stoves and fireplaces when we already have natural gas, geothermal, wind and solar energies that can be conveniently provided, and within our financial means. Commenter (0470) suggests we use our energy, money and lives wisely by turning our attention in the direction of alternative energies, as they are already keeping the air clean. Commenter (1021) states they would not burn wood if they had access to the abundant clean burning natural gas and the EPA should make realistic regulations and hook up natural gas to every residence with a wood-burning appliance; which would also cut emissions by not shipping it overseas. Commenter (0385) requests a public forum on Skype.

Commenter (0421) describes Aprovecho, a small, world-renowned group studying and designing wood-burning combustion efficiency systems for use in third world countries. Commenter (0421) asserts Aprovecho has considerable information on how to greatly reduce old inefficient wood-burning systems through new designs in the combustion area. According to the commenter (0421), these designs are reportedly not limited to manufactured stoves or heating devices but are rather intelligently built home heating systems where tremendous heat is produced, with a thermal mass for efficiency, and with extremely clean flue gases. Commenter (0421) invites the EPA to visit the processes at the Aprovecho lab and see the huge steps made in clean and efficient burning processes for wood and similar biomass.

Commenter (1231) states their township is discussing banning wood-burning fireplaces all together and understands the EPA has developed a device that can be installed in any fireplace and it cleans up most of the smoke and pollution. Commenter (1231) asks that the EPA require these devices on all fireplaces to prevent the banning of wood-burning fireplaces.

Response:

The science of climate change and global warming is only peripherally relevant to this rulemaking, which focuses on particulate pollution from residential wood heaters. Particulate pollution from wood heaters is a significant national air pollution problem and human health issue. Residential wood smoke contains $PM_{2.5}$, CO, VOC, toxic air pollutants (e.g., benzene and formaldehyde), and climate-forcing emissions (e.g., methane and black carbon). Residential wood smoke can increase $PM_{2.5}$ to levels that cause significant health concerns.

While natural gas, geothermal, wind and solar energy are important alternative fuel sources, the purpose of this action is to finalize standards for new residential wood heaters. For the foreseeable future, some American consumers will continue to burn wood as a source of heat, irrespective of the availability of alternative fuel sources. Regarding one commenter's suggestion that we hook up natural gas to every residence with a wood-burning appliance, this action is outside of the scope of NSPS under section 111 of the CAA. However, state, tribal and local authorities may consider such options.

The EPA appreciates one commenter's information and suggestion regarding Aprovecho. We are aware of many of the important studies that have been conducted at the Aprovecho Research

Center, some of which have been EPA-sponsored. We value smart innovators with new designs aimed at reducing pollution.

We are not certain what particular "device" one commenter is referring to that would clean up most smoke and pollution in fireplaces. The EPA has a voluntary fireplace program that encourages the development and sale of lower-emitting wood-burning fireplaces. Information available on this program includes a list of qualified fireplaces and retrofit devices. More details on this voluntary program are available through the EPA's Burn Wise website (available at: http://www.epa.gov/burnwise/participation.html#fireplace). While some local governments may be discussing banning fireplaces in response to local air quality concerns, we note that this rule is not banning or regulating wood-burning fireplaces. (See *Section 2.6.6* for commentary and response regarding regulating fireplaces.)

7.3 Suggested Corrections for Typographical Errors

7.3.1 Comment: Suggested preamble corrections

Commenter (1665) opines that there were a few false statements in the proposal preamble:

- Page 101 of proposal preamble: "a level of 1.3 g/hr is achieved by 27 adjustable burn rate wood heater models as of December 2013. This includes 11 certified noncatalytic wood heater models and 16 certified catalytic models." The commenter (1665) states that, as the leading manufacturer of clean burning catalytic wood heaters, they are certain that the 1.3 g/hr statement is false.
- Page 122 of the proposal preamble: The EPA states that British Columbia has enacted regulations limiting the sale of wood-burning appliances to those that comply with B415.1-10. The commenter (1665) reports that no such regulations have been enacted, only proposed.
- Page 354 of the proposal preamble: The EPA states "[a]n uncontrollable burn or a glowing red stove part or chimney connector indicates excessive draft." The commenter (1665) reports that this statement is false. The commenter (1665) explains that catalytic combustors can and do glow bright red and orange as a sign of activity. The commenter (1665) recommends the following clarifying sentence: "From time to time, owners of catalytic wood stoves may observe a bright red or orange glow emanating from their catalytic combustor element. This is normal and while glowing is not necessary for a combustor to be working to reduce emissions, a bright glowing combustor does not mean there is an over drafting situation."

Response:

We disagree with the commenter's statement regarding the number of adjustable burn rate heater models meeting a level of 1.3 g/hr as of December 2013. Note that the EPA's "List of EPA Certified Wood Stoves, December 2013" is available in the docket at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0734-0326.

With regard to British Columbia's regulations regarding compliance with B415.1, the EPA notes that, as we correctly stated in the preamble, British Columbia's (BC) Solid Fuel Burning Domestic Appliance Regulation (SFBDAR), Section 4.1, requires new wood stoves sold in B.C. to be certified to meet emission standards set by the USEPA, *or* certified to meet equivalent standards set by the Canadian Standards Association (CSA), which means meeting the requirements of B415.1, as updated from time to time. Nonetheless, we have dropped the reference in the final rule.

We agree that catalytic combustors may glow red without indicating an over drafting situation. We were referring not to the catalytic combustor, but rather to stove parts and chimney connectors. Nonetheless, we have removed this sample text to avoid confusion. In the final rule, the text in question states "An uncontrollable burn or excessive temperature indicates excessive draft."

7.3.2 Comment: Revocation – § 60.533(l)(1)

Commenter (1171) states there appear to be two item (l)(1)(iii) denoted in this subsection.

Response:

We have corrected the error in the final rule.

7.3.3 Comment: Quality assurance program cross reference errors – § 60.533(o)

Commenters (1543, 1550, 1643) note that the EPA has proposed to delete the quality assurance provisions that currently appear in § 60.533(o) and replace them with revised quality assurance plan requirements set forth in § 60.533(m) of the proposed rule. However, the commenters (1543, 1550, 1643) note several references to § 60.533(o) remain in the proposed rule, see, e.g., § 60.536(a)(5)(ii),(iii); § 60.537(a)(4).

Response:

We inadvertently retained references to § 60.533(o) after the rule superceded the referenced provisions. For the final rule, the EPA has revised the above-noted section of the rule text to eliminate active references to § 60.533(o), except in reference to the 1988 rule.

7.3.4 Comment: ASTM E2515

Two commenters (1486, 1546) note that the proposed rule incorrectly identifies ASTM E2515-10 as the latest revision of the standard; this should be changed to the 2011 version.

Response:

We incorrectly referenced the 2010 ASTM version rather than referencing the 2011 ASTM version. For the final rule, the EPA identifies this test method as ASTM E2515-11.

7.3.5 Comment: Step 1 emission limits for forced-air furnaces

Commenter (1549) notes that in Table 5 of the preamble, the proposed approach emission limits for forced-air furnaces for Step 1 is listed as 0.93 lb/mmBtu and Step 2 as 0.06 lb/mmBtu; Table 6 of the preamble for the alternate approach for forced-air furnaces lists Step 1 at 0.93 lb/mmBtu, Step 2 at 0.15 lb/mmBtu, and Step 3 at 0.06 lb/mmBtu. According to the commenter (1549), when referencing the rule, section 60.5474 (b)(3) states "2015 forced-air furnaces particulate matter emission limit: 0.93 lb/mmBtu (0.40 g/MJ) heat output and 7.5 g/hr (0.017 lb/hr) as determined by the test methods and procedures in § 60.5476." The commenter (1549) believes that the regulation language of § 60.5474(b)(3) is contradictory and contrary to the information in the preamble. The commenter (1549) requests that the EPA strike the 7.5 g/hr requirement from the rule, as the commenter believes it must be a typographical error, since both reporting numbers cannot be correlated. The commenter (1549) also reports that this is not consistent with the reporting limit as stated in CSA B415.1-10.

Response:

We deleted the proposed 7.5 g/hr particulate emission limit per individual burn rate because the CSA B415.1-10 certifications are based on lbs/mmBtu heat output limits at the higher burn rates, not g/hr limits and most of these manufacturers do not have sufficient experience with meeting g/hr limits for these furnaces at the higher burn rates. Under the final rule, work practice and operational standards will apply to each forced-air furnace manufactured or sold at retail after the effective date of the final rule. For small (less than 65,000 BTU/hr heat output) forced-air furnaces manufactured or sold on or after 1 year after the effective date of the final rule (2016), the Step 1 PM emission limit (0.93 lb/mmBtu heat output (weighted average)) will apply. For large (65,000 BTU/hr heat output or larger) forced-air furnaces manufactured or sold on or after 2 years after the effective date of the final rule (2017), the Step 1 PM emission limit (0.93 lb/mmBtu heat output (weighted average)) will apply. For both small and large forced-air furnaces, the Step 2 PM emission limit (0.15 lb/mmBtu heat output for each individual burn rate) will apply to each forced-air furnace manufactured or sold at retail on or after 5 years after the effective date of the final rule (2020).

7.4 Suggested Changes for Next Revision of the NSPS

We appreciate the comments received concerning future revisions to the NSPS and will consider the suggestions in future rulemakings. Because these comments are not pertinent to this final rule, we have placed these comments in the RTC for informational purposes (without specific response) and to inform future rulemakings.

7.4.1 Comment: Wood heater technology independent of operator

Commenters (1365, 1423, 1558, 1587) note that operators are essential to the emission performance of room heaters. Commenters (1365, 1587) support improvements to the EPA

certification process but believe the real world performance of wood heaters under the proposed rule will still be far too dependent on the operator's diligence, skill level, and fuel choice.

Commenters (1365, 1558, 1587, 1591) ask the EPA to ensure that future revisions of this rule require wood heater designs and certification methodology that ensure that wood heaters operate at certification values independent of the user's skill or diligence. Commenters (1365, 1558, 1587, 1591) state that, currently, the technology used in pellet stoves comes closest to this ideal, as the combustion air-to-fuel ratio and the fuel type cannot be changed by the operator; and the commenters would like to see all wood heaters move to a design that would prevent their emissions from varying depending on the operator and fuel choice. Commenter (1423) urges EPA to examine ways in which emission increases from these practices can be mitigated in the NSPS, including modifications to the certification test method, to more accurately characterize performance of appliances as used in the home.

7.4.2 Comment: Regulation of uncertified wood heaters

Due to the continuing problem states face in addressing emissions from these sources, commenter (1477) believes the EPA should evaluate in its next mandatory review under the statute whether it is appropriate to use its authority under section 111(d) to issue emission guidelines in conjunction with any promulgation of emission standards for other pollutants, such as PAHs. The commenter (1477) asserts section 111(d) directs the EPA to allow states to consider the remaining useful life of sources in developing their standards of performance and builds in flexibility in terms of the methods and the timing for compliance. 42 U.S.C. § 7411(d).

Commenter (1503) states that in the next revision to the wood heater NSPS, the EPA should regulate uncertified, pre-1988 stoves as new stoves if they are installed in a new location to help hasten the removal of the oldest, most polluting stoves from airsheds.

7.4.3 Comment: Comprehensive environmental justice analysis

Commenter (1503) states that a full, comprehensive EJ analysis would better account for the importance of reducing PM and other emissions from wood heating devices as a key step in eliminating the disproportionate impact that wood heater emissions can have on low-income and minority communities. Therefore, the commenter (1503) urges the EPA to perform a more comprehensive EJ analysis in the next revision to the wood heater NSPS that looks at the full range of wood smoke impacts on tribal, low-income, and minority communities.

8.0 Response to Comments Regarding the July 1, 2014 Notice of Data Availability (NODA)

Chapter 8 contains responses to comments specific to the Notice of Data Availability (NODA) published in the Federal Register on July 1, 2014. The NODA announced that additional information on testing and certification had been added to the docket for the proposed rule. Specifically, we added: (1) additional details of certification testing (using crib wood) of wood stoves and pellet stoves certified by the EPA between January 1, 2010 and May 30, 2014; (2) details of cord wood testing by two manufacturers of their three EPA-certified catalytic/hybrid wood stoves; and (3) details of cord wood testing by Brookhaven National Laboratory (BNL), under contract to the EPA, of a certified noncatalytic wood stove. No new data was received from the commenters who generally responded that the NODA did not persuade them to change their previous positions and comments, summarized in Sections 2 through 7 of this document.

8.1 Certification Test Results of Wood Stoves and Pellet Stoves Certified by EPA between January 1, 2010 and May 30, 2014

8.1.1 Comment: Testing and data reporting concerns

Commenter (1709) states that the EPA excluded or redacted some information that might have been helpful in an evaluation of the new data (e.g., firebox volume) and in some cases, the data fails to clarify what test method was used and the name of the testing laboratory was not always provided. Commenter (1709) adds that in one case, the data do not identify whether the model type was a catalytic or noncatalytic model. Commenter (1698) states some of the reports are incomplete and many do not include an explanation for the test runs that were excluded from the weighted average emissions determinations. Commenter (1698) is unclear how some of the redacted information, e.g. laboratory names, could be classified as CBI. Commenter (1698) adds that the length of time required to secure these records and the incompleteness described suggests that OECA has underestimated the time and resources needed for adequate oversight. Commenter (1698) states careful and timely review of test of reports is a necessary incentive for both testing laboratories and manufacturers to carefully follow the procedures outlined by EPA rules.

Commenter (1698) asserts test reports appear to indicate that hybrid stoves are best able to handle the challenges of reduced emissions at low and high burn rates. According to commenter (1698), the reports indicate that past assumptions about the universally low emission rates of pellet stoves are incorrect, with emission levels of some pellet stoves exceeding the proposed NSPS standard in either low or high burn rate categories. Noncatalytic stoves, commenter (1698) notes, appear the least resilient technology, with the most questionable use of substituted test runs and unreliable emission ratings.

Commenters (1698, 1701) assert that significant issues were found in the NODA certification test data that indicate a deviation from Method 28 protocol, including the lack of Category 1 (low burn rate) tests, which the commenter (1698) describes as a “serious flaw”. Commenter

(1701) states that, based on the NODA data, 90 percent of noncatalytic stoves and 50 percent of catalytic stoves did not have a Category 1 test. Commenter (1698) also notes that the test data is flawed for noncatalytic wood stoves. Commenters (1698, 1701) assert that low burn rates are associated with higher emission rates (as evidence, commenter 1701 provides the following reference: Houck, J.E., L.Y. Pitzman, and P. Tiegs. Emission Factors for New Certified Residential Wood Heaters, presentation at 17th Annual International Emission Inventory Conference "Inventory Evolution - Portal to Improved Air Quality," Portland, OR (June 4, 2008). Available at: http://www.epa.gov/ttnchie1/conference/ei17/session4/houck.pdf). Likewise, commenter (1701) states that the lack of Category 1 data is a serious issue for public health protection. Commenter (1698) states that data derived from devices tested only in their least polluting burn zones yields emission rates that are artificially lowered.

Commenter (1701) notes that Method 28 requires that the testing laboratory attempt two Category 1 runs before two Category 2 runs are allowed in-lieu of the Category 1 test; however, the test summaries provide no data to indicate that two attempts at conducting a Category 1 test had been completed. Commenter (1701) states that tests were certified by OECA without any documentation in the test summaries to explain why deviations were allowed, and requests that the EPA provide information as to why so many tests were accepted without Category 1 results. Commenter (1701) expresses concern that even though the certification tests may be acceptable under the current test method procedures, units are allowed to be sold without testing at their highest emission rates (i.e., the low burn rate).

Commenters (1698, 1701) recommend that the EPA create regulatory mechanisms to ensure that units are tested at their lowest operational setting. Commenter (1698) states that Method 28 and Method 28 WHH need to be revised to capture both start-up emissions and emissions from the lowest burn rate at which a device may be commonly operated. Commenter (1701) suggests that EPA could revise the test procedure for Category 1 to require emissions to be measured during the period that a device can burn at its lowest setting rather than requiring the burning of a full fuel charge.

Commenter (1701) states that, based on a review of the certification test data, many multiple-run tests within a burn category were identified, including many tests with eight runs and one test with 16 runs. Commenter (1701) expresses concern that, based on the high number of units utilizing multiple runs, poor test results are routinely being averaged out. Commenter (1701) recommends that the EPA limit the total number of runs to six.

Commenter (1701) states that the missing Category 1 test data supports their position on the need to provide the states and the public with better access to emissions testing data and underscores the commenter's (1701) concern about the capacity of laboratories to conduct and certify test results appropriately. Commenter (1701) encourages EPA to enact clear safeguards and methods to ensure valid and complete certification testing. Commenter (1701) states that if the poor performance of testing laboratories continues, the EPA must take back complete oversight of the program. Commenter (1701) adds that EPA OECA needs to improve its capacity and practices surrounding review of this critical source category in light of the omissions allowed to occur in the EPA certification approvals process.

Commenter (1701) recommends that EPA OECA develop a common test reporting form that cannot be submitted as CBI to (1) ensure consistent and complete data reporting, (2) ensure that emissions data and key test parameters are available for public review, and (3) reduce the review burden on the EPA. Commenter (1701) recommends that EPA develop an Electronic Reporting Tool (ERT) to meet these objectives.

Commenter (1721) states that appliances have tamper-proof combustion air controls with fixed stops preventing controls from being turned down below a level required to obtain a burn rate under 1 kg/hr and that under EPA AD 109 it is not required to conduct additional test runs to demonstrate that a lower burn rate cannot be achieved. Commenter (1721) asserts that the presumption that the lowest burn rate produces the highest emissions is generally incorrect.

Commenter (1721) found only one instance of a product with 9 test runs on review of 1010 test results released by the EPA. Commenter asserts there were 21 with 1 extra run, 10 with 2 extra runs, 3 with 3 extra runs and 75 reports only included the minimum 4 runs. Commenter (1721) asserts that extra runs may be required due to many factors that can result in invalid tests such as excessive stove temperature change or failure to meet dual sample train precision requirements. Commenter (1721) states that because the burn rate/category are not known until a test is completed, it is fairly common to set controls in an effort to reach a specific category but have the actual burn rate be too high/low, resulting in more than one run in a category. Commenter (1721) asserts that burn rate control of cord wood burning appliances is not simply a matter of where an air control is set; it is variable as are the emission rates produced. Finally, commenter (1721) asserts that additional test runs tend to improve the statistical precision of the resulting average.

Commenter (1721) believes that the EPA's data release appears to have fully met NESCAUM's FOIA request and found only one instance where the data did not appear to support the emission rate weighted average and that appeared to be a typo. Commenter (1721) states there is no indication that labs provided insufficient or incorrect reports or that the EPA did not conduct a complete and proper review.

Commenter (1721) states they are not opposed to making emissions data readily available to the public through on-line listings, provided appropriate steps are taken to protect the data that are entitled to be protected as CBI.

Commenter (1721) disagrees that the data provided in any way indicates that the EPA accredited independent laboratories lack capacity to independently conduct and certify results. In fact, the only information contained in the NODA that indicates poor reporting and test performance issues is the BNL report and the incomplete cordwood data supplied by two manufacturers. Commenter (1721) disagrees that the data indicates an issue with EPA OECA being ineffective in reviewing and certifying results. Commenter (1721) believes there is no evidence whatsoever in the certification test data that the laboratories conducted the tests improperly or that EPA OECA improperly issued certifications based on these results. Commenter (1721) asserts

NESCAUM's statements regarding laboratory performance are defamatory and insulting and have no basis in fact.

Commenter (1721) asserts the only real expertise in this complicated and demanding testing process resides in the EPA accredited labs and some manufacturer's in house R&D labs. Commenter (1721) states most emissions certification test programs end in failure and that the fact that only 101 new models were certified over the 4+ year period (< 25 models/year) through testing by 6 laboratories should be indication enough that the laboratories are diligent in assuring that only products that fully comply are submitted to EPA for certification. Commenter (1721) adds that EPA's rejection rate for certification reports submitted is virtually zero. Commenter (1721) adds that in most cases issues raised in EPA reviews are simply resolved by pointing EPA to the location of the information they need in the reports submitted. Occasionally errors are found that do require reports to be revised, according to commenter (1721), but these are almost always simple matters of transcription errors, forms left out of reports or other minor issues.

Response:

We understand the commenter's disappointment regarding redacted or other information excluded from the test reports. The EPA recognizes that some of the information redacted should not have been, because it was not CBI, and that the overuse of CBI claims has potentially serious consequences regarding protection of the environment and public health. Therefore, we have addressed the overuse of CBI claims in the final rule. The final rule explicitly states – in § 60.533(b)(4) and § 60.5475(b)(4) – that all emissions data, including all information necessary to determine rates in the format of the standard, cannot be claimed as CBI. The final rule furthermore requires – in § 60.537(f) and § 60.5479(f) – that if CBI is claimed (e.g., design drawings), industry must submit both CBI and non-CBI versions to the EPA and the non-CBI version must be submitted electronically. Finally, § 60.537(g) and § 60.5479(g) require that within 30 days of receiving a certification of compliance for a model line, the manufacturer must make the full non-CBI test report and the summary of the test report available on the manufacturer's website.

We understand that commenters (e.g., 1698) assert that (1) the data show that hybrid stoves are the best technology capable of meeting Step 2, better than noncatalytic stoves; and (2) the extensive lack of Category 1 burn rate data in the certification tests indicates a "serious flaw", underscoring the need for test methods more representative of in-home use that include start-up and the lowest burn rate at which a device may be commonly operated. We agree with that it appears that hybrid stoves may be the best technology capable of meeting Step 2, better than noncatalytic stoves; however, we are concerned about setting required emission levels that may have potential impacts on a large number of small businesses that may not yet have much experience with that technology, and we do not want to prematurely restrict their choices. As discussed in the preamble and in numerous other sections of this document, we agree that test methods are needed that better reflect in-home use and include start-up and the lowest burn rate at which a device may be commonly operated. The final rule requires that, during certification testing, the burn rate for the low burn rate category must be no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or

retailer. Although we have determined that it is premature to require a cord wood-based Step 2 emission limit at this time (for any appliances except forced-air furnaces), the final rule includes the alternative cord wood-based compliance option to encourage manufacturers to certify with cord wood as soon as possible to provide consumers with better information regarding in-home use. (Note that forced-air furnace certification tests are conducted according to CSA B415.1-10 which has specified cord wood as the test fuel since 2010.)

One commenter noted that testing was certified without data in the test summary report to indicate that Category 1 tests were run prior to running Category 2 test runs, as required by Method 28. We note that the final rule requires that the new test documentation be included in the summary and not just in the detailed report. The final rule requires manufacturers to submit all documentation pertaining to a valid certification test, including the complete test report and, for all test runs: raw data sheets, laboratory technician notes, calculations and test results. Documentation must include the items specified in the applicable test methods. Documentation must also include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why. The complete test report included in the application must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs.

Regarding one commenter's concern that units be tested at their lowest operational setting, we have revised the regulation to clarify that our intent is for a unit to be tested at the lowest operating setting, as was always our intent. With regard to the burn rate itself, we have revised the final rule to now require using the weighted average of the four burn rates to best express what the data show. We appreciate one commenter's concern that allowing a high number of test runs could average out poor results, we will be examining this issue as we fine tune the new cord wood test method. We also appreciate the commenter's concerns regarding assurance that testing labs are performing valid and complete testing and EPA OECA will continue to provide oversight to ensure the certification process.

Regarding a common test reporting form, EPA intends to develop an electronic format for submission of test reports, separate from the Compliance Emissions Data Reporting Interface (CEDRI). In the proposed rule, we were optimistic that reports would be able to be submitted to CEDRI, however, CEDRI will not be able to accommodate these reports at this time. Again, we hope to make an electronic reporting tool (ERT) available in the future.

8.1.2 Comment: Data do not support proposed Step 2 BSER finding

Commenter (1709) extracted the new data on noncatalytic and catalytic wood stoves (pellet stoves were excluded) emission and burn rate data from the test report pages and added it as supplemental information to the 2010 Hearth, Patio and Barbecue Association (HPBA) database. Commenter's (1709) analysis looked at the results of using the Category 1 and Category 4 burn rates compared to various levels of the proposed standards (figures 1 – 5). Commenter (1709) adds that figure 7 presents the emission profiles for models in the new EPA data sets that have

weighted average EPA certification values ≤ 1.3 g/h and all but one of these seven models has individual emission values that exceed 1.3 g/h. Commenter (1709) states that the foregoing analyses and charts confirm that the EPA's new data sets do not change the conclusions previously drawn from the HPBA Enhanced Certified Stove Database because very few models meet the lower emission limits that are currently under consideration by the EPA, even if the current EPA Method 28 data weighting is employed.

Commenter (1709) adds that the new data provide further support for concerns about the new compliance algorithm based on a Monte Carlo analysis conducted by the commenter. According to commenter (1709), an examination of the that data show that many of the models that meet lower limits based on weighted averaging across the full operating range of the heater will exceed those limits for individual test runs. Commenter (1709) notes that the analysis shows that even Model 102 (with maximum burn rate emissions under 1.3 g/h) would still be at considerable risk of failure if two additional test runs were conducted at this worst case condition. Commenter (1709) adds that reducing the highest burn rate of a model, even if technologically feasible, could reduce its marketability.

Commenter (1709) also examined data from models with multiple runs at similar burn rates and found significant variation in the outcome of testing the same model at the same or similar burn rates (figure 6).

Commenter (1694) reviewed the newly provided certification data and notes that the data represent results from a single test series for each product and is subject to substantial variability. Commenter (1694) cautions that making any determinations regarding effects of proposed compliance schemes needs to include consideration of the precision issues involved in the test process.

After removing duplicate data, commenter (1694) summarizes the data and notes that of the 101 stoves for which data were provided, only one catalytic and three pellet stoves would comply with the EPA proposed Step 2 limits using a compliance requirement that category 1 and 4 runs meet the limit. Commenter (1694) concludes that the EPA's proposed Step 2 compliance criteria would eliminate 98 percent (all but one) of the most recently tested cordwood stoves and 85 percent of the pellet burning stoves. Commenter (1694) adds that these conclusions are consistent with the earlier HPBA database results and concludes that the proposed Step 2 limit and alternative compliance algorithm cannot be deemed BSER.

Commenter (1710) states that the NODA documents do not provide sufficient or compelling evidence to change their position opposing a Step 2 limit of 1.3 g/hr. Commenter (1710) asserts that the second data set shows that while some units demonstrate emissions results below the Step 2 proposal, primarily at a particular burn rate, the vast majority of units provide four burn rate performance curves that are not at all linear, identifiably correlating distribution patterns, do not correlate by product type and include values significantly outside the proposed Step 2 limit. Commenter (1710) adds that some units are not identified by type and results for #32, having a 1.1029 g/hr weighted average, are not product type identified.

Commenter (1702) adds that, in general, there should be no Step 2 or Step 3 limits because there is not enough data to demonstrate BSER.

Response:

As noted previously, we have revised the proposed Step 2 PM emissions limit for new residential room heaters, including catalytic and noncatalytic adjustable rate stoves, single burn rate stoves and pellet stoves, from 1.3 g/hr to 2.0 g/hr using cribs. Compliance for room heaters will be determined using the weighted average of burn rates rather than requiring compliance at each individual burn rate. For hydronic heaters and forced air furnaces, Step 1 PM emission limit compliance is based on the weighted average and Step 2 PM emission limit compliance is based on compliance at each burn rate. However, for central heaters we have changed the proposed Step 2 PM emissions limit of 0.06 lb/mmBtu heat output, to 0.10 lb/mmBtu heat output for each burn rate tested on cribs for hydronic heaters, and to 0.15 lb/mmBtu heat output for each burn rate tested on cord wood for forced-air furnaces. The emission limits reflect the data available.

Manufacturers (of all appliances but forced-air furnaces) may choose to test using either cribs or cord wood, but cord wood testing is not required for these appliances (as it was in the proposed rule). If the manufacturer chooses the alternative cord wood compliance option, the Step 2 emission limit based on cord wood is 2.5 g/hr for room heaters under subpart AAA and 0.15 lb/mmBtu for central heaters under subpart QQQQ. Although the cord wood limits are higher compared to the crib wood limits, the cord wood test method is more reflective of the fuel that is used in homes and the limited cord wood data available to the EPA indicate that this emission level is at least as stringent as the 2.0 g/hr and 0.10 lb/mmBtu emission limits, respectively. (Note that forced-air furnace certification tests are conducted according to CSA B415.1-10 which has specified cord wood as the test fuel since 2010.)

For Step 2 PM emission limits, we proposed to require certification compliance at the lowest burn rate (Category 1) and the maximum burn rate (Category 4) rather than the weighted average of the four burn rates, which was required in the 1988 rule. Many comments on the proposal and the data in the NODA strongly supported the proposed compliance determinations per individual burn rates. Many other comments strongly opposed the proposal. Considering all of the comments and focusing on the available test data, especially the EPA wood stove certification test data by burn rate that we included in the NODA, we are requiring certification calculations based on the weighted average of the four burn rates for subpart AAA. This better matches the calculation procedures that the small business manufacturers have been accustomed to for the last 26 years and helps ease the transition to the new emission limits. For subpart QQQQ, the final rule uses the weighted average with a cap (for hydronic heaters) for each test run for Step 1, but retains the proposed requirement for compliance at each burn rate for Step 2 (for both hydronic heaters and forced-air furnaces), given concerns about the sometimes very large emissions at individual burn rates.

8.2 Cord Wood Testing by Two Manufacturers of Their EPA-certified Catalytic Wood Stoves

8.2.1 Comment: Sufficiency of catalytic data to support a cord wood standard and test result variability

Commenters (1691, 1692, 1705) state that the additional data provided in the NODA confirms that cord wood testing is more representative of emissions from actual consumer use (field conditions), is more accurate for measuring emissions and is achievable by manufacturers.

On the other hand, commenter (1694) states that insufficient information is provided in the submitted test results (i.e., very little specific information on how the tests were performed, lack of crib test results from "manufacturer 2") to draw valid conclusions. The fact that some catalytic units can perform well when operated with cordwood is not new information, according to the commenter (1694).

Commenter (1694) describes the impact on test results from a "hot-start" compared to a "cold-start" and states that it is unclear whether the Woodstock Soapstone Company (WSSC) data allowed for keeping the bypass open until flue temperatures reached 500ºF or if it was closed within 5 minutes after loading as required by the current EPA or ASTM test methods. According to commenter (1694), "reestablishing a strong fire" can easily take 10 to 20 minutes resulting in perhaps 20 to 35 minutes of high emissions operation. Commenter (1694) states that if the stove produces 20 - 30 grams of particulate during this period (typical of emissions rates of uncontrolled wood stoves), this could add 2.5 to 3.75 g/hr to an 8-hour burn test. Commenter (1694) concludes that poor start-up operation can defeat emission control technology and more could be gained through educating consumers how to operate stoves – to ensure that start-up and refueling allows the built-in emissions reduction technology (catalytic or otherwise) to work – than can be achieved by ever more restrictive emission limits. Commenter (1694) describes additional concerns related to stove maintenance and long term performance.

Commenter (1703) notes that transitioning from a standardized Douglas fir crib to an inherently more variable cord wood fuel load introduces a greater level of uncertainty to wood heater emissions testing. The commenter (1703) furthermore asserts that there is far too little side-by-side, crib fuel versus cord wood testing data upon which to base a realistic standard for cord wood performance, specifically one as stringent as the proposed Step 2 (and 3) limit. Commenter (1703) states that the majority of the data presented by the EPA in support of a switch to a cord wood fuel load is from emissions tests performed on different dates, at different locations, and under different circumstances. Commenter (1703) concludes that to propose to set a standard of 1.3 g/hr using cord wood is nothing more than taking a huge leap of faith.

Commenter (1710) states that the data provided fails to demonstrate that the Woodstock unit will meet the Step 2 1.3 g/hr limit with cribs or cord wood because the 1.3 g/hr result is reliant on the current weighting algorithm to achieve that value. Commenter (1710) notes that run 6 at 2.38 g/hr is nearly twice the 1.3 g/hr limit and run 7 at 1.36 g/hr also exceeds the limit.

Commenter (1710) adds that a comparison of the crib to cord wood burn rate data suggests that the maximum burn rate data for cord wood is incomplete or absent due to the wide separation of burn rates of 4.02 kg/hr for cribs compared to a nearly 40 percent lower cord wood burn rate of 2.56 kg/hr and a separation of this span would not be anticipated. Also, commenter (1710) states that no evidence is provided that the cord wood data was produced by a qualified laboratory. Finally, commenter (1710) adds, the Woodstock unit does not employ or offer a heated air circulating fan as an option, which is a desirable consumer feature. Commenter (1710) states that it is presumed by the EPA that a fan will increase emissions and it would be important to consider the impact of a fan in setting an emissions limit.

Commenter (1710) states that the data provided are partial and/or incomplete and there is no evidence that the tests were conducted by a qualified laboratory. Commenter (1709) also cites deficiencies in the information contained in the test reports, particularly EPA's failure to clarify which test methods the two manufacturers used to generate the emissions test data. Commenter (1709) concludes that the data on the three catalytic woodstoves are not an appropriate predicate for standard-setting because they do not reflect testing with the likely compliance method—a method which incorporates the design principle of better reflecting homeowner use patterns, and therefore "real world" emissions. Beyond that, commenter (1709) notes, there are problems with the completeness of the data sets and their representativeness in light of the fact that they reflect minimal testing of a very small number of models.

Woodstock Soapstone Company Response to Comments Above

Commenter (Woodstock Soapstone (1711)) states that it has been almost a year since the ANSI Working Group requested data from a "wide group of representative stove models" and neither HPBA nor the Working Group has produced such data. The commenter (1711) states that not providing data and then attacking data provided in the NODA conflicts with the alleged goals of the ANSI Working Group. In response to requests for more information about the source of the data, commenter (1711) reports that:

(1) An EPA-certified lab performed the cordwood tests at the same time that certification tests were performed (in October and early November 2013);

(2) the lab used was Polytests Services, 411 St Jacques, Napierville, Quebec and the test method used was 5G3;

(3) they used the most recent ASTM cordwood protocol that was available at the time (the ASTM Working Group draft dated September 24, 2013);

(4) the fuel used was air-dried red oak; and.

(5) the lab adhered to all of the fuel parameters, and start-up, pre-burn, loading, and test protocols specified in the September 24, 2013 draft (including but not limited to fuel moisture, loading density, coal-bed weight, allowable temperature differential and result calculations).

Commenter (1711) states that all three commenters (Jotul USA (1710), HPBA (1709), and Intertek (1694)) question the source and veracity of their data, with Jotul USA (1710) claiming that "no evidence was provided that the cord wood data was produced by a qualified laboratory". The commenter (1711) provides the following rebuttal to commenters' (1710, 1709, 1694) claims:

Woodstock Soapstone's (1711) rebuttal to Jotul USA (1710)

- Jotul USA (1710) claims that a comparison of Model 210 data "would suggest" that maximum burn rate data is "incomplete or absent" due to the fact that the high burn rate is significantly lower (2.56 kg/hr vs 4.02 kg/hr) using cord wood than crib wood. Commenter (1711) states that Jotul USA's comment is baseless and untrue. According to the commenter (1711), it is unclear whether Jotul has any experience testing with cord wood (this commenter testified to EPA in February 2014 that Jotul USA had done no cord wood testing before that date). In any case, the commenter (1711) states for the record that cord wood testing normally produces a longer burn than crib wood testing, because the wood is more densely loaded and not separated by wooden cleats. Thus, according to the commenter (1711), the burn rate is lower, whether it is expressed in kg/hr or Btu/hr.

- The commenter (1711) reports that the high burn rate was achieved with the damper wide open under the conditions prescribed by the 9/24/13 ASTM Working Group Draft. According to the commenter (1711), even if the damper was not all the way open (which it was), 2.56 is a Category 4 burn rate and the emissions using Method 5G3 were 0.50 g/hr. The commenter (1711) states that emissions would have to more than double before they would butt up against the proposed Step 2 limit of 1.3 g/hr.

- According to the commenter (1711), Jotul USA (1710) incorrectly claims that runs 6 and 7 exceed the proposed phase 2 limit. Commenter (1711) states that this is incorrect because the results that were reported in the test report are "adjusted results" and the EPA proposes to do away with the "adjustment factor" in the new NSPS. The 5G3 results for these two runs were 1.32 g/hr for run 6, and 0.73 g/hr for run 7.

- Finally, according to the commenter (1711), Jotul USA (1710) incorrectly claims that the Model 210 data "fail to demonstrate: that this stove "will meet the Step 2 1.3 g/hr limit with cribs or cordwood." The commenter (1711) reports that they have submitted 12 test results from a certified lab, 11 of which are not just under 1.3 g/hr, but are under 1 g/hr. The commenter (1711) reports that the average emissions for these 12 runs were 0.64 g/hr, or 0.39 g/kg depending on whether you choose to divide emissions by time or dry fuel weight. The only test that was above 1.3 g/hr using method 5G3 was a high burn using crib wood that registered 0.02 g/hr above the limit under Method 5G3: an amount that could easily be eliminated by averaging 3 runs (allowable under the proposed EPA protocol) or slightly modifying the air distribution.

Woodstock Soapstone's (1711) rebuttal to Intertek (1694) and HPBA (1709)

- According to the commenter (1711), Intertek (1694) complains about the lack of test agency information (responded to above), miscalculates weighted average emissions for both ASTM and EPA M28 methods, quotes a Woodstock Soapstone Manual for an entirely different stove than Model 210, and laments the lack of "cold start data" which is not currently required for any published test protocol, and has never been produced.

- Commenter (1694) states that "[t]he data provided represents results from a single test series for each product and is subject to substantial variability discussed in our previous comments (EPA-HQ-OAR-2009-734-1429). We would, therefore, caution that making any determination regarding effects of proposed compliance schemes needs to include consideration of the precision issues involved in the test process." According to commenter (1711), this comment, along with additional comments by Intertek and HPBA, repeatedly refer to a document entitled the *EPA Wood Heater Variability Study: An Analysis of Uncertainty, Repeatability and Reproducibility based on the EPA Accredited Laboratory Proficiency Test Database*, dated October 6, 2010 (the Variability Study). According to the commenters (1694, 1709), this study allegedly analyses test lab proficiency data "according to standardized and recognized statistical procedures and provides a clear indication that the variability in wood burning appliance testing is real and substantial." (EPA-HQ-OAR-2009-0734-1429) and that our results can only be interpreted within the framework provided by their Variability Study.

- According to commenter (1711), the Variability Study is selective, statistically-flawed and relies on a data series that is too old, too small and too compromised to be relevant. The commenter (1711) then critiques the Variability Study analysis assumptions and conclusions. The commenter (1711) states that the most charitable thing he can say about the proficiency test database is that about half the data is more than 25 years old (including all of the catalytic stove data), and that it includes some very small data samples. The commenter (1711) then states that the worst thing he can say about the database is that it evidences misconduct on the part of test labs, and that some stoves were certified that should not have been (3 of the 5 stoves in the proficiency database have mean proficiency values well above the limit for certification).

- In response to comments received regarding test results and repeatability / reproducibility, commenter (1711) reports that, in November 2012, Woodstock Soapstone performed QA tests under § 60.533(o)(3)(i). The commenter (1711) reports that though only required to conduct one test per model, they conducted a full battery of four emissions tests on two models (8 individual test runs total) (results are reproduced in the comment letter, page 6). The commenter (1711) notes that, based on the provided data and their experience, unlike the proficiency test database, the results are usually clustered around the original certification results. Furthermore, the commenter (1711) states that quality assurance (QA) and audit testing may provide a more realistic opportunity to look at whether test variability truly exists, and if so, to what extent.

<u>Intertek (1722) response to above Woodstock Soapstone (1711) critique</u>

Commenter (Intertek (1722)) stands by the results of the Variability Study as completely internally transparent; the raw data are reported in tables and graphs, the analytical framework was scrupulously identified, discussed and cited. Commenter (1722) asserts they followed the

ASTM procedure for precision studies, modified slightly (with full disclosure) to accommodate the limitations of the data being evaluated.

Commenter (1722) states the lack of cordwood emissions data that resulted from an ASTM E06.54 subcommittee request for manufacturers to conduct testing using the September 2013 draft cordwood fueling procedure is mischaracterized because the request was for people to exercise the proposed fuel loading operational protocol to provide data that would inform us of problems with it (e.g. fuel piece size, number, weight, etc.) that needed correction. Emissions performance was irrelevant and, according to commenter (1722), there was no reason to include emissions sampling at all. Because the method was (and is) still a work in progress, emissions sampling would have been largely irrelevant, according to commenter (1722), as it would not have reflected emissions performance with the ultimate method or with product designs developed using it, which is all that is relevant for BSER determinations.

Regarding criticism of the age of the data, commenter (1722) asserts that, because the test method has not been changed since its promulgation, the age of the data is irrelevant in a precision analysis. Commenter (1722) notes that many of the certified appliances currently on the market are also old designs. Commenter (1722) states the EPA PTP data is no less valid due to its age than the 1991 and 1995 data Mr. Morrissey (from Woodstock Soapstone) provides in his paper.

Commenter (1722) claims that the EPA certified emissions rates for the appliance models selected by EPA for the proficiency program have no relevance to the precision analysis because the appliances were physically modified by EPA so they were not identical to the certified versions. Commenter (1722) asserts that given that the original certified designs were most likely designed to obtain the best emissions performance possible it seems unlikely that any modification made would not have an adverse effect on the performance. Second, commenter (1722) states the labs were not provided with detailed operating instructions – particularly for the test run start-up which is common in certification tests and, thus, the labs would have followed whatever their default procedures were for the proficiency tests. Undoubtedly these procedures would not have produced the best possible results, according to commenter (1722).

The reproducibility (between lab) results were somewhat higher than the repeatability (within lab) which is the expected result due to differences in lab location, environment, equipment, operators and procedures, according to commenter (1722). The fact that the reproducibility is not much greater than the repeatability is an indicator that these differences were not likely very substantial, states commenter (1722). Statistical tests applied to the data in our analysis did not indicate that any specific labs produced data that was inconsistent with the other participants, according to commenter (1722).

Regarding use of the “T-test”, commenter (1722) states the EPA certified rate represents only a single datum and provides no insight into the distribution (i.e. mean and standard deviation) of potential results. Commenter (1722) states it is incorrect to assume that the EPA certified emissions rate represents the mean of multiple measurements, as they do not, but the means of the proficiency tests do.

Commenter (1722) states that the argument that the commenter's analysis is incomplete, because it did not include manufacturers QA or EPA RCA data, is incorrect as QA tests have been required by EPA to demonstrate that certified models still comply with requirements according to the schedule in 40 CFR Subpart AAA, 60.533(o)(3)(i). Regarding Woodstock's argument that their QA data proves the test process is reproducible – although they provide only data for two of their models and only one QA test program for each (apparently after 17 and 21 years after initial certification) – commenter (1722) states that whatever QA test data that may exist has not been made available for analysis and might well not be of much significance. Commenter (1722) notes that one might suspect that when a required QA test failed, some manufacturers simply discontinued the model line, obviating the need to take corrective action. In any case, commenter (1722) states the requirement for the QA tests was that they show compliance with the applicable EPA limit, not that they match the certified emissions rate.

Commenter (1722) asserts that Woodstock Soapstone makes accusations in its comment of "lab misconduct" with no evidence whatsoever to back up this charge. Commenter (1722) states the accusation that laboratories would not try to reproduce results in the proficiency tests is absurd because these were, after all, EPA required "Proficiency Tests". As EPA had also been the laboratory accreditor, it would have been very foolish, according to commenter (1722), to not run these tests as carefully and accurately as possible. Commenter (1722) notes the laboratories certainly understood that if their results turned out to deviate substantially from the rest of the labs, their accreditation could be jeopardized and they could be instantly put out of business. The laboratories could not have known that EPA would not actually analyze the data or question the competence of labs that turned in "outliers", according to commenter (1722).

Commenter (1722) states the suggestion that laboratories produce low emissions results when their clients pay them and produced high emissions results when doing "free" proficiency tests is ridiculous; laboratories get paid by their clients whether or not the test passes. In fact, according to commenter (1722), the majority of test programs end in failure, some after the first or second run. In reality labs generate more revenue when tests fail due to additional re-testing than they do if tests pass one the first try. Also, commenter (1722) states that any test produces a bad result if they can find any deviation from the test method, thus, it is never in the laboratory's interest not to run every test in strict accordance with the test method.

Commenter (1722) notes the EPA NODA included 101 certification test reports issued by 6 laboratories over a period of over 4 years, an average of about 4-5 successful test programs per year per laboratory, which translates to revenue that would not support even one employee's salary and benefits much less overhead and a profit. Commenter (1722) states clearly there is a great deal of testing going on in the labs that does not produce a certifiable result.

The reality, according to commenter (1722), is that many test programs start out with an extensive series of R&D tests where the manufacturer may make many design tweaks and experiment with start-up procedures; sometimes several certification test series are started but quickly turn into R&D programs. During this process, according to commenter (1722), the lab staff inevitably gains expertise in the operation of the appliance and eventually either just the

right procedural steps (within the allowable limits of the method) are found or the random variability lines up to produce a passing result, which are the test results that EPA sees. Commenter (1722) notes that they have not argued that none of the existing certified stove designs are capable of producing consistently low emissions—there may well be some designs that would produce much better repeatability and reproducibility than those selected for the EPA proficiency program—the issue is that we do not know which designs these might be or just how repeatable and reproducible their results would be.

Response:

We agree that cord wood testing is more representative of emissions from actual consumer use which is why EPA is moving toward a cord wood standard in the future and including an alternative cord wood compliance option under the final rule for all appliances except forced-air furnaces which must certify using cord wood. (Note that forced-air furnace certification tests are conducted according to CSA B415.1-10 which has specified cord wood as the test fuel since 2010.) Cord wood testing is a better measure of how stoves actually perform in homes. As indicated by the NODA, we had test data for three catalytic or hybrid wood heaters/stoves that performed very well on cord wood at the time of proposal. However, we appreciate the commenters' concerns.

We have revised the final rule to now require emission testing, reporting and certification based on crib wood to demonstrate compliance with Step 1 and Step 2 PM emissions limits (for all appliances except forced-air furnaces). We proposed to require testing only with cord wood for compliance with Step 2 PM emissions limits based on the existence of viable draft cord wood test methods and the expectation at proposal that the ASTM "real world" test methods for cord wood would be complete soon after the NSPS proposal and that significant testing of wood heaters re-tuned to perform well on cord wood would occur before promulgation of this final rule. However, the ASTM cord wood test methods have not been completed and only limited testing using the draft methods has occurred. We are concerned that many manufacturers (over 90 percent small businesses) lack experience with designing their stoves to perform well with cord wood testing. We received numerous comments from noncatalytic stove manufacturers, labs and some states with concerns about when the cord wood test methods would be ready and how quickly noncatalytic stoves could be redesigned to perform well with cord wood certification testing that we proposed for Step 2, i.e., 5 years after the effective date.

Considering this, we determined that we have insufficient data to adequately support a regulatory requirement for cord wood testing at this time (except for forced-air furnaces), although we will allow an alternative compliance option for cord wood testing. We will consider alternative cord wood test method requests on a case-by-case basis until there is agreement among the stakeholders on improved test methods. We expect that agreement will occur within the next 1 or 2 years. For now, we are receptive to alternative test method requests that use the current ASTM draft methods. We expect that within the next few years we will receive enough cord wood test data for the EPA to establish revised certification requirements based on cord wood testing.

8.3 Cord Wood Testing by Brookhaven National Laboratory (BNL), under Contract to the EPA, of an EPA-certified Noncatalytic Wood Stove

8.3.1 Comment: Sufficiency of BNL test results to support a cord wood standard

Commenters (1691, 1692, 1705, 1713) state that the NODA data confirms the June 30, 2014, report on cord wood testing submitted to EPA by the BNL. Commenter (1705) asserts the data shows that wood stove manufacturers can meet the emission levels proposed in the new source performance standards (NSPS) using cord wood testing and urged the EPA to base certification on emissions using cord wood test methods.

Commenter (1701) questions the accuracy of the BNL test data. Commenter (1701) states that based on Tables 3, 4, and 5 of the BNL report, the cordwood tests have lower total mass filter measurements and similar test run times as the crib test, but higher final mass over time emission rates. Commenter (1701) adds that Category 3 test runs show large variations in stack temperatures without any explanation. Commenter (1701) adds that average percent CO levels were an order of magnitude lower in the BNL test without any explanation for the cause (the commenter (1701) provides a comparison of percent CO levels between the certification test and the BNL test in Table 1 of their comment letter). Commenter (1701) states that operational parameters of the device in the BNL laboratory differed significantly from the certified test laboratory at all burn rates. Commenter (1701) provides a comparison of average stove temperatures between the certification test and the BNL test in Table 2 of their comment letter. Commenter (1701) asserts that the EPA must assess if these differences are due to changes in fueling procedures, stove design, or test implementation procedures before drawing conclusions about the results. Commenter (1701) states that these issues make thorough analysis of the BNL results impossible given the lack of access to underlying data for both the certification crib test and BNL test. Commenter (1701) adds that the data submitted by manufacturers for catalytic and hybrid stoves suggest that their control technologies' emission levels are not susceptible to changes in fuel types and burn practices.

Commenter (1701) states that the BNL data, if accurate, suggests that cordwood emission levels may be greater with noncatalytic stoves, which may be a result of some device manufacturers' fine tuning their units to pass a crib test. Commenter (1701) questions whether the increase in emissions is due to moving to a new fuel or due to an inability of the design to adapt to different fueling patterns, and questions whether this information should be used to support moving to a less stringent standard with cordwood. Commenter (1701) asserts that the noncatalytic stove data highlight the issue of variability and recommends that the EPA create mechanisms and procedures to ensure that a technology can burn clean in the laboratory and in the field, regardless of fueling procedures. Commenter (1701) states that a more in-depth study is necessary to draw clear conclusions.

On the other hand, commenter (1721) agrees that the BNL report is insufficient to draw any clear conclusions but disagrees with the assumption that EPA certified appliance should be able to

operate cleanly under a variety of fueling conditions, including using cordwood. Commenter (1721) states that while there are many issues with the BNL report, it does provide useful qualitative information on just how different emissions performance can be under significantly different test procedures, including properties of the fuel used. Commenter (1721) states the report reinforces their concern that the NSPS certified emissions rates are very poor predictors of "real-world" performance.

Commenter (1721) states the filter catch mass and CO data from the original certification tests and the BNL tests reflect the difference between direct stack sampling per EPA Method 5H used in the certification test and dilution tunnel data reported for the BNL tests. Commenter (1721) also questions the procedure used by BNL and SUNY to establish the fuel moisture content and measure it. For example, commenter (1721) states it seems that the forced drying technique employed resulted in a much steeper moisture gradient within the fuel pieces than occurs with either normal cordwood seasoning or long term conditioning as utilized in the accredited labs, creating additional uncertainty regarding the usefulness of the results. Commenter (1721) notes that the stove temperature data reported by BNL indicated stove firebox back wall temperatures only slightly above ambient (81-92 °F), clearly indicating either a defect in the thermocouple used or application to the appliance. The fact that this measurement problem occurs in all the test runs reported and went uncorrected and uncommented upon shows a significant quality deficiency in the view of commenter (1721). Commenter (1721) states the moisture values reported in Tables 3, 4 and 5 are in a percent wet basis and in paragraph 2 under the heading Experimental on page 2 the fuel moisture content is specified as 19-25% on a dry basis, which translates into a 16-20% wet basis moisture range. Thus, according to commenter (1721), several of the fuel load moisture contents are "Out of Spec". Commenter (1721) asserts that if this data were submitted to the EPA, the test run would be rejected.

Likewise, commenter (1694) concludes that the BNL data demonstrate that good emissions performance under EPA's Method 28 Douglas fir crib procedure can have little or no practical value in predicting performance in the field, and making a transition to cord wood testing will clearly require time, research and money. Commenter (1694) states that the BNL report on cordwood operation is consistent with what one would expect from a stove optimized to burn EPA M28 Douglas fir cribs. When cord wood is used, there is no quick ignition resulting in good secondary combustion for an extended period, particularly at lower burn rates, according to commenter (1694). Commenter (1694) adds that because the cord and crib tests were done by different labs on different appliances with different sampling methods and, in the BNL tests, most likely without the benefit of detailed start-up procedures that manufacturers typically provide in certification tests, it is highly questionable to conclude that the emissions performance differences indicated are due to the fuel type used alone. However, commenter (1694) adds that Method 28 Douglas fir cribs are designed to ignite and produce high secondary combustion zone temperatures much more quickly that generally occurs with hardwood cordwood, which is consistent with the lesser performance of the BNL cord wood test compared to crib results.

Commenter (1710) states that the BNL results cannot be considered a representative sample of the industry as a whole and, without robust supporting data, it would be presumptuous of the EPA to "reasonably anticipate" that achieving equivalent or close to crib performance using cord

wood is only a matter of manufacturers making inexpensive fine tuning adjustments to their products to achieve such performance.

Commenter (1710) states that the cord wood fuel density (nominal 7 lb/cu. ft.) in the current Method 28 is not representative of typical residential practice. Commenter (1710) adds that the cord wood moisture content data indicates that the fuel was subject to some form of "speed drying" process due to the significant disparity of moisture reading between the outer and inner portions of the fuel pieces.

Commenter (1702) states that in-house testing experience with ASTM E2780 (cordwood annex) coincides well with what is reflected in the BNL report regarding the comparison between testing with cord wood versus cribs. The stove tested for the BNL report had cleaner PM emissions numbers than the stove that was mentioned above, yet it showed similar results by performing increasingly more poorly as the burn rates decreased. Commenter (1702) concludes that it is clear by the PM emissions numbers in the report that the wood did not ignite properly after the test start in the lower burn rates, and the stove smoked for much of the test duration. According to commenter (1702), the BNL report concluded that the stove performed up to 18 times worse with cordwood versus cribs even with no data being collected for the lowest burn rates required to pass the current EPA test protocol.

Commenter (1703) emphasizes the conclusion of the BNL report, which states that "These results indicate that there can be very significant differences between the emissions during certification testing between cord wood and the Method 28 crib wood."
Commenter (1709) cites several deficiencies in the BNL test program, including identifying which draft of the ASTM method that was used, failure to run side-by-side cord wood and crib wood tests, and inability to draw any conclusions about repeatability at other burn rate categories. Commenter (1709) concludes that the BNL data strongly support the HPBA position that certification scores do not correlate with or reflect "real world" performance and, therefore, support HBPA's prior concerns that the Step 2/3 limits are not BSER.

Response:

The EPA appreciates the commenters' concerns. We and BNL and many commenters agree that the BNL results show that certification test results using crib wood do not necessarily agree with new cord wood test results across the full range of testing scenarios, for stoves that are not re-tuned by the manufacturer for cord wood testing, and that more cord wood testing is needed. Thus, we have revised the final rule to now require emission testing, reporting and certification based on crib wood to demonstrate compliance with Step 1 and Step 2 PM emissions limits. We proposed to require testing only with cord wood for compliance with Step 2 PM emissions limits based on the existence of viable draft cord wood test methods and the expectation at proposal that the ASTM in-home test methods for cord wood would be complete soon after the NSPS proposal and that significant testing of wood heaters re-tuned to perform well on cord wood would occur before promulgation of this final rule. However, the ASTM cord wood test methods have not been completed and only limited testing using the draft methods has occurred. We received numerous comments from noncatalytic stove manufacturers, labs and some states with

concerns about when the cord wood test methods would be ready and how quickly noncatalytic stoves could be redesigned to perform well with cord wood certification testing that we proposed for Step 2, i.e., 5 years after the effective date. (We had test data for three catalytic or hybrid wood heaters/stoves that performed very well on cord wood at the time of proposal.) Considering this, we determined that we have insufficient data to adequately support a regulatory requirement for cord wood testing at this time (except for forced air-furnaces), though we will allow an alternative compliance option for cord wood testing.

We do encourage manufacturers to design and build wood heaters that perform best on cord wood that consumers use. We expect that many manufacturers will choose the alternative cord wood compliance testing option, giving consumers more opportunities to purchase stoves that are tuned for in-home use. We will consider alternative cord wood test method requests on a case-by-case basis until there is agreement among the stakeholders on improved test methods. We expect that agreement will occur within the next 1 or 2 years. For now, we are receptive to alternative test methods requests that use the current ASTM draft methods and other method requests for which the requesters submit data that show that the methods are adequately demonstrated, ideally using the EPA Method 301 validation process. Additionally, we expect that within the next few years we will receive enough cord wood test data for the EPA to establish revised certification requirements based on cord wood testing.

8.4 Need for different cord wood approach

8.4.1 Comment: Proposed method development process

Commenter (1694) states that the implementation of a major change in the emissions performance regulation process must follow four critical steps:

> (1) Clearly define a test procedure that all stakeholders can reach consensus on.
> (2) Provide time and incentives for industry to produce designs and data to determine what performance levels can reasonably be achieved under the defined test method.
> (3) Evaluate the results and conduct validation testing necessary to determine the precision (repeatability and reproducibility) of test results.
> (4) Set compliance limits based on the results of steps 1-3 using a defined and statistically rigorous procedure.

After ASTM's cordwood testing protocol is developed, commenter (1694) believes that the EPA should either offer financial assistance to support R&D/certification tests or, more likely, an alternative compliance criteria for manufacturers to obtain certification that would allow a significantly higher emissions limit for appliances tested with cordwood to increase the chances of a successful outcome. Commenter (1694) speculates that manufacturers will find market advantage in being able to provide consumers with certified performance data that more closely models actual consumer use and competitive pressure will drive them to strive toward clean and efficient designs. After a few years, commenter (1694) believes that there would be enough cordwood certified products to make a valid assessment of BSER and revise compliance limits.

Commenter (1694) concludes that if the EPA cannot promulgate a regulation that provides a workable path to eventual cordwood based emission performance testing and certification only two outcomes seem likely:

> (1) Testing and certification will continue to be based on lumber cribs – perhaps for another 25 years – and remain poor predictors of real world performance, or;
> (2) The industry will collapse under the weight of an unachievable and unrealistic regulatory requirement.

Commenter (1694) states that neither of these outcomes will result in the environmental improvement goals that the EPA expects the new NSPS to achieve.

Commenter (1702) agrees that development of a real world cord wood method combined with a voluntary program to establish a database in order to determine BSER would generate real world emission numbers and strong market incentive for manufacturers to participate. Commenter (1703) agrees that additional time is needed to finalize the required testing methodology, generate useful data to determine the correlation between crib wood and cord wood emissions using an agreed upon methodology and to use the gathered data to set a realistic cord wood standard.

Response:

We agree that a transition from a crib wood-based test method to a cord wood-based test method is needed. For this reason we are allowing – not requiring – certification via the alternative cord wood compliance test method (except for forced-air furnaces, which will certify to cord wood, consistent with the test method). The EPA is working closely with laboratories, industry, and state and local authorities to ensure that a proper test method development process is followed and tests conducted accordingly.

We agree with one commenter that there will be a market advantage "in being able to provide consumers with certified performance data that more closely models actual consumer use…" We do expect that many manufacturers will choose the alternative cord wood compliance testing option, which will give consumers more opportunities to purchase stoves that are tuned for in-home use. We will consider alternative cord wood test method requests on a case-by-case basis until there is agreement among the stakeholders on improved test methods. We expect that agreement will occur within the next 1 or 2 years. At this time, use of alternative test methods may be requested using current ASTM draft methods. Additionally, we expect that within the next few years we will receive enough cord wood test data for the EPA to establish revised certification requirements based on cord wood testing.

8.4.2 Comment: Cord wood stoves will require significant redesign

Commenter (1702) states that it is an inherent mistake to use emissions methods and ratings from the burning of crib wood to measure and evaluate the performance of stoves that burn cord wood. Commenter (1702) cites several factors that affect performance such as wood density,

exposed surface area and spacing that pose a disadvantage for EPA crib-certified stoves under cord wood burning conditions. Commenter (1702) cites an example of an EPA certified stove (3.69 g/hr) in home use that requires much more air to start and maintain secondary combustion than would be allowed under current test protocols. Commenter (1702) emphasizes that simple tweaks to current stove designs will not allow stoves to receive ample air supply to start and maintain good combustion while still meeting current burn rates and guidelines in ASTM E2780.

Commenter (1702) states that all of their models would require major modifications to meet any sensible cordwood method and limit such as full burn systems redesign, a restart on all R&D testing, emissions certification and safety certification. Commenter (1702) adds that the financial implications of the transition to stoves certified to a cordwood standard for their small business could be upwards of $10 million by the costs cited for woodstove development in the EPA proposed rule and when paired with the costs that will be required to bring their wood burning forced air furnaces and wood pellet stoves to compliance, this could have a dire impact on the company. Commenter (1702) adds that the time resources are prohibitive for making the transition by the proposed Step 2 compliance date of 5 years after promulgation of the rule.

Commenter (1703) cites significant experience with re-engineering wood heaters to comply with the Australian cord wood standard and notes that drastic modifications to the secondary air systems were necessary. Commenter (1703) states that it can take hundreds of test runs to tune the design and learn how to make the stove burn cleanly. For example, commenter (1703) states, it took approximately 8 months of design and R&D testing for a hybrid/catalytic design. Commenter (1703) states that noncatalytic tube stove designs would take even more time.

Commenter (1710) objects to the EPA's assertion that only minor adjustments to air system or other minor system adjustments would be need to improve emissions performance for cord wood and that such changes would be inexpensive and economically viable for manufacturers. Commenter (1710) states that cord wood performance adjustments could cost $60,000 per model or more and include re-engineering/redesign in-house labor, in-house testing labor, independent agency retesting and certification for both emissions and safety, creation of new foundry tools, and new product roll-outs. Commenter (1710) is particularly concerned about the cost of maintaining old foundry tools to support existing models and creating new foundry tools to support new, cord wood models. Commenter (1710) describes past experience taking a European Jotul model that performs exceptionally well to European methods and very poorly to EPA methods as representative of the process and cost to redesign and modify stoves to meet a cord wood standard. Commenter (1710) concludes that the lack of confirmed test method and industry data result in an inability to predict how long it might take manufacturers to redesign and confirm cord wood results with any degree of confidence.

Commenter (1709) also agrees that it is a gross over-simplification of what will be required to develop a new generation of wood stoves with low emissions profiles when tested with a cord wood method that reasonably reflects homeowner use patterns. Commenter (1709) describes the design challenges related to the interplay of firebox volume, airwash systems and loading system combined with the need to develop a cord wood-based skill set for a test method that is still evolving. Commenter (1709) cites experience from two larger manufacturers who independently

confirmed that their average stove development projects take 8 – 12 months, typically include 200 R&D tests before they are ready to go to a certification lab and will only require more effort when you add in the switch to cord wood testing.

Response:

We appreciate the commenters' concerns regarding the redesign of wood stoves to accommodate testing with cord wood. We do not agree that this will require major modifications. We have determined that with appropriate lead time manufacturers can redesign their model lines to accommodate the improved technology across multiple model lines and test, field evaluate, and certify new model lines. Many manufacturers have been working on their wood stove models to perform well during cord wood operation. We expect most manufacturers will adjust their air flows/ratios/directions to optimal conditions for burning cord wood and that many will use the alternative cord wood option we have provided in the final rule. As noted in earlier responses to comments, we have included the cost of redesign in manufacturing cost estimates. We also allowed ample time for R&D and testing prior to the Step 2 effective date.

8.5 Case for stringency in proposed standards

8.5.1 Comment: NODA strengthens case for proposed standards

Commenters (1700, 1704, 1711) state that the additional information EPA has provided in this NODA strengthens the case for the EPA's proposed standards. First, commenters (1700, 1704, 1711) assert the NODA includes new test results confirming that well-designed residential wood stoves are capable of meeting the EPA's proposed particulate matter standard of 1.3 g/hr, even when fueled with cord wood as provided in the EPA's proposed test method. Second, according to commenter (1704), the NODA also includes test data confirming the importance of adopting test methods that require the same types of fuel used in practice by most consumers. Commenter (1704) notes the June 30, 2014 BNL report included with the NODA showing that tests using crib wood can dramatically understate actual emissions from wood stoves. Commenter (1704) asserts the BNL test data reinforce their initial comments expressing strong support for the EPA's proposed requirement that all wood stoves, hydronic heaters, and forced-air furnaces eventually be tested using either cord wood or pellet fuel.

Commenter (1700) supports allowing stoves to be certified with either crib wood or cord wood during the first phase of the NSPS and to require certification with cord wood thereafter. Commenter (1700) adds that the EPA should continue to gather test data on cord wood emissions rates for the next 5 years and consider revisiting the emission limits in the NSPS if additional data suggest that the NSPS should be adjusted for noncatalytic stoves.

Commenters (1693, 1713) support the use of cord wood rather than kiln-dried crib wood for emissions testing of outdoor wood-burning furnaces. Commenter (1693) asserts that in rural areas people throw whatever wood and other burnable substances are available into their furnaces. Commenter (1693) states that testing with expensive kiln-dried wood is not realistic, especially since kiln-dried wood has much lower emissions than ordinary cord wood.

Response:

We agree that a cord wood-based test method will better represent in-home use and we are focused on finalizing that method. We maintain that the data from the NODA support EPA's final standards, which have been revised from our proposed standards. As discussed in the preamble and in numerous other responses to comments in this document, we have determined that it is premature to establish a required emission level for cord wood at this time (except for forced-air furnaces), although we have provided an alternative compliance option based on cord wood.

8.5.2 Comment: Testing at the lowest possible burn rate setting

Commenter (1700) states that the data released in the NODA provide a vital insight that few people know: 80 percent of noncatalytic stoves cannot be successfully tested at the Category 1 burn rate (0.8 kg/h or less). According to commenter (1700), under EPA Method 28, these stoves have been allowed to test at the higher Category 2 burn rate, as long as they can successfully complete a test at 1.0 kg/h or less in Category 2. Commenter (1700) believes that the possibility of avoiding testing a stove at the lowest burn rate—which is when emissions of PM and other toxics are often the highest—has apparently created a loophole that has incentivized some manufacturers to design their stoves so that they fail to hold a flame for a sufficient amount of time in Category 1, allowing them to be tested at the easier-to-meet 1.0 kg/h burn rate in Category 2. Commenter (1700) adds that if the EPA finalizes the proposal to certify stoves based on only the highest and lowest burn rates, this loophole becomes even more important and the EPA should clarify that all stoves certified under the new NSPS must be capable of being tested at their lowest burn rate and that stoves that cannot successfully complete a test burn at their lowest rate will no longer be eligible for certification. Commenter (1700) points out that this will still allow stoves to be tested at 1 kg/h but assumes that the consumer cannot operate the stove at a lower burn rate. Commenter (1700) does not oppose allowing stoves to use a minimum burn rate of up to 1.15 kg/h for cordwood testing, but again, they must be successfully tested at their lowest burn rate. Otherwise, commenter (1700) states, the proposal to raise the minimum to 1.15 kg/h could just enlarge the loophole of stoves testing at higher burn rates than consumers could operate them.

Commenter (1700) adds that many manufacturers are using the K list to make minor changes to their stoves to ensure 5 more years of sales life before retesting with one result being that manufacturers can avoid testing at their lowest burn rate until 2019 for many to all of their stoves.

Response:

We agree that testing at the lowest burn rate is essential for representing in-home use and moreover for protection of public health. The final rule requires that, during certification testing,

the burn rate for the low burn rate category must be no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer.

8.5.3 Comment: Testing at the highest burn rate setting

Commenter (1700) provides an analysis, dated April 1, 2014, of the HPBA data base of 147 certified stoves. According to the commenter (1700), this analysis shows that stoves in all categories usually burn dirtiest on their high-air setting, which under a weighted average in the existing NSPS, is largely discounted. However, commenter (1700) states, under the proposed NSPS the high burn rate becomes all important and may lead to manufacturers trying to reduce the high air settings to get their stoves to pass. Commenter (1700) is concerned that this could increase start-up emissions and make it harder to get stoves up to temperature quickly. Commenter (1700) offers suggestions of alternative weighting schemes and summarizes the impacts, based on the HPBA data, of removal of the 5G correction factor, which types of stoves burn the cleanest and dirtiest at various burn rates, correlation between firebox size and emissions and the implications of stoves that test just less than 4.5 g/hr (many) and just above 4.5 g/hr (few).

From a different perspective, commenter (1709) states that the data that the EPA has recently made available confirm that compliance under the proposed rule is increasingly a matter of random chance. Commenter (1709) adds that there is no basis for dramatically shifting how compliance with the NSPS is determined and, in particular, giving Category 4 emissions dramatically more weight, which will severely prejudice design choices driven by the current emphasis on Category 1 and 2 emissions performance. Commenter (1709) believes that the current emphasis on lower burn rates in the weighted average approach is grounded in the reasonable assumption that most homeowners will be operating woodstoves at those rates for the majority of the time. Commenter (1709) states that this policy choice was one of the bedrock principles underlying existing subpart AAA, and the EPA has offered no justification for departing from it.

Response:

We have reviewed the data and, as noted in our previous responses to comments, the final rule uses a weighted average approach for Step 1 and Step 2 standards under subpart AAA and for Step 1 PM emission limits under subpart QQQQ. See our previous responses for further detail on this decision and the rationale behind it. Moving forward, we will take into consideration the commenter's suggestions regarding alternative approaches.

8.5.4 Comment: Efficiency results reporting

Commenter (1700) states that many manufacturers are using the K list to make minor changes to their stoves to ensure 5 more years of sales life before retesting, with one result being that manufacturers can avoid releasing their efficiency data until 2019 for many to all of their stoves. Commenter (1700) urges the EPA to require that B415.1 efficiency numbers using HHV be submitted to the EPA within 6 months of promulgation.

Commenter (1700) states that the data released in the NODA confirm previous data sets, that the efficiency range of pellet stoves is far wider than wood stoves. According to commenter (1700), these certified pellet stoves ranged from 62 to 80 percent efficient with a standard deviation of 8.5, double the standard deviation of noncatalytics and four times the deviation of catalytic stoves. Because of this wide variation of efficiencies, commenter (1700) believes that it is in the public interest to require efficiencies be released as soon as practicable. Commenter (1700) states that manufacturers already have efficiency data for most or all of their stoves so there would not be any significant burden to them.

Response:

We are requiring efficiency testing and reporting to the EPA, as well as publication of efficiency values on the manufacturer's website (for all models) and on the temporary labels (hangtags) for new certification tests for heaters that meet the Step 2 PM emission limits early and for heaters that certify with cord wood. Each manufacturer must submit performance test data including results of efficiency testing. In addition to requiring the manufacturers to publish the efficiency values, the EPA will include the efficiency results for all models on our Burn Wise website. We will allow manufacturers to submit efficiency data from previous certification tests; however, we are not requiring retroactive reporting.

8.5.5 Comment: Masonry heater calculator proposal

Commenter (1723) submitted their MHA goals for developing a calculator for masonry heaters, including the following:

1. Prove that the open-source calculator does calculate standard Austrian design of a channeled heater.
2. Ensure all types of heaters are covered (contraflow and bell heaters).
3. Test heaters made with other refractory materials (firebricks, refractory concrete, soapstone) that have been calculated with Damiens calculator. Co-ordinate with Tulikivi regarding the testing of soapstone properties.
4. Test a heater with a large glass door by reducing glass area to see what the effect on emissions and performance is.
5. Allow the use of a prefabricated or partly prefabricated core (covered by standard 15250 in Europe).
6. Make the burn rate variable. This will allow the simulation of firing with large firewood pieces (EN 15544 sets firing duration to 77 minutes, whatever the fuel load, meaning that the larger the load, the smaller the pieces have to be, which is not how masonry heaters are typically operated in North America).
7. Base the dimensioning of the firebox on burn rate instead of on fuel load (EN 15544).

Regarding a testing proposal, commenter (1723) also noted that, for the best outcome regarding calculator testing, the MHA should build a specific heater. According to commenter (1723), this would allow easy changes for all versions requiring testing (rather than collecting bits of

information from different labs, different people and heaters). Commenter (1723) listed the benefits of this approach as follows: having the same firebox would eliminate unnecessary variability and would simplify the task; getting a small change to arrive at the needed variation would be easy in comparison to trying to build entire specific heater or trying to make changes in someone's existing test heater; it would be much cheaper for the association to invest in a single set of proper quality equipment, than trying to finance part or entire cost of several sets or trying to solicit donations; and the convenience of having everything set-up and ready for tests any time.

Response:

We acknowledge receipt of the MHA's comments. As noted previously, the EPA is not taking final action at this time on proposed subpart RRRR for new residential masonry heaters. The EPA has reviewed all comments related to subpart RRRR and includes the above summary for informational purposes. We appreciate these comments, which may be useful for a future rulemaking, but offers no specific response at this time.

Appendix A: Complete List of Commenters

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0368	2/3/14	R. Lehet, Kimberly Wood Stoves
0370	2/3/14	Anonymous
0371	2/4/14	E. Peterson, Private Citizen
0372	2/4/14	Anonymous
0373	2/5/14	Anonymous
0374	2/5/14	Anonymous
0375	2/4/14	Anonymous
0376	2/4/14	Anonymous
0377	2/6/14	Anonymous
0379	2/7/14	Anonymous
0380	2/8/14	Anonymous
0381	2/9/14	Anonymous
0382	2/9/14	Anonymous
0383	2/9/14	Anonymous
0384	2/9/14	Anonymous
0385	2/10/14	Anonymous
0386	2/10/14	Anonymous
0387	2/10/14	Anonymous
0388	2/10/14	Anonymous
0389	2/11/14	L. Archer, Private Citizen
0390	2/12/14	Anonymous
0391	2/13/14	Anonymous
0392	2/13/14	Anonymous
0393	2/13/14	Anonymous
0394	2/13/14	Anonymous
0395	2/13/14	Anonymous
0396	2/14/14	Anonymous
0397	2/14/14	Anonymous
0398	2/14/14	Anonymous
0399	2/14/14	Anonymous
0400	2/17/14	Anonymous
0401	2/17/14	Anonymous
0402	2/17/14	Anonymous
0403	2/18/14	Anonymous
0404	2/18/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0405	2/18/14	Anonymous
0410	2/20/14	B. Stegman, Private Citizen
0411	2/20/14	B. Stegman, Private Citizen
0412	2/20/14	Anonymous
0413	2/21/14	Anonymous
0414	2/20/14	Anonymous
0416	2/19/14	Anonymous
0418	2/20/14	Michael, Private Citizen
0419	2/19/14	Jeff Chernach, Private Citizen
0420	2/19/14	Bridget Gentleman, Private Citizen
0421	2/18/14	Eric Jenkins, Private Citizen
0422	1/19/14	Pam and Dave Hyziak, Private Citizens
0423	1/14/14	W. Austin, Private Citizen
0424	1/7/14	Anonymous
0425	1/14/14	P. Nugent, Private Citizen
0426	1/11/14	S. and A. Peabody, Private Citizens
0427	1/10/14	M. Tiersma, Private Citizen
0428	1/13/14	B. Johnson, Private Citizen
0429	1/12/14	T. Thiessen, Private Citizen
0430	1/12/14	C. Stahler, Private Citizen
0431	1/11/14	V. Dumitrescu, Private Citizen
0432	1/11/14	J. Schlaybach, Private Citizen
0433	1/10/14	J. Mcinturff, Private Citizen
0434	1/9/14	B. McLaughlin, Butte County Air Quality Management District (BCAQM), California
0435	1/9/14	B. Washburn, Private Citizen
0436	1/9/14	Anonymous
0437	1/9/14	Anonymous
0438	1/8/14	L. Totilas, Private Citizen
0439	1/8/14	B. Kuntze, Private Citizen
0440	1/8/14	R. Randall, Private Citizen
0441	1/8/14	J. Bell, Private Citizen
0442	1/8/14	John and Kim, Private Citizens
0443	1/8/14	R. Williams, Private Citizen
0444	1/7/14	S. Bean, Private Citizen
0445	1/7/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0446	1/7/14	Anonymous
0447	1/7/14	W. Stone, Private Citizen
0448	1/7/14	Anonymous
0449	1/8/14	Anonymous
0450	1/8/14	G. Binkley, Private Citizen
0451	1/4/14	Anonymous
0452	1/7/14	Anonymous
0453	1/7/14	Anonymous
0454	1/7/14	T. Brinlee, Private Citizen
0455	1/7/14	K. Hart, Private Citizen
0456	1/7/14	K.L. Hoover, Private Citizen
0457	1/7/14	Anonymous
0458	1/7/14	Anonymous
0459	1/7/14	Anonymous
0460	1/7/14	Anonymous
0461	1/7/14	G. Hoam, Private Citizen
0462	1/5/14	Anonymous
0463	1/6/14	R. Ney, Private Citizen
0464	1/6/14	J. Bonitz, Southern Alliance for Clean Energy - Pittsboro, NC
0465	1/6/14	D. Jacoby, Portage and Main Outdoor Wood Boilers - Trego, WI
0466	1/6/14	J. Donnelly, RGS Mill Products Corporation
0467	1/3/14	John, Private Citizen
0468	1/8/14	R. Williams, Private Citizen
0469	1/6/14	D. Jacoby, Portage and Main Outdoor Wood Boilers - Trego, WI
0470	1/4/14	D. Marchant, Private Citizen
0471	1/21/14	E. Grolimund, Private Citizen
0472	1/6/14	J. Donnelly, RGS Mill Products Corporation
0473	1/3/14	L. Balough, Park County Department of Heritage, Tourism and Economic Development - Fairplay, CO
0474	1/3/14	M. Weissman, Private Citizen
0475	2/17/14	P.A. Doscher, Private Citizen
0476	2/16/14	R. Carson, Private Citizen
0477	2/16/14	T. Lawson, Private Citizen

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0478	2/16/14	A. Spreen, Private Citizen
0479	2/14/14	K. Gaylor, Private Citizen
0480	2/13/14	M. Martin, Private Citizen
0481	2/13/14	Anonymous
0482	2/11/14	G. Kidd, Private Citizen
0483	2/9/14	L. and M. Call, Private Citizens
0484	2/23/14	Anonymous
0485	2/25/14	Anonymous
0486	2/24/14	Anonymous
0487	2/24/14	Anonymous
0488	2/24/14	Anonymous
0489	2/25/14	Anonymous
0490	2/24/14	Anonymous
0491	2/24/14	Anonymous
0492	2/24/14	Anonymous
0493	2/24/14	Anonymous
0494	2/13/14	Anonymous
0495	2/13/14	Anonymous
0496	2/13/14	Anonymous
0497	2/12/14	Anonymous
0498	2/12/14	Anonymous
0499	2/12/14	Anonymous
0500	2/9/14	T. and L. Bishop, Private Citizens
0501	2/9/14	L. Strauss, Private Citizen
0502	2/9/14	R. Kominsky, Private Citizen
0503	2/7/14	M. White, Private Citizen
0504	2/7/14	I. Carlson, Private Citizen
0505	2/4/14	V. Steblin, Private Citizen
0506	2/4/14	R. Ukeiley, Law Office of Robert Ukeiley
0507	2/4/14	K. Harris, Private Citizen
0508	2/3/14	V. Steblin, Private Citizen
0509	2/3/14	J. Stiller, Private Citizen
0510	2/3/14	B. Lichak, Private Citizen
0511	2/3/14	R. Mayo, Private Citizen
0512	2/3/14	Anonymous
0513	2/3/14	W. and C. Winn, Private Citizens

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0514	2/2/14	J. Dyer, Private Citizen
0515	1/30/14	Anonymous
0516	1/30/14	Anonymous
0517	1/29/14	Dave, Breathe Healthy Air Coalition
0518	1/24/14	L. Epstein, Private Citizen
0519	1/22/14	A. Mercer, Private Citizen
0520	2/12/14	D. A. Thomas, State Representative, 25th District, Senator from Maine
0521	2/26/14	Anonymous
0522	2/26/14	Anonymous
0523	2/26/14	Anonymous
0524	2/26/14	Anonymous
0525	2/26/14	Anonymous
0526	2/26/14	Anonymous
0527	2/26/14	Anonymous
0528	2/26/14	Anonymous
0529	2/27/14	Anonymous
0530	2/28/14	Anonymous
0531	2/28/14	Anonymous
0532	2/28/14	Anonymous
0533	2/28/14	Anonymous
0534	2/27/14	D. Hannah, Chimney Sweep
0535	1/31/14	M. Link, Private Citizen
0536	1/31/14	J. and B. Lichak, Private Citizens
0537	2/3/14	J. and B. Lichak, Private Citizens
0538	2/24/14	Anonymous
0539	2/24/14	Anonymous
0540	2/25/14	Anonymous
0541	2/25/14	J. Peterson, ClearStak, LLC
0542	2/25/14	Anonymous
0543	2/26/14	Anonymous
0544	2/26/14	Anonymous
0545	2/26/14	Anonymous
0546	2/26/14	Anonymous
0547	2/28/14	Anonymous
0548	2/28/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0549	2/28/14	Anonymous
0550	2/28/14	Anonymous
0551	3/1/14	Anonymous
0552	3/1/14	Anonymous
0553	3/1/14	Anonymous
0554	3/1/14	Anonymous
0555	3/1/14	Anonymous
0556	3/1/14	Anonymous
0557	3/1/14	Anonymous
0558	3/1/14	L. Unsworth, Private Citizen
0559	3/1/14	Anonymous
0560	3/1/14	D. Bush-Retherford, Private Citizen
0561	3/2/14	K. Messina, Private Citizen
0562	3/2/14	Anonymous
0563	3/2/14	Anonymous
0564	3/2/14	Anonymous
0565	3/2/14	Anonymous
0566	3/2/14	Anonymous
0567	3/2/14	Anonymous
0568	3/3/14	Anonymous
0569	3/3/14	Anonymous
0570	3/3/14	Anonymous
0571	3/3/14	R. Bragg, Private Citizen
0572	3/3/14	Anonymous
0573	3/4/14	Anonymous
0574	3/4/14	Anonymous
0575	3/5/14	M. D. Curtis, CEO, Engineered Carbon Solutions
0576	1/1/14	J. Hallowell, President, ClearStak, LLC
0577	1/1/14	Hearthstone
0578	3/5/14	Environment & Human Health, Inc. (EHHI)
0579	1/1/14	Environment & Human Health, Inc. (EHHI)
0580	3/6/14	C.B.W. Miller, Massachusetts State Director, Toxics Action Center Campaigns
0581	1/21/14	E. Grolimund, Private Citizen
0582	3/6/14	E. Grolimund, Private Citizen
0583	2/21/14	E. Grolimund, Private Citizen

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0584	2/25/14	E. Grolimund, Private Citizen
0585	2/26/14	E. Grolimund, Private Citizen
0586	2/26/14	E. Grolimund, Private Citizen
0587	3/4/14	Anonymous
0588	3/4/14	Anonymous
0589	3/4/14	Anonymous
0590	3/4/14	Anonymous
0591	3/4/14	Anonymous
0592	3/4/14	Anonymous
0593	3/4/14	Anonymous
0594	3/4/14	Anonymous
0595	3/4/14	Anonymous
0596	3/4/14	Anonymous
0597	3/4/14	Anonymous
0598	3/4/14	Anonymous
0599	3/4/14	Anonymous
0600	3/4/14	Anonymous
0601	3/4/14	Anonymous
0602	3/4/14	Anonymous
0603	3/4/14	R. Haslag, Private Citizen
0604	3/4/14	Anonymous
0605	3/4/14	Anonymous
0606	3/4/14	Anonymous
0607	3/4/14	Anonymous
0608	3/4/14	Anonymous
0609	3/5/14	Anonymous
0610	3/6/14	Anonymous
0611	3/6/14	Anonymous
0612	3/6/14	Anonymous
0613	3/6/14	Anonymous
0614	2/1/14	N. Alderman, Environment & Human Health, Inc. (EHHI)
0615	3/6/14	Anonymous
0616	3/6/14	Anonymous
0617	3/6/14	Anonymous
0618	3/6/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0619	3/8/14	Anonymous
0620	3/6/14	Anonymous
0621	3/6/14	Anonymous
0622	3/6/14	Anonymous
0623	3/6/14	Anonymous
0624	3/6/14	Anonymous
0625	3/6/14	Anonymous
0626	3/6/14	Anonymous
0627	3/6/14	Anonymous
0628	2/26/14	N.L. Seidman, National Association of Clean Air Agencies (NACAA)
0629	2/26/14	J. Hedrick, Executive Director, Pellet Fuels Institute (PFI)
0630	3/5/14	Susanna, Private Citizen
0631	2/26/14	S. Nichols, President, Tarm USA, Inc.
0632	3/5/14	Anonymous
0633	3/5/14	Anonymous
0634	3/5/14	Anonymous
0635	3/5/14	Anonymous
0636	3/5/14	Anonymous
0637	3/5/14	Anonymous
0638	3/5/14	Anonymous
0639	3/5/14	Anonymous
0640	3/5/14	Anonymous
0641	3/5/14	Anonymous
0642	3/5/14	Anonymous
0643	3/5/14	Anonymous
0644	3/5/14	Anonymous
0645	3/5/14	Anonymous
0646	3/5/14	Anonymous
0647	3/5/14	Anonymous
0648	3/5/14	Anonymous
0649	3/6/14	Anonymous
0650	2/26/14	Jotul North America, Inc.
0651	2/26/14	Jotul North America, Inc.

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0652	3/6/14	N.L. Seidman, Assistant Commissioner, MA DEP and National Association of Clean Air Agencies (NACAA)
0653	3/6/14	D. Hannah, Private Citizen
0654	3/6/14	D. Henry, Consultant, 5G3 Consulting
0655	3/6/14	Anonymous
0656	3/7/14	D. Huse, Private Citizen
0657	3/5/14	D. Mears, Commissioner, Vermont Department of Environmental Conservation
0659	3/7/14	R. Bonar, CEO, Founder, Co-owner, Industrial Chimney Company (ICC)
0661	3/8/14	Anonymous
0662	3/8/14	Anonymous
0663	3/8/14	Anonymous
0664	3/8/14	Anonymous
0665	3/8/14	Anonymous
0666	3/8/14	Anonymous
0667	3/8/14	Anonymous
0668	3/8/14	Anonymous
0669	3/8/14	Anonymous
0670	3/8/14	Anonymous
0671	3/8/14	Anonymous
0672	3/8/14	Anonymous
0673	3/8/14	Anonymous
0674	3/8/14	Anonymous
0675	3/8/14	Anonymous
0676	3/8/14	Anonymous
0677	3/8/14	Anonymous
0678	3/8/14	Anonymous
0679	3/8/14	Anonymous
0680	3/8/14	Anonymous
0681	3/8/14	Anonymous
0682	3/8/14	Anonymous
0683	3/8/14	Anonymous
0684	3/8/14	Anonymous
0685	3/8/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0686	3/11/14	Anonymous
0687	3/7/14	Anonymous
0688	3/7/14	Anonymous
0689	3/7/14	Anonymous
0690	3/7/14	Anonymous
0691	3/7/14	Anonymous
0692	3/7/14	Anonymous
0693	3/7/14	Anonymous
0694	3/7/14	Anonymous
0695	3/7/14	Anonymous
0696	3/7/14	Anonymous
0697	3/7/14	Anonymous
0698	3/7/14	Anonymous
0699	3/7/14	Anonymous
0700	3/7/14	Anonymous
0701	3/7/14	Anonymous
0702	3/7/14	Anonymous
0703	3/7/14	Anonymous
0704	3/7/14	Anonymous
0705	3/8/14	Anonymous
0706	3/8/14	Anonymous
0707	3/8/14	Anonymous
0708	3/8/14	Anonymous
0709	3/8/14	Anonymous
0710	3/8/14	Anonymous
0711	3/8/14	Anonymous
0712	3/8/14	Anonymous
0713	3/8/14	Anonymous
0714	3/8/14	Anonymous
0715	3/8/14	Anonymous
0716	3/8/14	Anonymous
0717	3/8/14	Anonymous
0718	3/8/14	Anonymous
0719	3/8/14	Anonymous
0720	3/8/14	Anonymous
0721	3/8/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0722	3/8/14	Anonymous
0723	3/8/14	Anonymous
0724	3/8/14	Anonymous
0725	3/8/14	Anonymous
0726	3/8/14	Anonymous
0727	3/8/14	Anonymous
0728	3/9/14	Anonymous
0729	3/9/14	Anonymous
0730	3/9/14	Anonymous
0731	3/10/14	Anonymous
0732	3/10/14	Anonymous
0733	3/10/14	Anonymous
0734	3/10/14	Anonymous
0735	3/10/14	Anonymous
0736	3/10/14	Anonymous
0737	3/10/14	Anonymous
0738	3/10/14	Anonymous
0739	3/10/14	Anonymous
0740	3/10/14	Anonymous
0741	3/10/14	Anonymous
0742	3/10/14	Anonymous
0743	3/10/14	Anonymous
0744	3/10/14	Anonymous
0745	3/10/14	Anonymous
0746	3/10/14	Anonymous
0747	3/10/14	Anonymous
0748	3/10/14	Anonymous
0749	3/10/14	Anonymous
0750	3/10/14	Anonymous
0751	3/10/14	Anonymous
0752	3/10/14	Anonymous
0753	3/10/14	Anonymous
0754	3/10/14	Anonymous
0755	3/10/14	Anonymous
0756	3/10/14	Anonymous
0757	3/10/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0758	3/10/14	Anonymous
0759	3/10/14	Anonymous
0760	3/10/14	Anonymous
0761	3/10/14	Anonymous
0762	3/10/14	Anonymous
0763	3/10/14	Anonymous
0764	3/10/14	Anonymous
0765	3/10/14	Anonymous
0766	3/10/14	Anonymous
0767	3/10/14	Anonymous
0768	3/10/14	Anonymous
0769	3/10/14	Anonymous
0770	3/11/14	Anonymous
0772	3/12/14	Anonymous
0773	3/12/14	W. Coltrane, Private Citizen
0774	3/13/14	Anonymous
0775	3/4/14	Anonymous
0776	3/11/14	C. Wertz, Private Citizen
0777	3/13/14	Anonymous
0778	3/13/14	Anonymous
0779	3/13/14	Anonymous
0780	3/13/14	Anonymous
0781	3/13/14	Anonymous
0782	3/13/14	Anonymous
0783	3/13/14	Anonymous
0784	3/13/14	Anonymous
0785	3/13/14	Anonymous
0786	3/13/14	Anonymous
0787	3/13/14	Anonymous
0788	3/13/14	Anonymous
0789	3/13/14	Anonymous
0790	3/8/14	Anonymous
0791	3/13/14	Anonymous
0792	3/13/14	Anonymous
0793	3/13/14	Anonymous
0794	3/13/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0795	3/13/14	Anonymous
0796	3/13/14	Anonymous
0797	3/13/14	Anonymous
0798	3/13/14	Anonymous
0799	3/13/14	Anonymous
0800	3/13/14	Anonymous
0801	3/13/14	Anonymous
0802	3/13/14	Anonymous
0803	3/14/14	Anonymous
0804	3/14/14	Anonymous
0805	3/14/14	Anonymous
0806	3/14/14	Anonymous
0807	3/14/14	Anonymous
0808	3/14/14	Anonymous
0809	3/14/14	Anonymous
0810	3/14/14	Anonymous
0811	3/14/14	Anonymous
0812	3/14/14	Anonymous
0813	3/14/14	Anonymous
0814	3/14/14	Anonymous
0815	3/14/14	Anonymous
0816	3/14/14	Anonymous
0817	3/14/14	Anonymous
0818	3/14/14	Anonymous
0819	3/14/14	Anonymous
0820	3/14/14	Anonymous
0821	3/14/14	Anonymous
0822	3/14/14	Anonymous
0823	3/14/14	Anonymous
0824	3/14/14	Anonymous
0825	3/14/14	Anonymous
0826	3/14/14	Anonymous
0827	3/14/14	Anonymous
0828	3/14/14	Anonymous
0829	3/14/14	Anonymous
0830	3/14/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0831	3/14/14	Anonymous
0832	3/14/14	Anonymous
0833	3/14/14	Anonymous
0834	3/14/14	Anonymous
0835	3/14/14	Anonymous
0836	3/14/14	Anonymous
0837	3/14/14	Anonymous
0838	3/14/14	Anonymous
0839	3/14/14	Anonymous
0840	3/14/14	Anonymous
0841	3/14/14	Anonymous
0842	3/14/14	Anonymous
0843	3/14/14	Anonymous
0844	3/14/14	Anonymous
0845	3/14/14	Anonymous
0846	3/14/14	Anonymous
0847	3/14/14	Anonymous
0848	3/14/14	Anonymous
0849	3/14/14	Anonymous
0850	3/14/14	Anonymous
0851	3/14/14	Anonymous
0852	3/14/14	Anonymous
0853	3/14/14	Anonymous
0854	3/14/14	Anonymous
0855	3/14/14	Anonymous
0856	3/14/14	Anonymous
0857	3/14/14	Anonymous
0858	3/14/14	Anonymous
0859	3/14/14	Anonymous
0860	3/14/14	Anonymous
0861	3/14/14	Anonymous
0862	3/14/14	Anonymous
0863	3/14/14	Anonymous
0864	3/14/14	Anonymous
0865	3/14/14	Anonymous
0866	3/14/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0867	3/14/14	Anonymous
0868	3/14/14	Anonymous
0869	3/15/14	Anonymous
0870	3/15/14	Anonymous
0871	3/15/14	Anonymous
0872	3/15/14	Anonymous
0873	3/15/14	Anonymous
0874	3/15/14	Anonymous
0876	3/15/14	Anonymous
0877	3/15/14	Anonymous
0878	3/15/14	Anonymous
0879	3/15/14	Anonymous
0880	3/15/14	Anonymous
0881	3/15/14	Anonymous
0882	3/15/14	Anonymous
0883	3/15/14	Anonymous
0884	3/15/14	Anonymous
0885	3/15/14	Anonymous
0886	3/15/14	Anonymous
0887	3/15/14	Anonymous
0888	3/15/14	Anonymous
0889	3/15/14	Anonymous
0890	3/15/14	Anonymous
0891	3/16/14	Anonymous
0892	3/16/14	Anonymous
0893	3/16/14	Anonymous
0894	3/16/14	Anonymous
0895	3/16/14	Anonymous
0896	3/16/14	Anonymous
0897	3/16/14	Anonymous
0898	3/16/14	Anonymous
0899	3/16/14	Anonymous
0900	3/17/14	Anonymous
0901	3/17/14	Anonymous
0902	3/17/14	Anonymous
0903	3/17/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0904	3/17/14	Anonymous
0905	3/17/14	Anonymous
0906	3/17/14	Anonymous
0907	3/18/14	Anonymous
0908	3/10/14	B. Lichak, Private Citizen
0909	3/18/14	Anonymous
0910	3/20/14	Anonymous
0911	3/20/14	Anonymous
0912	3/20/14	M. Germain, Private Citizen
0913	3/20/14	Anonymous
0914	3/21/14	Anonymous
0915	3/21/14	Anonymous
0916	3/21/14	Anonymous
0917	3/21/14	Anonymous
0918	3/21/14	Anonymous
0919	3/21/14	Anonymous
0920	3/21/14	Anonymous
0921	3/21/14	Anonymous
0922	3/22/14	Anonymous
0923	3/22/14	Anonymous
0924	3/22/14	Anonymous
0925	3/22/14	Anonymous
0926	3/23/14	Anonymous
0927	3/23/14	Anonymous
0928	3/23/14	Anonymous
0929	3/23/14	Anonymous
0930	3/22/14	Anonymous
0931	3/22/14	Anonymous
0932	3/22/14	Anonymous
0933	3/11/14	D. Dover, Director of Operations, AgFuel Energy Systems
0934	3/11/14	J. Hussong, President, Kozy Heat, HPBA
0935	3/23/14	Anonymous
0936	3/24/14	Anonymous
0937	3/11/14	American Lung Association of the Northeast, et al. (includes 7 other health organizations)

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0938	3/11/14	American Lung Association of the Northeast, et al. (includes 9 other health organizations)
0939	3/26/14	Anonymous
0940	3/11/14	J. Seyler, CEO, American Lung Association of the Northeast
0941	3/11/14	B. Barry, Director of Engineering Product Research and Testing Division, United States Stove Company (USSC)
0942	3/11/14	N. Alderman, President, Environment and Human Health, Inc.
0943	3/11/14	N. Alderman, President, Environment and Human Health, Inc.
0944	3/11/14	M. Nelson, Residential Wood Combustion Coordinator, Minnesota Pollution Control Agency (MPCA)
0945	3/4/14	L. Parlee, ACME Stove & Fireplace Center
0946	3/11/14	O. Liu, Environmental Defense Fund
0947	3/11/14	M. Klein, President and CEO, Innovative Hearth Products (IHP)
0948	3/24/14	N. Russell, Product Manager, Evoworld
0949	3/25/14	Anonymous
0950	3/25/14	Anonymous
0951	3/26/14	Anonymous
0952	3/11/14	B. K. Allan, MA Leadership Board of the ALA of the Northeast
0953	3/11/14	R. Carroll, Associate Director of Government Affairs, Hearth, Patio & Barbecue Association (HPBA)
0954	2/26/14	J. Goldman, President and CEO, Hearth, Patio & Barbecue Association (HPBA)
0955	3/26/14	Anonymous
0956	3/11/14	T. Remole, State Representative, 6th District, Missouri House of Representatives
0957	3/11/14	M. Elliot, Owner, Central New England Chimney Sweeps
0958	3/11/14	P. Dircks, Vice President, Marketing, Hearth & Home Technologies (HHT)

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0959	3/11/14	C. Wiberg, Manager, Timber Products Inspection, Inc.
0960	3/11/14	F. Moore, President and Owner, Hardy Manufacturing Co.
0961	3/11/14	R. Bonar, Co-CEO and Owner, Industrial Chimney Co.
0962	3/11/14	C. Gagner, President and Owner, Northwest Manufacturing, Inc.
0963	3/11/14	Y. Nanasi, Field Manager, Moms Clean Air Force
0964	3/11/14	D. Hannah, Officer and Director, President, National Chimney Sweep Guild, Massachusetts Chimney Sweep Guild
0965	3/11/14	Anonymous
0966	3/28/14	Anonymous
0967	3/29/14	Anonymous
0968	3/29/14	Anonymous
0969	3/29/14	Anonymous
0970	3/29/14	Anonymous
0971	3/30/14	Anonymous
0972	3/30/14	Anonymous
0974	3/28/14	Anonymous
0975	3/29/14	Anonymous
0976	3/29/14	Anonymous
0977	3/29/14	Anonymous
0978	3/30/14	Anonymous
0979	3/30/14	Anonymous
0980	3/31/14	Anonymous
0981	3/31/14	Anonymous
0982	3/31/14	Anonymous
0983	4/1/14	Anonymous
0984	4/1/14	Anonymous
0985	4/1/14	Anonymous
0986	3/31/14	Anonymous
0987	4/1/14	Anonymous
0988	4/2/14	Anonymous
0989	4/2/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
0990	4/2/14	L.E. Bowman, Private Citizen
0991	4/3/14	Anonymous
0992	4/3/14	Anonymous
0993	4/3/14	Anonymous
0994	4/3/14	Anonymous
0995	4/2/14	H. Dresser, Jr., Managing Director, Maine Energy System
0996	4/3/14	Anonymous
0997	4/3/14	Anonymous
0998	3/11/14	J. Koechlin, Technical, Architectural, Earthcore Industries
0999	3/11/14	D. C. Kelly, President, Healthy Hearth
1000	3/11/14	C. DeHoff, Plant Operations, COO, Whitacre Greer
1001	3/11/14	C. Lilley, Vice President of Research and Development Hearth, Napoleon Products
1002	3/11/14	R. Allred, President, Clear Skies Unlimited
1003	4/5/14	Anonymous
1004	4/5/14	Anonymous
1005	4/5/14	Anonymous
1006	4/5/14	Anonymous
1007	4/5/14	Anonymous
1008	4/4/14	Anonymous
1009	4/4/14	Anonymous
1010	4/4/14	D. Miller, Private Citizen
1011	4/5/14	Anonymous
1012	4/5/14	Anonymous
1013	4/5/14	Anonymous
1014	4/5/14	Anonymous
1015	4/5/14	Anonymous
1016	4/5/14	Anonymous
1017	4/5/14	Anonymous
1018	4/5/14	Anonymous
1019	4/5/14	Anonymous
1020	4/5/14	Anonymous
1021	4/5/14	J. Fenton, Private Citizen
1022	4/5/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1023	4/5/14	Anonymous
1024	4/5/14	Anonymous
1025	4/6/14	Anonymous
1026	4/6/14	E. Grolimund, Private Citizen
1027	4/6/14	Anonymous
1028	4/6/14	Anonymous
1029	4/6/14	Anonymous
1030	4/6/14	Anonymous
1031	4/6/14	Anonymous
1032	4/6/14	Anonymous
1033	4/6/14	Anonymous
1034	4/6/14	Anonymous
1035	4/6/14	Anonymous
1036	4/7/14	Anonymous
1038	4/7/14	Anonymous
1039	4/7/14	Anonymous
1040	4/7/14	Anonymous
1041	4/7/14	Anonymous
1042	4/7/14	Anonymous
1043	4/7/14	Anonymous
1044	4/7/14	Anonymous
1045	4/7/14	Anonymous
1046	4/7/14	Anonymous
1047	4/7/14	Anonymous
1048	4/7/14	Anonymous
1049	4/7/14	Anonymous
1050	4/7/14	Anonymous
1051	4/8/14	Anonymous
1052	4/9/14	Anonymous
1053	4/8/14	T.P. Morrissey, Woodstock Soapstone Company, Inc.
1054	4/9/14	Anonymous
1055	4/9/14	Anonymous
1056	4/9/14	Anonymous
1057	4/9/14	Anonymous
1058	4/9/14	Anonymous
1059	4/9/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1060	4/9/14	Anonymous
1061	4/4/14	Dave, Private Citizen
1062	4/11/14	S.W. Nichols, President, Tarm USA
1063	4/10/14	Anonymous
1065	4/11/14	Anonymous
1066	4/11/14	Anonymous
1067	4/11/14	Anonymous
1068	4/11/14	Anonymous
1069	4/11/14	Anonymous
1070	4/12/14	Anonymous
1071	4/12/14	Anonymous
1072	4/12/14	Anonymous
1073	4/12/14	Anonymous
1074	4/12/14	Anonymous
1075	4/12/14	Anonymous
1076	4/12/14	Anonymous
1077	4/12/14	Anonymous
1078	4/12/14	Anonymous
1079	4/12/14	Anonymous
1080	4/12/14	Anonymous
1081	4/12/14	Anonymous
1082	4/12/14	Anonymous
1083	4/12/14	Anonymous
1084	4/12/14	Anonymous
1085	4/12/14	Anonymous
1086	4/12/14	Anonymous
1087	4/12/14	Anonymous
1088	4/12/14	Anonymous
1089	4/12/14	Anonymous
1090	4/12/14	Anonymous
1091	4/12/14	Anonymous
1092	4/12/14	Anonymous
1093	4/12/14	Anonymous
1094	4/12/14	Anonymous
1095	4/12/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1096	4/13/14	Anonymous
1097	4/13/14	Anonymous
1098	4/13/14	Anonymous
1099	4/13/14	Anonymous
1100	4/13/14	Anonymous
1101	4/13/14	Anonymous
1102	4/3/14	S. Haley, Private Citizen
1103	2/24/14	Anonymous
1104	2/28/14	E. Davis, Private Citizen
1105	3/14/14	E. Grolimund, Private Citizen
1106	2/27/14	H. Lewis II, Private Citizen
1107	4/16/14	Anonymous
1108	3/20/14	Mark, Private Citizen
1109	2/28/14	Marie, Private Citizen
1110	4/6/14	M. Sambi, Private Citizen
1111	4/14/14	Anonymous
1112	4/14/14	Anonymous
1113	3/18/14	S. Haley, Private Citizen
1114	4/11/14	M. Madrigal, Chair, Board of County Commissioners, Multnomah County, Oregon
1115	4/10/14	K. Luthy, President, Randolph County Farm Bureau, Illinois
1116	4/3/14	D. Ferry, Private Citizen
1117	3/26/14	A. Pulliam, Private Citizen
1118	3/24/14	Anonymous
1119	3/23/14	A. Scofield, Private Citizen
1120	3/19/14	R. Taylor, Private Citizen
1121	3/18/14	V. Mannino, Private Citizen
1122	3/11/14	J. and B. Lichak, Private Citizens
1123	3/11/14	D. Gale, Private Citizen
1124	3/10/14	M. Dunican, Private Citizen
1125	3/9/14	J. Salo, Private Citizen
1126	3/5/14	F. Herschelman, Private Citizen
1127	3/5/14	Bob, Private Citizen
1128	3/4/14	P. Freitag, Private Citizen
1129	3/3/14	P. James, Private Citizen

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1130	3/2/14	J. Reed, Private Citizen
1131	3/2/14	C. Brown, Private Citizen
1132	2/26/14	J. Bodalski, Private Citizen
1133	2/26/14	V. Keniry, Private Citizen
1134	2/25/14	J. Senneker, Private Citizen
1135	2/24/14	M. Daul, Private Citizen
1136	2/24/14	N. Moses, Private Citizen
1137	2/23/14	W. Lockwood, Private Citizen
1138	2/28/14	R. Martin, Private Citizen
1139	2/21/14	T. Carothers, Private Citizen
1140	2/21/14	P. Triandafillou, Vice President Woodlands, Huber Resources Corporation
1141	2/21/14	S. Hensley, Private Citizen
1142	2/16/14	R. Carson, Private Citizen
1143	2/16/14	A. Spreen, Private Citizen
1144	2/14/14	K. Gaylor, Private Citizen
1145	2/13/14	V. Steblin, Private Citizen
1146	2/12/14	V. Steblin, Private Citizen
1147	3/5/14	V. Steblin, Private Citizen
1148	4/2/14	P. Wender, Private Citizen
1149	4/15/14	V. Steblin, Private Citizen
1150	4/15/14	M. R. Martin, Private Citizen
1151	4/15/14	V. Steblin, Private Citizen
1152	4/15/14	Anonymous
1153	4/15/14	G. Kidd, Private Citizen
1154	4/15/14	L. and M. Call, Private Citizens
1155	4/15/14	Anonymous
1156	4/15/14	R. Kominsky, Private Citizen
1157	4/15/14	Anonymous
1158	4/15/14	Anonymous
1159	4/15/14	Anonymous
1160	4/15/14	Anonymous
1161	4/15/14	Anonymous
1162	4/15/14	Anonymous
1163	4/15/14	Anonymous
1164	4/15/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1165	4/15/14	Anonymous
1166	4/15/14	Anonymous
1167	4/15/14	Anonymous
1168	4/15/14	Anonymous
1169	4/15/14	Anonymous
1170	4/15/14	Anonymous
1171	4/16/14	P.S. Unger, President and CEO, American Association for Laboratory Accreditation
1172	4/16/14	Anonymous
1173	4/16/14	Anonymous
1174	3/29/14	J. Frisk, Private Citizen
1175	2/26/14	J. Wiley, Private Citizen
1176	3/8/14	J. Meeker, Private Citizen
1177	4/16/14	Anonymous
1178	4/16/14	Anonymous
1179	4/16/14	Anonymous
1180	2/24/14	K. Zimmerman, Private Citizen
1181	4/16/14	Anonymous
1182	4/16/14	Anonymous
1183	4/17/14	Anonymous
1184	4/17/14	Anonymous
1185	4/17/14	Anonymous
1186	4/17/14	Anonymous
1187	4/17/14	Anonymous
1188	4/17/14	Anonymous
1189	4/17/14	Anonymous
1190	4/17/14	Anonymous
1191	4/17/14	Anonymous
1192	4/17/14	L. Greene, Sacramento Metropolitan Air Quality Management District (SMAQMD), California
1193	4/17/14	Anonymous
1194	4/17/14	L. Greene, Sacramento Metropolitan Air Quality Management District (SMAQMD), California
1195	4/17/14	Anonymous
1196	4/18/14	Anonymous
1197	4/18/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1198	4/18/14	Anonymous
1199	4/18/14	Anonymous
1200	4/18/14	Anonymous
1201	4/18/14	Anonymous
1202	4/18/14	Anonymous
1203	4/18/14	Anonymous
1204	4/18/14	Anonymous
1205	4/18/14	Anonymous
1206	4/18/14	Anonymous
1207	4/18/14	Anonymous
1208	4/18/14	Anonymous
1209	4/18/14	Anonymous
1210	4/18/14	Anonymous
1211	4/18/14	Anonymous
1212	4/18/14	Anonymous
1213	4/18/14	Anonymous
1214	4/18/14	Anonymous
1215	4/18/14	Anonymous
1216	4/20/14	Anonymous
1217	4/20/14	Anonymous
1218	4/21/14	Anonymous
1219	4/18/14	Anonymous
1220	4/18/14	Anonymous
1221	4/18/14	Anonymous
1222	4/18/14	Anonymous
1223	4/19/14	Anonymous
1224	4/19/14	Anonymous
1225	4/19/14	Anonymous
1226	4/19/14	Anonymous
1227	4/19/14	Anonymous
1228	4/19/14	Anonymous
1229	4/19/14	Anonymous
1230	4/19/14	Anonymous
1231	4/19/14	Anonymous
1232	4/19/14	Anonymous
1233	4/19/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1234	4/19/14	Anonymous
1235	4/19/14	Anonymous
1236	4/19/14	Anonymous
1237	4/19/14	Anonymous
1238	4/21/14	Anonymous
1239	4/21/14	B. Thompson, Chairman, National Tribal Air Association (NTAA) Executive Committee
1240	4/19/14	Anonymous
1241	4/19/14	Anonymous
1242	4/19/14	Anonymous
1243	4/19/14	Anonymous
1244	4/19/14	Anonymous
1245	4/19/14	Anonymous
1246	4/19/14	Anonymous
1247	4/19/14	Anonymous
1248	4/19/14	Anonymous
1249	4/19/14	L.E. Bowman, Private Citizen
1250	4/19/14	Anonymous
1251	4/19/14	Anonymous
1252	4/19/14	Anonymous
1253	4/19/14	Anonymous
1254	4/19/14	Anonymous
1255	4/19/14	Anonymous
1256	4/19/14	Anonymous
1257	4/19/14	Anonymous
1258	4/19/14	Anonymous
1259	4/19/14	Anonymous
1260	4/19/14	Anonymous
1261	4/22/14	S. Eckerly, Senior Vice President, Public Policy, National Federation of Independent Business (NFIB)
1262	4/22/14	Anonymous
1263	4/22/14	Anonymous
1264	4/22/14	Anonymous
1265	4/5/14	W. Sheeder, Private Citizen
1266	4/6/14	A. Crimmings, Private Citizen
1267	4/14/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1268	4/22/14	G.J. Gefrich, Private Citizen
1269	4/23/14	Anonymous
1270	4/23/14	Anonymous
1271	4/23/14	Anonymous
1272	4/23/14	Anonymous
1273	4/23/14	Anonymous
1274	4/23/14	Anonymous
1275	1/12/14	M. Mattingly, Private Citizen
1276	4/24/14	Anonymous
1277	4/24/14	Anonymous
1278	4/24/14	Anonymous
1279	4/24/14	Anonymous
1280	4/24/14	Anonymous
1281	4/24/14	Anonymous
1282	4/24/14	Anonymous
1283	4/17/14	R. L'Esperance, Unknown Retail Store
1284	4/25/14	Anonymous
1285	4/25/14	Anonymous
1286	4/27/14	Anonymous
1287	4/27/14	Anonymous
1288	4/28/14	Anonymous
1289	4/25/14	Anonymous
1290	4/25/14	Anonymous
1291	3/11/14	Anonymous
1292	4/16/14	B. Wise, Private Citizen
1293	4/16/14	A. Nayfeh, Private Citizen
1294	4/16/14	L. Pereira, Private Citizen
1295	4/16/14	C. Weeden, Private Citizen
1296	4/16/14	L. Hacker, Private Citizen
1297	4/15/14	C. Moody, Private Citizen
1298	4/15/14	C. Piper, Private Citizen
1299	4/15/14	K. Galgano, Private Citizen
1300	4/15/14	D. Marchant, Private Citizen
1301	4/15/14	M. Naseman, Private Citizen
1302	4/15/14	A. Schexnayder, Private Citizen
1303	4/15/14	M. Shimizu, Private Citizen

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1304	4/15/14	M. Lackey, Private Citizen
1305	4/14/14	M. Smith, Private Citizen
1306	4/14/14	A. Ruthsdottir, Private Citizen
1307	4/14/14	S. Carr, Private Citizen
1308	4/14/14	D. Freiburger, Private Citizen
1309	4/14/14	H. Carr, Private Citizen
1310	4/14/14	C. Grace, Private Citizen
1311	4/14/14	S. Silverman, Private Citizen
1312	4/14/14	K. Caprio, Private Citizen
1313	4/14/14	B. Hepner, Private Citizen
1314	4/14/14	H. Federspiel, Private Citizen
1315	4/14/14	J. Bergeron, Private Citizen
1316	4/14/14	L. Palacios, Private Citizen
1317	4/25/14	Anonymous
1318	4/25/14	Anonymous
1319	4/25/14	Anonymous
1320	4/25/14	Anonymous
1321	4/25/14	Anonymous
1322	4/25/14	Anonymous
1323	4/25/14	Anonymous
1324	4/25/14	Anonymous
1325	4/27/14	Anonymous
1326	4/27/14	Anonymous
1327	4/27/14	Anonymous
1328	4/14/14	M. Moench, Private Citizen
1329	4/14/14	H. Youngs, Private Citizen
1330	4/14/14	J. Lakela, Private Citizen
1331	4/14/14	M. Snyder, Private Citizen
1332	4/14/14	A. Kukulan, Private Citizen
1333	4/14/14	R. Burtis, Private Citizen
1334	4/14/14	W. LK, Private Citizen
1335	4/14/14	M. and M. Reps, Private Citizens
1336	4/14/14	N. Bartol, Private Citizen
1337	4/14/14	J. Smill, Private Citizen
1338	4/14/14	K. Rowlett, Private Citizen
1339	4/14/14	P. Bouton, Private Citizen

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1340	4/14/14	R. Tanz Kubota, Private Citizen
1341	4/14/14	L. Yow, Private Citizen
1342	4/14/14	W. Costa, Private Citizen
1343	4/14/14	E.D. Kennedy, Private Citizen
1344	4/14/14	L. Gerhardt, Private Citizen
1345	4/14/14	W. Kuschner, Private Citizen
1346	4/14/14	S. Frontczak, Private Citizen
1347	4/14/14	R. Thomas, Private Citizen
1348	4/14/14	M. Clark, Private Citizen
1349	4/28/14	Anonymous
1350	4/28/14	Anonymous
1351	4/28/14	Anonymous
1352	4/28/14	Anonymous
1353	4/28/14	D. Marchant, Private Citizen
1354	4/28/14	Anonymous
1355	4/27/14	Unstated, Tribal Environmental Policy Center (TEPC)
1356	4/25/14	M. Klein, President and CEO, Innovative Hearth Products (IHP)
1357	4/14/14	M. Hernandez, Private Citizen
1358	4/14/14	T. Caffery, Private Citizen
1359	4/14/14	T. Hildebrandt, Private Citizen
1360	4/14/14	C. Cassinelli, Private Citizen
1361	4/14/14	C. Zadog, Private Citizen
1362	4/14/14	S. Hagan, Private Citizen
1363	4/14/14	S. Stephens, Private Citizen
1364	4/14/14	J. Mellum, Private Citizen
1365	4/21/14	I. Thomsen, Private Citizen
1366	3/6/14	F. Ferguson, Private Citizen
1367	4/28/14	Anonymous
1368	4/28/14	Anonymous
1369	4/28/14	Anonymous
1370	4/29/14	D. Marchant, Private Citizen
1371	4/29/14	Anonymous
1372	4/29/14	Anonymous
1373	4/29/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1374	4/29/14	S.E. Brant, Private Citizen
1375	4/29/14	Anonymous
1376	2/24/14	K. Zimmerman, Private Citizen
1377	2/24/14	Anonymous
1378	4/29/14	M. Klein, President and CEO, Innovative Hearth Products (IHP)
1379	4/29/14	Anonymous
1380	4/29/14	Anonymous
1381	4/29/14	Anonymous
1382	4/29/14	Unstated, Heatmor, Inc.
1383	4/29/14	Anonymous
1384	4/28/14	Anonymous
1385	4/28/14	Anonymous
1386	4/29/14	Anonymous
1387	4/29/14	Unstated, Osterhus Outdoors
1388	4/29/14	Anonymous
1389	4/29/14	Anonymous
1390	4/29/14	Anonymous
1391	4/29/14	M. McCue, President. Condar Company
1392	3/27/14	J. Thune, Senator from South Dakota, United States Senate
1393	4/11/14	Congressman T. Reed and W. Owens from New York, United States House of Representatives
1394	4/1/14	C. Neufeld, Vice President, Blaze King Industries
1395	4/30/14	S. Gill, Director of Strategies and Incentives, San Joaquin Valley Air Pollution Control District (APCD), California
1396	5/1/14	K.W.F. Rumens, President, Travis Industries
1397	5/1/14	S. A. Clark, Air Quality Program Manager, Washington State Department of Ecology
1399	3/27/14	S. Collins and A. King, Senators from Maine, United States Senate
1400	3/18/14	R. Blunt, Senator from Missouri, United States Senate
1401	4/16/14	R.D. Edwards, Private Citizen
1402	3/19/14	Congressman D. Benishek from Michigan, 1st District, United States House of Representatives

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1403	4/25/14	Mayor B. Dixson and Supervisor S. Carbajal, Chair, Air, Climate & Energy Workgroup , Local Government Advisory Committee (LGAC)
1404	5/2/14	A. Carroll, Applied Ceramics, Inc.
1405	5/2/14	A. Waters, Earth Blow Masonry, LLC
1406	4/30/14	Anonymous
1407	4/30/14	Unstated, Clover Hill Sales, LLC
1408	4/30/14	Anonymous
1409	4/30/14	Anonymous
1410	4/30/14	Anonymous
1411	4/30/14	Anonymous
1412	4/30/14	Anonymous
1413	4/30/14	Michigan resident, Hettinger's Backyard & Power Store
1414	4/30/14	C. Hagerbaumer, Oregon Environmental Council
1415	4/30/14	Anonymous
1416	4/30/14	Anonymous
1417	5/1/14	G.S. Aburn Jr. and L.A. Liddigton, Co-chairs, National Association of Clean Air Agencies (NACAA) Criteria Pollutants Committee
1418	4/30/14	Wade S. , Private Citizen
1419	4/30/14	Anonymous
1420	5/1/14	Anonymous
1421	5/1/14	D.T. Steadman, Owner, Burner Boys
1422	5/1/14	J.A. Thomas, President, ASTM International
1423	5/1/14	D. Johnson, Executive Director, Western States Air Resources (WESTAR) Council
1424	5/1/14	Anonymous
1425	5/2/14	Anonymous
1426	5/1/14	H. Fluer, Biofire Inc.
1427	5/1/14	C.T. Kenworthy, Executive Director, Puget Sound Clean Air Agency
1428	5/2/14	J. Horne, Greentech Manufacturing Inc.
1429	5/1/14	R. Curkeet, Chief Engineer, Intertek Testing Services NA, Inc.

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1430	4/30/14	Mass Comment Campaign Letter submitted by T. Morrissey, on the behalf of Woodstock Soapstone and the Alliance for Green Heat (4,385 petitioners)
1431	5/2/14	J. Horne, Greentech Manufacturing Inc.
1432	5/3/14	Anonymous
1433	5/2/14	Anonymous
1434	5/2/14	W.F. Pedersen, Counsel, Wood Heat Coalition (WHC)
1435	5/2/14	S.A. Armstrong, Counsel, Hearth, Patio & Barbecue Association (HPBA)
1436	5/2/14	D. Kuhfahl, President, Hearthstone Quality Home Heating Products Inc.
1437	5/2/14	S. Mulholland, Associate Professor of Economics, George Mason University, Mercatus Center
1438	5/3/14	Anonymous
1439	5/3/14	Anonymous
1440	5/3/14	Anonymous
1441	5/3/14	Anonymous
1442	5/3/14	P. Hechler, Private Citizen
1443	5/3/14	R. Flanagan, Private Citizen
1444	5/3/14	Anonymous
1445	5/4/14	Anonymous
1446	5/4/14	Anonymous
1447	5/4/14	K. and R. Deschere, Private Citizens
1448	5/4/14	T. Olsen, President, Alpha American Company
1449	5/4/14	C. Baiton, Private Citizen
1450	5/4/14	Anonymous
1451	5/3/14	Anonymous
1452	5/4/14	Anonymous
1453	5/4/14	Unstated, MF Fire, LLC
1454	5/4/14	Anonymous
1455	5/4/14	Anonymous
1456	5/4/14	D. Hechler, Private Citizen
1457	5/4/14	Unstated, MF Fire, LLC
1458	5/4/14	K.W. Jones, Kelly's Southern Ohio Classics
1459	5/4/14	J. Stenger, Tree-Land, Inc.

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1462	5/5/14	M. Gilroy, Deputy Air Pollution Control Officer, Monterey Bay Unified Air Pollution Control District (MBUAPCD), California
1463	5/5/14	J. Linc Stine, Commissioner, Minnesota Pollution Control Agency (MPCA)
1464	5/5/14	Anonymous
1465	5/5/14	D. J. Shaw, Director, Division of Air Resources, New York State Department of Environmental Conservation et al.
1466	5/5/14	G. Whiting, President, EcoHeat Solutions LLC
1467	5/5/14	A. & M. Cragg, Central Boiler (authorized dealers)
1468	5/5/14	A. Barton, CEO, Massachusetts Clean Energy Center
1469	5/5/14	D. Hargrave, Tulikivi Distributor, Mid-Atlantic Masonry Heat Inc.
1470	5/5/14	Lincoln County Manager and Lincoln County Commission, Lincoln County, New Mexico
1471	5/5/14	Anonymous
1472	5/5/14	B.R. Lisle, President, Founder, Energex Corporation
1473	5/5/14	P. Miller, Executive Director and P. Lee, Co-coordinator, Alaska Community Action on Toxics (ACAT) and Citizens for Clean Air
1474	5/5/14	Anonymous
1475	5/5/14	W.B. Smith, Ph.D., Professor of Wood Products Engineering, SUNY College of Environmental Science and Forestry
1476	5/5/14	M. Doth, Lincoln County Commissioner, Lincoln County, New Mexico
1477	5/5/14	M.J. Meyers, Representative, Attorneys General of the States of New York, Maryland, and Massachusetts
1478	5/5/14	B.R. Lisle, President, Founder, Energex Corporation
1479	5/5/14	ClearStak, LLC
1480	5/5/14	A. Pluger, White Pine Outdoor Boilers LLC
1481	5/5/14	B. White, hydronic heater dealer
1482	5/5/14	Anonymous
1483	5/5/14	Anonymous

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1484	5/5/14	J. Bishop-Green, "Public Interest Comment"
1485	5/5/14	Anonymous
1486	5/5/14	B. Myren, President, Myren Consulting, Inc.
1487	5/5/14	T. Carbonell, Attorney, Environmental Defense Fund
1488	5/5/14	S. Schultz, Clean Air Fairbanks
1489	4/2/14	P. Wender, Private Citizen
1490	5/2/14	D. Craig, et al., 83rd Assembly District, Wisconsin State Legislature
1491	5/4/14	F. Bianchi, hydronic heater dealer
1492	5/5/14	M. Doerrier, Private Citizen
1493	5/5/14	Dr. D.L. Robinson, Private Citizen
1494	5/4/14	Nick S., hydronic heater dealer
1495	5/5/14	Anonymous
1496	5/5/14	M. Bentovim, Private Citizen
1497	5/5/14	J. Nye, "Public Interest Comment"
1498	5/5/14	Anonymous
1499	5/5/14	Anonymous
1500	5/5/14	Congressman J. Smith from Missouri, 8th District, United States House of Representatives
1502	5/5/14	R.J. Klee, Commissioner, Connecticut Department of Energy and Environmental Protection (DEEP)
1503	5/5/14	J. Ackerly, Alliance for Green Heat
1504	5/5/14	S.J. Ikle-Khalsa, President, Save Our Sky and Protect Our Planet Home Heating Cooperatives (a.k.a. Corn Coop)
1505	5/5/14	M.A. and P.A. Boivin, No-Mon-Ne Farm Associates, Vermont Golden Harvest BioFuels and Boivin Farm Supply
1506	5/5/14	S.E. Dudley, Director, The George Washington University Regulatory Studies Center
1507	5/5/14	T.S. Ellis, Jr., President, Ellis Contracting Inc.
1508	5/5/14	R.E. Mosier, Chief of Regulations Development Division, Air Quality Planning Program, Maryland Department of the Environment (MDE)
1509	5/5/14	Unstated, Hardy Manufacturing Co.
1510	5/5/14	Unstated, Hardy Manufacturing Co.

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1511	5/5/14	B. Sponseller, Bureau of Air Management Director, Wisconsin Department of Natural Resources (WDNR)
1512	5/5/14	L.C. Bitzer, Owner, Maple Run Enterprises
1513	5/5/14	B. Lee, Air Pollution Control Officer, Northern Sonoma County Air Pollution Control District (NSCAPCD), California
1514	5/5/14	M. Freeman, President, KUMA Stoves, Inc.
1515	5/5/14	Anonymous
1516	5/5/14	Anonymous
1517	5/5/14	Anonymous
1518	5/5/14	Anonymous
1519	5/5/14	P. Rokas, Ambiance Stoves & Chimney
1520	5/5/14	J.E. Nolen, Assistant Vice President, National Policy, American Lung Association
1521	5/5/14	P.W. Aho, Commissioner, Maine Department of Environmental Protection
1522	5/5/14	S.J. Faehner, CEO and Owner, American Wood Fibers
1523	3/4/14	M. Sambi, Private Citizen
1524	2/28/14	C.M. Rogers, Private Citizen
1525	5/2/14	D. Zeltwanger, Owner, D K and Sons, LLC
1526	3/20/14	Mark, Private Citizen
1527	5/2/14	R. Curkeet, Chief Engineer, Hearth Products, Intertek Testing Services NA, Inc.
1528	5/4/14	S. Grabowski, SG Masonry
1529	5/5/14	C.R. Niebling, Consultant to New England Wood Pellet
1530	3/29/14	J. Frisk, Private Citizen
1531	3/8/14	J.G. Meeker
1532	2/24/14	K. Zimmerman
1533	5/5/14	B. Hallowell, ClearStak, LLC
1534	4/14/14	Mass Comment Campaign Email submitted by American Lung Association
1535	5/5/14	D. Wagner, General Manager, Appalachian Wood Pellets, Inc.

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1536	5/5/14	Anonymous
1537	5/5/14	K. Stichter, Stichter & Sons Masonry Inc.
1538	5/5/14	L. Hartig, Commissioner, Alaska Department of Environmental Conservation
1539	5/5/14	C. Fairchild, North Idaho Energy Logs (NIEL)
1540	5/4/14	J. Sheaff, President, Crossfire Fireplaces
1541	5/2/14	M. Odell, Econoburn Boilers, Econoburn LLC
1542	5/5/14	E. Moshier, President, Solid Rock Masonry
1543	5/2/14	L.P. Hauer, Executive Director, Northwest Hearth, Patio & Barbecue Association (NWHPBA)
1544	5/6/14	R. "Jiggs" Blackburn, Rising Stone, Inc.
1545	5/5/14	J. Seymour, Executive Director, Biomass Thermal Energy Council (BTEC)
1546	5/2/14	J. Clark, OMNI-Test Laboratories, Inc.
1547	5/3/14	C.M. Hudson, President and CEO, England's Stove Works, Inc.
1548	5/4/14	Dr. B. Moench, President, Utah Physicians for a Healthy Environment (UPHE)
1549	5/2/14	P. Williams, National Sales Manager, United States Stove Company (USSC)
1550	5/5/14	J. Francisty, Pacific Energy Fireplace Products Ltd.
1551	5/6/14	A. Marin, Executive Director, Northeast States for Coordinated Air Use Management (NESCAUM)
1552	2/27/14	H. Lewis, Private Citizen
1553	2/26/14	J. Wiley, Private Citizen
1554	5/5/14	B.M. Watson, President, Jotul North America, Inc.
1555	5/5/14	W. Cooke, Private Citizen
1556	5/4/14	J.A. Frisch, President, Western Masonry Inc.
1557	5/4/14	M. and M. Reps, Private Citizens
1558	5/4/14	A. Wieland, Private Citizen
1559	5/3/14	P.K. Hopke, Professor and Director of Center for Air Resources Engineering and Science, Clark University
1560	5/2/14	J-F Vachon, President, Les Pierres Steatites, Inc.
1561	5/2/14	M.L. Hough, Director, Lane Regional Air Protection Agency (LRAPA)

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1562	5/2/14	M. Lunde, President, Dectra Corporation (manufacturers of GARN)
1563	5/5/14	D. Brazier, Owner and CEO, Central Boiler, Inc.
1564	5/5/14	Unstated, Hardy Manufacturing Co.
1565	3/14/14	E. Grolimund, Private Citizen
1566	5/5/14	S. Cohan, Owner, Hot Rock Masonry
1567	5/5/14	J. Steinert, Dirigo Laboratory, Inc.
1568	5/5/14	K. Reed, Private Citizen
1569	5/5/14	C. Springer, Iron Hammer Stoneworks, LLC
1570	5/5/14	J.P. Broadbent, Executive Officer, APCO, Bay Area Air Quality Management District (BAAQM), California
1571	5/5/14	W. Bell, Executive Director , Maine Pellet Fuels Association
1572	5/5/14	R. Friesen, Heatmasters Outdoor Furnaces
1573	5/2/14	K. Reynolds, Administrative Assistant, Napoleon on behalf of Wolf Steel USA Ltd.
1574	5/5/14	N. Senf, Chair, on behalf of D. Givens, President, Masonry Heater Association (MHA) of North America
1575	5/4/14	R. Thibodeau, Owner, Independent Power
1576	5/5/14	B. Claeys, Deputy Director, Renewable & Alternative Energy Development, Massachusetts Department of Energy Resources (DOER)
1577	5/5/14	H. Vauhkonen, President, Tulikivi U.S. Inc.
1578	5/4/14	M. Seymour, President, Radiant Hearth, Inc.
1579	5/5/14	B. Black, Executive Director, Renewable Resource Innovative Design Group Enterprise
1580	5/5/14	B. Schmidt, Air Quality Specialist, Missoula City County Health Department (MCCHD), Montana
1581	4/9/14	P. Leahy, Senator from Vermont, United States Senate
1582	3/21/14	C. McCaskill, Senator from Missouri, United States Senate
1583	5/5/14	T. Morrissey, President, Woodstock Soapstone Company, Inc.

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1584	5/5/14	R. Pihl, Tulikivi Distributor, Warmstone Fireplaces and Designs
1585	5/5/14	V. Stori, Project Director, Clean Energy States Alliance (CESA)
1586	5/5/14	C. Hazelbaker, Staff Liaison, Radiant and Hydronics Council Manager, State Energy Outreach, Air Conditioning Contractors of America
1587	5/5/14	S. Goldsborough, Executive Director, Families for Clean Air
1588	5/5/14	M.J. Gilmore, President, Gilmore Masonry Heaters, Inc.
1589	5/4/14	A. Wieland, Private Citizen
1590	3/12/14	M.R. Warner, Senator from Virginia, United States Senate (with attachments from constituents)
1591	5/4/14	B. Lichak, Private Citizen
1592	5/5/14	F. Moore, Hardy Manufacturing Co.
1593	5/5/14	L. Dennison, Rhode Islanders for Clean Air
1594	5/5/14	G. Mastroeni, Private Citizen
1595	5/5/14	C. Lynch, Downeast Outdoor Boiler
1596	5/5/14	J. Skinner, Private Citizen
1597	5/5/14	D. Bottorff, Private Citizen
1598	5/5/14	M. and A. Cragg, Riverview Outdoor Furnaces
1599	5/5/14	S. Charette, Furnaces
1600	5/5/14	J. A Bottorff, Private Citizen
1601	5/5/14	J.N. and S. Donnelly, Private Citizens
1602	5/5/14	T. Ellis, President, Ellis Contracting Inc.
1603	5/5/14	M. Williams, Private Citizen
1604	5/5/14	D. Seitz, Private Citizen
1605	5/5/14	M. Scott, Private Citizen
1606	5/5/14	T. Dawson, Private Citizen
1607	5/5/14	M. L. Bynum, Private Citizen
1608	5/5/14	K. Decker, Private Citizen
1609	5/5/14	J. Schill, Private Citizen
1610	5/4/14	G. Terry, Private Citizen
1611	5/4/14	D. Meeks, Private Citizen
1612	5/4/14	S. Brandie, Private Citizen

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1613	5/4/14	B. Valentine, Private Citizen
1614	5/4/14	Anonymous
1615	5/3/14	M. Bowling, Private Citizen
1616	5/3/14	K. Leonhardt, Private Citizen
1617	5/3/14	L. Briley, Private Citizen
1618	5/1/14	K. Stichter, Private Citizen
1619	5/1/14	J. Lorentz, Private Citizen
1620	5/1/14	K.G. Martin, General Manager, Lawn Care Distributors, Inc.
1621	4/30/14	L. Hamer, Hamer Pellet Fuel
1622	4/30/14	G. Terry, Private Citizen
1623	4/29/14	D. Stemple, Private Citizen
1624	4/29/14	G. Matthews, Private Citizen
1625	4/27/14	A. Marince, Private Citizen
1626	4/24/14	M. de Serres, Private Citizen
1627	4/23/14	B. Earnest, Spring Island Green Design & Building Collaborative
1628	2/24/14	M. Daul, Private Citizen
1629	2/24/14	Anonymous
1630	2/23/14	W. Lockwood, Private Citizen
1632	5/1/14	G. Achman, Vice President, Product Engineering & Standards, Hearth & Home Technologies (HHT)
1633	5/1/14	W.W. Walborn, Hawken Energy, Inc.
1634	5/3/14	C. Rakos, President, European Pellet Council
1635	4/25/14	Mayor B. Dixon, Chair and S. Carbajal, Supervisor and Chair, Air, Climate & Energy Workgroup, Local Government Advisory Committee (LGAC)
1636	4/30/14	L. Alexander and B. Corker, Senators from Tennessee, United States Senate
1637	5/5/14	L. Starbard, Crystal Rock Farm Inc.
1638	5/5/14	G. Murray, Executive Director, Wood Pellet Association of Canada (WPAC)
1639	5/5/14	M.A. and P.A. Boivin, No-Mon-Ne Farm Associates, Vermont Golden Harvest BioFuels and Boivin Farm Supply

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1640	5/8/14	U. Papish, Air Quality Program Manager, Oregon Department of Environmental Quality
1641	4/30/14	Mass Comment Campaign Letter submitted by T. Morrissey, on the behalf of Woodstock Soapstone and the Alliance for Green Heat (4,385 petitioners)
1642	4/30/14	S.A. Armstrong, Counsel, Crowell and Moring, Hearth, Patio and Barbecue Association (HPBA)
1643	5/2/14	D.Y. Chung, Crowell & Moring, Hearth, Patio & Barbecue Association (HPBA), plus 20 attachments
1644	5/5/14	G. Overk, President, Solid Timber Construction
1645	5/3/14	L. Statz, Private Citizen
1646	5/5/14	T. N. Seaton, Timely Construction Incorporated and Empire Masonry Heaters Incorporated
1647	5/2/14	EPA Accredited Wood Burning Appliance Emissions Testing Laboratory Coalition
1648	5/5/14	S. Jacobs, Chairman, Pellet Fuels Institute (PFI)
1649	4/3/14	S. Haley, Private Citizen
1650	5/4/14	L. Brown, Dealer, Brown's Classics
1651	5/5/14	C. Fairchild, North Idaho Energy Logs (NIEL)
1652	5/1/14	M. Hemenway, Owner and President, A-1 Sewer & Drain, Inc. d.b.a. Roto-Rooter
1653	5/5/14	C. Lyons, Amberg Supply Company, LLC
1654	5/5/14	D. Tessmann, Amberg Supply Company, LLC
1655	5/5/14	J. Kessinger, President, Kessinger Wood Heating
1656	5/5/14	M. McCue, President, Condar Company
1657	5/2/14	D. Walters, HY-C Company
1658	5/5/14	D. Givens, President , Stone Castle Masonry
1659	5/5/14	M-A. Cantin, President, Stove Builder International Inc. (SBI)
1660	4/28/14	T. D. Lorton, Private Citizen
1661	5/6/14	P. Petrich, Private Citizen
1662	5/1/14	L. VanHouten, Double L. Tack Inc.
1663	4/30/14	C. Shelton, Owner, Shelton's Heating & Plumbing
1664	5/7/14	Congressman P. Welch from Vermont, United States House of Representatives
1665	4/25/14	C. Neufield, Vice President, Blaze King Industries

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1666	5/5/14	Congressman J. Smith from Missouri, 8th District, United States House of Representatives
1667	1/9/14	A. Wieland et al., Private Citizens
1668	1/9/14	S. Schultz, Clean Air Fairbanks
1670	6/5/14	R. Curkeet, Intertek
1671	5/21/14	P. Leahy, Senator from Vermont, United States Senate
1672	5/7/14	Congressman S. Pearce from New Mexico, 2nd District, submitted on behalf of the Lincoln County Manager and Commission, New Mexico
1690	7/24/14	Anonymous
1691	7/29/14	Anonymous
1692	7/29/14	J. and B. Lichak
1693	7/29/14	E. Lawrence
1694	7/29/14	R. Curkeet, Intertek
1695	7/29/14	Anonymous
1698	7/30/14	S. A. Clark, Air Quality Program Manager, Washington State Department of Ecology
1699	7/31/14	Anonymous
1700	7/31/14	John Ackerly, Alliance for Green Heat
1701	7/31/14	Arthur Marin, Exec. Dir., NESCAUM
1702	7/31/14	United States Stove Co.
1703	7/31/14	Alan Atemboski, Travis Industries
1704	7/31/14	Tomas Carbonell, EDF
1705	7/31/14	A. Wieland
1706	7/01/14	E. Sierzega
1707	7/24/14	T. Roberts
1709	7/31/14	HPBA
1710	7/31/14	R.W. Purinton, Jotul North America
1711	8/15/14	T. Morrissey, Woodstock Soapstone Company
1713	7/31/14	G. Mastroeni
1714	7/06/14	J. Head
1715	7/02/14	M. Tulk
1716	7/24/14	T. Roberts
1718	9/04/14	A.Wieland
1719	9/04/14	A.Wieland

Appendix A: Complete List of Commenters

EPA-HQ-OAR-2009-0734 Document ID	Date Received	Name and Affiliation
1721	9/10/14	Accredited Laboratory Coalition
1722	9/9/14	R. Curkeet, Intertek
1723	9/5/14	R. Pihl, Masonry Heater Association
1750	1/23/15	T. Tudor