

Meeting with OMB/OIRA on Boiler MACT and Related Rules

New Executive Office Building, Room 10103

725 17th Street, N.W.

February 1, 2011, 1:00 pm EST

- I. Introductions

- II. Overview
 - 1. Timing of rulemaking
 - 2. Achievability

- III. Key policy Issues:
 - 1. Source-based approach
 - 2. Health-based alternative
 - 3. Multi-fuel boilers
 - 4. Non-Hazardous Secondary Materials rule
 - 5. Work practices
 - 6. Implementation

- IV. Other Issues:
 - 1. International competitiveness
 - 2. Benefits
 - 3. Previous letters

- V. Wrap-up



**American
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American Forest & Paper Association Boiler MACT Information

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Table of Contents

Agenda

Position Paper on Boiler MACT Regulations.....	Tab 1
Legal Arguments for Reasonable Boiler MACT Limits.....	Tab 1
EPA’s “MACT” Standard for Industrial Boilers Must Be Based on the Performance of Real Boilers.....	Tab 2
Source By Source Approach.....	Tab 2
Additional Comments on Boiler MACT Pollutant by Pollutant Approach and Effects of Multiple Emissions Controls.....	Tab 2
HBCA Crosswalk.....	Tab 3
EPA–HQ–OAR–2002-0058 – HBEL Section of AF&PA comments.....	Tab 3
Tier I HBEL Lookup Tables.....	Tab 3
Non-Hazardous Solid Materials Rule.....	Tab 4
International Emission Limits for Industrial Boilers.....	Tab 5
Boiler MACT and Benefit Claims.....	Tab 6
Selected Quotes from Governors on Boiler MACT.....	Tab 7
Senate Boiler MACT letter to The Honorable Lisa Jackson, EPA Administrator.....	Tab 7
Association Boiler MACT letter to The Honorable Lisa Jackson, EPA Administrator.....	Tab 8

TAB 1

Position Paper on Boiler MACT Regulations

Background:

Although most boilers already are well controlled for key pollutants, EPA is in the process of reissuing the Boiler MACT¹ rules to require 99% of boilers to do much more. We anticipate that solid fuel-fired boilers (like those that burn coal) will be heavily impacted. But even boilers using relatively clean fuels like biomass, hydrogen, clean process gas or other gaseous fuels will be subject to ultra-low emission levels which will be extremely expensive to meet if they can be met at all.

The Boiler MACT sets emission limits for hazardous air pollutants. On June 4th, EPA proposed new rules for industrial, commercial and institutional boilers using fossil fuels and biomass to address concerns raised about the original rule in recent court decisions. EPA is under a court order to finalize the Boiler MACT rules by February 21, 2011.

The Boiler MACT rules would require installation of up to four different air pollution control devices that will conflict with other existing control requirements. Due to the methodology EPA is using, the Boiler MACT emission limits would be extremely stringent, often approaching levels that can barely be detected.

During this current economic crisis, these rules would impose an unsustainable regulatory burden if finalized as proposed. The capital cost for all manufacturing could be \$21 billion, plus billions more in annual costs and no other country in the world as a set of standard as stringent jeopardizing our global competitiveness. A wide range of manufacturers and the jobs they sustain would be severely harmed, as well as municipalities, universities, hospitals, federal facilities and others.

Possible Solutions At Hand:

EPA can use newly submitted and existing data to revise its proposed rules to protect air quality and target investments strategically, preventing severe job losses and tens of billions of dollars in unnecessary regulatory costs.

EPA should set standards based on what real-world sources actually can achieve. Instead, EPA is proposing a pollutant-by-pollutant approach based on the best performers for each of five separate pollutants. This results in a set of standards based on a

¹ The "Boiler MACT" is a rulemaking under the Clean Air Act Amendments of 1990. The statute requires that EPA regulate hazardous air pollutants from emission sources, including boilers, using maximum achievable control technology ("MACT"). Boilers use various fuels at industrial, commercial and institutional facilities to generate steam, heat, and/or electricity to power manufacturing. In addition to Boiler MACT, EPA is finalizing three related rules: Boiler GACT (Generally Achievable Control Technology for boilers at smaller sites); the Commercial and Industrial Solid Waste Incinerator (CISWI) rule (setting limits for non-hazardous solid waste incinerators); and the definition of Non-Hazardous Secondary Materials (a Resource Conservation Recovery Act rule determining which materials are wastes and thus covered under the CISWI rule when burned).

hypothetical boiler that can somehow simultaneously achieve the greatest reductions for each separate pollutant. This is like mandating a best-performing car that simultaneously is the best in fuel efficiency, passenger capacity, acceleration, towing capacity and safety. Some facilities that have recently upgraded their boilers or built new ones with the latest technology do not meet the proposed standards. Under the statute, 12% of boilers should be able to meet the standards with little or no additional effort, but under the proposed rule, less than 1% can comply without further controls. The tremendous diversity of boiler types, fuels used, operating conditions and products made justify “source-based” floor setting.

EPA should provide alternative health-based emissions limitations for qualifying low-level emissions. A practical, health oriented standard for threshold pollutants like hydrogen chloride and manganese would allow sources to demonstrate that their emissions of these compounds do not pose a public health concern. Section 112(d)(4) of the Clean Air Act expressly contemplates the use of such a standard, which can be implemented at each facility without compromising public health protection. EPA has argued that reductions of other pollutants not covered by the MACT program (“co-benefits”) justify not using this authority, but that is contrary to the law. EPA should not add unnecessary stringency to the rule in a misguided effort to control non-HAP emissions that are better regulated under other parts of the Clean Air Act. EPA should make the health threshold standard an integral part of its final rule.

EPA should expand the use of work practice standards to all gas-fired boilers. EPA appropriately used its authority under 112(h) to set work practices for natural gas fired boilers. These units are very clean burning, indeed they are so low that the emissions are extremely difficult and uneconomical to measure. It is critical to both preserve the proposed work practice and to expand the universe of gas fired boilers covered by work practices to other clean burning gases. EPA could avoid the increase in emissions (e.g., NO_x and CO₂) and energy use that would result from the numerous control technologies required with no guarantee of actually achieving the emission limits.

In the related rule defining “Non-Hazardous Secondary Materials,” EPA should reaffirm that many secondary materials including biomass residuals are fuels and not wastes. The statute and related case law allow EPA to classify these materials as fuels if they are not discarded, are treated as valuable commodities, and are burned for energy recovery. Failure to encourage these alternative and often renewable fuels will result in more materials being landfilled and increase use of fossil fuels.

EPA should use representative data in setting the standards and should factor into the MACT the variability in operations, fuels, designs and testing performance across the many types of boilers. There is insufficient latitude for variability among the extremely diverse universe of units and fuels used. Boilers burning significant amounts of biomass with coal and other solid fuels are inappropriately treated as coal boilers for pollutants that are combustion by-products. EPA has a large amount of data from recent testing and data requests as well as that submitted during the comment period to supplement its record of the last 15 years. They should examine these data using different analytical methods to derive defensible limits that are achievable in actual

operation for both existing and new units. To do otherwise leaves many companies in a position where the only way they can comply with the regulation is to stop operating.

EPA should base the standards on the emissions of the best performing 12% of sources, rather than the “best of the best.” In its Phase II emissions testing program, EPA targeted only those sources that were the best performers. Then when EPA went to select the top 12% for setting the MACT floors, it assumed that this data set was representative of the full range of operations. In other words, EPA cherry picked the data and based the standards on the “best of the best” rather than the 12% best performing sources in the entire source category. The result is arbitrary because it is based on a skewed data set that by design is not representative of the full range of sources in the source category. Proposed emission limits are close to the detection limit of test methods and far beyond what normal best performing units can achieve. In fact, pollution control vendors and manufacturers of new boilers are questioning whether the limits are achievable. Thus, EPA is setting the stage for an over-reaching regulation that is legally vulnerable for ignoring the practical capabilities of combustion units and controls.

In the related “Boiler GACT” rule for smaller boilers, EPA should set work practices, not emissions limits, for area source biomass, coal and oil boilers. EPA has the discretion either not to regulate CO emissions from biomass and oil fired boilers at smaller facilities OR to choose to set a work practice standard based on section 112(d)(5). The database EPA relies on for the GACT standards is so poor that the limits end up being even more stringent than those for major sources. In addition, EPA has not shown that emissions of polycyclic organic matter (POM)² from biomass or oil combustion is part of the 90% of sources identified in the urban air toxics program as needing reductions.

Summary:

1. EPA should set limits based on the overall performance of actual sources, not on a hypothetical boiler that does not exist in the real world.
2. EPA should include a health threshold standard in the final Boiler MACT rule to target environmental investments where there is a real need.
3. EPA should finalize work practice standards for natural gas and refinery gas and expand their use to all gas-fired boilers and emission controls.
4. EPA should narrowly define solid waste in the related rule on the definition of Non-Hazardous Secondary Materials.
5. EPA should set standards that reflect the variability in the operations of true best performing boilers due to fuels, operations, designs and testing differences.
6. EPA should base the standards on the best performing 12% of sources, rather than the “best of the best.”
7. EPA should establish work practices for smaller biomass, coal and oil fired boilers in the related Boiler GACT rule.

² CO is the surrogate for POM.

Legal Arguments for Reasonable Boiler MACT Limits

A. The “pollutant by pollutant” approach to determining MACT is not appropriate because it results in standards that do not reflect the performance of the best performing boilers.

- The proposed Boiler MACT standards are based on pollutant-by-pollutant analyses that rely on a different set of best performing sources for each separate HAP standard.¹ In other words, EPA has “cherry picked” the best data in setting each standard, without regard for the sources from which the data come.
- The statute unambiguously directs EPA to set standards based on the overall performance of *sources*. Sections 112(d)(1), (2), and (3) specify that emissions standards must be established based on the performance of “sources” in the category or subcategory and that EPA’s discretion in setting standards for such units is limited to distinguishing among classes, types, and sizes of sources. These provisions make clear that standards must be based on actual sources, and cannot be the product of pollutant-by-pollutant parsing that results in a set of composite standards that do not necessarily reflect the overall performance of any actual source. Congress provided express limits on EPA’s authority to parse units and sources for purposes of setting standards under § 112 and that express authority *does not* allow EPA to “distinguish” units and sources by individual pollutant as is proposed in this rule. *Sierra Club v. EPA*, 551 F.3d 1019, 1028 (D.C. Cir. 2008).
- EPA’s database shows that very few units (six) are best performers for all pollutants and thus it could not have reasonably concluded that the proposed standards reflect the performance of actual sources.

B. EPA should establish health-based emissions limitations for acid gases and manganese under § 112(d)(4).

- Section 112(d)(4) authorizes EPA to set health-based emissions limitations and is a powerful tool that enables EPA to match the stringency of a HAP emissions limitation to the level determined necessary to fully protect human health
- In formulating § 112(d)(4), Congress recognized that, “For some pollutants a MACT emissions limitation may be far more stringent than is necessary to protect public health and the environment.”² As a result, § 112(d)(4) was provided as an alternative standard setting mechanism for HAPs “where health thresholds are well-established ... and the pollutant presents no risk of other adverse health effects, including cancer....”³

¹ See, e.g., 75 Fed. Reg. 32019 (“For each pollutant, we calculated the MACT floor for a subcategory of sources by ranking all the available emissions data from units within the subcategory from lowest emissions to highest emissions, and then taking the numerical average of the test results from the best performing (lowest emitting) 12 percent of sources.”).

² S. Rep. No. 101-228 (1990) at 171.

³ *Id.*

- EPA acknowledges its authority under § 112(d)(4) but proposes not to establish any health-based emissions limitations “[g]iven the limitations of the currently available information (*i.e.*, the HAP mix where boilers are located, and the cumulative health impacts from co-located sources), the environmental effects of HCl, and the significant co-benefits of setting a conventional MACT standard for HCl.”⁴
- Ample scientific information supports a determination that HCl, chlorine, hydrogen fluoride, hydrogen cyanide, and manganese are threshold pollutants, and thus, are eligible to be regulated under § 112(d)(4). In addition, the Agency has the technical tools and significant factual support for establishing health-based emissions limitations for these HAPs that would provide the requisite ample margin of safety to health and the environment.
- From a legal standpoint, the statute makes clear that criteria pollutant co-benefits associated with the proposed MACT standards may not be considered in deciding whether to establish § 112(d)(4) health-based emissions limitations. Also, EPA has failed to explain why the health-based emissions limitations it established in the 2004 Industrial Boiler MACT and the justification provided for those limitations should now be reversed.

C. EPA inappropriately relies on emissions data from the “best of the best” in determining the existing source MACT floors.

- The relative lack of data is a fundamental problem because EPA construes the statute as requiring it to set existing source MACT floors based on the top performing 12% of sources for which it has data for the larger source categories and subcategories. Less data means the pool from which the top 12% is drawn is smaller and, therefore, the actual number of sources used to determine the MACT floor is smaller.
- The bulk of the information on which EPA’s relied in developing the proposed standards was collected by way of a § 114 information request that required testing of specified best performing units for specified pollutants. In this way, EPA artificially limited the pool of data from which it drew its top 12% best performing sources. The result is fatally arbitrary because EPA’s sampling approach for Phase II created a dataset that is not representative of sources for which the data is being used to infer emissions.
- Instead of using emissions data from the “best of the best,” EPA should simply use emissions data from the “best” units in each subcategory.

D. EPA must adopt a work practice standard for dioxins/furans.

- The proposed dioxin/furan emission standards are so low and the detection limits of dioxin and furan isomers are so variable that many boilers are likely to exceed the proposed emission limits for dioxin/furans even though the tests show that all the isomers are present below the detection limits. Thus, imposing a dioxin/furan

⁴ 75 Fed. Reg. at 32032.

emissions limitation on industrial boilers would be arbitrary and capricious because the method of demonstrating compliance would not reliably distinguish compliant boilers from noncompliant boilers.

- In this situation, EPA has ample authority to prescribe a work practice standard instead of a numeric emissions limit. Section 112(h)(2)(B) authorizes EPA to establish work practice standards when “the application of measurement methodology to a particular class of sources is not practicable due to technological and economic limitations.”
- In any event, the § 112 HAP list includes only the named compounds dibenzofuran (CAS #132649) and 2,3,7,8 Tetrachlorodibenzo-p-dioxin (CAS #1746016). Therefore, if EPA decides to adopt numeric standards, the standards must be specific to these compounds. EPA has no authority to regulate under § 112 the generic chemical categories of “dioxins” and “furans.”

E. The proposed rule fails to adequately account for variability in emissions that reasonably is expected from the top performing sources.

- EPA has improperly developed a CO standard that boilers must meet at all times based on 3-run stack tests that fail to properly characterize the highly variable nature of CO emissions in solid fueled boilers. EPA has used only 3-run stack test data, which represents only a small and unrepresentative snapshot in time captured during the best operating conditions, to set emission limits for a pollutant that is highly variable.
- EPA makes a similar mistake with regard to its proposal not to set a separate standard for periods of startup, shutdown, and malfunction. The emissions data on which the standards are based do not, in fact, reflect or adequately accommodate emissions from periods of startup, shutdown, or malfunction.
- EPA proposes to use the 99 percent upper predictive limit (“UPL”) to accommodate and reflect variability in the operation of the best performers in calculating the MACT floor. The use of the 99 percent UPL calculated on only a small number of sources in a subcategory does not adequately capture variability or serve to predict the MACT floor level achievable by the top performers.
- Instead of using the UPL, EPA should use the upper tolerance limit (“UTL”), which is meant for use in situations where the available data does not represent the entire population. In addition, since the proposed 99% confidence interval is applied to all 5 HAPs, the combined probability of achieving the set of limits drops to 95%, which is inappropriately low when facilities must be in compliance 100% of the time.

F. The emissions database includes numerous fundamental flaws that compromise the MACT floor analysis that is based on these data.

- EPA’s failure to provide adequate time for an appropriate assessment of the data violates the Agency’s obligation to provide a full and fair opportunity for public comment on the proposed rule. Within these severe time constraints, we

conducted a spot check of approximately 100 stack test reports which revealed numerous data errors – many of which, if corrected, would have a material impact on the stringency of EPA’s calculated MACT floors and associated proposed standards.

Boiler GACT Legal Arguments

A. EPA Has Not Justified The Need To Regulate Area Source Industrial Boilers In Order To Satisfy § 112(c)(6).

- EPA's MACT proposal for the § 112(c)(6) pollutants is flawed because the Agency provides no basis for its assertion that mercury (Hg) and polycyclic organic matter (POM) must be regulated under this standard in order to satisfy the requirement that 90% of nationwide emissions of these pollutants must be regulated under § 112 standards. In 1998, when EPA published the list of source categories that must be regulated to meet the § 112(c)(6) 90% control requirement, the Agency did not draw firm conclusions as to whether any area source categories needed to be regulated.
- Moreover, § 112(c)(6) does not obligate EPA to regulate in order to provide "an anticipated margin to ensure that the obligations under CAA section 112(c)(6) are met." EPA has either exceeded the 90% standard or not. When the facts show that the 90% standard is met, EPA has satisfied its § 112(c)(6) obligation.
- When the facts are not sufficient for EPA to reliably draw conclusions, EPA's obligation is to seek the additional information necessary to determine whether additional regulations are needed to meet the 90% standard. EPA's obligation to provide record support for its regulatory decisions is turned on its head by the assertion that the lack of facts or uncertainty as to the available information justifies additional regulation under § 112(c) (6).

B. Even If EPA Needed To Regulate Area Source Industrial Boilers To Meet § 112(c)(6), It Would Not Be Required To Adopt MACT Standards.

- CAA § 112(d)(5) authorizes EPA in most cases to set standards for area sources using "generally available control technologies or management practices" (*i.e.*, "GACT") rather than "MACT." Section 112(d)(5) provides, "With respect to categories and subcategories of area sources listed pursuant to [§ 112(c)], the Administrator may, in lieu of the authorities provided in [§ 112(d)] ... elect to promulgate standards or requirements applicable to sources in such categories or subcategories which provide for the use of generally available control technologies or management practices by such sources." In other words, EPA may establish "GACT" standards for area sources rather than "MACT" standards under § 112(d).
- EPA takes the position in the proposal that it cannot use GACT to regulate HAP emissions from area source categories that are subject to § 112(c)(6). This

position ignores the language in § 112(d)(5) that defines the scope of the Agency's authority to use GACT. Section 112(d)(5) expressly states that EPA is authorized to use GACT "[w]ith respect to categories and subcategories of area sources listed pursuant to [§ 112(c)]."

- A fundamental problem with EPA's position is that it ignores the language in § 112(d)(5) authorizing EPA to use the GACT method "in lieu of" the § 112(d)(2) MACT procedure. EPA itself has observed that the term "in lieu of" is commonly understood to mean "in place thereof" and, thus, has previously correctly concluded that, "CAA section 112(d)(5) authorizes EPA to promulgate standards under CAA section 112(d)(5) that provide for the use of generally available control technologies or management practices (GACT), instead of issuing MACT standards pursuant to CAA section 112(d)(2) and (d)(3)."⁵
- In short, the statute plainly says that the requirement to set a standard under § 112(d)(2) can be satisfied by using the alternative GACT procedure specified in § 112(d)(5). As a result, setting GACT under § 112(d)(5) meets the §112(c)(6) requirement to regulate under § 112(d)(2).

C. The GACT Standard For Area Source Industrial Boilers Should Consist Of Management Or Work Practices Rather Than Numeric Emissions Limitations.

- In situations where the use of GACT is authorized (as it is here), § 112(d)(5) on its face authorizes EPA to establish "standards *or requirements* which provide for the use of generally available control technologies *or management practices*." (Emphasis added). In other words, when setting standards based on GACT, EPA is expressly authorized to establish work practices instead of emissions limitations.
- There is no need under the express terms of § 112(d)(5) for EPA to make a showing under § 112(h) in order to set management or work practice standards. This interpretation is supported by the legislative history of § 112⁶ and is reflected in numerous existing GACT standards.⁷

⁵ 73 Fed. Reg. 1916,1920-1921 (Jan. 10, 2008).

⁶ See, S. Rep. No. 101-228, 101st Cong. 1st sess. 171-172 (GACT is to encompass "methods, practices and techniques which are commercially available and appropriate for application by the sources in the category").

⁷ See, e.g., 72 Fed. Reg. 16636, 16639 *et seq.* (Apr. 4, 2007) (describing methods of determining GACT for 7 area source categories).

TAB 2

EPA’s “MACT” Standard for Industrial Boilers Must Be Based on the Performance of Real Boilers

EPA’s proposed “MACT” standard for industrial boilers would set extraordinarily stringent emissions limits – limits that are far stricter than needed to protect health and the environment. This rule will cost companies billions of dollars and will create a strong incentive for companies to shift their manufacturing operations and the jobs that go with them overseas.

EPA has many choices as to how it sets the standard. The Agency has deliberately chosen to forego alternative approaches that would protect health and the environment at far less cost. EPA can and must change its course.

How does the air toxics program work? The purpose of § 112 of the Clean Air Act is to eliminate undue risk from emissions of hazardous air pollutants. Congress intended to accomplish this goal through a carefully designed two step process. The first step – the so-called “MACT” standards – requires EPA to set emissions limits from a given category of sources (in this case industrial boilers) at the level no less stringent than what is already being achieved by the better-controlled source or sources in the category. EPA may make the standard more stringent than this “floor” level, but must prove that the more stringent standard is justified. In short, EPA must figure out who is doing a good job of controlling HAPs and require all other similar sources to do the same or better.

In the second step, which must be accomplished within 8 years after a MACT standard is set, EPA must determine whether there is unacceptable remaining risk to health or the environment. If such risk exists, EPA must strengthen the MACT standard to eliminate the undue risk.

Industrial boilers emit several types of hazardous air pollutants (“HAPs”). Section 112 requires EPA to set emissions limits for each of them. Therefore, the industrial boiler MACT “standard” actually will be comprised of a collection of several separate emissions limits.

What’s the biggest problem with EPA’s chosen method of setting this standard? Under EPA’s proposed method of setting the standard – the “pollutant-by-pollutant” approach – EPA identifies a different set of best-performing boilers for each of the pollutant-specific emissions limits. So, for example, boilers A, B, and C might be the best performing with regard to mercury emissions, while boilers D, E, and F are best performing for hydrogen chloride emissions. In other words, EPA “cherry picks” the best data in setting each standard, without regard for the fact that a different collection of boilers are the best performers for each pollutant.

The result is a composite set of standards that, taken together, reflect the characteristics of hypothetical best performing boilers that simultaneously achieve the greatest reductions for all HAPs. However, such standards fail to reflect the performance achieved by the actual best performing boilers. For industrial boilers, this “franken-plant” approach would cause the standards to be so stringent that they could not be achieved by many boilers – which stands in sharp contrast to the clear Congressional direction for EPA to set “maximum achievable control technology” standards.

By analogy, the Clean Air Act requires EPA to determine the “most valuable player,” and set standards based on what that player actually accomplished on the field. Instead, EPA has constructed a hypothetical MVP comprised of Player A’s batting average, Player B’s fielding performance, and Player C’s impeccable pitching. However much we might like to see a single player with such talents, the reality is that the MVP will be pretty good at most skills, but not the best at all of them. The same is true of industrial boilers.

What can and should EPA do to fix its flawed approach? EPA should set the industrial boiler MACT based on the overall performance of actual boilers, rather than creating a composite reflecting the performance of super-boilers that do not actually exist. Under an actual-boiler approach, EPA would identify the “MVP” boilers – *i.e.*, those that are the best performing when considering all HAPs – and then set the individual HAP emissions limits based on the performance achieved by these boilers. This method guarantees that the collection of emissions limits that make up the MACT standard is based on the actual performance of real boilers.

What does the Clean Air Act say? The CAA unambiguously directs EPA to set standards based on the overall performance of sources. Sections 112(d)(1), (2), and (3) specify that emissions standards must be established based on the performance of “sources” in the category or subcategory and that EPA’s discretion in setting standards for such units is limited to distinguishing among classes, types, and sizes of sources. These provisions make clear that standards must be based on actual sources, and cannot be the product of pollutant-by-pollutant parsing that results in a set of composite standards that do not necessarily reflect the overall performance of any actual source. Congress provided express limits on EPA’s authority to parse units and sources for purposes of setting standards under § 112 and that express authority *does not* allow EPA to “distinguish” units and sources by individual pollutant as is proposed in this rule. *Sierra Club v. EPA*, 551 F.3d 1019, 1028 (D.C. Cir. 2008).

EPA mistakenly believes the CAA is not so clear. Not surprisingly, EPA asserts that “section 112(d)(3) does not mandate a total facility approach” and that “[a] reasonable interpretation of section 112(d)(3) is that MACT floors may be established on a HAP-by-HAP basis.” 75 Fed. Reg. 54970, 54998 (Sept. 9, 2010). But, even if § 112 were ambiguous (which it is not), EPA has improperly exercised its discretion in this rule. EPA has not shown or attempted to show that the proposed standards reflect the performance of any actual boilers and has not determined whether the suite of proposed emissions limitations is practicable. This failure to investigate a fundamental aspect of the proposed rule renders the rule arbitrary and capricious. EPA’s database shows that very few units are best performers for more than one pollutant, which clearly indicates that the proposed standards reflect the performance of exceedingly few actual boilers.

Notably, EPA has expressed concern that the source-approach “likely yields least common denominator floors – that is floors reflecting mediocre or no control, rather than performance which is the average of what best performers have achieved.” 75 Fed. Reg. at 54999. But, this is a hypothetical concern that would not be realized for industrial boilers. Commenters on EPA’s proposed rule submitted analyses proving that the source-based approach produces stringent standards that would result in steep reductions in HAP emissions from industrial boilers.

Source by Source Approach for Boiler MACT

November 30, 2010

Source by Source Approach

- Current MACT floors are set based on pollutant by pollutant approach, resulting in a different set of top performing boilers for each pollutant.
- We looked at setting MACT limits using a source approach instead.
- Due to small number of boilers that had data for all 5 pollutants proposed to be regulated, we did an analysis instead for boilers that had data for the 3 “fuel based HAP.”

Methods

- ERG MACT Floor Memo Appendix C-2 was used to separate boilers that had data for Mercury, HCl and PM.
- The lowest test was used as presented in Appendix C-2 in order to have the same rankings as the EPA's pollutant by pollutant approach.
- Each boiler was ranked by each pollutant (Mercury, HCl and PM) then an average ranking was taken.
- The Top 12% of this final average ranking was taken and used in source by source floor calculations.
- We then used all of the run by run data for these boilers to calculate a 99UPL for Mercury, HCl, and PM.
- Fuel Variability Factors followed the same guidelines as described in pages 7-9 and Appendices A-1a, A-1b, A-2a and A2b in ERG MACT Floor Memo.

Boiler Changes We Made

- WIGPGreenBay2818 B10 - Wastepaper Sludge-Fired Boiler 10 that is incorrectly categorized by EPA as liquid instead of biomass.
- GAGPSRMRIincon EU BO02 and WIGPGreenBay2818 B29 - Fluidized Bed Boiler #9 that burn petcoke but had been incorrectly categorized as coke oven gas boilers
- LASHellChemicaGeismar Furnace F-S801 is incorrectly categorized by EPA as Gas 2 instead of Liquid.
- We used test data as-is, so results subject to change based on QA of test data and any changes to results based on detection limit recalculation, etc.

Biomass Source by Source

- 57 boilers had test data for all 3 fuel based HAP.
- Top 12% is 7 boilers.
- Calculated fuel variability factors where data available.
- Top ranked boiler is OR Flakeboard Eugene, which burns primarily natural gas with 15-20% biomass, so this boiler is not representative. Used AR Potlatch Forest Warren boiler (100% biomass) instead for new source MACT.

Biomass Floor Units

FacilityID	CombustorID _common	Mercury Rank	HCl Rank	PM Rank	Summed Rank
ORFlakeboardEugene	Boiler-2	2	16	3	21
MESDWarrenSomerset	No2 Power Boiler	3	3	17	23
ARPotlatchForestWarren	Wellons Boiler	24	1	4	29
GAGPMadisonPly	800 Wood Waste Boiler	23	4	5	32
MEBoralexStratton	Boiler #1	13	6	14	33
FLUSSugarCorp	Boiler No. 7	1	26	18	45
IDPotlatch	PB-1 CE	31	2	12	45

Biomass Results

Biomass Boilers	Proposed MACT Limit	Source Approach UPL	Source Approach Limit With Variability	Proposed New Source MACT	Source-based New Source Limit
Mercury (Hg)	9.E-07	2.E-06	3.E-06	2.E-07	7.E-07
Hydrogen Chloride (HCl)	0.006	0.02	0.04	0.004	0.004
Particulate Matter (filterable)	0.02	0.05		0.008	0.050

Coal Source by Source Floor Boilers

- 202 total boilers with data available for all 3 pollutants.
- 12% is 25 boilers.
- Existing and new limits have fuel variability info factored in.

FacilityID	CombustorID _common	Hg Rank	HCl Rank	PM Rank	Summed Rank
IAArchersDanielsMidlandDesMoines	Asea Boiler #1	2	7	1	10
VAUniversityofVirginia	7103-1-01R	18	9	4	31
WIGPGreenBay2818	B29 - Fluidized Bed Boiler #9	17	8	7	32
IARoquetteAmerica	Circulating Fluidized Bed Boiler (121)	3	2	35	40
TNEastman_NO_CBIDATA	Boiler 30	36	4	19	59
INPurdueUniverisity	Boiler 5	4	40	18	62
SCCogenSouth	B001 - Main Boiler	6	3	55	64
AKDoyonUtilities_AK	4	15	34	17	66
MENewPage-Rumford	Cogen#6	13	60	12	85
MENewPage-Rumford	Cogen#7	14	61	13	88
IDAmalgamatedSugarCoTwinFalls	S-B1	11	59	23	93
AKDoyonUtilities_AK	7	33	33	30	96
IDTASCONampa	Babcock and Wilcox (B&W) #1	41	16	46	103
IAUoflowa	EP7 Boiler 11	1	77	27	105
IDTASCONampa	Babcock and Wilcox (B&W) #2	42	17	47	106
VASmurfitStoneWestpt	PB08	37	11	61	109
WINewPageBiron	B24	100	10	11	121
TNEastman_NO_CBIDATA	Boiler 31	87	12	26	125
INTateLyleSagamore	31B1	24	48	56	128
INSABICInnovativePlastics	01-001 BW1 Boiler	49	66	14	129
INSABICInnovativePlastics	01-001 BW2 Boiler	50	67	15	132
PAPHGlatfelter	PB5	51	74	8	133
OKGPMuskogeeMill	B-3	25	83	34	142
IAMuscatinePowerandWater	Unit 7	80	20	45	145
MIPharma&Upjohn1180	Boiler 3	73	23	49	145

Coal Source by Source Approach Results

Coal Boilers	Proposed MACT Limit	Source Approach UPL	Source Approach Limit With Variability	Proposed New Source MACT	Source New Source Limit
Mercury (Hg)	3E-06	6E-06	2E-05	2E-06	1E-06
Hydrogen Chloride (HCl)	0.02	0.06	0.09	6E-05	5E-04
Particulate Matter (filterable)	0.02	0.04		0.001	0.001

Liquid Source by Source Floor Boilers

- 13 boilers with data available for all 3 pollutants, took top 5 boilers for floor calculations.
- After examining data for this floor, Mercury run by run data for TN Invista Chattanooga EU003 - Vaporizer#2 was not available in the database (ERG used fuel data instead of stack test data), so fuel data was used to calculate the Mercury limit.

Liquid Source by Source

FacilityID	CombustorID_common	Hg Rank	HCl Rank	PM Rank	Summed Rank
LAShellChemicaGeismar	Furnace F-S801	5	1	1	7
SCMilliken-Dewey	D30	6	2	4	12
MNGPDuluth	EU33Boiler#3	1	7	6	14
TNInvistaChattanooga	EU003-Vaporizer#2	12	3	5	20
MEFPLEnergyWyman	Unit#5	2	6	12	20

Liquid Source by Source Approach Limits

Liquid Boilers	Proposed MACT Limit	Source Approach Limit	Proposed New Source MACT	Source-based Approach New Source MACT
Mercury (Hg)	4E-06	5E-06	3E-07	2E-07
Hydrogen Chloride (HCl)	9E-04	1E-03	4E-04	1E-04
Particulate Matter (filterable)	0.004	0.2	0.002	0.01

No fuel variability data available.

Gas 2 Source by Source Floor Boilers

FacilityID	CombustorID_common	Hg Rank	HCl Rank	PM Rank	Sum
INTateLyleSagamore	21B501	2	1	2	5
SCBMWManufacturingCo	HB03	1	4	1	6
MDSeverstalSparrows	1BLR(No.1Boiler)	3	2	3	8
WVMountainStateCarbonFollansbee	S1	4	3	4	11

Only 4 boilers with data available for all 3 pollutants, so all boilers were in floor.
No fuel variability data available.

Gas 2 Source by Source Approach Limits

Gas 2 Boilers	Proposed MACT Limit	Source Approach Limit	Proposed New Source MACT	Source-based Approach New Source MACT
Mercury (Hg)	2E-07	7E-06	2E-07	3E-07
Hydrogen Chloride (HCl)	3E-06	0.003	3E-06	4E-04
Particulate Matter (filterable)	0.05	0.01	0.003	0.005

Additional Comments on Boiler MACT Pollutant by Pollutant Approach and Effects of Multiple Emissions Controls

The proposed MACT standards for industrial boilers and process heaters are based on pollutant-by-pollutant analyses that rely on a different set of best performing sources for each separate HAP standard. The result is a set of standards that reflect the performance of a hypothetical set of non-existent best performing sources that simultaneously achieve the greatest emission reductions for each HAP or surrogate rather than the actual performance of one or more real sources with a specific set of emissions controls. The purpose of this review is to evaluate if the limits being considered for Boiler MACT would, in some cases, necessitate installation of combinations of emission controls that may have adverse effects on each other. In other words, the presence of one control technology could prevent a second control technology from operating at optimum performance. In many cases, the installation of additional controls will also result in increased emissions of criteria pollutants and greenhouse gases (GHG).

The table below summarizes the control interactions discussed in this document.

Control Device	Interactions and Concerns with Additional Controls
CO Catalyst following other control devices for reducing CO and organic HAPs	<ul style="list-style-type: none"> • For solid fuels, the CO catalyst must be placed after other controls removing particulate and sulfur to avoid poisoning catalyst and converting sulfur dioxide to SO₃. Since higher temperatures are necessary to control HAPs than CO, this will likely require reheating of flue gas using additional fossil fuel in order to achieve the proper catalyst operating temperature, resulting in additional emissions of criteria pollutants and GHG. • Use of a catalyst will result in conversion of NO to NO₂, which will adversely affect compliance with NO₂ NAAQS.
Sorbent injection to control HCl in boilers equipped with dry ESPs	Presence of SO ₃ in flue gas improves PM collection efficiency of ESPs by lowering ash resistivity and also improves dioxin capture. If sorbent injection is used prior to the ESP for acid gas control to achieve Boiler MACT HCl limits, the sorbent will also capture SO ₃ and result in higher PM and dioxin emissions.
CO catalyst followed by carbon injection	CO Catalyst will oxidize fuel sulfur to SO ₃ , which inhibits the ability of activated carbon to adsorb mercury.
CO versus NOx control	Reducing NOx emissions will result in higher CO emissions, reducing CO emissions will result in higher NOx emissions.
Retrofit installation of multiple control devices	<ul style="list-style-type: none"> • Adding multiple control devices to a boiler will increase the pressure drop through the system and require additional electricity to run the system, resulting in reduced boiler efficiency and additional emissions of criteria pollutants and GHG. • Retrofit installation of multiple controls could enhance the conditions that favor formation of dioxin.
Sorbent injection prior to PM control device	<ul style="list-style-type: none"> • Injection of sorbent to control HAPs prior to a PM control device will increase PM emissions over baseline. • Flyash may no longer be eligible for re-use and may have to be landfilled.

1. CO Catalyst operation vs. NO₂ and GHG emissions

CO oxidation catalysts are likely to be deactivated by certain metals that are present in the flue gas produced from the combustion of solid fuels. These metals may poison the catalyst or mask the active sites on the catalyst material, rendering them ineffective. In addition, oxidation catalysts are very efficient at converting SO₂ to SO₃, which would have a detrimental effect on downstream heat recovery surfaces, and could produce a visible sulfuric acid plume. Therefore, the oxidation catalyst would have to be placed downstream of the particulate controls and SO₂/acid gas scrubbers. Note that emissions of NO will also be oxidized to NO₂, which may adversely affect a source's compliance with the NO₂ NAAQS.

The flue gas temperature leaving particulate and acid gas control devices is typically well below the minimum effective operating temperature of the oxidation catalyst. While CO catalysts are effective at oxidizing CO at temperatures of 450-750°F, experience has shown that they need to be operated at much higher operating temperatures to actually achieve volatile HAP control (600-750°F). In order to reduce HAPs and CO, it would therefore be necessary to install a duct burner to reheat the flue gas by several hundred degrees to the necessary temperature. The additional fossil fuel that would be consumed by the duct burner would produce a dramatic decrease in the overall boiler efficiency. The duct burner would also produce increased emissions of GHG and criteria pollutants such as NO_x, SO₂, and particulate.

2. Acid Gas Removal vs. Particulate and Dioxin Control

The presence of SO₃ in flue gas has been shown to significantly improve the collection efficiency of electrostatic precipitators (ESP) by lowering the resistivity of the fly ash. Since most of the chlorinated dioxins are attached to the particulate matter, the dioxin capture in the ESP would also be enhanced by the presence of SO₃. However, a likely strategy for controlling HCl emissions (also required by Boiler MACT) is to inject sorbent to achieve acid gas control. These sorbents would also remove SO₃ from the flue gas, which results in higher resistivity of the fly ash, and reduced ESP collection efficiency. Therefore, sorbent injection for HCl control could negatively impact the effectiveness of dioxin controls for boilers burning sulfur-containing fuels.

3. Effect of Fuel Sulfur and Chloride on Mercury and HCl Emissions Control

Fuels with high sulfur or chloride contents form oxidized forms of mercury which are more easily captured in particulate control devices and scrubbers. Boilers burning fuels with low sulfur and chloride contents emit higher fractions of mercury in its elemental form, which is harder to capture. When burning fuels containing mercury with fuels containing sulfur (e.g., biomass with TDF, oil, or coal), mercuric sulfate is formed, which is a particulate and can be captured in a fabric filter or electrostatic precipitator. However, when fuels such as biomass and natural gas with low mercury contents are burned without sulfur-containing fuels, elemental mercury is the primary emission and is not captured in a fabric filter.

A primary control for Hg emissions involves the injection of activated carbon into the flue gas. The activated carbon oxidizes the mercury on the active sites on the carbon particles. The oxidized form of Hg can then either be recovered by the particulate control equipment, or by a scrubber (oxidized Hg is soluble). The oxidation reactions only occur at temperatures below about 350°F.

The use of activated carbon injection for Hg control is negatively affected by the presence of sulfur trioxide (SO₃). While the majority of the sulfur in fuel is converted to SO₂, a small amount is converted to SO₃. SO₃ occupies the active sites on the carbon, taking away those sites from the Hg. Even a few parts per million of SO₃ can have a significant negative impact on the Hg removal that is achieved by activated carbon injection. Additionally, other control devices, such as CO oxidation catalyst or SCR NO_x reduction catalyst, will convert an additional percentage of the SO₂ to SO₃, resulting in reduced Hg removal.

There is a large body of research which has documented that during combustion there is a complex interaction between fuel chlorine, alkali metal, and sulfur content that determines the amount of hydrochloric acid that is finally produced. When fuels containing chlorine and alkali metals are burned, HCl and alkali chlorides are formed. During such combustion, the ratio of HCl and alkali chloride is determined primarily by the combustion temperature. Higher combustion temperatures generally cause lower HCl formation. However, when fuel sulfur is converted to SO₂ during combustion, it reacts with alkali chloride to release HCl.

Activated carbon injection is not as effective on units firing solid fuels with low levels of halogenated compounds. The solution on these units has been to inject a brominated compound with the carbon. Units equipped with scrubbers capture the resulting oxidized Hg and any excess bromine. Since the corrosivity of HBr is much greater than that of HCl, it is likely that HBr will create problems for the structural materials associated with the scrubber.

4. Conflict of Lower CO vs. Higher NO_x and other Pollutants

The minimization of excess oxygen in boiler applications is a key feature for maximizing boiler efficiency. A boiler's efficiency is affected by the amount of combustion air that is present, and the difference between the ambient temperature and the stack exhaust temperature. The more air that is heated up through the combustion process, the more heat is lost to the atmosphere, causing the boiler to be less efficient. A less efficient boiler will require more fuel to be fired to produce a given amount of steam, resulting in higher operating costs and higher GHG emissions.

Minimizing the level of excess oxygen is a primary strategy for reducing NO_x emissions from a boiler. The NO_x formation mechanisms are dependent upon the temperatures in the flame zone, and the amount of nitrogen in the fuel. Reducing the level of excess oxygen reduces the adiabatic flame temperature, which reduces the rate at which the

nitrogen in the combustion air and fuel forms NO_x. Consequently, when low oxygen levels are maintained in the combustion air, less thermal NO_x is produced. Similarly, if there is less oxygen present, nitrogen is less likely to be oxidized (and more likely to form diatomic nitrogen). This reduces both the amount of thermal NO_x, and the fuel NO_x (NO_x that is formed by the release of fuel-bound nitrogen). Therefore, increasing the level of excess oxygen to reduce the CO level will result in higher NO_x emissions.

Low NO_x burner designs for gas-fired boiler applications manipulate the stoichiometry within the flame to minimize NO_x formation. These designs establish a fuel-rich zone for the initial phase of combustion, and then add air at a later stage in the outer regions of the flame. In the initial phase, there is not sufficient oxygen available to form significant amounts of NO_x, and in the secondary phase, the flame is much cooler, which also inhibits NO_x formation. However, these burners often operate with CO emissions up to 10 ppmvd in the upper part of the load range. At mid loads, the CO begins to increase near 50 ppmvd, and at low loads, it may exceed 100 ppmvd. These low-NO_x burners will not be able to achieve CO emissions as low as 2 ppmvd. Drawbacks to the use of CO catalysts to achieve these ultra low CO levels were discussed above, and API has submitted extensive comments on why ultra low CO levels are not necessary to achieve low HAP levels.

Data reviewed by the National Council of Air and Stream Improvement for biomass boilers indicates that boilers with higher carbon content in their fly ash will achieve some mercury and acid gas control. Operation of boilers under conditions meant to minimize CO will reduce the carbon content of the fly ash and reduce the inherent minimization of mercury and HCl.

5. Loss of Boiler Efficiency due to Installation of Emissions Controls, and Implications for PSD and GHG Increases

Boiler efficiency may be defined in a number of ways, but it is essentially the net amount of energy that may be extracted from the process, as a fraction of the gross energy input. There are a number of ways in which emission controls produce a negative impact on boiler efficiency. The most common of these is the increased backpressure created by the addition of control technologies that lie in the path of the flue gas. These include catalyst beds (e.g., for CO or NO_x control), and baghouses (for particulate control). To overcome the increased backpressure, the combustion air fan requires more power to deliver the same amount of air. Thus, more energy is required to produce the same amount of steam, resulting in higher fuel consumption, and increases in emissions of GHG and other combustion-related pollutants.

Similarly, pollutant controls for acid gas, mercury, or dioxins involve the injection of chemicals into the flue gas stream. The injection equipment consumes electricity that reduces efficiency. Some of these technologies require injection of a wet sorbent, for which water is the carrier fluid. The water vaporizes, and in doing so acts as a heat sink, and decreases the boiler efficiency. As a result, more energy is required to produce the

same amount of steam, again resulting in higher fuel consumption and increases in emissions of GHG and other combustion-related pollutants.

As stated previously, CO oxidation catalysts require a specific temperature window to operate effectively. Due to space and operational concerns, many boilers would have to install oxidation catalyst downstream of their existing pollution control equipment. In these cases, a duct burner will be required to reheat the flue gas. The additional fuel used would increase emissions of GHG, and other combustion-related PSD pollutants.

The use of activated carbon for Hg removal may be problematic for boilers equipped with an ESP. The presence of SO₃ is often critical to the successful operation of an ESP. Therefore, adding chemicals to remove the SO₃ in the flue gas will result in less particulate control for the ESP. The increased carbon in the particulate has also been shown to alter the resistivity of the fly ash, causing arcing in the ESP, and reducing the overall control efficiency. If the boiler is equipped with a hot-side ESP for particulate control, carbon injection may not successfully remove Hg because the flue gas temperature in the ESP is too high for Hg oxidation to have occurred (>350°F).

Injection of activated carbon for Hg control has a number of ancillary adverse environmental impacts. The increased amount of carbon in the fly ash causes it to be unsuitable for use in other applications (e.g., cement), so a facility that has an activated carbon injection system for Hg control will be required to send its fly ash to a landfill. The carbon that is injected into the flue gas also represents and increase in the inlet loading to the particulate control device. It may be necessary to install additional particulate control equipment (such as a fabric filter) downstream of the existing particulate control device to adequately control emissions. Therefore, a unit that met the MACT PM emission limit could still have to install additional PM control equipment to offset the effect of the Hg control strategy.

In addition, as more emission controls are added, they tend to increase the backpressure of moving the flue gas through the system, and out the stack. The increased backpressure results in less gas volume flow for a given fan capacity. Boilers that add multiple emission controls will either have to accept a reduction in the rated steam production capacity, or will have to increase their fuel usage and possibly fan capacity to produce the same amount of steam, further reducing their efficiency.

Many boilers are located in boilerhouses that have little available space for additional controls. Retrofit of new controls on these boilers may require major structural changes to the buildings in which they are located. In many cases, the flue gas leaving the boiler must be diverted to a piece of control equipment located to one side (or even at elevation), and then ducted back to the original flue gas path. The additional ducting further increases the backpressure on the boiler.

Chlorinated dioxins are formed in boilers as a result of reactions between chlorine/chlorinated compounds and products of incomplete combustion in a temperature range from 750°F down to 400°F. One strategy for controlling dioxin emissions is to

minimize the time that the flue gas occupies this temperature window. Adding additional control devices may lengthen the amount of time gases spend in this temperature window and increase the opportunity for dioxin formation. In addition, retrofit of pollution controls could adversely affect the flow patterns in the duct, and the resulting poor mixing of the combustion gases could also contribute to dioxin formation.

TAB 3

HBCA Crosswalk

The numbered questions are the Specific Requests for Comments/Data questions from the “HBCA Comments Requested 5-10” document.

The bulleted responses (blue font) are from the “AFPA Boiler MACT Comments 08-23-10” document, with page numbers included for reference.

- 1) Peak short-term emissions of HCl from boilers – Note: comment/data is not specifically requested, but this is a point raised in the p. 132 lead-in, associated with EPA concerns about acute exposure
 - Peak short term emissions can be estimated using the maximum hourly fuel use and either a 95th percentile of stack test or fuel analysis data. [pg. 169]
 - HCl is typically an acute exposure concern, but the chronic RfC is typically the limiting factor in exposure assessments. [pg. 154]
 - Once acid gases are emitted from a stack, they have a short life in the atmosphere, due to high solubility and reactivity and concentrations decrease rapidly with distance from the source. [pg. 149]

- 2) Facility-specific information: emissions, plant configurations, and fence-line characteristics. Needed to enable EPA to develop model plants for the 11 subcategories, in order to conduct dispersion modeling
 - A health protective HBEL under CAA 112(d)(4) could take a number of forms. For example, a tiered approach could be developed where a conservative look-up table provides HCl equivalent emission rate thresholds for various source-receptor combinations. If the look-up table is not viable, then site-specific modeling following established U.S. EPA risk assessment guidance could be performed to establish an appropriate HBEL. For example, detailed dispersion modeling using source specific stack parameters, distance to fenceline, and receptor locations could be used to establish appropriate HBELs. [pg. 149]
 - Example lookup tables are provided in Appendix H.

- 3) Whether appropriate to establish health-based thresholds for all acid gases, or for one acid gas as a surrogate
 - **If for all acid gases:** for each, EPA would need to be able to conclude there is a health threshold, no scientific evidence of carcinogenicity, and emission standard uses best available science to consider possibility of toxicologic interactions with the other emitted gases

 - **If for one acid gas as a surrogate:** also define the mechanism proposed to determine the appropriate surrogate

- **If for one acid gas as a surrogate:** must demonstrate, based on the knowledge of the effectiveness of scrubbers for controlling each of the acid gases, that the surrogate emission standard ensures that ambient levels of each of the other acid gases do not exceed their respective chronic health thresholds
- HCl, other acid gases and some metal HAPs, such as Mn qualify as threshold pollutants. Supporting evidence includes identification of a threshold dose below which adverse effects do not occur, lack of evidence for carcinogenicity, and consideration of toxicological interactions among acid gases and potential for additive effects. Demonstration of a common mode of action amongst the various HAPs would support the notion of applying a single 112(d)(4) standard for acid gases. [pg. 152]
 - Both acute and chronic exposure to HCl, Cl₂, and HF affect the respiratory system and the pollutants cause respiratory irritation by similar mechanisms of action. However, the primary chronic toxicity effect for HF (skeletal fluorosis) occurs at lower doses than the reported respiratory effects. Therefore, it is recommended that a combined acute HBEL for HCl, Cl₂, and HF and a combined chronic HBEL for HCl and Cl₂ be established, but a separate chronic HBEL for HF is recommended. [pg. 162]
 - HCN has a completely different mechanism of action than HCl and HF. Therefore, establishment of a single acute HBEL for HCN is recommended. Mn has a completely different mechanism of action from HCN and affects a different target organ than HCl and HF, so establishment of a separate chronic HBEL for Mn is indicated as well. [pg. 162]
- 4) Whether there would be an additive affect if individual section 112(d)(4) standards are set for each acid gas, and if so, how to simulate that affect.
- Because it is acknowledged that some of the HAPs subject to HBELs may have overlapping health effects, the concept of the Target Organ Specific Hazard Index (TOSHI) following U.S. EPA Guidance may be appropriate in some instances. The hazard index concept inherently assumes that potential health effects due to simultaneous exposure are additive. This method was applied in the 2004 Boiler MACT HBCA where the effects of Cl₂ and HCl were assumed to be additive by computing HCl toxic equivalent emissions. Adding the health effects is appropriate for the acute health effects of the primary HAP acid gases from solid fuel industrial boilers, HCl, Cl₂, and HF, and adding chronic effects of HCl and Cl₂ is also appropriate...(i.e., an HCl acid gas toxicity-weighted short-term emission rate can be defined as the emission rate of HCl + the emission rate of Cl₂ x Threshold of HCl /Threshold of Cl₂ + the emission rate of HF x Threshold of HCl /Threshold of HF). [pg. 163]
- 5) Comment on use of the hazard index (HI) approach, as described in EPA's "Guideline for the health risk assessment of chemical mixtures" and whether there are any other approaches to address such additive effects.
- With the Target Organ Specific Hazard Index (TOSHI), the potential for health consequences for various HAPs with similar types of health effects are assumed to be additive. Toxicological studies for HCl and HF indicate that they have the same mode of action. Given that HCl and HF concentrations are simultaneously present in flue gas, it may be appropriate to consider acute

and chronic effects of these two HAPs collectively in evaluating peak short term (e.g., 1-hour) and long-term (e.g., annual average) exposure concentrations. This concept could be readily incorporated by computing a toxicity weighted emission rate of HCl that accounts for HCl and HF emissions and their corresponding health effects benchmarks. We note that EPA's suggestion in the 2010 proposed rule that HF and HCN could materially contribute to health risk runs directly counter to the statement that the agency made in the preamble to the 2004 Boiler MACT Final Rule (69 FR 55244) when it stated that its research indicated that health risks from HF and HCN emissions from boilers are considered to be insignificant. [pg. 148]

- 6) Whether EPA should consider the affected sources (boilers) by themselves, or whether it should consider all HAP emissions at the facility when developing a standard.
- CAA Section 112(d)(f) does not express any intent that emissions from other types of sources at a facility or background concentrations should be considered in a cumulative fashion with emissions from permitted source. Evaluation of the acid gas impacts from all regulated boilers at a facility will, in most cases, address virtually all of the irritant gas hazard. With the possible exception of some types of chemical production and metallurgical facilities, nearly all of the industrial emissions of HCl (and other acid gases) at industrial facilities are associated with boilers. As such, computing an acid gas TOSHI associated with boiler emissions represents the acid gas risk for the entire facility. [pg. 149]
 - The language of CAA Section 112(d)(4) indicates that only the potential threshold effects from the MACT source should be considered. [pg. 165]
- 7) How to consider the potential interactions of acid gases with other emitted respiratory irritants at these types of locations. Actual data requested, or, if no data is available, then comment on whether such a demo could be made using a bounding calculation.
- The comments discuss cumulative exposure concerns for each compound. As HCl, Cl₂, and HF affect the same acute target organ system and HCl and Cl₂ affect the same chronic target organ system, the effects of these compounds could potentially be additive. Because HCN has a different mode of action than HCl, Cl₂, and HF, its effects would not be additive. [pp. 152-158]
- 8) Whether EPA should consider HAP emissions from neighboring facilities, and if so, what the geographic scope of such consideration should be. EPA notes consideration also could be based on "average" or "high end" ambient levels of respiratory irritants seen in recent monitoring data or modeled estimates, since site-specific data might not be available on all respiratory irritants.
- Once acid gases are emitted from a stack, they have a short atmospheric half-life due to high solubility and reactivity, and as such, concentrations decrease rapidly with distance from a source. Thus, it would be a very unusual circumstance if impacts from multiple facilities would overlap in a cumulative layer cake fashion. This is confirmed by ambient measurement studies in source-rich urban areas, which have shown that HCl concentrations are very low, typically less than 5% of the 20 µg/m³ Reference Concentration (RfC). In coastal areas, most of the airborne HCl is attributable to the contribution of air-sea interaction. Natural coastal deposition of HCl is also reflected in data from EPA's National Acid Deposition Network, which indicates that there is no spatial correlation between deposition and major combustion sources. [pg. 148]

- Even if this were applicable under CAA 112(d)(4), dispersion modeling shows that maximum impact short-term and annual average concentrations of non-reactive pollutants associated with boiler emissions generally occur within 1 km and fall off rapidly with distance. This limits the range at which appreciable concentrations of these gases are transported. Because acid gases are highly soluble, react with ammonia the ambient air, and are rapidly deposited through wet and dry deposition, the range of ground-level concentrations is much more limited than for non-reactive pollutants. Therefore, unless there are boilers at an immediately adjacent facility, it is highly unlikely that impacts would overlap to the extent that it would materially affect the HBEL. [pg. 166]
- There is no evidence that background concentrations of HCl are at appreciable levels from a public health perspective. A limited number of ambient measurement studies have shown that ambient concentrations, even in highly urbanized areas, are very low. A long-term measurement study of ambient acid gas concentrations in New York City (Bari et al 2003) indicates an average of about 0.5 $\mu\text{g}/\text{m}^3$, which is only 2.5% of the chronic RfC (Reference Concentration). Thus, there is little basis for adjusting the HBEL to adjust for background concentrations of acid HAP gases. A study of HCl emissions and impacts from utility boilers (Harkov 1999) concludes that, even in the vicinity of major sources of HCl, ambient concentrations are very low. [pp. 166-167]

9) How to appropriately simulate all reasonable facility/exposure situations (e.g., using worst-case facility emissions coupled with worst-case population proximity, average emissions and population, or 90th percentile emissions and population). Simulation could be based on sequential examination of the facilities or could use screening or bounding methodologies. Seeking comment on these and other approaches.

- Realistic, yet conservative, HAP emission rate assumptions should be used in determining compliance with HBELs under 112(d)(4) rather than across-the-board worst-case assumptions because using worst-case emission assumptions will materially overestimate both chronic and acute risk. Although care must be taken in estimating emissions, for the HAPs under consideration, standardized methods could be established to develop suitably conservative emission estimates based either on fuel data or emission tests. A conservative analysis would assume maximum emission rates of each pollutant occur simultaneously at worst-case dispersion conditions. [pp. 168-169]
- As previously stated, we do not believe it is appropriate to consider sources other than the facility's boilers in the analysis.

10) Comments are sought on all conclusions in this section, which would include its final segment discussing co-benefits.

- EPA asserts that Congress acknowledged the possibility that MACT standards would result in collateral non-HAP emissions reductions and, therefore, that "the Agency may consider such benefits as a factor in determining whether to exercise its discretion under section 112(d)(4)."

Consideration of non-HAP collateral emissions reductions is impermissible in setting MACT standards. Section 112(d)(2) provides an express list of factors that EPA may consider in setting § 112(d) standards – including “the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements.” This list does not allow consideration of non-HAP air quality benefits, such as the co-benefits of reducing PM2.5 emissions. This restriction is an unambiguous command that EPA should not consider non-HAP air quality benefits in setting standards under § 112(d). More fundamentally, the CAA clearly distinguishes regulation of HAPs from criteria pollutants. NAAQS are already in place for all relevant criteria pollutants, so only HAPs should be considered under MACT. In terms of biomass, there are no associated SO₂ reductions to claim. [pp. 145-147]

I. Health-Based Emission Limits Should be Incorporated into the Rule

A. Introduction

In the Industrial Boiler MACT proposal, EPA acknowledges its authority under § 112(d)(4) to establish a health-based emissions limitation (“HBEL”) for threshold pollutants in lieu of a MACT emissions limitation. However, the Agency proposes not to establish any HBEL “[g]iven the limitations of the currently available information (*i.e.*, the HAP mix where boilers are located, and the cumulative health impacts from co-located sources), the environmental effects of HCl, and the significant co-benefits of setting a conventional MACT standard for HCl.” Draft at 140. Nevertheless, EPA asks for comment on a wide range of issues related to the justification for setting HBELs and the method by which they should be set.

i. There are several compelling reasons for setting HBELs for HCl and manganese in the Industrial Boiler MACT.

Section 112(d)(4) is a powerful tool that enables EPA to match the stringency of a HAP emissions limitation to the level determined necessary to fully protect human health. As a result, the standard is no more stringent and no less stringent than needed to get the job done.

As EPA explains in the proposed rule, § 112(d) generally requires MACT emissions limitations to be set at a level that reflects the performance of the better performing sources in the given source category or subcategory. Section 112(d)(4) provides an alternative to this basic approach for pollutants for which a health threshold has been established. For such pollutants, § 112(d)(4) authorizes EPA to “consider such threshold levels, with an ample margin of safety, when establishing emission standards” under § 112(d).

The default technology-based method of setting MACT standards is a cookie cutter approach that can and does result in HAP emissions limitations that go well beyond what is needed to protect the public from HAP emissions. The clear purpose of § 112(d)(4) is to prevent this from happening. The legislative history of § 112(d)(4) is abundantly clear on this point. In formulating § 112(d)(4), Congress recognized that, “For some pollutants a MACT emissions limitation may be far more stringent than is necessary to protect public health and the environment.”¹ As a result, § 112(d)(4) was provided as an alternative standard setting mechanism for HAPs “where health

¹ S. Rep. No. 101-228 (1990) at 171.

thresholds are well-established ... and the pollutant presents no risk of other adverse health effects, including cancer....”²

When the first Industrial Boiler MACT was promulgated in 2004, it included health-based emissions limitations for HCl and manganese. Under both of these standards, a site-specific risk assessment had to be conducted to prove that emissions from the site were low enough that human health would be protected, with an ample margin of safety. Actual emissions testing of all affected emissions points was required to verify the emissions rates used in the risk assessment. All relevant site parameters were required to be recorded in the site’s Title V operating permit to provide assurance over time that public health would be adequately protected.³

In short, these health-based emissions limitations were rigorous standards that demanded accountability. They were a winner for the Agency and the public because public health would have been protected with an ample margin of safety. At the same time these standards were a winner for affected sources because the standards would not have blindly required emissions to be reduced far below the levels needed to assure that the public was protected. It was estimated at the time that these health-based standards would have saved over \$2 billion in compliance costs, as compared to the technology-based standards that otherwise would have applied.

The first Industrial Boiler MACT was overturned by the D.C. Circuit, but on grounds unrelated to the health-based emissions limitations. Notably, in defending the health-based emissions limitations, the Department of Justice concluded that, “Environmental Petitioners’ claim that the statute precludes EPA from establishing alternative standards for threshold pollutants (which petitioners mischaracterize as an exemption) is meritless.”⁴

Giving full consideration to the use of health-based standards is particularly important in the wake of the series of decisions from the D.C. Circuit that have progressively limited EPA’s discretion to make common-sense decisions when setting MACT standards under § 112. EPA’s authority to set health-based standards under § 112(d)(4) is unassailable. For appropriate HAPs and where the relevant facts substantiate its use, EPA can set health-based standards with full confidence that they will survive judicial review.

² *Id.*

³ *See, generally*, 69 Fed. Reg. 55218, 55227-55228 (Sept. 13, 2004).

⁴ Final Brief For Respondent United States Environmental Protection Agency, D.C. Cir. Case No. 04-1385 (Dec. 4, 2006) at 53-54.

ii. In light of the exceedingly stringent proposed MACT emissions limitations for HCl and metals (including manganese), it is arbitrary and capricious for EPA not to develop HBELs for these pollutants.

While EPA has discretion in deciding whether to set HBELs under § 112(d)(4), the Agency cannot be arbitrary and capricious in making such a decision. The proposed HCl and PM emissions limitations for all types of industrial boilers are exceedingly stringent. Affected sources will have to spend tens of millions of dollars in order to meet the standards and, as even EPA predicts, a significant number of existing units simply will not be able to meet the standards and will be required to shut down. In addition, the work that EPA performed in support of the HBELs included in the 2004 rule demonstrates that the proposed standards are far more stringent than needed to assure the protection of public health with an ample margin of safety. The costs and burdens on affected sources and the degree of control needed to provide adequate health and environmental protection are both key factors that should be considered by the Agency in deciding whether to adopt HBELs in the Industrial Boiler MACT.

In the proposed rule, EPA completely ignores these factors. The Agency's discussion of HBELs includes no assessment whatsoever of the costs that might be avoided by adopting HBELs for HCl or manganese. As to potential effects on health or environment, EPA simply raises implementation questions and asserts a lack of information to resolve the questions. Such an approach is facially inadequate in light of the extensive policy, scientific, and technical assessment developed in support of the HBELs in the 2004 Industrial Boiler MACT standard.

In short, EPA's failure to fully consider key factors that are relevant to making an informed decision as to whether HBELs should be adopted is arbitrary and capricious.

iii. EPA has failed to provide a rational basis for ignoring and contradicting the findings made in support of the HBELs included in the 2004 Industrial Boiler MACT rule.

EPA asserts in the proposed rule that its decision not to propose HBELs "is not contrary to EPA's prior decisions where we found it appropriate to exercise the discretion to invoke the authority in section 112(d)(4) for HCl, since the circumstances in this case differ from previous considerations." Draft at 140. In contrast to "other source categories for which EPA has exercised its authority under section 112(d)(4)," EPA explains that boilers and process heaters are more likely to be co-located with other HAP sources and are often located in heavily populated urban areas where many other HAP sources exist. *Id.* at 140-141. The Agency concludes that, "These factors make

an analysis of the health impact of emissions from these sources on the exposed population significantly more complex than for many other source categories, and therefore make it more difficult to establish an ample margin of safety.” *Id.* at 141.

These assertions are astonishing in that they fail to reflect the fact that the industrial boiler source category is one of the few categories where EPA has previously “found it appropriate to exercise the discretion to invoke the authority in section 112(d)(4).” As a result, EPA has already drawn conclusions as to how to deal with possible co-location with other HAP sources and how to appropriately consider HAP emissions from other nearby sources. These are not issues of first impression generally or in the specific context of industrial boilers and process heaters. The questions have been asked and answered in the context of notice and comment rulemaking for the industrial boiler and process heater source category.

Thus, EPA is mistaken in asserting that its decision not to propose HBELs is “not contrary to EPA’s prior decisions.” The decision not to propose HBELs is flatly inconsistent with EPA’s prior determination that HBELs are appropriate and justified for the industrial boiler and process heater source category. EPA’s failure to acknowledge its prior determination and failure to explain why it has raised as questions issues that previously were resolved (such as how to consider co-located HAP sources and nearby HAP sources) render its decision not to propose HBELs arbitrary and capricious.

iv. The co-benefits of collateral non-HAP emissions reductions cannot be used to justify a decision not to adopt HBELs.

EPA explains in the proposal that “it considered the fact that setting conventional MACT standards for HCl as well as PM (as a surrogate for metals including manganese) would result in significant reductions in emissions of other pollutants, most notably SO₂, non-condensable PM, and other non-HAP acid gases (e.g., hydrogen bromide) and would likely also result in additional reductions in emissions of mercury and other HAP metals (e.g., selenium).” Draft at 139. The Agency notes in particular that its belief that the rule will result in the reduction of up to 340,000 tons per year of SO₂, which it characterizes as “substantial reductions with substantial health benefits.” *Id.* EPA asserts that Congress acknowledged the possibility that MACT standards would result in collateral non-HAP emissions reductions and, therefore, that “the Agency may consider such benefits as a factor in determining whether to exercise its discretion under section 112(d)(4).” *Id.* at 140.

EPA is mistaken. Consideration of non-HAP collateral emissions reductions is impermissible in setting MACT standards. Section 112(d)(2) provides an express list of

factors that EPA may consider in setting § 112(d) standards – including “the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements.” This list does not allow consideration of non-HAP air quality benefits, such as the co-benefits of reducing PM_{2.5} emissions. This restriction is an unambiguous command that EPA should not consider non-HAP air quality benefits in setting standards under § 112(d).

More fundamentally, the CAA clearly distinguishes regulation of HAPs from criteria pollutants. Section 112 “prohibits the addition of any criteria pollutant to ‘the list’ of HAPs, with a single exception for certain precursor pollutants not relevant to this case. This prohibition extends of necessity not only to rules that literally list a criteria pollutant as a HAP but also to any rule that in effect treats a criteria pollutant as a HAP.” *National Lime Ass’n v. U.S. EPA*, 233 F.3d 625, 638 (D.C. Cir. 2000).

By basing its rejection of the health-based approach for Boiler MACT on the co-benefits of criteria pollutant reduction, EPA is “in effect” unlawfully treating a criteria pollutant as a HAP. EPA’s action here is not the simple use of a criteria pollutant as a surrogate for a HAP, which courts have upheld as long as EPA proves the scientific underpinning of the surrogate relationship. *Id.* Rather, EPA argues directly that it is the reduction in criteria pollutant emissions that causes it to reject the health-based approach. This EPA cannot do.⁵

EPA’s sole support for its “collateral benefits” theory is legislative history -- the Senate Report that accompanied Senate Bill 1630 in 1989. But the D.C. Circuit rejected precisely the same argument in *National Lime*. In that case, EPA supported its argument regarding particulate matter as a surrogate for HAP metals by referring to the same Senate Report discussed above. The court rejected EPA’s argument, noting that the Senate Report referred to an earlier version of the statute that was ultimately not enacted, and hence was irrelevant:

The final statute, by contrast, unqualifiedly prohibits listing a criteria pollutant as a HAP, that is, regardless of the reason. Because the comment in the Senate Report regarding PM and metals was made before the blanket prohibition upon regulating PM as a HAP was added to the statute, the report is irrelevant to our construction of 7412(b)(2) as enacted.

⁵ Moreover, criteria pollutants from boilers are strictly regulated elsewhere under the Clean Air Act through New Source Performance Standards and other provisions of the Act.

National Lime at 638. Similarly here, EPA cannot use the language of a Senate Report that did not reflect the language of the statute as enacted to support its co-benefits theory and rejection of the health-based approach.

Moreover, even if it were relevant, the language in the Senate Report cited by EPA appears to address only area-source GACT standards under Section 112(d)(5), and therefore is not relevant to interpretation of MACT standards under Section 112(d)(2) or the health-based alternative under Section 112(d)(4). And, in the final analysis, “it is the statute, and not the Committee Report, which is the authoritative expression of the law.” *City of Chicago v. Env. Defense Fund*, 511 U.S. 328, 337 (1994). Here, the statute clearly provides that MACT standards may address only HAPs, not criteria pollutants. See *National Lime Ass’n* at 638.

But, even if it were not unambiguously prohibited, consideration of non-HAP air quality benefits under § 112(d)(4) would be unreasonable. National Ambient Air Quality Standards (“NAAQS”) are in place for all relevant pollutants, including ozone, SO₂, and PM. A MACT standard is a very imprecise tool for helping to attain and maintain such NAAQS because it imposes across-the-board requirements in circumstances where tailored solutions are needed. Each area has its own unique mix of sources and its own particular needs in terms of what reductions are needed and where such reductions should be achieved. SIP-based air quality programs provide the needed flexibility to design a program that effectively addresses local air quality needs. MACT standards are an unreasonably blunt instrument for dealing with non-HAP air quality issues.

Lastly, emissions of SO₂ from unit burning biomass are very low when compared to other fuels. The AP-42 emission factor for wood combustion is 0.025 lb/mmBTU and AF&PA’s experience with biomass units is that SO₂ emissions are routinely much lower than this emission factor. NCASI also has completed research (NCASI Technical Bulletin 640, Sulfur Capture in Combination Bark Boilers, and Special Report 09-02, Sulfur Capture in Combination Bark Boilers – An Update) that demonstrates that even when sulfur containing fuels are burned with biomass, a significant portion of sulfur is captured by the alkaline wood ash.⁶ Thus, even if EPA could consider co-benefits of non-HAP reductions in developing standards under § 112, the nominal co-benefits of reducing SO₂ emissions from biomass units would not outweigh the other advantages of establishing a health-based emissions limitation for HCl.

⁶ These 2 documents are available to NCASI members and can be made available to EPA staff upon request.

B. Technical Assessment

The purpose of this provision of the CAA is to allow EPA to focus more stringent MACT controls on non-threshold HAPs (those that could pose some level of adverse health effects at any non-zero concentration) than HAPs with thresholds, for which the level of incremental concentration from a source could pose potential health consequences. By providing a special provision for threshold HAPs that likely pose little or no potential adverse health effects, the CAA allows EPA to consider limiting the burden on regulated sources with HAP emissions that pose little or no health hazard. Some of the HAPs targeted by the Boiler MACT, such as the acid gases, hydrogen chloride (HCl), chlorine (Cl₂), hydrogen fluoride (HF) and hydrogen cyanide (HCN), as well as metals such as manganese (Mn) meet the requirements for classification as threshold pollutants. Therefore, if the associated incremental ambient concentrations of these threshold pollutants as a result of emissions from a regulated source are sufficiently low, they would qualify for alternative MACT provisions under 112(d)(4).

Section 112(d)(4) does not specify how EPA should “consider threshold levels, with an ample margin of safety” in developing alternative MACT requirements. In the Pulp and Paper MACT and in the 2004 Boiler MACT, EPA maintained that that application of this CAA section is met if the incremental exposure concentration from subject MACT sources at a facility is less than established health effects thresholds. The “margin of safety” is built into the means by which:

- Emissions and associated exposure concentrations are characterized;
- Health effects thresholds are derived; and
- Dispersion models estimate exposure.

CAA Section 112(d)(4) does not apply to HAPs from other source categories at a facility or background concentrations, as the CAA explicitly directs EPA to address residual issues subsequent to the initial MACT setting process under CAA Section 112(f)(c).

HCl typically comprises about 80% or more of acid gas emissions from boilers, with 20% or less comprised of HF. In terms of developing Health-Based Emission Limits (HBEL), it is appropriate to consider EPA’s concept of Target Organ Specific Hazard Index (TOSHI), where the potential for health consequences for various HAPs with similar types of health effects are assumed to be additive. Toxicological studies for HCl and HF indicate that they have the same mode of action as irritant acid gases. Given that HCl and HF concentrations are simultaneously present in flue gas, it may be appropriate to consider acute and chronic effects of these two HAPs collectively in evaluating peak short term (e.g., 1-hour) and long-term (e.g., annual average) exposure concentrations. This concept could be readily incorporated by computing a toxicity-weighted emission rate of HCl that accounts for HCl and HF emissions and their corresponding health effects benchmarks.

We noted that EPA’s suggestion in the 2010 proposed rule that HF and HCN could materially contribute to health risk runs directly counter to the following statement that

the agency made in the preamble to the 2004 Boiler MACT Final Rule (69 FR 55244) when it stated that its research indicated that health risks from HF and HCN emissions from boilers are considered to be insignificant.

“Facilities attempting to utilize the health-based compliance alternative for HCl will not be required to evaluate emissions of other inorganic HAP except for chlorine. We conducted an assessment of boiler emissions and determined that, of the acid gas HAP controlled by scrubbing technology, chlorine is responsible for the great majority of risk and HCl is responsible for the next largest portion of the total risk. The contributions of other HAP, including hydrogen fluoride, to the total risk were negligible. Therefore, facilities attempting to demonstrate eligibility for the health-based compliance alternative for HCl, either by conducting a lookup table analysis or by conducting a site specific compliance demonstration, must include emission rates of chlorine and HCl from their boilers. We do not expect hydrogen cyanide emissions from boilers covered under the final rule.”

If EPA has conducted new research that refutes this former finding, it is imperative that this research be brought to light.

As noted, the language of CAA Section 112(d)(f) does not express any intent that emissions from other types of sources at a facility or background concentrations should be considered in a cumulative fashion with emissions from permitted source. Evaluation of the acid gas impacts from all regulated boilers at a facility will, in most cases, address virtually all of the irritant gas hazard. With the possible exception of some types of chemical production and metallurgical facilities, nearly all of the industrial emissions of HCl (and other acid gases) at industrial facilities are associated with boilers. As such, computing an acid gas TOSHI associated with boiler emissions only under CAA 112(d)(4) represents the acid gas risk for the entire facility. Once acid gases are emitted from a stack, they have a short atmospheric half-life due to high solubility and reactivity, and as such, concentrations decrease rapidly with distance from a source. Thus, it would be a very unusual circumstance if impacts from multiple facilities would overlap in a cumulative layer cake fashion. This is confirmed by ambient measurement studies in source-rich urban areas, which have shown that HCl concentrations are very low, typically less than 5% of the 20 $\mu\text{g}/\text{m}^3$ Reference Concentration (RfC). In coastal areas, most of the airborne HCl is attributable to the contribution of air-sea interaction. Natural coastal deposition of HCl is also reflected in data from EPA’s National Acid Deposition Network, which indicates that there is no spatial correlation between deposition and major combustion sources.

A health protective HBEL under CAA 112(d)(4) could take a number of forms. For example, a tiered approach could be developed where a conservative look-up table provides HCl equivalent emission rate thresholds for various source-receptor combinations. If the look-up table is not viable, then site-specific modeling following established U.S. EPA risk assessment guidance could be performed to establish an

appropriate HBEL. For example, detailed dispersion modeling using source specific stack parameters and receptor locations could be used to establish appropriate HBELs. Variability in emissions could be addressed by consideration of variability in fuel consumption and fuel content. A robust statistical method could be applied to assure conservatism with a reasonable level of certainty, such as the 95th percentile commonly applied by EPA. Alternatively, limits for HCl and other pollutants established in air permits could be proposed for use in lieu of establishing separate HBELs.

In the proposed rulemaking, EPA concluded that the information available at this time is insufficient to establish health-based emission standards for HCl or the other acid gases. In the 2004 Boiler MACT EPA concluded that HCl was a threshold pollutant for which CAA Section 112(d)(4) should be applied and there are many other historical precedents where EPA has considered HCl a threshold pollutant. Some of those precedents include: 1) National mission Standards for Hazardous Air Pollutants: Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors (Phase I Final Replacement Standards and Phase II); Final Rule; 2) National Emission Standards For Hazardous Air Pollutants; Proposed Standards For Hazardous Air Pollutants From Chemical Recovery Combustion Sources At Kraft, Soda, Sulfite, And Stand-Alone Semichemical Pulp Mills; 3) National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry; Proposed Rule; 4) National Emission Standards for Hazardous Air Pollutants: Chlorine and Hydrochloric Acid Emissions From Chlorine Production.

Thus, the recent change in EPA's position appears not to be based on changes in the underlying scientific evidence since 2004 but rather a shift in policy. In this proposed rulemaking, EPA interprets section 112(d)(4) to allow additional factors beyond any established health threshold, such as cumulative and ecological effects, to be weighed in making a judgment whether to set a standard for a specific pollutant based on the threshold. This interpretation of the CAA represents a significant and unexplained departure from previous MACT rulemakings and from EPA's prior decision to adopt health based emissions limitation in the 2004 industrial boiler MACT rule. The Agency has made a 180 degree turn that is not supported by the record and not scientifically justified.

A. Basis for HBELs under CAA Section 112(d) in the Industrial Boiler MACT

CAA 112(d) enables EPA to establish alternative MACT standards by applying provisions such as the HBEL to avoid unnecessary regulation for HAPs that do not pose a health risk. In 2004, EPA determined that two HAPs commonly emitted from solid fuel industrial boilers, hydrogen chloride (HCl) and manganese (Mn), are threshold pollutants that do not pose a significant health risk at a potentially large proportion of

regulated sources. If it can be demonstrated that health benchmarks are met for these HAPs, emission controls for these materials are not deemed to be necessary.

Similar considerations for addressing HCl as a threshold pollutant have been included in 1) National Emission Standards for Hazardous Air Pollutants: Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors (Phase I Final Replacement Standards and Phase II); Final Rule; 2) National Emission Standards For Hazardous Air Pollutants; Proposed Standards For Hazardous Air Pollutants From Chemical Recovery Combustion Sources At Kraft, Soda, Sulfite, And Stand-Alone Semichemical Pulp Mills; 3) National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry; and 4) National Emission Standards for Hazardous Air Pollutants: Chlorine and Hydrochloric Acid Emissions From Chlorine Production. In the absence of specific scientific evidence to the contrary, it has historically been EPA's policy to classify non-carcinogenic effects as threshold effects, as demonstrated in the above rulemakings.

The logic provided by EPA in developing the 2004 HBCA was a direct interpretation of 112(d)(4). In summary:

- Hydrogen chloride is the chief acid gas HAP from solid fuel combustion and emissions are related to chloride and chlorine content in fuel. Hydrogen chloride and chlorine are threshold HAPs with associated similar effects and established Reference Concentrations (RfC), such that the combined inhalation risk of these HAPs can be considered collectively.
- Manganese is a threshold HAP metal, which is a chief risk driver for wood-fired boilers. The 2004 Boiler MACT included emission standards for Total Selected Metals (TSM), of which manganese was a component. The HBCA would exempt manganese from the TSM calculation.
- 112(d)(4) was interpreted to require that all MACT boilers (i.e., from the same MACT source category) at a single facility not significantly contribute to risk. It does not require risk evaluation of other HAPs with different types of health effects or contribution from other sources or background concentrations, as presently suggested in the proposed rule. In 2004, EPA stated the basis for this determination in response to comments that cumulative risks should be evaluated under the HBCA. EPA responded that 112(d)(4) does not indicate that a risk assessment should be undertaken, but simply that the threshold level of a particular HAP should be considered and that it is appropriate to consider cumulative risk under 112(f), which requires the evaluation of residual risk after the implementation of MACT standards. Section 112(f)(1)(c) states that EPA will address "actual health effects with respect to persons living in the vicinity of sources, any available epidemiological or other health studies, risks presented by background concentrations of hazardous air pollutants" in the residual risk assessments.

Rather than this direct interpretation of the CAA 112(d)(4) applied by EPA in 2004, the preamble to the 2010 proposed Boiler MACT repeatedly cites congressional intent, suggesting expanding the consideration of threshold level to other tangential issues such as MACT HAP controls also reducing criteria pollutant and ecological benefits of controls. Although such objectives may appear to be meritorious from an overall environmental protection perspective, there is no indication from the language of 112(d)(4) that other factors besides human health effects of specific threshold HAPs are intended to be considered.

B. Acid Gas HAPs (HCl, Cl₂, HF, HCN) and Mn Qualify Threshold HAPs with Established Thresholds

HCl, other acid gases and some metal HAPs, such as Mn qualify as threshold pollutants and, therefore, they should be considered under section 112(d)(4). Supporting evidence includes identification of a threshold dose below which adverse effects do not occur, lack of evidence for carcinogenicity and consideration of toxicological interactions among acid gases and potential for additive effects. In addition, demonstration of a common mode of action amongst the various HAPs would support the notion of applying a single 112(d)(4) standard for acid gases.

Table 1 summarizes data on threshold doses for HCl, Cl₂, hydrogen cyanide (HCN), HF, and Mn. Information supporting the existence of health effects thresholds for each HAP is provided below along with a discussion of whether the HAPs have similar modes of action.

TABLE 1: THRESHOLDS FOR ACUTE AND CHRONIC HEALTH EFFECTS

Chemical	Acute Criteria $\mu\text{g}/\text{m}^3$	Critical Acute Effect	Threshold	Chronic Criteria $\mu\text{g}/\text{m}^3$	Critical Chronic Effect	Threshold
HCl	REL=2100	Upper respiratory system, eyes	2700 (1.8 ppm) Stevens et al. 1992 Asthmatics	RfC = 20 REL = 9 (out of date)	Hyperplasia of nasal mucosa-larynx and trachea – Respiratory system	Data on chronic toxicity of HCl are very limited. A chronic threshold for respiratory effects has not been identified (Sethakumar et al. 1994), but a single dose (only) was administered to rats in the primary study and the lowest dose administered in the few other available studies is the LOAEL (40 ppm). The NOAEL for systemic toxicity in rats and mice has been determined to be 20 ppm (30,400 $\mu\text{g}/\text{m}^3$) (HSDB, 2010). For repeated dose toxicity, local irritation effects were observed in humans at 10 ppm and above in a 90-day inhalation study. Kamin (1992) reported that levels above 10 ppm (15,200 $\mu\text{g}/\text{m}^3$) lead to work impairment in humans, above 50 ppm (76,000 $\mu\text{g}/\text{m}^3$) lead to work hindrance, and above 100 ppm (152,000 $\mu\text{g}/\text{m}^3$) lead to a work environment in which work is impossible (Lehmann 1886, Matt 1889, and Lehman et al).
Cl ₂	MRL = 200	Respiratory system and eye irritation	2900 (1 ppm) Anglen 1981, D. Alessandro et al. 1986, Rotman et al. 1983, Schins et al. 2000, Shupferman et al. 1998, 2003	MRL = 0.15	Presence of phlegm, wheezing without cold, chest illness, lower fixed expiratory flow rate, nasal lesions in monkeys	290 (0.1 ppm) Klonne et al. 1987
HCN	REL = 348	Loss of coordination and loss of consciousness due to cellular hypoxia of CNS	60 ppm (68 mg/m^3) Purser, 1984, Purser et al., 1984	RfC = 3 REL = 9	CNS symptoms and thyroid effects, endocrine system, cardiovascular system	There are limited data on health effects associated with long-term inhalation of HCN. A threshold was not demonstrated in the critical study (El Ghawabi et al., 1975). Men exposed for of 5-10 years presented with CNS symptoms and thyroid effects. The lowest mean concentration recorded in three factories, 6.4 ppm (7.07 mg/m^3) is designated as a LOAEL in the El Ghawabi et al., study (1975). Chronic exposure to low concentrations of cyanide can cause neurological, respiratory, cardiovascular, and thyroid effects. But the acute effect on the CNS effects occur at lower concentrations at which portal of entry effects (respiratory) occur. A subacute inhalation NOAEL for HCN in rabbits of 0.5 ppm (Hubbs 1979, 1981)
HF	REL=240	Upper respiratory system, eyes	0.7-2.4 mg/m^3 Lund et al. 1997	REL = 14	Bone and teeth, respiratory system	1.07 mg/m^3 (1.13 $\text{mg}/\text{HF}/\text{m}^3$) Deryberry et al. (1963)
Mn	NA	NA		RfC=0.05 Rois et al. 1992	Neurobehavioral	No threshold was established in the critical study for chronic inhalation. It is believed that there should be NOAEL at low exposures, because Mn is an essential element. 0.18 mg/m^3 total Mn dust (0.066 $\text{mg}/\text{Mn}/\text{m}^3$ respirable dust). Gibbs et al. 0.2 mg/m^3 Deschamps et al. 0.21 mg/m^3 Myers et al.

1. Hydrogen Chloride (HCl)

Critical Target Organ

The critical target organ for acute toxicity of HCl is the upper respiratory system (sore throat, nasal discharge), lower respiratory system (pulmonary function, cough, chest pain), and eyes. The target organ for chronic toxicity is also the respiratory system.

Mechanism of Action

On contact with moisture, HCl dissociates almost completely. The hydrogen ions combine with water to form hydronium ions (H_3O^+), which can cleave organic molecules and cause cell death. Thus, the adverse effects associated with HCl exposure are due to direct contact irritation of tissues at the portal of entry and persistent cellular injury in the affected tissue.

Evidence of Threshold

An acute threshold has been established. A chronic threshold has not been established. However, data on chronic toxicity of HCl are very limited and all studies located in the literature have used the Lowest Observed Adverse Effect Level (LOAEL) as the lowest dose in the dosing regimen. Therefore, the failure to identify a chronic

threshold is not an indication that no threshold exists, but rather an indication that data on chronic effects from HCl are very limited. HCl is typically an acute exposure concern but the chronic RfC is usually limiting in exposure assessments. However, controlling short-term peak exposures naturally has the dual benefit of also reducing long-term exposures. In addition to the general lack of toxicological studies suggesting that HCl could be a potential carcinogen (see below), the listing of health thresholds for HCl by the Environmental Protection Agency (EPA), Agency for Toxic Substance Disease Registry (ATSDR), California EPA, and the World Health Organization in the public domain has established that HCl is a threshold pollutant.

Evidence of Carcinogenicity

No pre-neoplastic or neoplastic nasal lesions were observed in a 128-week inhalation study with SD male rats at 10 ppm HCl gas. No evidence of treatment related carcinogenicity was observed in other animal studies performed by inhalation, oral or dermal administration. In humans, no association between HCl exposure and tumor incidence has been observed.

Cumulative Exposure

There is little evidence that the general public is exposed routinely to measurable quantities of gaseous chlorine and/or HCl. Even the HCl produced during the combustion of fossil fuels or the incineration of solid waste apparently lasts too short a time in the un-reacted state to pose a significant health risk (IPCS, 1982). However, HCl does affect the same target organ system (respiratory system) as hydrogen fluoride (HF) and, therefore, it is possible that the effects of HCl and HF could be additive.

2. Chlorine (Cl₂)

Critical Target Organ

The critical target organ for the acute toxicity of Cl₂ is the upper respiratory system (transient respiratory irritation), lower respiratory system (slight alterations in pulmonary function tests), and the eyes. The target organ for chronic toxicity is also the respiratory system.

Mechanism of Action

Cl₂ is a strong oxidizer that hydrolyzes in water forming HCl and hypochlorous acid. Cl₂ gas has been shown to be 33 times more potent as a sensory irritant in mice than HCl (Barrow et al. 1977). The assumption is that products of the reaction of Cl₂ with water are able to interact with functional groups in components from cells in the respiratory epithelium. At low concentrations, only sensory receptors are affected, triggering only changes in respiratory dynamics, but higher concentrations produce frank tissue damage due to disruption of cellular components (ATSDR, 2007).

Evidence of Threshold

The effects of acute-exposure to Cl₂ have been well characterized in humans and animals. Collectively, the results suggest that brief exposures to concentrations of Cl₂ less than 0.5 ppm do not cause sensory irritation or significant alterations in pulmonary function tests, but exposure to 1 ppm or greater can induce transient respiratory and eye irritation and slight alterations in pulmonary function tests (Anglen 1981; D'Alessandro et al. 1996; Rotman et al. 1983; Schins et al. 2000; Shusterman et al. 1998, 2003). There is no information regarding chronic-duration exposure of the general population to chlorine because this type of exposure occurs only in occupational settings. There are few studies of chronically exposed workers that were not also subjected to acute episodes of high exposure or "gassing" incidents. However, a chronic threshold based on nasal lesions has been established in monkeys (Klonne et al. 1987).

Evidence of Carcinogenicity

No studies on the carcinogenic effects of Cl₂ in humans and only a few animal studies were located in the literature. All of the animal carcinogenicity studies listed on the Chemical Carcinogenesis Research Information System were negative and no positive studies were listed on the Carcinogenic Potency Project at <http://potency.berkeley.edu/chemicalsummary.html>. Co-carcinogenic properties (i.e., some studies suggest that Cl₂ can promote the carcinogenicity of other compounds) of Cl₂ in animals have been examined, but the results are mixed, with one study resulting in cancer in a single mouse and another study causing a 40% decrease in the number of skin cancers in initiated mice. Study results on genotoxicity of Cl₂ have also been mixed. Neither, the EPA, the International Agency for Research on Cancer (IARC), or the Department of Health and Human Services (DHHS) have classified Cl₂ gas as to its carcinogenicity. Although EPA has not developed a formal evaluation of the potential for Cl₂ carcinogenicity, the evaluation by the International Agency for Research on Cancer stated that there was inadequate evidence for carcinogenicity in humans or experimental animals and thus concluded that Cl₂ is not classifiable as to its carcinogenicity to humans. Other rules (e.g., Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors (Phase I Final Replacement Standards and Phase II); Final Rule; 2) National Emission Standards For Hazardous Air Pollutants) have evaluated Cl₂ only with regard to non-cancer effects. In the absence of specific scientific evidence to the contrary, it has been EPA's policy to classify non-carcinogenic effects as threshold effects.

Cumulative Exposure

There is little evidence that the general public is exposed routinely to measurable quantities of gaseous Cl₂. However, Cl₂ does affect the same acute target organ system (respiratory system) as HCl and hydrogen fluoride (HF) and the same chronic target organ system (respiratory system) as HCl. Therefore, it is possible that the acute effects of Cl₂, HCl and HF could be additive and the chronic effects of Cl₂ and HCl could also potentially be additive.

3. Hydrogen Cyanide (HCN)

Critical Target Organ

The Central Nervous System (CNS) is the target organ for the acute health effects associated with HCN. The critical target organ for the chronic health effects of HCN is also the CNS, but long-term exposure can also affect thyroid function (CalEPA, 2008b).

Mechanism of Action

The mode of action of HCN toxicity is cytochrome oxidase inhibition, which prevents cellular utilization of oxygen. The cyanide ion blocks oxidative respiration, causing failure of oxygen usage with tissue hypoxia leading to metabolic acidosis.

Evidence of Threshold

An acute threshold has been established. A chronic threshold in humans has not been established. Data on chronic toxicity of HCN in humans (and animals) is very limited. However, a subacute inhalation NOAEL for HCN has been established in rabbits (CalEPA, 2008b). In addition to the lack of evidence that HCN is a potential carcinogen (see below), the listing of health thresholds for HCN by California EPA (CalEPA, 2008b) and many other organizations (e.g., Agency for Toxic Substance Registry [ATSDR], World Health Organization [WHO], National Institute of Public Health and the Environment, Bilthoven (The Netherlands), etc.) in the public domain has established HCN as a threshold pollutant.

Evidence of Carcinogenicity

Out of 20 mutagenicity studies summarized on the Chemical Carcinogenesis Research Information System (CCRIS) for sodium cyanide, there was not a single positive result (CCRIS, 2010). Therefore, available data indicate that HCN does not have mutagenic properties and is not considered to be a carcinogen. Free CN is not classifiable as to human carcinogenicity (IRIS, 2010).

Cumulative Exposure

HCN has a completely different mechanism of action than the other two acid gases on which comments have been requested (i.e., HCl and HF) and affects a different target organ system. While several studies indicate that chronic exposure of workers to low concentrations of cyanide can cause respiratory, cardiovascular, and thyroid effects, the acute effect on the CNS system occurs at lower concentrations than those at which the

portal of entry (respiratory) effects occur. Because HCN has a different mode of action than HCl and HF, it is not a candidate for a limit that addresses the combined effects of multiple acid gases.

4. Hydrogen Fluoride (HF)

Critical Target Organ

The critical target organ for acute health effects of HF is the upper respiratory system (irritation), with symptoms such as coughing, choking, and chills, followed by pulmonary edema, which may occur with cough, chest tightness, rales, and cyanosis after an asymptomatic period of one to two days (CalEPA, 2008a). The critical chronic target organs include bone and teeth (skeletal/dental fluorosis), as well as the upper respiratory system (pulmonary hemorrhage) (CalEPA, 2008b).

Mechanism of Action The acute respiratory effects of HF are the result of dehydration and corrosion of tissues mediated by free hydrogen ions (CalEPA, 2008a). The respiratory system is also listed as one of the critical target organs for chronic toxic effects of HF; however, respiratory effects result from higher exposure levels than required for fluorosis (Hodge and Smith, 1977). Presumably, direct contact irritation of tissues at the portal of entry and persistent cellular injury in the affected tissue are responsible for the chronic respiratory effects of HF. In addition, the dissociated fluoride ion is also capable of complexing certain bivalent cations, primarily calcium and magnesium, which interferes with calcium metabolism and causes cell destruction (CalEPA, 2008b) and fluorosis upon chronic exposure. Skeletal fluorosis is considered to be the critical target organ for chronic exposure since this effect is seen at lower concentrations than the respiratory system effects.

Evidence of Threshold

Both acute and chronic threshold doses have been established. In addition, since lower doses of fluoride have a beneficial or nutritional effect, a threshold type of response for adverse effects is clearly expected (CalEPA, 2008b). In addition to the general lack of evidence that HF is a carcinogen in humans (see discussion below), the listing of health thresholds for HF by California EPA (CalEPA, 2008b) and many other organizations (e.g., Agency for Toxic Substance Registry [ATSDR], World Health Organization [WHO], etc.) in the public domain has established HF as a threshold pollutant.

Carcinogenicity

Several authors have suggested the potential mutagenicity of HF or sodium fluoride, although EPA and National Research Council have concluded that the mutagenicity of HF in man has not been demonstrated (EPA, 1998). According to the National Toxicology Program, "the preponderance of evidence" from laboratory *in vitro* (i.e., cell culture) studies indicate that fluoride is a mutagenic compound in laboratory studies. Some substances that are shown to be mutagens in laboratory studies, are also carcinogens. In some cases, "the overall significance of the *in vitro* fluoride transformation data are subject to question" (NRC, 1993) because the cells used in

some of the laboratory studies are unusually sensitive to the induction of transformation. In addition, the concentrations of fluoride causing mutagenic damage in the *in vitro* studies is higher than the concentrations found in human blood. More importantly, no specific epidemiological evidence is available for evaluation of the potential carcinogenicity of HF or other fluoride compounds in humans. Increased rates of cancer have been reported in workers in several industries involving exposure to mixtures containing fluorides, but fluoride could not be specifically implicated as the cause of the cancer in any of these studies (EPA, 1998). The potential carcinogenic potential of fluorides in drinking water has also been investigated. The International Agency for Research on Cancer (IARC) concluded that when differences in demographics, degree of industrialization, and other social factors are accounted for, the studies provide no evidence that an increase in the level fluorides in drinking water is associated with an increase in cancer mortality (EPA, 1998). Therefore, there is a lack of evidence to suggest that HF or other fluoride compounds are carcinogenic.

5. Manganese (MN)

Critical Acute Target Organ

Mn toxicity has been reported through occupational (e.g. welder) and dietary overexposure and is evidenced primarily in the Central Nervous System, although lung, cardiac, liver, reproductive and fetal toxicity have been noted. The CNS is considered the critical target organ for the chronic toxicity of Mn (Crossgrove and Zheng, 2004). No information on acute toxicity of Mn could be located in the open scientific literature.

Mechanism of Action

Mn neurotoxicity results from an accumulation of the metal in brain tissue and results in a progressive disorder of the extrapyramidal system which is similar to Parkinson's disease. In order for Mn to distribute from blood into brain tissue, it must cross either the blood–brain barrier (BBB) or the blood–cerebrospinal fluid barrier (BCB). Brain import, with no evidence of export, would lead to brain Mn accumulation and neurotoxicity. The mechanism for the neurodegenerative damage specific to select brain regions is not clearly understood. Disturbances in iron homeostasis and the valence state of Mn have been implicated as key factors in contributing to Mn toxicity (Crossgrove and Zheng, 2004).

Evidence of a Threshold

Lower doses of Mn have a beneficial or nutritional effects, therefore, a threshold type of response for adverse effects is clearly expected. There is debate about where the threshold for Manganese falls, but several studies in the last two decades provide for determination of No Observed Adverse Effect Levels (NOAELs) for chronic neurological effects in workers. In addition to the lack of evidence that Mn is a carcinogen (see discussion below), the listing of health thresholds for Manganese by EPA, California EPA (CalEPA, 2008b) and the Agency for Toxic Substance Registry (ATSDR) in the public domain has established Manganese as a threshold pollutant.

Evidence of Carcinogenicity

Mn is listed in IRIS as Classification D (not classifiable as to human carcinogenicity) (IRIS, 2010). Although there are some mixed results, there are little data to suggest that inorganic Mn is carcinogenic.

C. Summary and Conclusions Regarding Threshold Pollutant Determination

1. Evidence for Thresholds

Hydrogen Chloride (HCl)

Based on the limited negative carcinogenicity data, and on knowledge of how chlorine reacts in the body, its likely mechanism of action, and its consideration as a threshold pollutant in numerous other rulemakings, HCl is presumptively considered to be a threshold pollutant.

Chlorine (Cl₂)

Based on the thresholds established for Cl₂, the lack of evidence for carcinogenicity, its likely mechanism of action, and its consideration as a threshold pollutant in numerous other rulemakings, Cl₂ is presumptively considered to be a threshold pollutant.

Hydrogen Cyanide (HCN)

Based on the thresholds established for HCN, the lack of evidence for carcinogenicity, and knowledge of how HCN reacts in the body, HCN is considered to be a threshold pollutant.

Hydrogen Fluoride (HF)

Based on the thresholds that have been established and lack of reliable data suggesting that HF is carcinogenic, HF is presumptively considered to be a threshold pollutant.

Manganese (Mn)

Lower doses of Mn have a beneficial or nutritional effects, therefore, a threshold type of response for adverse effects is clearly expected. In addition to the lack of evidence that Mn is a carcinogen (see discussion below), the listing of health thresholds for Manganese by EPA, California EPA (CalEPA, 2008b) and the Agency for Toxic Substance Registry (ATSDR) in the public domain has established Manganese as a threshold pollutant.

2. Proposed Toxicity Factors and Margins of Safety

Hydrogen Chloride (HCl)

It is proposed that the California EPA (CalEPA) acute Reference Exposure Level (REL) be established as the acute threshold dose and that the EPA RfC be established as the chronic threshold dose. The human studies on which the California acute REL is based were done with asthmatics, which represent a sensitive human subpopulation. Also, the chronic EPA RfC has a cumulative uncertainty factor of 300 (10 for extrapolation from a LOAEL to a NOAEL, 3 for interspecies variability, and 10 for intraspecies variability) built into it. Therefore, both the acute and chronic threshold values recommended for HCl provide an ample margin of safety for use in establishing emission standards under CAA112(d)(4).

Chlorine (Cl₂)

It is proposed that the Agency for Toxic Substances and Disease Registry (ATSDR) acute Minimal Risk Levels (MRL) be established as the acute threshold dose. The acute no-observed-adverse-effect level (NOAEL) of 0.5 ppm was adjusted to account for continuous exposure (0.5 ppm x 8 hours/24 hours = 0.2 ppm). Although sensitive individuals were tested in some of the studies, an uncertainty factor of 3 was used to account for sensitive populations to arrive at the acute-duration inhalation MRL of 0.07 ppm (0.2 ppm/3). It is also proposed that the ATSDR chronic MRL be established as the chronic threshold dose. An uncertainty factor of 30 (3 for extrapolation from animals to humans with dosimetric adjustment and 10 for human variability) was applied to the lower 95% confidence limit predicted exposure concentration associated with a 10% extra risk to arrive at the chronic-duration inhalation MRL of 0.00005 ppm for Cl₂. Therefore, both the acute and chronic threshold values recommended for Cl₂ provide an ample margin of safety for use in establishing emission standards under CAA 112(d)(4).

Hydrogen Cyanide (HCN)

It is proposed that the California EPA (CalEPA) acute Reference Exposure Level (REL) be established as the acute threshold dose and that the EPA RfC be established as the chronic threshold dose. The California acute REL has a cumulative uncertainty factor of 100 (10 for interspecies variability and 10 for intraspecies variability) built into it. In addition, the acute studies were done on primates, which represent the species most similar to man, thereby reducing uncertainty regarding toxic response. Also, the chronic EPA RfC has a cumulative uncertainty factor of 1000. A factor of 10 is used for sensitive human subpopulations, a factor of 10 is used for the lack of a NOAEL, and partial factors of 3 each are used for deficiencies in the database (lack of chronic and multigenerational reproduction studies) and for less than chronic duration. Therefore, both the acute and chronic threshold values recommended for HCN provide an ample margin of safety for use in establishing emission standards under CAA112(d)(4).

Hydrogen Fluoride (HF)

It is proposed that the CalEPA acute and chronic RELs be established as threshold doses for HF. Both the acute and chronic California RELs for HF incorporate a cumulative uncertainty factor of 10 to account for variability in human responses

(intraspecies variability) to inhalation exposure to HF. While this safety factor is not as large as some, both threshold values are judged to provide an ample margin of safety for use in establishing emission standards under CAA112(d)(4) since the studies were conducted in human populations, thereby eliminating much of the uncertainty regarding toxic responses. The chronic REL in particular is judged to be amply conservative because the human population consisted of fertilizer plant workers who were no doubt exposed to many other chemicals simultaneously.

Manganese (Mn)

No acute toxicity criteria for Mn were located in the open scientific literature. It is proposed that the EPA RfC be established as the chronic threshold dose. The chronic EPA RfC has a cumulative uncertainty factor of 1000. This uncertainty factor reflects 10 to protect sensitive individuals, 10 for use of a LOAEL, and 10 for database limitations reflecting both the less-than-chronic periods of exposure and the lack of developmental data, as well as potential but unquantified differences in the toxicity of different forms of Mn. Therefore, the chronic threshold value recommended for Mn provides an ample margin of safety for use in establishing emission standards under CAA112(d).

3. Health Effects Thresholds to be used for CAA112(d)(4) Emission Standards

Both acute and chronic exposure to HCl, Cl₂ and HF affect the respiratory system and the pollutants cause respiratory irritation by similar mechanisms of action (direct contact irritation of tissues at the portal of entry and persistent cellular injury in the affected tissue). However, the critical effect on which the chronic toxicity criterion for HF is based is skeletal fluorosis, which occurs at lower doses than the reported respiratory effects (Hodge and Smith, 1977). Therefore, it is recommended that a combined acute HBEL for HCl, Cl₂, and HF and a combined chronic HBEL for HCl and Cl₂ be established. However, a separate chronic 112(d)(4) HBEL for HF is recommended.

While chronic exposure of workers to low concentrations of cyanide can cause respiratory symptoms, effects on the CNS system occur at lower concentrations than those at which the portal of entry (respiratory) effects occur. In addition, HCN has a completely different mechanism of action than HCl and HF. Therefore, HCN is not a good candidate for inclusion if a combined acid gas standard is derived. Therefore, establishment of a single acute 112(d)(4) HBEL for HCN is recommended. Although the critical target organ for Mn is the CNS, Mn has a completely different mechanism of action from HCN. Since Mn has a different mechanism of action from HCN and affects a different target organ than HCl and HF, establishment of a separate chronic 112(d)(4) HBEL for Mn is indicated as well.

4. How HBELs can be implemented under CAA Section 112(d)(4)

EPA has a great deal of latitude in exploring other ways to “*consider threshold levels with ample margin of safety*”. Even though the MACT are primarily technology-based standards, the intent of section 112(d)(4) is to allow flexibility for EPA to establish special provisions for threshold HAPs that do not contribute significant health risk. Here we provide a conceptual model of how an HBEL could be incorporated into the Boiler MACT.

Following the approach of the Health Based Compliance Alternative of the 2004 Boiler MACT rule, HBELs could either be established through conservatively-derived look-up tables (Tier 1 HBEL) or a facility could develop a site-specific HBEL based on modeling following EPA guidance (EPA, 2004) (Tier 2 HBEL). A facility would need to certify through fuel analysis or source testing that its boiler emissions meet the corresponding HBEL. Alternatively, limits for HCl and other pollutants that are already established in a facility’s air permit could be used in lieu of HBELs.

Toxicity Considerations in Developing HBELs

Because it is acknowledged that some of the HAPs subject to HBELs may have overlapping health effects, rather than considering only individual HAP exposure, the concept of Target Organ Specific Hazard Index (TOSHI) following U.S. EPA Guidance (EPA 2004) may be appropriate in some instances. The hazard index concept inherently assumes that potential health effects due to simultaneous exposure are additive. [This method was applied in the 2004 Boiler MACT HBCA where the effects of Cl₂ and HCl were assumed to be additive by computing HCl toxic equivalent emissions. Although not elaborated in these comments, it is inherently assumed, that this same or similar approach for combining effects of Cl₂ and HCl effects is appropriate.] As noted above, adding the health effects is appropriate for the acute health effects of the primary HAP acid gases from solid fuel industrial boilers, HCl, Cl₂, and HF, and adding chronic effects of HCl and Cl₂ is also appropriate. For instance, following the TOSHI concept, the development of acute HBELs for acid gases can consider combined emissions of HCl, Cl₂, and HF, and development of chronic HBELs can consider combined emissions HCl and Cl₂ based on toxicity weighted emissions. In this case, an HCl acid gas toxicity-weighted short-term emission rate can be defined as the emission rate of HCl + the emission rate of Cl₂ x Threshold of HCl /Threshold of Cl₂ + the emission rate of HF x Threshold of HCl /Threshold of HF.

Establishment of separate chronic 112(d)(4) HBEL for HF and HCN is supported since the critical effect/target organ on which the chronic toxicity criteria are based is different for the two acid gases and the mechanism of action is different as well. Because Mn

health effects and mechanisms of action can be differentiated from other HAPs, HBELs for Mn should be established independently.

Tier 1 HBELs – Based on Physical Parameters using Look-up Tables

The HBELs could take the form of a limited number of alternative HAP emissions limits that would be based on simple physical parameters related to dispersion. These limits would be set in such a way that there would be no health effects due to inhalation of specified threshold HAPs such as acid gases (primarily hydrogen chloride) and metals such as Mn.

EPA could develop Tier 1 HBELs based on screening-level dispersion modeling that conservatively relates maximum off-site concentrations associated with all Boiler MACT sources at a facility. A separate HBEL would apply to each facility based on the combination of physical stack parameters from each subject boiler.

The physical parameters incorporated into the screening-level modeling used to develop the tables should include the basic parameters that govern the dispersion and are. These include:

- Source characteristics, such as stack height and building height for each MACT source;
- Distance to property line;
- Maximum height of on-site structures;
- Presence of highest nearby terrain (e.g., within 5 km).

Tier 1 HBELs look-up tables would account for various combinations of these physical parameters. Because the look-up tables are based on screening-level dispersion models, such as SCREEN3 or AERSCREEN, that are designed to be conservative, this would provide the “ample margin of safety” as required by 112(d)(4). Thus, EPA can assure that compliance with the Tier 1 HBELs will mean that actual concentrations to which the public could be exposed are below established health effects threshold levels. The screening modeling that EPA would use to develop Tier 1 HBELs may address both chronic (annual average) and acute (maximum 1-hour) threshold effects, as appropriate. The determination of whether HBELs are appropriate for acute effects, chronic effects or both types of effects depends on whether an acute or chronic effect for a threshold HAP is universally demonstrated to be more limiting. EPA may conclude, as it did in 2004, that protection against chronic health effects will inherently safeguard against acute health effects. An example of the possible structure of Tier 1 HBEL look-up tables is provided in Appendix H to these comments.

Tier 2 HBELs – Based on Site-specific Dispersion Modeling

If facility boiler emissions exceed the conservatively derived Tier 1 HBELs or if the regulatory agency judges that the physical layout or dispersion environment of the site make it inappropriate to apply the Tier 1 HBEL look-up tables, a facility would conduct site-specific dispersion modeling. Site specific modeling would use source specific stack parameters and apply EPA's state-of-the-science dispersion model AERMOD with five years of representative meteorological data. Model receptors could be placed at the boundary and in a specified grid representing off-site locations out to 5 km or could use site-specific receptor locations such as have been previously established for ambient air quality modeling.

In this modeling, the combined impact of the specific HBEL HAPs would be modeled for the appropriate averaging times (1-hour for acute and annual average for chronic) and compared to established health effects benchmarks, such as those provided in Section B, Table 1 of these comments. As noted, to address acute effects of acid gases, it is appropriate to add the hazard quotients (HQ) (modeled concentration divided by health effects threshold) for HCl, Cl₂, and HF to compute a hazard index (HI) for acute respiratory effects. A HI < 1.0 indicates that there is no incremental health effect. To address chronic effects of acid gases, it is appropriate to add the HQs (modeled concentration divided by health effects threshold) for HCl and Cl₂ to compute a hazard index (HI) for chronic respiratory effects. As noted, for chronic effects of HF, HCN and Mn it is appropriate to evaluate threshold effects separately for each pollutant. To establish HBELs for each boiler, the facility would use the modeling to determine the combination of peak 1-hour and annual average emission rates that result in a HI or HQ of 1.0. Thus, if emissions from each subject boiler are less than these site-specific HBELs it will be assured that exposure will not exceed health effects thresholds as required under CAA Section 112(d)(4).

D. Consideration of Overlapping Impacts of and Background HAPs for HCl

Among the reasons cited by EPA for not proposing the HBEL for HCl in the 2010 Boiler MACT rule is the belief that impacts from other sources at the same facility or nearby facilities may need to be considered in evaluating risk. As noted above, the language of CAA Section 112(d)(4) indicates that only the potential threshold health effects from the MACT source should be considered. Furthermore combined risk sources from various MACT categories should be considered under the residual risk program, after MACT standards have been promulgated and implemented. However, even if an HBEL analysis were to consider these cumulative exposures, the effect would be minimal

because the evidence indicates that the potential incremental risk added as a result of overlapping plumes is very small.

The chief acid gas HAPs emitted from most industrial boilers are chiefly HCl (since most elemental chlorine in fuel is converted to HCl during combustion) and HF. A review of TRI 2008 data (excluding EGUs, chemical plants, and metal mining) indicates that 77.3% of acid HAP gas emissions are HCl, 22.4 % are HF and only 0.3% are HCN. As noted, the threshold effects of acid gases are dissimilar to other HAPs and, therefore, these can be considered separately from other HAPs using EPA's TOSHI concept. At most types of industrial facilities that have substantial emissions of acid gases, solid fuel boilers subject to the boiler MACT (or other MACT such as the Hazardous Waste Combustor MACT) are the only significant source of these emissions. Because it is unlikely that there would be a substantial contribution of acid gas HAP emissions that are not regulated under the boiler MACT at most facilities, it should not generally be necessary to consider non boiler MACT sources in establishing HBELs.

Another consideration potentially affecting HBEL development is whether boiler MACT source impacts from nearby facilities overlap. Even if this were applicable under CAA 112(d)(4), dispersion modeling shows that maximum impact short-term and annual average concentrations of non-reactive pollutants associated with boiler emissions generally occur within 1 km and fall off rapidly with distance. This limits the range at which appreciable concentrations of these gases are transported. Because acid gases are highly soluble, react with ammonia the ambient air, and are rapidly deposited through wet and dry deposition, the range of ground-level concentrations is much more limited than for non-reactive pollutants. Therefore, unless there are boilers at an immediately adjacent facility, it is highly unlikely that impacts would overlap to the extent that it would materially affect the HBEL.

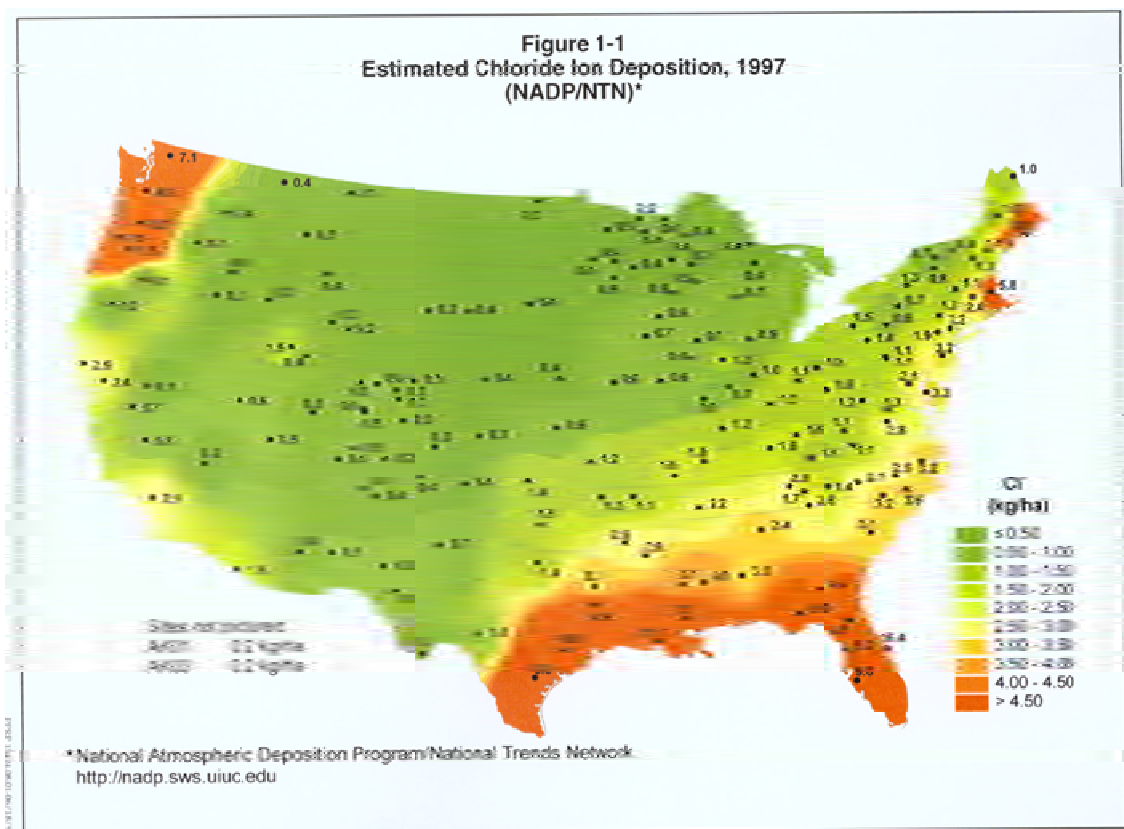
There is no evidence that background concentrations of HCl are at appreciable levels from a public health perspective. A limited number of ambient measurement studies have shown that ambient concentrations, even in highly urbanized areas, are very low. A long-term measurement study of ambient acid gas concentrations in New York City (Bari et al 2003) indicates an average of about $0.5 \mu\text{g}/\text{m}^3$, which is only 2.5% of the chronic RfC (Reference Concentration). Thus, there is little basis for adjusting the HBEL to adjust for background concentrations of acid HAP gases.

A study of HCl emissions and impacts from utility boilers (Harkov 1999) concludes that, even in the vicinity of major sources of HCl, ambient concentrations are very low. This report states:

“In the atmosphere, HCl is fairly short-lived...since it is very soluble and reacts readily with ammonia (NH_3) or alkaline cations such as Ca or K to form chloride salts. Therefore, even though the mass of HCl emitted may be substantial, the actual impacts of these emissions may not be significant. For example, data from the National Atmospheric Deposition Program (NADP 1998) National Trends Network deposition monitoring network over the years indicates that chloride ion deposition is strongly influenced by sea salts, rather than simply point sources of HCl emissions... EPA did not identify exceedances of any HCl health-based standards in the health risk studies reported in the Utility HAP Report (EPA 1998a).”

The conclusion is that evaluation of non-boiler MACT, multiple facility and background do not need to be considered in establishing HBELs for acid HAP gases.

Another assertion in the proposed Boiler MACT rule is that control of HCl emissions from solid fuel boilers will reduce acidic deposition. A map of chloride deposition in 1997 (from Harkov, 1999) illustrates that there is no correlation between chloride deposition and distance from coal fired power plants in the Ohio Valley or industrial areas in the Midwest but is instead is related to the influence of sea salt, especially in the Pacific Northwest, New England and Southern Atlantic and Gulf coasts. Thus, there is no indication that HCl deposition from major point source emissions contribute materially to chloride deposition or acidification.



E. Realistic but Suitably Conservative Emission Rate Assumptions Can be Used to Estimate Compliance with Acute and Chronic HBELs

In establishing compliance with HBELs, a facility will need to estimate upper-limit short-term emissions to assess acute threshold health effects and annual average emissions to assess chronic threshold effects. Realistic, yet conservative, HAP emission rate assumptions should be used in determining compliance with HBELs under 112(d)(4) rather than across-the-board worst-case assumptions because using worst-case emission assumptions will materially overestimate both chronic and acute risk. EPA contends that a reason not to include a risk option such as HBEL is that there is lack of available data for HAP emissions from boiler sources. Although care must be taken in estimating emissions, for the HAPs under consideration, standardized methods could be established to develop suitably conservative emission estimates based either on fuel data or emission tests.

If fuel testing is used, emissions for HCl, Cl₂, HF, and Mn may be conservatively estimated based on knowledge of fuel type, measured fuel concentrations and use rate, assuming 100% of the HAP is released to the atmosphere. If source testing is used it will automatically account for a degree of HAP removal through bottom ash, and

emission controls. Because it is recognized that a single fuel sample or source test may not be representative of the long-term average, multiple fuel samples taken over an established period could be required. If a boiler has variable fuel sources, (e.g., coal from different mines or various types of wood), a number of samples from each source type would also be required. The variability of emissions would then be used following standardized data analysis methods to estimate the 95th percentile average emission factor to be used in the chronic HBEL compliance determination and combined with permitted annual fuel use. To account for short-term (hour-by hour) fluctuations the maximum hourly fuel use could be applied, along with a statistical estimate of the 95th percentile concentration for each HAP to estimate emissions for the acute HBEL.

This method of evaluating short-term fluctuations is highly conservative because the modeling used to develop the HBELs implicitly assumes that a source continuously emits each HAP at its 95th percentile maximum emission rate and that the worst-case emissions occur concurrently with worst-case dispersion conditions (Paine and Heinold 2010). The degree to which this highly conservative assumption affects HBEL certification depends on whether the acute HBEL or the chronic HBEL is limiting.

A similar procedure can be applied based on source test data. In the case where emission controls are in-place, the source could have the option of measuring uncontrolled or controlled emissions. If emission controls are used during the source test, additional parameters related to the control device would need to be monitored.

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Appendix H – Tier I HBEL Lookup Tables

Example Instructions for the Application of Tier 1 HBEL Look-up Tables that account for stack height, property boundary distance, building height and terrain

1. Compute HAP Emissions for each MACT boiler unit at a facility.
2. Determine the minimum stack height and distance to property boundary among MACT boilers.
3. Perform Good Engineering Practice (GEP) Stack Height analysis following EPA guidance. Compare GEP height to each boiler stack height.
4. If one or more boilers is less than GEP height, divide GEP stack height by 2.5 to determine effective building height to be applied in the table.
5. Use stack height, building height and boundary distance to determine HBEL value from Table Xa.
6. If all stack heights are above highest terrain within 5 km: Tier 1 HBEL = HBEL from Table Xa. If one or more stack heights are below highest terrain within 5 km, proceed to step 7.
7. Determine closest distance to terrain that is at or above minimum stack height.
8. Look-up HBEL-b from Table Xb
9. Tier 1 HBEL = lesser of HBEL from Table Xa and HBEL from Table Xb

Table Xa HAP1 HBEL (lb/hr) (according to stack height, boundary distance and building height)

Stack Height (m)	Effective Building Height (m)	Distance to Property Boundary (m)											
		0	50	100	150	200	250	500	1000	1500	2000	3000	5000
5	NA	115	115	115	115	115	115	114	287	373	373	373	373
10	NA	189	189	189	189	189	189	195	328	433	433	433	433
20	8	386	386	386	386	386	386	386	425	580	603	603	603
30	12	396	396	396	396	396	396	396	436	596	691	808	817
30	20	307	307	307	307	307	307	307	338	462	535	626	632
30	30	251	251	251	251	251	251	251	276	377	437	511	516
40	16	408	408	408	408	408	408	408	448	613	716	832	966
40	20	365	365	365	365	365	365	365	401	549	640	744	864
40	30	298	298	298	298	298	298	298	327	448	523	608	705
40	40	258	258	258	258	258	258	258	283	388	453	526	611
50	20	421	421	421	421	421	421	421	461	631	746	858	1003
50	30	344	344	344	344	344	344	344	376	515	609	701	819
50	40	298	298	298	298	298	298	298	326	446	528	607	709
50	50	267	267	267	267	267	267	267	291	399	472	543	634
60	24	436	436	436	436	436	436	436	473	649	779	885	1043
60	30	390	390	390	390	390	390	390	423	580	696	792	933
60	40	337	337	337	337	337	337	337	367	503	603	686	808
60	60	275	275	275	275	275	275	275	299	410	492	560	660
70	28	450	450	450	450	450	450	450	487	667	814	912	1087
70	40	377	377	377	377	377	377	377	407	558	681	763	910
70	50	337	337	337	337	337	337	337	364	499	609	683	814
70	70	285	285	285	285	285	285	285	308	422	515	577	688
80	32	466	466	466	466	466	466	466	500	686	850	941	1135
80	40	416	416	416	416	416	416	416	447	613	760	842	1015
80	60	340	340	340	340	340	340	340	365	501	621	687	829
80	80	294	294	294	294	294	294	294	316	434	537	595	718
100	40	498	498	498	498	498	498	498	527	724	917	1001	1241
100	60	406	406	406	406	406	406	406	431	591	749	817	1014
100	80	352	352	352	352	352	352	352	373	512	648	708	878
100	100	315	315	315	315	315	315	315	334	458	580	633	785
200	80	677	677	677	677	677	677	677	682	920	1167	1390	1925
200	100	606	606	606	606	606	606	606	610	823	1044	1244	1721
200	150	495	495	495	495	495	495	495	498	672	852	1015	1406
200	200	428	428	428	428	428	428	428	432	582	738	879	1217

Table Xb HAP1 HBEL (lb/hr) (according to stack height and distance to elevated terrain)

Stack Height (m)	Distance to Off-site Terrain Above Stack Top (m)										
	50	100	150	200	250	500	1000	1500	2000	3000	5000
5	57	57	57	57	57	57	144	187	187	187	187
10	94	94	94	94	94	98	164	216	216	216	216
20	193	193	193	193	193	193	213	290	301	301	301
30	198	198	198	198	198	198	198	218	298	345	404
40	204	204	204	204	204	204	204	224	307	358	416
50	211	211	211	211	211	211	211	230	316	373	429
60	218	218	218	218	218	218	218	237	325	389	443
70	225	225	225	225	225	225	225	243	334	407	456
80	233	233	233	233	233	233	233	250	343	425	470
100	249	249	249	249	249	249	249	264	362	459	501
200	339	339	339	339	339	339	339	341	460	584	695

TAB 4

Non-Hazardous Solid Materials Rule

As our nation struggles to recover from the recession and the unemployment rate lingers at historic levels, non-hazardous solid waste rules that are central to Clean Air Act rules covering boilers could be unsustainable for U.S. manufacturing and the high-paying jobs it provides. Greater flexibility is needed to avoid unintended consequences.

Background:

As EPA develops rules for boilers, the Agency must also determine which combusted materials are fuels and which are solid wastes. Fuels may be burned in regulated boilers under the Boiler Maximum Achievable Control Technology (MACT) but solid waste must be burned in units regulated under another, more onerous and stigmatizing provision of the Clean Air Act (section 129 for Commercial and Industrial Solid Waste Incinerators -- CISWI). EPA is using its authority under the Resource Conservation and Recovery Act (RCRA) to make decisions about which materials are solid wastes and which are not.

As energy costs rise and the nation moves towards alternative fuels, boiler owners continue to evaluate materials that can substitute for traditional fossil fuels. Materials that were once considered expendable, such as used tires, are now being routinely used as energy sources. Other materials, such as biomass residues from the manufacture of lumber, wood panels and paper making, have always been considered valuable commodities – whether used in production processes or for their fuel value. Many of these materials when burned are carbon-neutral.

Boiler owners do not want their combustion units to be classified as solid waste incinerators because of the stigma associated with burning wastes. The public has a very negative view of waste incinerators and fights their permitting in their towns. Mills are likely to stop using non-traditional fuels rather than have to cope with the millions in added costs associated with CISWI regulations and public opposition. Collection and processing of these residuals creates jobs that will be lost if EPA doesn't retain these materials as fuels.

EPA appears to be taking a very narrow view of which materials are fuels and which are solid wastes. EPA has legal authority under RCRA, supported by numerous court decisions, to classify a wide range of materials as non-wastes and thus appropriately regulated under Boiler MACT.

Policy Position:

AF&PA supports the broadest definition of secondary materials as fuels eligible to be burned in boilers. This approach reduces our dependence on foreign oil, relies on a renewable resource and increases the use of carbon-neutral fuels – all national priorities. Furthermore, increasing the use of non-traditional fuels keeps energy costs down which enhances competitiveness while protecting and creating jobs. AF&PA is prepared to work with the EPA to protect both public health and jobs while using the flexibility of RCRA to come up with workable policies.

TAB 5

Summary of International Emission Limits for Industrial Boilers

December 2010

Key Findings

Environmental regulatory programs vary across the globe. Each country has a unique set of laws and procedures to implement and ultimately enforce these requirements. Programs aimed at protecting air quality have evolved substantially over the last several decades in the United States and the rest of the world. At the same time, economies have changed dramatically with globalization and the increasingly competitive world marketplace. The rise of imports into the U.S. and the decline of exports raise significant concerns about the sustainability of the U.S. manufacturing sector and the jobs it supports. This document summarizes available information on air emissions standards for boilers in various countries and regions, such as the European Union, New Zealand, Australia, Canada, China, India, South Korea, Brazil, and South Africa.

Of the countries examined in this review, the proposed EPA limits under the Industrial Boiler Maximum Achievable Control Technology (Boiler MACT) rule would be the most stringent limits on emissions from boilers from a number of perspectives. First, the U.S. has the only legislation that regulates 187 hazardous air pollutants (HAPs). This includes the five categories of emissions regulated by the Boiler MACT rules proposed by the U.S. Environmental Protection Agency (EPA): metallic HAPs whose surrogate is particulate matter (PM); acid gases such as hydrochloric acid (HCl); mercury (Hg); organic HAPs whose control surrogate is carbon monoxide (CO); and dioxin/furans. The European Union regulates some of these pollutants, but their program does not directly regulate mercury emission limits from boilers. The EU regulates only CO and PM from gas-fired boilers, not other HAPs. Other countries typically limit only PM emissions from boilers, and typically do not regulate emissions from gas-fired boilers. Those countries that have PM emission limits are concerned with the fine PM health concerns, not metallic HAPs per se (for which PM is a surrogate in EPA's Boiler MACT proposal), with the possible exception of the transboundary pollution directive in the EU.

Second, the U.S. and the EU have the tightest emission limits for boilers and have the only limits for gas-fired boilers. Additionally, the U.S. and EU are alone in having a focus on existing units. Although emissions limits in the EU are comparable to those in the proposed Boiler MACT, EU Directives have significantly more flexibility incorporated into them, such as the ability to include site-specific factors when establishing pollutant limits in permits, and the exclusion of periods of start-up, shutdown and malfunction (SSM) in determining compliance with emissions limits. The EU guidelines for establishing emission limits are based on what available combinations of control technologies are generally capable of achieving, not based on what a hypothetical best performing boiler could achieve on a pollutant-by-pollutant basis, which EPA uses to set its MACT standards. Furthermore, the enforcement system in the U.S. is unique in its litigious nature, role of citizen suits, inflexibility in remedies if standards or even

paperwork requirements are not met, implementation timeframes and significant penalties.

Table ES1 summarizes emissions limits for countries included in this review. The table makes clear that EPA’s proposed Boiler MACT is the most strict boiler regulation of all the countries reviewed. This raises serious concern that, if finalized in its current form, EPA’s proposed Boiler MACT rule would create an unlevel playing field for U.S. manufacturers compared with their international competition.

ES1. Summary of Regulated Compounds

<i>Country</i>	<i>PM</i>	<i>HCl</i>	<i>Hg</i>	<i>CO</i>	<i>Dioxin/Furan</i>
European Union	=	-	N	=	-
New Zealand	-	N	N	N	N
Australia	-	N	N	N	N
Canada	N	N	N	N	N
China	-	N	N	N	N
India	-	N	-	N	N
South Korea	-	N	N	N	N
South Africa	-	N	N	N	N
Brazil	-	N	N	-	N
Russian Federation	-	N	N	N	N
Dominica	-	N	N	-	N
Indonesia	-	N	N	N	N
Jamaica	-	N	N	N	N
Japan	-	N	N	N	N
Malaysia	-	N	N	N	N
Thailand	-	N	N	N	N
Republic of Trinidad and Tobago	-	N	N	N	N
Tasmania	-	N	N	N	N
Turkey	-	N	N	N	N
Vietnam	-	N	N	N	N

- “-“ means less stringent than U.S.
- “=” means comparable limit to U.S.
- “N” means not regulated

Compendium of Competitor Nation Clean Air Standards

The following is a more detailed analysis of a dozen combustion source air emissions standards for key competitors of U.S. manufacturing.

European Union

The Integrated Pollution Prevention and Control (IPPC) Directive, promulgated in November 2010, sets more stringent limits for boilers specifically.^{1,2} The limits in this directive are summarized in Table 3.³ Compliance is required for new sources by 2012 and for existing sources by 2016, unless the source will shut down by 2023.

Table 3. Emissions limits for dust for existing boilers using solid or liquid fuels with the exception of gas turbines and gas engines

<i>Total Rated Thermal Input</i>	<i>Coal and Lignite</i>	<i>Biomass and Peat</i>		<i>Liquid Fuels</i>	
	<i>mg/Nm³</i>	<i>mg/Nm³</i>	<i>lb/MMBtu^a</i>	<i>mg/Nm³</i>	<i>lb/MMBtu^a</i>
50-100	30	30	0.017	30	0.016
100-300	25	20	0.011	25	0.013
> 300	20	20	0.011	20	0.011

^a Conversion from mg/Nm³ to lb/MMBtu for assumes biomass f factor of 9600 dscf/MMBtu liquid f factor of 9190 dscf/MMBtu.

These values are comparable to the U.S. EPA's proposed existing source MACT limits for biomass and coal boilers (0.02 lb/MMBtu), but higher than the proposed new source biomass boiler PM limits (0.008 lb/MMBtu), much higher than the proposed new source coal boiler PM limits (0.001 lb/MMBtu), and higher than the proposed existing and new liquid boiler PM limits (0.004 lb/MMBtu existing and 0.002 lb/MMBtu new).

Table 4. Emissions limits for dust for new boilers using solid or liquid fuels with the exception of gas turbines and gas engines

<i>Total Rated Thermal Input (MW)</i>	<i>Emissions limit</i>	
	<i>(mg/Nm³)</i>	<i>(lb/MMBtu)</i>
50 - 300	20	0.011
> 300	10	0.006
> 300 for biomass and peat	20	0.011

The directive also contains a provision that strengthens the role of best available technology (BAT) in establishing emission limit values in permits. Specifically, the

¹ Directive 2008/1/EC of the European Parliament and of the Council 15 January 2008 concerning integrated pollution prevention and control. January 15, 2008. LINK. Accessed September 27, 2010.

² Council of the European Union. Interinstitutional file 2007/0286 (COD). Proposal for a Directive of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control) (recast) – Outcome of the European Parliament's second reading. July 12, 2010.

³ All emissions limit values are calculated at 273.15 K, 101.3 kPa, and after correction for water vapor content at an oxygen content of 6% for solid fuels, 3% for combustion plants other than gas turbines and gas engines using liquid and gaseous fuels.

directive states that the permit granting body (competent authority) may set emission limit values (ELV) that differ from the emission levels associated with BAT values in terms of values, time periods, and reference conditions in the event that geography or technical considerations render achieving BAT disproportionately expensive considering the environmental benefits. Ultimately, however, emissions monitoring must demonstrate that emissions do not exceed BAT.

Additionally, the directive contains the following provisions that render it more flexible than the U.S. EPA proposed Boiler MACT.

- If applying an emission level associated with BAT will be overly expensive compared to the environmental benefits, competent authorities should be able to set limits that deviate from the BAT emission limits values based on well-defined criteria. The emissions levels in the directive, though, can not be exceeded.
- If an operator is testing a promising new pollution control technique, the competent authority should grant temporary deviations from emissions levels based on BAT.
- Within 24 hours of a malfunction, a combustion plant should cease operation or use low-polluting fuels. Unabated operation should not exceed 120 hours in a 12-month period. If there is an overriding need for energy or the possibility of avoiding an overall emissions increase through operating another combustion plant to meet that need, the competent authority can grant a deviation from the emissions limits.
- Member states can allow coverage of two or more partial or whole installations under one permit. Each entity under a permit must comply with the Directive's requirements.
- Emission limits based on BAT should not prescribe the use of any one particular technology to meet those limits.
- Compliance with the emission limit values is considered achieved if none of the arithmetic averages of readings taken over a 24-hour period exceed the limit. The averaging period does not include times of start up, shutdown, and malfunction (SSM). Therefore, European installations are not penalized for emitting at levels higher than those in the Directive during times of SSM.

The large combustion plant directive BREF⁴ contains a chapter on combustion techniques for biomass and peat. Table 5 contains the emission limit values (ELV) that the chapter specifies beyond PM.

⁴ European Commission Joint Research Center. Integrated Pollution Prevention and Control Reference Document on Best Available Techniques for Large Combustion Plants. July 2006. http://eippcb.jrc.ec.europa.eu/reference/brefdownload/download_LCP.cfm. Accessed October 11, 2010.

Table 5. Emission Limit Values from Large Combustion Plant BREF and in the Proposed Boiler MACT

<i>Pollutant</i>	<i>Emission Limit Value</i>	<i>Emission Limit Value</i>	<i>U.S. EPA Proposed Values</i>
Carbon Monoxide	50-250 mg/Nm ³	40 – 200 ppmv at 7% O ₂	40 – 560 ppmv at 7% O ₂
Hydrogen Fluoride and Hydrogen Chloride ^b	< 25 mg/Nm ³	0.014 lb/MMBtu ^a	0.004 – 0.006 lb/MMBtu
Ammonia	5 mg/Nm ³	0.003 lb/MMBtu ^a	N/A
Dioxins and Furans ^c	0.1 mg/Nm ³	9.47E+04 ng/dscm	0.0003 - 0.003 ng/dscm

a Conversion from mg/Nm³ to lb/MMBtu assumes biomass f factor of 9,600 dscf/MMBtu.

b Additional values are established for combustion plants using straw as a fuel.

c Conversion from Nm³ to dscm assumes 1 Nm³ = 1.056 dscm.

The range of ELV for carbon monoxide is comparable to U.S. EPA proposed limits. The U.S. EPA proposed standards for hydrogen chloride and dioxin are much tighter than those proposed in the EU.

An agreement on the long-range transboundary air pollution from heavy metals in the EU limits particulate matter (as a proxy for heavy metals, including mercury) to 50 mg/m³ (0.028 lb/MMBtu assuming a biomass f factor of 9,600 dscf/MMBtu) from combustion installations with a net rated thermal input exceeding 50 MW.⁵ This limit is less stringent than that in the IPPC Directive.

Individual permit limits can be different from those in the BAT and/or directive as discussed above. For example, one French pulp and paper mill has the following emissions limits in its permit, which was issued in 2009.⁶ The ELVs for this plant that are established for pollutants the Boiler MACT regulates are in Table 6.

Table 6. Emission Limit Values for French Pulp and Paper Mill

<i>Pollutant</i>	<i>Emissions Limit</i>	<i>Unit</i>
PM – Filt	0.04	lb/MMBtu
Mercury	4.5 E-05	lb/MMBtu
CO	230	ppm @ 3% O ₂

Of these limits, the CO limit is more stringent than the proposed EPA limit (560 ppm @ 3% O₂).

Further, individual countries interpret each directive and can set different emissions limits. Germany has set the PM emission limits in Table 7 for installations generating

⁵ 2001/379/EC: Council Decision of 4 April 2001 on the approval, on behalf of the European Community, of the Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Heavy Metals.

⁶ Email from Glenn Rives, International Paper to Amy Marshall, URS dated October 15, 2010.

electricity through the combustion of coal, coke, coal briquettes, peat briquettes, fuel peat, or untreated wood with a rated thermal input of less than 50 MW.⁷

Table 7. PM Emission Limits from Combustion of Solid Fuels in Germany

<i>Rated Thermal Input</i>	<i>Emission Limits</i>	
	<i>(mg/m³)</i>	<i>(lb/MMBtu)^a</i>
≥ 5 MW	20 mg/m ³	0.011
≤ 5 MW	50 mg/m ³	0.028
< 2.5 MW using exclusively untreated wood	100 mg/m ³	0.055

^a Assuming a biomass f factor of 9,600 dscf/MMBtu.

The German regulation also limits CO emissions to 0.15 g/m³ (0.083 lb/MMBtu). If the furnace has a rated thermal input below 2.5 MW, the emission standard applies only to normal operating conditions (e.g., not during SSM). Further, when untreated wood is used, organic substances, measured as total carbon, should not exceed a limit of 10 mg/m³, which is significantly higher than the proposed emissions levels in the Boiler MACT.

If straw or similar plant matter is used, the PM emissions limit is 20 mg/m³ (0.011 lb/MMBtu) for installations with rated thermal inputs above 1 MW. For installations with thermal input below 1 MW, a limit of 50 mg/m³ (0.028 lb/MMBtu) applies. Carbon monoxide emissions must be below 0.25 mg/m³ (0.0001 lb/MMBtu). The organic substance emissions limit is 50 mg/m³ (0.028 lb/MMBtu).

Existing sources must comply with these limits within eight years after the legislation became effective.

These emission standards are in line with those in the IPPC Directive for installations with rated thermal input exceeding 5 MW. Germany, however, limits emissions from smaller installations than the EU-wide Directive.

Luxembourg develops permits based on the strongest local regulations and on the German TA –Luft.¹⁰ The emissions limit on CO from fuel oil-fired boilers is 100 mg/m³ or 87 ppmv.⁸ The corresponding limit for CO in the boiler MACT is 1 ppmv.

New Zealand

Historically, PM emissions limits in New Zealand for PM were 250 mg/m³ (0.139 lb/MMBtu assuming a biomass f factor of 9600 dscf/MMBtu) for new boilers and 500 mg/m³ (0.278 lb/MMBtu) for existing boilers. Currently, a limit of 125 mg/m³ (0.069 lb/MMBtu) is typical for new boilers.⁹ One report, however, indicates that there have

⁷ First General Administrative Regulation Pertaining to the Federal Immission Control Act (Technical Instructions on Air Quality Control – TA Luft). July 30, 2002.

⁸ Email from Alan Turner, DuPont to John deRuyter, DuPont, dated November 2, 2010.

⁹ Email from Rhys Kevern, URS to Amy Marshall, URS dated September 24, 2010.

been limits on TSP for boilers, but not generally PM₁₀.¹⁰ It seems in general, however, that limits on new installations are determined on a case-by-case basis.¹¹ These limits are much higher than the proposed U.S. EPA Boiler MACT limits.

Australia

In New South Wales state of Australia, in-stack concentrations of pollutants are subject to limits.¹² The limit depends on the age of the equipment/facility, which determines into which group the equipment/facility falls. The following two tables lay out both the groupings and the emissions limits.

Table 8. New South Wales emitting facility groupings¹³

<i>Group</i>	<i>Year of commencement</i>
1	Before 1972
2	1972-1979
3	1979-1986
4	1987-1997
5	1997-2005
6	After 2005

Table 9. Limits for solid particle (total) emissions¹⁴ for any activity or plant using a liquid or solid standard fuel or a non-standard fuel

<i>Group</i>	<i>Limit (mg/m³)</i>	<i>Limit (lb/MMBtu)*</i>
1	400	0.222
2, 3, or 4	250	0.139
5	100	0.056
6	50	0.028

* Assuming a biomass f factor of 9600 dscf/MMBtu.

¹⁰ Environment Ltd. Improving PM₁₀ Emission Factors from Industrial Boilers in New Zealand – Stage 1. July 2008. http://www.niwa.co.nz/_data/assets/pdf_file/0009/96093/Wilton-et-al-2008.pdf. Accessed September 27, 2010.

¹¹ New Zealand Ministry for the Environment. Good Practice Guide for Assessing Discharges to Air from Industry. June 2008. <http://www.mfe.govt.nz/publications/air/assessing-discharges-air-industry-jun08/assessing-discharges-air-industry-jun08.pdf>. Accessed September 27, 2010.

¹² Email from Rhys Watson, URS to Amy Marshall, URS dated September 24, 2010.

¹³ New South Wales Government. <http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+428+2010+cd+0+N>. Accessed September 27, 2010.

¹⁴ New South Wales Government. <http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+428+2010+cd+0+N>. Accessed September 27, 2010.

Victoria State’s State Environment Protection Policy regulates industrial air emissions including those from boilers.¹⁵ It depends on site-specific factors but there are indicator-specific maximum emission limits for new and existing stationary sources. If the boiler meets receptor limits, the generic limits are generally met. The emissions limit for total particulate matter emissions from stationary sources in Victoria are 0.5 g/m³ (0.278 lb/MMBtu assuming a biomass f factor of 9600 dscf/MMBtu).¹⁶ In air quality control regions, that limit drops to 0.25 g/m³ (0.139 lb/MMBtu).

The Group 6 emission rate is slightly higher than the U.S. EPA’s proposed existing source MACT limits for biomass and coal boilers, but quite a bit higher than the proposed new source biomass and coal boiler PM limits.

Canada

Canada does not have national limits on PM emissions from boilers. In Ontario, sulfur fuel content is limited to one percent.¹⁷

China

China implemented Environmental Protection Law in 1989. This Law contains the following (Tables 10 and 11) limits for controlled and uncontrolled boilers that are coal-fired.¹⁸ The limits were converted to lb/MMBtu assuming that similar limits would apply to biomass-fired boilers.

Table 10. China mainland emission limits for controlled boilers

<i>Boiler Type</i>	<i>Applicable Area</i>	<i>Emission Standard (mg/m³)***</i>		<i>Emission Standard (lb/MMBtu)***</i>	
		<i>Period I**</i>	<i>Period II**</i>	<i>Period I**</i>	<i>Period II**</i>
Natural Circulation (< 0.7 MW (1 t/h))	Zone 1	100	80	0.055	0.044
	Zone 2,3*	150	120	0.083	0.066
Other Boilers	Zone 1*	100	80	0.055	0.044
	Zone 2*	250	200	0.138	0.110
	Zone 3*	350	250	0.193	0.138

¹⁵ Email from Timothy Routley, URS to Amy Marshall, URS dated September 24, 2010.

¹⁶ Victoria Government. Environment Protection Act of 1970. State Environmental Protection Policy (Air Quality Management). [http://epanote2.epa.vic.gov.au/EPA/Publications.nsf/d85500a0d7f5f07b4a2565d1002268f3/249fd0306cb8a9d5ca256b43007ba829/\\$FILE/829.pdf](http://epanote2.epa.vic.gov.au/EPA/Publications.nsf/d85500a0d7f5f07b4a2565d1002268f3/249fd0306cb8a9d5ca256b43007ba829/$FILE/829.pdf). Accessed September 27, 2010.

¹⁷ Government of Ontario. <http://www.canlii.org/en/on/laws/regu/rro-1990-reg-338/latest/rro-1990-reg-338.html>. Accessed September 27, 2010.

¹⁸ IEA Clean Coal Center. <http://www.iea-coal.org.uk/site/ieacoal/databases/worldwide-emission-standards/china-volume-2?>. Accessed September 27, 2010.

* Zones are defined in China's 'Air Quality Standards (GB 3095-1996)

** Emission limit values for period I apply to boilers that began operation before December 31, 2000, including boilers that were extended or modernized after December 31, 2000.

*** Assuming a biomass f factor of 9,600 dscf/MMBtu.

These limits and the limits in Table 8 below are higher than the proposed US EPA Boiler MACT limits.

Table 11. China mainland emission standards from coal-fired boilers without emission controls

Boiler Type		Ash Content of Coal (as received %)	Emission Standard (mg/m ³)		Emission Standard (lb/MMBtu)**	
			Period I*	Period II*	Period I*	Period II*
Layer Combustion Stoker Boiler	Natural Circulation (< 0.7 MW (1 t/h))		150	120	0.092	0.073
	Other Boilers (≤2.8 MW (4 t/h))	≤25%	1,800	1,600	1.10	0.98
		≥25%	2,000	1,800	1.22	1.10
	Other Boilers (>2.8 MW (4 t/h))	≤25%	2,000	1,800	1.22	1.10
≥25%		2,200	2,000	1.34	1.22	
Fluidized Bed Combusting (FBC) Boiler	Circulating FBC Boiler		15,000	15,000	9.16	9.16
	Other FBC Boiler		20,000	18,000	12.21	10.99
Spreader Stoker Boiler			5,000	5,000	3.05	3.05

* Emission limit values for period I apply to boilers that began operation before December 31, 2000, including boilers that were extended or modernized after December 31, 2000.

** Assuming a coal f factor of 9,780 dscf/MMBtu.

India

The Indian Central Pollution Control Board (CPCB) limits emissions from industrial sources. In Part D of the General Environmental Standards, CPCB lays out general concentration-based emission standards. For PM, this standard is 150 mg/Nm³ (0.083 lb/MMBtu assuming a biomass f factor of 9,600 dscf/MMBtu). For mercury, this standard is 0.2 mg/m³ (0.0001 lb/MMBtu assuming a biomass f factor of 9,600

dscf/MMBtu). Annexure II puts forth specific emissions standards as Tables 12 and 13 review.

Table 12. General Emission Standards National PM Emission Standards^{19,20}

<i>Source</i>	<i>Emissions Limit (mg/m³)</i>	<i>Emissions Limit (lb/MMBtu)^a</i>
Thermal power plants commissioned before 1/1/1982 with capacity < 62.5 MW	350	0.083
Bagasse-fired step grate	250	0.14
Horse shoe/pulsating grate ^c	500 ^b	0.28
Spreader stoker ^c	800 ^b	0.44

^a Assuming a biomass f factor of 9,600 dscf/MMBtu.

^b 12% CO₂

^c If more than one boiler is attached to a single stack, the standard is set based on capacity of all boilers exhausting to that stack.

Table 13. National PM Emission Standards for Small Boilers²¹

<i>Steam Generating Capacity (tonnes per hour)</i>	<i>Emissions Limit (mg/m³)</i>	<i>Emissions Limit (lb/MMBtu)^a</i>
<2	1,200	0.66
≥2 and < 10	800	0.44
≥10 and < 15	600	0.33
≥15	150	0.083

^a Assuming a biomass f factor of 9,600 dscf/MMBtu.

South Korea

Table 14 contains PM emissions limits for industrial boilers and combustion facilities/boilers in South Korea.

¹⁹ India Central Pollution Control Board. General Standards.

<http://www.cpcb.nic.in/GeneralStandards.pdf>. Accessed October 28, 2010.

²⁰ India Central Pollution Control Board. Standards for Bagasse-Fired Boilers.

<http://www.cpcb.nic.in/Industry-Specific-Standards/Emission/BagasseeFired%20Boilers.pdf>. Accessed October 28, 2010.

²¹ India Central Pollution Control Board. Standards for Small Boilers. <http://www.cpcb.nic.in/Industry-Specific-Standards/Emission/Boiler.pdf>. Accessed October 28, 2010.

Table 14. South Korean Boiler Emission Limits

Pollutant	Fuel	Capacity	Installed Time	Standard		
				(mg/m ³)	(lb/MMBtu)	
PM	Liquid	Steam Generating Calorie	> 150ton	(1) installed before Jun.30,2001	20	0.011
		Steam Generating Calorie	>92,850,000kcal	(2) installed after Jul. 1,2001	40	0.021
		Steam Generating Calorie	20ton<Facility<150ton	(1) installed before Jan.31, 2007	20	0.011
		Steam Generating Calorie	12,380,000<Facility<92,850,000kcal	(2) installed after Feb. 1,2007	50	0.027
		Steam Generating Calorie	5ton<Facility<20ton	Every	70	0.037
		Steam Generating Calorie	3,095,000<Facility<12,380,000kcal	Every	30	0.017
	solid fuel mixture with liquid fuels	Steam Generating Calorie	>20ton	Every	50	0.028
		Steam Generating Calorie	>12,380,000kcal	Every	70	0.039
		Steam Generating Calorie	5ton<Facility<20ton	Every	50	0.028
		Steam Generating Calorie	3,095,000<Facility<12,380,000kcal	Every	70	0.039
		Steam Generating Calorie	<5ton	Every	50	0.027
		Steam Generating Calorie	<3,095,000kcal	Every	70	0.037

- 1) The standard & facility classification of Korean air regulation had changed from 2010
- 2) Upper table shows the standard of general boiler, except combustion facility/boiler(i.e waste combustion boiler, waste gas combustion facility, etc)
- 3) If other air pollutants except upper table are possible to emit, those pollutants should be report to governmental office and regulated
- 4) Liquid fuels use f factor of 9,190 dscf/MMBtu; solid fuels use f factor of 9,600 dscf/MMBtu.

These limits are an order of magnitude higher than those proposed in the EPA Boiler MACT.

South Africa

South Africa's Regulations Relating to Listed Activities and Minimum Emission Standards limit air emissions from coal-fired power plants. The plant-wide PM emissions limit for new plants with capacity exceeding 70 MWh is 20 mg/m³ (0.011 lb/MMBtu).²² For existing plants, the PM emissions limit is 75 mg/m³ (0.041 lb/MMBtu). (Note that mg/m³ limits are converted to lb/MMBtu assuming a biomass factor of 9,600 dscf/MMBtu.)

Brazil

Brazilian emission limits for boilers that generate steam are presented in Table 15.

Table 15. Brazilian Emission Limits for Steam-Generating Boilers

Pollutant	Fuel	Thermal Capacity (MW)	Installed Time	Standard	lb/MMBtu	OBS	
PM	Sugar Cane Bagasse	< 10	installed after December 26, 2006	280	mg/Nm ³	0.154	2
		10 <= Capacity <= 75	installed after December 26, 2006	230	mg/Nm ³	0.130	
		> 70	installed after December 26, 2006	200	mg/Nm ³	0.110	
	Wood	< 10	installed after December 26, 2006	730	mg/Nm ³	0.391	2
		10 <= Capacity < 30	installed after December 26, 2006	520	mg/Nm ³	0.278	
		30 <= Capacity < 70	installed after December 26, 2006	260	mg/Nm ³	0.139	
		>= 70	installed after December 26, 2006	130	mg/Nm ³	0.070	
	Coal	< 70	installed after December 06, 1990	1500	g/10 ⁶ Kcal	0.826	
> 70		installed after December 06, 1990	800	g/10 ⁶ Kcal	0.441		
CO	Sugar Cane Bagasse	<= 0,05	installed after December 26, 2006	6500	mg/Nm ³	3.58	2
		0,05 < Capacity <= 0,15	installed after December 26, 2006	3250	mg/Nm ³	1.79	
		0,15 < Capacity <= 1,0	installed after December 26, 2006	1700	mg/Nm ³	0.935	
		1,0 < Capacity <= 10,0	installed after December 26, 2006	1300	mg/Nm ³	0.715	
	Wood	<= 0,05	installed after December 26, 2006	6500	mg/Nm ³	3.48	2
		0,05 < Capacity <= 0,15	installed after December 26, 2006	3250	mg/Nm ³	1.74	
		0,15 < Capacity <= 1,0	installed after December 26, 2006	1700	mg/Nm ³	0.910	
		1,0 < Capacity <= 10,0	installed after December 26, 2006	1300	mg/Nm ³	0.696	

1) The results should be expressed on a dry basis and corrected to 3% oxygen

2) The results should be expressed on a dry basis and corrected to 8% oxygen

NA: Not Applicable

These emission limits are significantly higher than those proposed in the Boiler MACT.

Russian Federation

The Russian Federation has established PM emissions limits in its general technical requirements for boiler plants as summarized in Table 16.²³

²² IEA Clean Coal Center. <http://www.iea-coal.org.uk/site/ieacoal/databases/worldwide-emission-standards/south-africa?>. Accessed September 30, 2010.

²³ State Standard of the Russian Federation. Boiler Plants. Thermal and Mechanical Equipment. General Technical Requirements GOST P 50831-95.

Table 16. Russian Federation Limits on PM from Boiler Plants

Boiler Rating <i>Q</i> (MW) (boiler steam capacity (t/hr))	Adjusted Ash Content (% x kg/MJ)	Bulk Particulate Concentration in Flue Gas			
		Plants built prior to 12/31/00		Plants built after 12/31/00	
		(mg/m ³) ^a	(lb/MMBtu) ^b	(mg/m ³) ^a	(lb/MMBtu) ^b
≤ 299 (≤ 420)	< 0.6	150	0.083	150	0.083
	0.6 – 2.5	150 - 500	0.083 – 0.275	150 - 500	0.083 – 0.275
	> 2.5	500	0.275	500	0.275
≥ 300 (≥ 420)	< 0.6	100	0.055	50	0.028
	0.6 – 2.5	100 – 400	0.055 – 0.220	50 – 150	0.083
	> 2.5	400	0.220	150	0.083

^a At 0°C, 101.3 kPa, and an air-to-fuel ratio of 1.4.

^b Assuming a biomass f factor of 9,600 dscf/MMBtu.

The Russian Federation also requires that the particulate matter content in the exhaust gasses of solid fuel boilers must be documented in the operating specifications for each boiler.²⁴ Air dispersion modeling is also typically required to document air quality impacts from industrial source groupings.

Additional Countries

The following countries have PM limits less stringent than those U.S. EPA is proposing.²⁵

- Dominica;
- Indonesia;
- Jamaica;
- Japan;
- Malaysia;
- Thailand;
- Republic of Trinidad and Tobago;
- Tasmania;
- Turkey; and
- Vietnam.

Emission Limits on Gas-Fired Combustion Sources

Of the sources examined in the preparation of this compendium, only the EU IPPC directive² contains limits on combustion sources firing natural gas for any of the compounds EPA is proposing to include in the Boiler MACT. A CO limit (100 mg/Nm³ or around 80 ppmv) is mandated for boilers firing natural gas. This limit is significantly

²⁴ State Standard of the Russian Federation. Hot-Water Heated Boilers Capacities from 0.1 to 4.0 MW. General Specifications. GOST 30735-2001.

²⁵ IEA Clean Coal Center. <http://www.iea-coal.org.uk/site/ieacoal/databases/worldwide-emission-standards/worldwide-emission-standards?> Accessed September 29, 2010.

higher than EPA’s proposed CO limit for gas-fired boilers. Combustion plants fired with the following fuels are not subject to any CO limit:

- Blast furnace gas
- Coke oven gas
- Low calorific gases from gasification of refinery residues
- Other gases

Table 17 contains the EU emission limit values for PM from gas-fired combustion plants. These limits are comparable to EPA’s proposed PM limits for new Gas 2 boilers.

Table 17. PM Emission Limit Values from Gas-Fired Combustion Plants

<i>Gas Type</i>	<i>Emission Limit Value</i>	
	<i>(mg/Nm³)</i>	<i>(lb/MMBtu)</i>
In general	5	0.003
Blast furnace gas	10	0.006
Gases produced by the steel industry which can be used elsewhere	30	0.015

Conversion from mg/Nm³ to lb/MMBtu assumes natural gas f factor of 8710 dscf/MMBtu.

The best available technology that must be used to achieve CO emissions limits is complete combustion, which can be achieved through good furnace design, monitoring and process controls, and maintenance procedures. In highly populated areas, an oxidation catalyst may be considered appropriate BAT. For PM, the BAT recommended only for refinery or blast furnace gas is to apply pre-treatment measures like fabric filters.

In summary, the EU limits only CO and PM from gas fired boilers and does not regulate other pollutants like HAPs that are included in the proposed Boiler MACT. There are different PM limits for gases derived from different sources, and CO emissions are only regulated from natural gas combustion. PM control technologies are considered BAT for units fired with refinery or blast furnace gas. In general, good combustion practices are considered BAT to control CO from gas-fired combustion plants.

United States EPA Proposed Boiler MACT

Table 17. Boiler MACT emission limits as proposed in June 2010.

Existing Biomass Boilers			
Compound	Original Existing MACT Limit	Proposed Rule	Units
PM	0.07	0.02	lb/MMBtu
HCl	0.09	0.006	lb/MMBtu
Hg	9E-06	9E-07	lb/MMBtu
Dioxin (TEQ basis) (no limit under original MACT)	Susp burner/Dutch oven	0.03	TEQ ng/dscm @ 7% O ₂
	Fluidized Bed	0.02	TEQ ng/dscm @ 7% O ₂
	Fuel Cell	0.02	TEQ ng/dscm @ 7% O ₂
	Stoker/grate/other	0.004	TEQ ng/dscm @ 7% O ₂
Carbon Monoxide (no limit under original MACT for existing)	Susp burner/Dutch oven	1010	ppm @ 3% O ₂
	Fluidized Bed	250	ppm @ 3% O ₂
	Fuel Cell	270	ppm @ 3% O ₂
	Stoker/grate/other	560	ppm @ 3% O ₂
Existing Coal Boilers			
Compound	Original Existing MACT Limit	Proposed Rule	Units
PM	0.07	0.02	lb/MMBtu
HCl	0.09	0.02	lb/MMBtu
Hg	9E-06	3E-06	lb/MMBtu
Dioxin (TEQ basis) (no limit under original MACT)	Stoker/grate/other	0.003	TEQ ng/dscm @ 7% O ₂
	Pulverized Coal	0.004	TEQ ng/dscm @ 7% O ₂
	Fluidized Bed	0.002	TEQ ng/dscm @ 7% O ₂
Carbon Monoxide (no limit under original MACT for existing)	Stoker/grate/other	50	ppm @ 3% O ₂
	Pulverized Coal	90	ppm @ 3% O ₂
	Fluidized Bed	30	ppm @ 3% O ₂
Existing Liquid Fuel Boilers			
Compound	Original Existing MACT Limit	Proposed Rule	Units
PM	NA	0.004	lb/MMBtu
HCl	NA	9E-04	lb/MMBtu
Hg	NA	4E-06	lb/MMBtu
Carbon Monoxide	NA	1	ppm @ 3% O ₂
Dioxin (TEQ basis)	NA	0.002	TEQ ng/dscm @ 7% O ₂
Existing Units burning gases other than natural gas or refinery gas			
Compound	Original Existing MACT Limit	Proposed Rule	Units
PM	NA	0.05	lb/MMBtu
HCl	NA	3E-06	lb/MMBtu
Hg	NA	2E-07	lb/MMBtu
Carbon Monoxide	NA	1	ppm @ 3%
Dioxin (TEQ basis)	NA	0.009	TEQ ng/dscm @ 7% O ₂

New Biomass Boilers			
Compound	Original NEW MACT Limit	Proposed Rule	Units
PM	0.025	0.008	lb/MMBtu
HCl	0.02	0.004	lb/MMBtu
Hg	3E-06	2E-07	lb/MMBtu
Dioxin (TEQ basis) (no limit under original MACT)	Susp burner/Dutch oven	0.03	TEQ ng/dscm @ 7% O ₂
	Fluidized Bed	0.007	TEQ ng/dscm @ 7% O ₂
	Fuel Cell	5E-04	TEQ ng/dscm @ 7% O ₂
	Stoker/grate/other	5E-05	TEQ ng/dscm @ 7% O ₂
Carbon Monoxide (original new MACT limit of 400)	Susp burner/Dutch oven	1010	ppm @ 3% O ₂
	Fluidized Bed	40	ppm @ 3% O ₂
	Fuel Cell	270	ppm @ 3% O ₂
	Stoker/grate/other	560	ppm @ 3% O ₂
New Coal Boilers			
Compound	Original New MACT Limit	Proposed Rule	Units
PM	0.025	0.001	lb/MMBtu
HCl	0.02	6E-05	lb/MMBtu
Hg	3E-06	2E-06	lb/MMBtu
Dioxin (TEQ basis) (no limit under original MACT)	Stoker/grate/other	0.003	TEQ ng/dscm @ 7% O ₂
	Pulverized Coal	0.002	TEQ ng/dscm @ 7% O ₂
	Fluidized Bed	3E-05	TEQ ng/dscm @ 7% O ₂
CO (original new MACT limit of 400)	Stoker/grate/other	7	ppm @ 3% O ₂
	Pulverized Coal	90	ppm @ 3% O ₂
	Fluidized Bed	30	ppm @ 3% O ₂
New Liquid Fuel Boilers			
Compound	Original New MACT Limit	Proposed Rule	Units
PM	new large: 0.03	0.002	lb/MMBtu
HCl	new large: 0.0005	4E-04	lb/MMBtu
Hg	NA	3E-07	lb/MMBtu
Carbon Monoxide	400	1	ppm @ 3% O ₂
Dioxin (TEQ basis)	NA	0.002	TEQ ng/dscm @ 7% O ₂
New Units designed to burn other gases			
Compound	Original New MACT Limit	Proposed Rule	Units
PM	NA	0.003	lb/MMBtu
HCl	NA	3E-06	lb/MMBtu
Hg	NA	2E-07	lb/MMBtu
Carbon Monoxide	400	1	ppm @ 3% O ₂
Dioxin (TEQ basis)	NA	0.009	TEQ ng/dscm @ 7% O ₂

Some countries have PM emission limits for boilers that are fairly comparable to EPA's proposed existing source PM emission limits for coal and biomass boilers. EPA proposed limits for new source biomass boilers, new source coal boilers, and proposed existing and new liquid boilers are tighter than those being considered in the EU. In the EU, proposed limits on dioxin and hydrogen chloride are above those proposed in the

U.S. Proposed CO emissions limits are comparable in the U.S. and EU. Other countries, including China and India, have promulgated less stringent PM limits for new and existing boilers than those in the proposed boiler MACT.

TAB 6

Boiler MACT and Benefit Claims

Some have argued that for EPA revise its proposed Boiler MACT rule would create a threat to public health. However, these concerns fail to consider some important factors, where the rule's MACT benefits can be maintained while reducing costs and protecting jobs.

- MACT is the cornerstone of the air toxic program in Title III of the Clean Air Act focused on reducing Hazardous Air Pollutants (HAPs). Yet the only quantified health benefits from the Boiler MACT come from reducing emissions of fine particulate matter (PM_{2.5}) and PM_{2.5} precursors such as sulfur dioxide (SO₂), rather than HAPs. This leads to the claim that for every dollar spent five to twelve dollars in health benefits will be realized. EPA needs to focus on the HAP reductions and find alternative approaches that can obtain those benefits at far lower cost using the flexibility in the law. For example, roughly 70% of the mercury costs come from controls on biomass and oil which represent only 5% of the total emissions from industrial boilers.
- The estimated PM_{2.5} benefits (2,000 to 5,100 premature deaths plus other morbidity effects, such as bronchitis and non fatal heart attack); if they are to be believed (see comment below), appear to be the same benefits claimed in the 2006 PM_{2.5} NAAQS revisions. This approach would be double counting the benefits.
- The major recommendations for improvements in the proposed rule, such as use of the source based approach, greater consideration of variability, and accounting for the skewed data set, will lead to standards more stringent than the 2005 limits and require billions in new investments but not be unachievable or ultra low. The vast majority of the HAP benefits come from reducing emissions from the dirtiest units. For example, going from 10 lb/T Btu mercury to 3 lb/T Btu and not all the way to 0.9 lb/T Btu for biomass boilers will still achieve an emissions reduction from the highest emitters at a fraction of the cost and will still preserve most of the 15,000 ton estimated reductions, as these are primarily based on emissions reductions from coal-fired boilers.
- The language of Section 112 clearly states that EPA can look at other non-air quality benefits like energy use but not other air pollutants like PM and SO₂. Thus, it is illegal to factor in these “co-benefits” to justify not choosing flexible options like the health based emission limit.
- Efforts to reduce PM and SO₂ should be left to the Title I State Implementation Plan (SIP) program and not become the rationale for tougher MACT rules, as Congress intended. Congress clearly created two distinct programs – one where MACT sets nationwide controls for air toxics and a second where controls for pollutants like PM and SO₂ are targeted to non-attainment areas where air quality problems exist. Many boilers are located in areas far from non-attainment areas so the proposed MACT would not help these areas reach attainment. In fact, only 4% of the SO₂

emissions from paper mills occur in non-attainment areas given our rural based industry. This comes after the industry has reduced SO₂ emission by 37% since 1995.

- Finally on the subject of PM benefits, it is worth pointing out just how uncertain and overstated they are based on a careful look at the health science. First, EPA's most recent estimates of risk from exposure to PM_{2.5} shows less risk than in 1997 when EPA issued the standards for the first time. Second, the key studies relied upon by EPA fail to explain a "cause and effect" between PM_{2.5} and health effects. Third, the uncertainties in the science are greater now than when the original standards were established suggesting that further reductions may be overvalued. Finally, EPA has "cherry picked" the results by relying on selected studies showing effects and ignoring many others.
- EPA failed to include any cancer or non-cancer benefits in the Regulatory Impact Analysis for Boiler MACT. However, EPA's assessment of all MACT source categories shows that the toxicity weighted cancer emissions from boilers represent about 5% of the total and less than 1% of non-cancer toxicity weighted emissions. (see EPA OAQPS slide on NEI risks).

TAB 7

Selected Quotes from Governors on Boiler MACT
(October 2010)

Alabama Governor Bob Riley (R)

“As our state’s unemployment rate hovers around 11 percent, enacting stringent federal Boiler MACT rules would jeopardize more good paying jobs across the manufacturing sector.” ... “While I support efforts to address serious health threats from air emissions, I also believe that regulations can be crafted in a balanced way that sustains both the environment and jobs. “

Arkansas Governor Mike Beebe (D)

“While I strongly support efforts to address serious health threats from air emissions, I feel that where no risk to public health is posed, regulations should be crafted in a balanced way that sustains both the environment and jobs. “

“We understand that it is often difficult for the EPA to consider and address broad environmental effects when dealing with specific media-related rulemaking. However, I feel that the time is ripe with this rulemaking to do just that. The EPA has promoted the development of alternative energy sources for a number of reason, including the protection of air quality. Unfortunately, when one looks at EPA’s specific rulemaking, the impact has been to discourage that very goal. This proposed rule is an example.”

California Governor Arnold Schwarzenegger (R)

“California has adopted some of the nation’s most ambitious renewable energy and greenhouse gas reductions goals and I am concerned that rule changes being considered by your agency will undermine the progress we are making.”

“I know the Obama Administration is working as hard as we are to increase, not eliminate, green jobs.”

“While I support your efforts to adopt national regulations to reduce hazardous air pollutants, I have significant concerns that these proposed standards would have adverse impact on California’s environment and economy. “

Georgia Governor Sonny Perdue (R)

“Being good stewards of our environment is a principle that is very close to the hearts of Georgians and I certainly desire to protect Georgians citizens from exposure to harmful compounds. However, the proposed rule is unreasonable and will impose serious – perhaps fatal – hardships on significant sectors fo the economy just as the first fragile signs of economic recovery begin to emerge. “

“I know that we share many of the same concerns of protecting the environment and the welfare of our citizens. As you move forward in the process of finalizing a Boiler MACT rule, I hope that you will recognize that the welfare of our citizens is dependent on many factors, not the least of which is the availability to find good jobs, plan for the future, and provide for their families. This will require the final Boiler MACT rule to be reasonable and workable.”

Hawaii Governor Linda Lingle (R)

“Hawaii, as an island state, relies on the importation and refining of crude oil for its electrical generation, transportation, and aviation needs... The proposed rule would impose emission standards for liquid fired process heaters and boilers that are infeasible for Hawaii’s refineries to meet.”

Idaho Governor Butch Otter (R)

“ I am concerned the combination of the depressed economy and all the new regulatory burdens proposed by EPA, such as the Green House Gas Tailoring rule and the upcoming potential reduction in the ozone standard to name a few, could be devastating on Idaho business. I question why EPA is not employing all the flexibility of its authority.”

“I urge you to use your discretionary authority under 112(d)(4), as was originally proposed in the 2004 Boiler MACT rule, to provide small business and larger industries with the flexibility they need to continue to protect air quality and to remain economically healthy for both Idaho and the nation.”

Maine Governor John Baldacci (D)

“The proposal concludes that the use of the authority under Section 112(d)(4) of the Clean Air Act is discretionary and EPA does not support its use in Boiler MACT. I believe that provision reflects Congress’ intent to provide for flexibility where there is not a public health threat. In such cases, it makes sense to allow that approach in the final rule for threshold substances.”

“EPA should use a method to set emissions standards that is based on what real world best performing units actually can achieve for all the regulated pollutants. EPA should not ignore biases in its emissions database, the practical capabilities of controls or the variability in operations, fuels and testing performance across the many regulated subcategories of boilers.”

Minnesota Governor Tim Pawlenty (R)

“The pending regulations would be a blow to these [economic recovery] efforts by diverting investments from job creation and economic expansion, particularly for

manufacturing, the forest products industry, and both small and large businesses. Likewise, these rules would impact state and local government facilities and higher education institutions.”

“As you develop a final Boiler MACT rule, please consider an approach that fosters economic recovery and job growth balanced with environmental protection.”

Mississippi Governor Haley Barbour (R)

“Because of the costly control devices that would have to be installed, the pending Boiler MACT policy could restrict resources for potential investment and hiring, therefore, jeopardizing the future of the manufacturing industry and its important role in the state’s economy.”

North Carolina Governor Bev Perdue (D)

“North Carolina has been a national leader in addressing serious health threats from air emissions. However, our efforts have been grounded in a belief that regulations need to be balanced, in order to sustain both the environment and our competitive position in the world marketplace, and still maintain jobs for North Carolinians. “

“I encourage EPA to use a method to set emissions standards based on what real world, best performing units actually can achieve for all the regulated pollutants... Clearly, EPA should not adopt Boiler MACT standards that commercial suppliers of such equipment say are unattainable.”

Ohio Governor Ted Strickland (D)

“I ask that the U.S. EPA give appropriate attention to the economic impact of the rule on Ohio businesses, including the potential for job loss resulting from such large capital investments.”

Oregon Governor Ted Kulongoski (D)

“I ... write to express my concern about a potential unintended consequence of the proposed Boiler MACT rule... While these regulations are important to protect public health from hazardous air pollutants, I am particularly concerned about the impact these regulations could have on our growing renewable energy sector.because of variability in boiler design and fuel quality, the proposed limits may be impracticable for many existing biomass boilers. This could work against our goal to expand the use of sustainable biomass as a part of our GHG reduction efforts.”

“As EPA develops a final Boiler MACT rule, I hope you will carefully consider sustainable approaches that protect the environment and public health while fostering economic recovery and jobs within the bounds of the law.”

Virginia Governor Bob McDonnell (R)

“I believe we can all agree that risks to public health should be a principal concern when designing such regulations. However, the proposed Boiler MACT rule misses the opportunity to avoid controls where certain air emissions are not a problem. Instead, it should be redrafted to support a health based approach and set standards that reflect the variety of boilers in use and their variable performance.”

“The final Boiler MACT rule needs to be reasonable and workable. As your Administration moves toward finalizing this rule, I ask that you make the necessary adjustments to protect health of our citizens without threatening their livelihoods and the recovery of our economy.”

Washington Governor Christine Gregoire (D)

“I write to express my concern that your agency’s proposed rule to establish ‘maximum achievable control technology’ for industrial, commercial and institutional boilers could undermine the progress we are making in Washington State with renewable bioenergy. While I strongly support the need for updated rules that protect public health from hazardous air pollutants, I believe this can be accomplished with attainable technologies and appropriate flexibility to reduce economic harm and unintended environmental effects.”

Wisconsin Governor Jim Doyle (D)

“The importance of balancing environmental protection with economic vitality has been a central theme for my administration during my two-terms as Governor of Wisconsin. . . However, I am greatly concerned that the Boiler MACT rule currently proposed by your agency [EPA] works against a sustainable future for Wisconsin and the nation.”

“As EPA develops a final Boiler MACT rule, I hope you will consider a balanced approach that is sustainable, protects public health and the environment and fosters energy independence, economic recovery and jobs.”

United States Senate
WASHINGTON, DC 20510

January 27th, 2010

The Honorable Lisa Jackson, Administrator
U.S. Environmental Protection Agency
Ariel Rios Building, Mail Code: 1101A
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Administrator Jackson:

As newly elected Senators, we look forward to working with you in the 112th Congress. At this time, however, we are writing to echo concerns recently expressed by a bi-partisan group of 49 Senators during the 111th Congress on EPA's proposed Maximum Achievable Control Technology (MACT) rules, which affects boilers and process heaters.

We are concerned that even recently installed boilers cannot meet the requirements set forth in the proposed rule. The rule appears to be based on a "super" boiler that does not currently exist. As a result, these proposed boiler MACT rules are expected to cost billions of dollars and would put a tremendous number of jobs at risk. The manufacturing industry has been hit particularly hard by our struggling economy and while this proposal would have an effect on jobs from many sectors, manufacturers would be affected the most. In addition, the proposal's biomass standards significantly undercut the potential to use this important source of renewable energy and are at odds with the popular promotion of renewable energy sources.

EPA is tasked with protecting and enhancing our nation's air quality under the Clean Air Act, and we ask you to consider revisions to the proposed rules that will not only protect the environment, but also preserve jobs. Congress gave EPA latitude in certain areas to balance the economic impact with the health effects of such rules. We believe EPA should consider using this health-based standard to adjust their approach to Boiler MACT, which is specifically authorized by section 112(d)(4) of the Clean Air Act.

We are committed to protecting the jobs of hardworking Americans that recently elected us and we believe EPA should revise the rule to enact emissions standards that are actually achievable by real-world boilers. We support EPA's efforts to address health threats from air emissions and we are hopeful that these regulations can be crafted in a way that will benefit the environment and not harm existing jobs.

Sincere Regards,



Roy Blunt



John Boozman

Rob Austin

Ron Johnson

Jerry Moran

Kelly Ayotte

Pat Doomey

Rand Paul

Paul Manchillo

Ron Coats

Clankin

Mark

John Hovorn

November 11, 2010

The Honorable Lisa Jackson
Administrator
United States Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N. W.
Washington, DC 20460

Dear Administrator Jackson:

We are writing to express our concerns about the proposed Boiler MACT rule – the Maximum Achievable Control Technology rule for industrial, commercial and institutional boilers and process heaters – and the other associated rules that were published on June 4th. As our nation struggles to recover from the current recession, we are deeply concerned that the potential impact of pending Clean Air Act regulations would be harmful to U.S. manufacturing and the high-paying jobs it provides, as well as all sectors of the US economy. Both small and large businesses are vulnerable to extremely costly regulatory burdens, as well as municipalities, universities, federal facilities, and commercial entities. The flow of capital for new investment and hiring is still seriously restricted, and the costs imposed by these regulations as proposed could make or break the viability of continued operations. As proposed, the Boiler MACT rule alone could impose over twenty billion dollars in capital costs at thousands of facilities across the country and billions more in operating costs.

We support efforts to address significant health threats from air emissions in a cost effective manner, and also believe that regulations can be crafted to accomplish this and still protect jobs and economic growth. Thus, we appreciate your willingness, as expressed in your responses to recent Congressional letters, to consider changes to the proposed rules and incorporating flexible approaches that appropriately address the diversity of boilers, operations, sectors, and fuels that could provide assurance of achievability and prevent severe job losses and billions of dollars in unnecessary regulatory costs.

Specifically, we encourage EPA to set standards based on what real-world sources actually can achieve. EPA has proposed a pollutant-by-pollutant approach based on the “best performers” for each of five separate Hazardous Air Pollutants (HAP)/ surrogate emissions categories. This approach had many data and methodology problems, and resulted in a set of standards such as those for dioxin, mercury and carbon monoxide that cannot be met by even the best performing actual boilers and process heaters.

EPA should finalize work practices for *all* gas and distillate oil fired units at major sources and oil and biomass fired boilers located at area sources to avoid the *increase*

in emissions (e.g., NO_x and CO₂) and energy use that would result from the numerous control technologies required to meet the proposed emission limits with no guarantee of actually achieving those limits.

In addition, EPA should provide an alternative health-based emissions approach for qualifying low-risk emissions. A practical, health-oriented standard for threshold pollutants would allow sources to demonstrate that their emissions of these pollutants do not pose a public health concern. Section 112(d)(4) of the Clean Air Act expressly contemplates the use of such a standard, which can be implemented at each facility to protect public health.

In the related rule defining “Non-Hazardous Secondary Materials,” EPA should reaffirm that many secondary materials including biomass and biomass processing residuals are not solid wastes. The statute and related case law allow EPA to classify these materials as fuels if they are not discarded, are treated as valuable commodities, and are burned for energy recovery. Failure to encourage these alternative and often renewable fuels will result in more materials being landfilled and increase use of fossil fuels.

Lastly, EPA should promulgate work practice standards for dioxins/furans in Boiler MACT due to the many problems with emissions measurement, lack of knowledge of conditions and unit features leading to those emissions, and the inability to further control emissions at the already extremely low emission rates shown for these units.

As EPA turns to developing the final Boiler MACT and related rules, we believe it is imperative that EPA utilize adequate time and resources to fully evaluate all comments and data provided through the public comment process so that a reasonable rule can be promulgated. We appreciate your willingness to consider our suggestions.

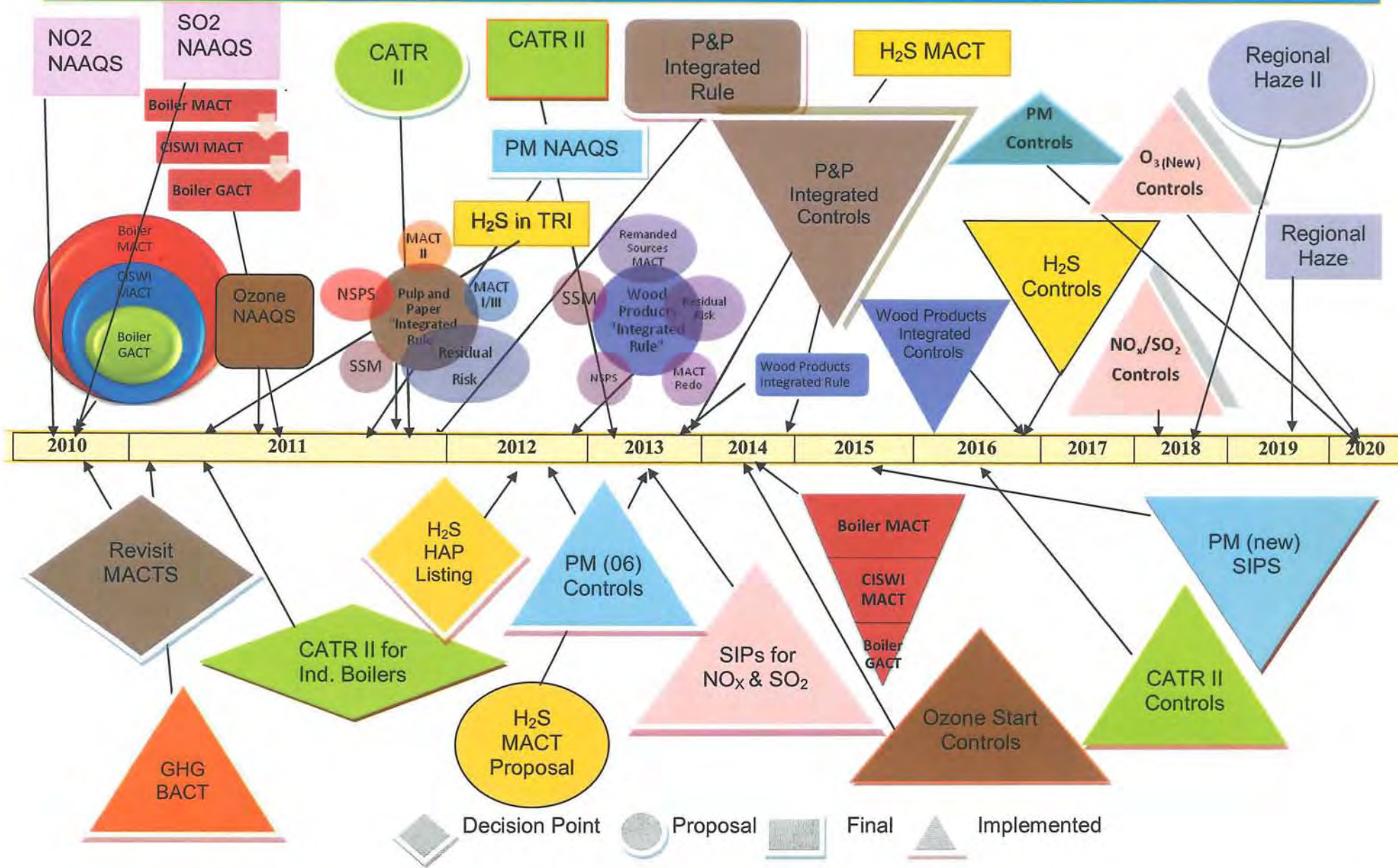
Sincerely,

American Chemistry Council
American Coke & Coal Chemicals Institute
American Forest & Paper Association
American Home Furnishings Alliance
American Municipal Power
American Petroleum Institute
American Public Power Association
American Sugar Alliance
American Wood Council
Associated Oregon Industries
Biomass Thermal Energy Council

Brick Industry Association
California Cotton Ginners Association
Composite Panel Association
Corn Refiners Association
Council of Industrial Boiler Owners
Empire States Forest Products Association
Hardwood Federation
Hardwood Manufactures Association
Hardwood Plywood and Veneer Association
Indiana Hardwood Lumbermen's Association
Indiana Manufacturers Association
Industrial Energy Consumers of America
Kentucky Forest Industries Association
Lake States Lumber Association
National Alliance of Forest Owners
National Association of Manufacturers
National Cotton Ginners' Association
National Hardwood Lumber Association
National Oilseed Processors Association
National Rural Electric Cooperatives Association
National Wood Flooring Association
Northeastern Loggers' Association
Ohio Manufacturers' Association
Ohio Municipal Electric Association
PA Anthracite Council
Pellet Fuels Institute
Pennsylvania Forest Products Association
Rubber Manufacturers Association
Society of Chemical Manufacturers and Affiliates
Southeastern Lumber Manufacturers Association
Tennessee Chamber of Commerce & Industry
Texas Cotton Ginners' Association
The Aluminum Association
The State Chamber of Oklahoma
Treated Wood Council
U.S. Chamber of Commerce
Utah Manufacturers Association
Virginia Manufacturers Association
Wisconsin Paper Council

cc: Regina McCarthy, Environmental Protection Agency
Robert Perciasepe, Environmental Protection Agency
Cass Sunstein, Office of Management and Budget

Potential Air Regulations Affecting Forest Products (2010-2020)



Boiler MACT	CATR	P&P Integrated	WP Integrated	NSR	H ₂ S	PM	Ozone	NO _x	SO ₂	Haze II
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