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Docket ID No. OAR-2002-0056
Air Docket
Clean Air Mercury Rule
U.S. Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Sir/Madam:

On behalf of NESCAUM, we thank you for this opportunity to comment on the "National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units: Notice of Data Availability," which was published in the *Federal Register* on December 1, 2004 (69 *Federal Register* 69864).

A General Comment on the NODA Process and its Timing:

First, we would like to make a general comment about the process and timing EPA has chosen to get public comments on the December 1, 2004 NODA. The EPA NODA is rather vague in what EPA plans to do before making its final decision by March 15, 2005. At many places, the NODA gives a distinct impression that EPA is in the middle of completing additional technical analyses, including:1] investigations on how various IPM modeling results would be used (we note at the outset that EPA's own IPM modeling results are not robust or technically adequate to develop a thoughtful and considered response to this docket), 2] how EPA will determine the effect of mercury speciation on the effectiveness of various control technologies and on atmospheric transport and deposition of mercury, and 3] how EPA would undertake its "revised benefits assessment." Given the length of time required to undertake various studies and develop responses and recommendations based on their conclusions, we cannot help but believe that EPA has already made up its mind with respect to this issue before the NODA was even released.

From a timing standpoint, while we appreciate the fact that EPA has issued additional information and requested public input, we object to the schedule and manner in which EPA has handled this exercise. To allow the public only 30 days to review and comment on this amount of information is inadequate. This is not a recipe for a thorough review of the data.

Additionally, as we note above, EPA is seeking information from the public, but did not offer the public information in return. Namely, EPA never conducted the additional modeling with the Integrated Planning Model (IPM) to evaluate more stringent MACT options, which the Federal Advisory Committee Act workgroup requested. The NODA leaves us with a clear and distinct impression that EPA is still evaluating many issues and options related to modeling, speciation, and benefits calculation. Unfortunately, under these conditions, this latest EPA NODA effort would only marginally benefit from pubic input, thus reaffirming our earlier statement that this "extra public comment" will have no bearing on EPA's final decision that seems to have been made already.

Introduction

We include our previous comments below (with some modifications) for the sake of completeness as well as for providing a context of our later comments on EPA's revised benefit assessment (RBA) that appear at the end of these comments. We are near completion of a two-year extensive Harvard/NESCAUM's study which developed a detailed benefits assessment methodology for evaluating and monetizing the benefits for two endpoints related to human mercury exposure through fish consumption. The NESCAUM draft study "**Estimating Reductions in U.S. Mercury Exposures from Decreased Power Plant Emissions and the Associated Economic Benefit,"** is currently undergoing an extensive peer review. The study was undertaken for NESCAUM by the Harvard Center for Risk Analysis (HCRA), part of the Harvard School of Public Health (HSPH). It will be submitted to the Docket as soon as it is finalized, sometime in January 2005.

The report integrates the avoided costs ("or benefits") associated with a reduction in the neurological effects that result from intrauterine methylmercury exposures and with reductions in adult fatal and non-fatal cardiovascular (myocardial) events related to adult methylmercury exposures. The effects of methylmercury intake on myocardial events are less certain than the effects on neurological events. The neurological benefits were valued using a cost-of-illness model based on IQ-point gains that could result from decreased methylmercury exposures. The non-fatal myocardial events were valued using a cost-of-illness approach. The premature mortality events were valued using a willingness-to-pay or value-of-statistical-life approach. This second endpoint (fatal and non fatal heart attacks in adult population associated with mercury exposure) and its associated monetized benefits by reducing power plant mercury emissions are being addressed for the first time in the U.S. in this Harvard/NESCAUM study. We note that the EPA's revised benefit assessment does not address this critical endpoint and we strongly urge EPA to do so.

These neurological effects and the fatal and non-fatal cardiovascular effects likely account for a large fraction of the total monetary value of damage to humans that is associated with methylmercury exposures. The study also discusses two additional effects that have been observed in children and associated with intrauterine methylmercury exposures: increased blood pressure and decreased heart rate variability.

However, the study does not quantify these risks, because the increased blood pressure does not appear to persist and the clinical significance of changes in heart rate variability of otherwise healthy children is not known.

Our June 29, 2004 Comments (OAR-2002-0056-2887 and -2890) on January 30, 2004 EPA's Proposed Standards (69 FR 4652-4752) with appropriate modifications to address new issues arising from NODA follow. Then, we provide new and additional comments regarding EPA's proposed revised benefits assessment.

Our Previous Comments with Modifications to Address NODA

Recent scientific studies have confirmed the serious health risks to the developing fetus from methylmercury exposure.[1] In addition, recent studies confirm that a greater amount of methylmercury is distributed to the fetus than previously estimated,[2] leading to a doubling of an earlier annual estimate of newborn infants at risk in the U.S from 300,000 to 600,000. In the Northeast, the prospect of over 84,000 newborns per year potentially at-risk for irreversible neurological deficits and cardiovascular abnormalities from methylmercury exposure represents one of the most critical public health threats in our region today.

Over 15,000 fish samples collected in the Northeast region confirm widespread mercury contamination of our aquatic ecosystems, irreparably threatening human health and wildlife unless actions are taken to reduce significant sources of mercury emissions. All Northeast states have issued fish consumption advisories because of mercury contamination. In addition to the toll on human health and wildlife, mercury contamination also threatens the tourist and recreational fishing industries, which contribute $3 billion a year to our regional economy.

Recent scientific field studies have shown that reductions in mercury emissions lead to reductions in the mercury concentrations in fish tissue. After several years of implementing effective regulations to control mercury (Hg) emissions from municipal waste combustors, medical waste incinerators, and other sources in the Northeast, the electric utility steam generating units (EGUs) remain the largest uncontrolled source category of Hg and other hazardous air pollutant (HAP) emissions in the region. Further, transported mercury emissions from out-of-region coal-fired EGUs are a major contributor to mercury deposition in the Northeast. In view of the public health and environmental impacts associated with exposure to mercury and other hazardous pollutants, NESCAUM believes it is extremely important that the EPA take swift and aggressive steps to reduce emissions of these pollutants from EGUs burning coal and oil.

[1] Murata K, Weihe P, Budtz-Jorgensen E, Jorgensen PJ, Grandjean P. 2004. Delayed brainstem auditory evoked potential latencies in 14-year-old children exposed to methylmercury. J Pediatr. 2004 Feb;144(2):177-83.

[2] Stern A, Smith A. 2003. An assessment of the cord blood:maternal blood methylmercury ratio: implications for risk assessment. Environ Health Perspect. 2003 Sep;111(12):1465-70.

The NESCAUM's previous comments addressed EPA's proposed Utility Maximum Achievable Control Technology (MACT) rule(s) to control mercury from coal- and oil-fired EGUs. The NESCAUM states, as noted in our June 29, 2004, comments, were opposed then and are opposed now to all three of the options EPA has proposed in this important rulemaking (We are opposed to both the Section 111 and Section 112 (with emission trading) approaches on statutory grounds, and even though we support the Section 112 MACT approach without trading, we strongly disagree with unacceptably lenient MACT limits proposed by EPA under this approach, see below). Given the serious public health threat and the commercial availability of cost-effective control options, we are dismayed that EPA's proposal is far removed from what we believe is needed, achievable, cost-effective, and statutorily mandated. Accordingly, NESCAUM strongly urged EPA to promulgate final MACT standards for EGUs, with appropriately stringent emission limits and expeditious deadlines, as required by Section 112(d) of the Clean Air Act (CAA).

We had four specific concerns with EPA's January 31, 2004, proposal: (1) EPA's MACT floor determination is flawed; (2) NESCAUM strongly opposes EPA's trading scheme under Sections 112 and 111; (3) EPA needs to consider other HAPs in the EGU regulation; and (4) despite EPA's claims to the contrary, control technologies are commercially available now to substantially reduce mercury (Hg) emission from EGUs.

1. EPA's MACT Floor Determination is Flawed

EPA's first (but not its preferred) proposal is to regulate Hg emissions from coal-fired EGUs with MACT standards (without a cap-and-trade program) under section 112 of the CAA. NESCAUM supports this option as the only appropriate and statutorily required mechanism for regulating Hg and other HAPs from coal- and oil-fired EGUs. However, we believe that EPA's proposed MACT limits are unacceptably lenient and are based on a seriously flawed methodology that incorporates invalid statistical manipulation of the Information Collection Request (ICR, 1999) data and unnecessary and excessive subcategorization of coal-fired boilers.[3]

The limits proposed for both the existing and new EGUs are much higher than would be allowed if EPA applied the prescribed and long-standing application of the Section 112 MACT approach, which requires that the MACT limit be at least as stringent as "the average emission limitation achieved by the best performing 12 percent of the existing sources." For new sources, the reduction requirements under Section 112 must be at least as stringent as the emission control that is achieved in practice by the best-controlled similar source. For example, as part of the Federal Advisory Committee Act's (FACA) stakeholder process that was convened by EPA to develop the utility MACT,[4] the Hg control efficiencies of the eighty ICR units for which EPA had collected data under real-

[3] In this and the other two approaches, EPA plans to subcategorize pulverized coal-fired power plants based on the type of coal (bituminous, subbituminous, lignite, coal refuse) and proposes to treat IGCC units differently than pulverized coal boilers.

[4] NESCAUM staff (Praveen Amar) and the State of New Jersey (William O' Sullivan, Administrator, Division of Air Quality) were two of the five members representing state and local air quality regulators.

world field conditions were ranked. The "top twelve percent" of the 80 units, or the top 10 units, had percent control ranging from 99 percent for the top unit (measured from Hg in coal) to 84 percent for the 10th unit, with an average of 91.1 percent. None of these units had Hg-specific control technology such as activated carbon technology in place. The top 10 units are listed in Table 1.

Table 1. Determination of MACT Floor Based on Percent Reduction in Mercury
Top 12 percent (10 Plants) from EPA 1999 ICR Data

Plant Name	Calculated Hg Reduction (percent from coal)
1 Scrubgrass Generating Company, L.P.	99
2 Clover Plant Station	97
3 Mecklenburg Cogeneration Facility	96
4 Logan Generating Plant	96
5 Dwayne Collier Battle Cogeneration Facility	92
6 Stockton Cogen Company	90
7 SEI - Birchwood Power Facility	87
8 Clay Boswell	86
9 Intermountain	84
10 Big Bend	84
Average of Top 12%	**91.1%**

Source: Memo to the Utility MACT Workgroup from the Ranking Subgroup (Praveen Amar, Patrick Raher, Felice Stadler). February 5, 2002. Online. Available: http://www.epa.gov/ttn/atw/combust/utiltox/feb5memo

A 91 percent reduction from Hg in coal (from the current baseline of 75 tons per year) applied across all of the 1143 coal-fired EGUs would reduce emissions to under 7 tons of Hg. Instead, EPA is proposing only a 29 percent reduction in EGU emissions, resulting in 34 tons per year in 2007. This is almost five times more Hg than would be allowed under the prescribed application of Section 112(d). What is particularly troubling is the fact that EPA's proposed MACT standards are even less stringent than the recommendations made by industry representatives during the two-year FACA stakeholder process.

Subcategorizing Is Neither Necessary Nor Desirable for Determining the MACT Floor

The CAA allows subcategorization of a source category (for example, EGUs) based on class, type, and size, but not on the kind of fuel used by sources in that category. Thus, the subcategorization of existing coal-fired EGUs based on whether units burn western coal or eastern coal, blends of coals, high- or low-Hg coal, high- or low-chlorine coal, or other combinations, is inconsistent with the CAA. We oppose the use of

subcategorization by EPA in this proposal because it results in a MACT floor determination for subbituminous coal that is about three times less stringent than the one for bituminous coal. Our position is consistent with the position taken by the state and local representatives during the FACA stakeholder process (see Attachment A; October 22, 2002 report; pages 8-9). There are also a number of practical reasons to minimize the number of subcategories, some of which are addressed below in the discussion about variability. Key among them is the reduction in the regulatory burden and the increased flexibility for power plant operators in directing their fuel procurement and management strategies. Also, air pollution control technology has significantly advanced in recent months, and halogenated activated carbon sorbents have been shown to be effective in achieving 90% control of mercury for subbituminous and lignite coals.

EPA's Statistical Approach to Address Variability in Establishing the MACT Floor is Fundamentally Flawed

NESCAUM finds EPA's variability analysis that was used to arrive at extremely lenient MACT floors for all subcategories, completely unacceptable. First, EPA divided the universe of the 80 power plants that comprise the ICR data set into five subcategories[5]: four based on coal rank and one on process type (i.e., IGCC). It is quite apparent that EPA did so largely because Hg emissions are easier to control up to the so-called "co-benefit" levels (in the range of only 20 to 40 percent and much less than 90 percent and higher reductions that are needed and achievable) from some ranks of coal (bituminous coal) than from others (subbituminous and lignite). The so called "co-benefits" are simply the incidental but uncertain reductions in Hg emissions that are expected to occur with technologies designed to address conventional pollutants, SO_2, NOx, and particulate matter (PM). EPA calculated the arithmetic average of the ICR emission test results from the best performing 12 percent of sources in each subcategory and then chose (separately for each subcategory) to arbitrarily adjust each average for variability arising from the Hg content of the fuel and in the performance of a particular control device in order to reflect "the actual performance of each of the floor units over the full range of operating conditions." This resulted in EPA proposing a standard 17 times higher than the numerical average of the best performing units burning bituminous coal and 8 times higher than the average for best performing units burning subbituminous coal.

The EPA approach is fundamentally flawed because it attempts to address variability by emphasizing the "variability of the inputs" (for example, variability in Hg and chlorine concentrations in coal, measurement variability in tests, and plant to plant variability). However, the basic problem with EPA focusing on "the effect of variability in the input values" is that it only addresses part of the issue. The appropriate way to address the variability of the system is to assess the effect of various components of the "variability of the inputs" on the outlet Hg concentrations after the appropriate control technology is applied.

[5] Bituminous, subbituminous, lignite, coal refuse, and IGCC (coal gas). As we note above, we strongly oppose such subcategorization whether it is based on coal rank or type of controls used for criteria pollutants.

ACI, for example, is the most advanced technology to control exhaust gas Hg and is capable of handling the "incoming variability" by adding more or less activated carbon (or by using more advanced forms of activated carbon) and other system controls. It is important to note that none of the units in the ICR data had Hg-specific controls, such as activated carbon injection (ACI), a technology that has been shown to successfully address the variability in incoming mercury concentrations.

This appropriate application of technology can be effective in meeting prescribed stringent emission rate limits. The requirement that these stringent emission limits be met on an annual average basis rather than on daily or hourly basis will also provide substantial operational and compliance flexibility without worrying about various components of input variability.

We believe common sense and standard engineering practices provide a much more appropriate and workable approach to address variability than statistical manipulation of data as undertaken by EPA. For example, the FACA stakeholders representing state and local air quality agencies (see Attachment A, pages 10-16) recommended that a "safety factor" in the range of two to three be applied to the limit obtained strictly from the "average of the top 12 percent" MACT procedure (e.g., 0.4 to 0.6 lb/TBTU, compared to 0.2 lb/TBTU based on the "12 percent rule"). Also, state and local agency stakeholders recommended a combined standard (less stringent of a percent reduction (85 to 90 percent) or an emission limit (0.4 to 0.6 lb/TBTU)) that provides even more flexibility in handling variability in all its forms, real or potential.

In summary, we believe that EPA's variability analysis is an exercise in statistical manipulation of data used to obtain a predetermined result. Further, we believe that the Agency addressed the wrong question. Therefore, NESCAUM strongly objects to EPA's proposal to allow the values of 2 lb/TBTU for existing bituminous coal-fired boilers and 5.8 lb/TBTU for existing subbituminous coal-fired boilers when much more stringent levels can be readily achieved using commercially available technology.

We would also like to note that this is not the first time EPA has had to address variability in setting NSPS or MACT standards. We recommend that EPA follow the same procedure as was followed for the Hg MACT for MWCs and NSPS for industrial boilers for NOx to handle variability in the present proposal.

2. NESCAUM Strongly Opposes EPA's Trading Schemes Under Section 112 and Section 111

We believe that the public health and environmental impacts associated with Hg exposure warrant the most stringent controls achievable on EGUs. Widespread methylmercury contamination, primarily from deposition of Hg from the atmosphere, has resulted in elevated levels of Hg in fish. In fact, methylmercury contamination of fish is so pervasive in the Northeast and throughout the U.S. that 45 state health departments have

issued freshwater fish consumption advisories. Fish-eating birds and mammals at the top of the food web are also at risk from consuming methylmercury-contaminated fish.

However, EPA's proposed trading schemes do not achieve the needed reductions in Hg emissions from EGUs to adequately protect public health and the environment. While we support properly designed cap-and-trade approaches for NOx and SO_2, we oppose the Hg cap-and-trade approach. Therefore, NESCAUM strongly opposes the two options offered by EPA that allow emissions trading of Hg and other HAPs between utilities. One proposal allows a cap-and-trade program under section 112. The second proposal allows a cap-and-trade program under Section 111.

Under Section 112, EPA proposes to allow trading of Hg emissions between utilities on a national basis with a 34-ton annual cap in 2007. In the second proposal, EPA proposes to implement the same cap-and-trade approach under the NSPS provisions of Section 111, which is expected to achieve only a 54 percent reduction in Hg emissions by 2018 when the role of banking and trading of mercury emissions in delaying the target year is considered. Clearly, both emissions trading proposals fall far short of what is technologically feasible and needed to protect human health and the environment.

NESCAUM does not believe that the Hg emissions trading approach proposed by EPA is allowed under either provision of the CAA. Furthermore, we do not believe that section 112(n) allows for emission trading once the finding was made by EPA to regulate Hg as a HAP in December 2000. We also strongly oppose the removal of coal- and oil-fired EGUs from the section 112(c) list. Such an action would be entirely inconsistent with the federal air toxics program given the fact that EGUs are one of the largest sources of HAPs in the country. We also note that at no time did EPA raise the possibility of a mercury cap-and-trade approach during the two-year FACA stakeholder public process to develop a mercury MACT standard. Consequently, in NESCAUM's opinion, EPA's cap-and-trade scheme contravenes the CAA, fails to protect public health and the environment, and represents a betrayal of the public stakeholder process.

Therefore, NESCAUM strongly urges EPA to reject this poorly conceived approach and to promulgate final MACT standards with appropriate and achievable emission limits (i.e., > 90 percent controls or an emission rate which would achieve close to 90% control overall, See Table 1) and expeditious deadlines, as required by Section 112(d) of the Clean Air Act.

<u>Specific Comments on EPA's Proposal to Regulate EGUs under Section 111 and Concerns about Hot Spots</u>

Additionally, the Northeast states believe there are many other problems with the Section 111 approach as outlined below.

- The approach would result in very weak emission limits for Hg. EPA's proposal under Section 111 calls for a national emissions cap in 2010 of 34 tons of Hg per year. This cap does not require any additional control of Hg beyond the so-called

"co-benefits" expected from other programs (for example, EPA's proposed Clean Air Interstate Rule), which are aimed at reducing emissions of NOx and SO_2. However, while the proposal cites a 15-ton final annual cap to be achieved in 2018, EPA does acknowledge in its proposal that the annual cap could actually be as high as 22 tons, when the role of emissions banking and trading in essentially delaying the target year is considered.

- The deadlines in the Section 111 proposal are extremely protracted. The court settlement agreement requires EPA to issue final utility emission standards for HAPs by December 2004 and compliance by the end of 2007 (with the potential for one- or two-year extension, if justified). By contrast, EPA's proposal postpones final compliance until 2018 and would allow compliance to be further delayed as a consequence of the emissions banking and trading provisions. Given the serious public health and environmental threats posed by Hg exposure, this delay of more than a decade is irresponsible and unacceptable. It is also counter to the stipulations agreed upon by the EPA in the court settlement.

- The Section 111 proposal is administratively unworkable since EPA can only promulgate regulations that establish a procedure for states to follow in establishing NSPS for existing sources. This prolonged approach would result in a scenario where fifty states develop their own Hg control plans, rather than follow one consistent national approach. We do not believe that Congress intended to regulate EGUs in this manner. Furthermore, this does not comport with the national multi-pollutant framework that is also being espoused by EPA.

Another major concern is that EPA's emissions cap-and-trade approach will allow EGUs to purchase and use allowances in lieu of reducing emissions on site. Although EPA's position is that it does not expect "hot-spots" to develop from trading, EPA has not considered local deposition of Hg associated with emissions trading that can disproportionately affect sensitive environmental ecosystems. Nor does EPA's proposal adequately address existing "hot spots", "hot states" and "hot regions." For example, EPA has not presented the results of any atmospheric mercury deposition modeling to address the issue of mitigating existing hot spots or protecting against creating new ones. Sources that purchase allowances in effect emit uncontrolled levels of all three species of Hg: gaseous elemental Hg, reactive gaseous (oxidized) Hg (RGM) and particulate Hg. The mercury trading scheme can exacerbate existing hot spots and possibly create new ones near power plants because the RGM – which can be as high as 70 percent of the total Hg emitted from a bituminous coal-fired power plant – has relatively short travel distances (up to 50-100 kilometers) and small residence times in the atmosphere (on the order of a day or two), and, therefore, tends to deposit locally near the source.

The importance of controlling Hg emissions from EGUs ("new" Hg) has been demonstrated in recent field studies that have shown that Hg newly deposited to the zone of methylation in the water body is more readily converted to methylmercury than

existing Hg pools.[6] It is also important to note that in addition to local source impacts from EGUs, the Northeast region is affected by long-range transport of elemental Hg emitted from EGUs because many areas in our region – including remote areas – experience high ozone levels, which can oxidize elemental Hg and, therefore, increase Hg deposition throughout the ozone-polluted airshed.

3. EPA Needs to Include Other HAPs into the MACT Regulation

Congress specifically mandated that all significant HAPs be regulated when a MACT rule is developed for a source category. However, another major flaw in EPA's proposed rule (and it applies to *all* three proposals) is that it completely ignores requirements in Section 112 for EPA to address HAPs other than Hg from coal-fired utilities (and nickel emissions from oil-fired utilities) that are emitted from power plants. The technology-based MACT program under the CAA is designed to ensure that all significant sources of HAPs implement controls to reduce emissions to the maximum extent achievable. Given our incomplete understanding about the health impacts of HAPs, we believe that the legislative mandate that EPA address all HAPs is based on prudent public health policy.

In addition to Hg and nickel, the major HAPs of concern emitted from EGUs include acrolein, arsenic, chromium, cadmium, dioxins/furans, and acid gases (hydrochloric acid and hydrofluoric acid). NESCAUM's technical review of the risk assessment that EPA conducted under in Section 112(n)(1) or Utility Report to Congress (Utility RTC) indicates that the assessment of HAPs emitted from EGUs was incomplete and inadequate. (A summary of the deficiencies in the Utility RTC is summarized in Table 2, Attachment B). In fact, the risk assessment does not appear to have addressed numerous external peer review comments that were submitted to EPA in 1995, including a specific request that further analysis of HAPs other than Hg and nickel be conducted. Therefore, the record does not support EPA's conclusion that "*Utility units of the remaining HAP examined in the Study did not appear to be a concern for public health.*"

There are several important implications associated with EPA's use of an incomplete and inadequate risk assessment of HAPs from EGUs. First, EPA cannot make the determination that other HAPs should be excluded from regulation without completing an adequate risk assessment of HAPs emitted from EGUs. Second, EPA is obligated to consider the advancements made in human health risk assessment since 1993-1994 in order to ensure that the regulatory decision is adequately protective of public health and scientifically defensible. This includes an assessment of more recent information on the health effects of HAPs, cumulative risks associated with exposure to all HAPs emitted from EGUs, risks associated with metals, and inclusion of potentially sensitive subpopulations, such as children, in the exposure assessment and characterization of risks from EGUs. EPA should also provide a summary of its response to external peer review comments on the Utility RTC. Finally, EPA needs to correct the summary of the health effects information on Hg that is presented in Section C of the preamble of the Federal Register proposal. Currently, the summary downplays the findings of the adverse health

[6] See Attachment B

effects associated with Hg. It is also critically important for EPA to include recent studies that confirm the health risks to the developing brain and cardiovascular system, especially to the developing fetus and child, from methylmercury exposure.[7] Recent studies have also linked the neurological changes to decreased nervous system control of the heart function.

4. Control Technologies are Commercially Available to Substantially Reduce Hg Emission from EGUs

The NESCAUM states strongly disagree with EPA's stated position that Hg emission control technologies are currently not available and will not be until at least 2010. The findings of recent NESCAUM analyses (see Attachment C) demonstrate that commercially available control technologies, as well as rapidly emerging technologies, are capable of achieving 90 percent and higher emission control. Clearly, EPA's proposals to achieve about a 30 percent reduction by 2007-2010 are not credible given the factual record.

For example, ACI technology has been applied to municipal waste combustors in the U.S. for over five years (in some cases approaching ten years) and is routinely achieving greater than ninety percent reductions, with some units achieving controls as high as 99 percent (Attachment C). While there are relevant differences between municipal waste combustors and coal-fired boilers, the application of ACI technology to coal-fired boilers does not depend upon any new technology breakthrough. Rather, as has been successfully demonstrated through studies funded by the U.S. Department of Energy, it is a matter of traditional technology transfer to these larger boilers (Attachment C). We, therefore, strongly disagree with EPA's misleading characterization of the finding of our October 2003 report (Attachment C) reported on page 4674 of the Federal Register. On Page 4674 of the Federal Register, EPA attributes the statement "the technical differences between utility units and municipal waste combustors and health, medical and infectious waste incinerators need to be recognized," to our October 2003 report (Attachment C). However, our report goes on to state clearly " Even when these differences are taken into account, the application of the ACI technology to coal-fired boilers appears to be simply an issue of technology transfer to larger boiler units which does not depend on any new technology breakthrough." We request that EPA correct the record to reflect the actual and complete conclusions of our report and not quote from our report in an incomplete manner and out of context.

As we note above, EPA's proposals are based on the assumption that control technologies that are capable of achieving substantial Hg emission reductions would not be available until much later (2010 and beyond). It is illuminating to view the EPA's proposals in the context of the encouraging relationship evident over the last several decades between environmental regulatory drivers and technological development. A major finding of a

[7] Murata K, Weihe P, Budtz-Jørgensen E, Jørgensen PJ, Grandjean P. Delayed brainstem auditory evoked potential latencies in 14-year-old children exposed to methylmercury. J Pediatr 2004; 144: 177-83. Also see footnote 1.

September 2000 NESCAUM study (Attachment D) was that innovation in control technologies has occurred only after regulatory drivers with well-defined and stringent emission targets and deadlines were adopted.[8] This dynamic has occurred even when control options were limited or untested at the time regulations were introduced.

As a part of the September 2000 study, NESCAUM undertook extensive case studies and developed case histories for the development and field implementation of control technologies (including SCRs, SNCRs, wet and dry FGDs) for NOx and SO_2 emissions from power plants in the U.S. The case studies spanned over a 50-year period and clearly demonstrated the positive role well designed regulatory drivers have played in moving the technology forward.

Since compliance costs are an important factor in most regulatory decisions, the NESCAUM report also reviewed the cost histories associated with case histories of NOx and SO2 control from power plants. In both cases, early estimates consistently overstated actual compliance costs, often by a factor of two or more. Likely reasons included poor or incomplete information, overly conservative assumptions (generally motivated by the industry's desire to bolster the case against regulation), and a failure to account for the technological innovation that appears only after concrete regulatory drivers are in place.

The experience with requirements for the control of NOx and SO_2 emissions from power plants is instructive. Total costs, including both capital and operating and maintenance costs, tended to fall dramatically as control technologies passed from the development phase to full-scale demonstration and commercialization. In the case of NOx, cost estimates declined by as much as 90 percent (on a cost per ton of NOx removed basis) for SCR technology between 1989 and 1998 (see footnote 8).

The cost trend for Phase II of the national Acid Rain Program is similarly striking. In 1989, industry estimated that annual compliance costs would range from $4.7 to $6.6 billion per year with trading. A year later, EPA put the range at $1.6 to $5.3 billion per year. By 1997, the estimate of the Electric Power Research Institute had fallen to $1.5 to $2.1 billion per year, three to four times lower than the figures widely cited in the Congressional debates that shaped the 1990 Clean Air Act Amendments (see footnote 8).

Based on this strong historical evidence of successful technology implementation that was driven by regulatory drivers at the federal level for SO_2 and NOx controls, we believe that controlling mercury emissions from power plants would be no exception.

Cost of Hg Control Technologies

It is also important to note that both the capital costs and cost effectiveness of controlling Hg from coal-fired boilers need to be presented in a realistic manner. For example, a common but quite misleading practice is to present cost effectiveness in terms of dollars

[8] Amar, P. (Project Director), NESCAUM report. Environmental Regulation and Technology Innovation: Controlling Mercury Emissions from Coal-Fired Boilers, September 2000

per pound of Hg removed from the application of ACI or other technologies and compare this to the costs of controlling a ton of NOx or SO_2 from power plants. For example, typical values of cost effectiveness are as follows: $5,000 to $30,000 per pound of Hg removed for ACI; $100 to $200 per ton of SO_2 removed; and $1,000 to $1,500 per ton of NOx removed. Obviously, the control costs appear high using such a comparison because Hg is emitted in far smaller quantities than conventional pollutants (in the U.S., power plants currently emit "only" 48 tons per year of Hg; compared to 5 million tons per year of NOx and over 10 million tons per year of SO_2). Control costs for Hg on a pound for pound or ton for ton basis are therefore necessarily higher. However, it must be emphasized that Hg presents a far greater public health and environmental hazard on an equivalent mass basis when compared to criteria pollutants such as SO_2 and NOx.

A more illuminating metric for estimating true costs of technology for a project is when the costs of controlling Hg with a technology such as ACI are expressed in terms of cost to the ratepayer (e.g., mills per kWh of electricity). When this approach is followed, the costs are even lower than the costs currently being incurred for control of pollutants such as NOx from EGUs (See Table 2). Note that these values for NOx are considered cost-effective by industry and regulatory agencies, and were the basis for recent (1997-1998) state and federal requirements for wide-scale NOx reductions from EGUs in the eastern U.S. under "Section 110 Transport SIP call" as well as the EPA's newly proposed (on January 30, 2004) Clean Air Interstate Rule (CAIR).

Table 2. Comparison of Mercury Control Costs with NOx Control Costs

Control Type	Total Annual Cost (mills/kWh)
Mercury Controls	0.18 – 1.15
Low-NOx Burners	0.21 – 0.83
Selective Catalytic Reduction	1.85 – 3.62

Source: Srivastava, R.K., C.B. Sedman, and J.D. Kilgroe. "Preliminary Performance and Cost Estimates of Mercury Emission Control Options for Electric Utility Boilers." AWMA 93rd Annual Conference & Exhibition, Salt Lake City, UT, 2000.

Status of More Stringent Mercury Control Regulations in the States

Many states have already adopted stringent limitations on Hg emissions from new and existing power plants (Attachment C). Connecticut has passed legislation that requires 90 percent Hg control by July 2008. Massachusetts's proposed regulations require 85 percent Hg control by January 2008 and 95 percent Hg control (equivalent to 0.2 lbs/TBTU) by October 2012. The state of New Jersey has adopted new rules that would require up to 90 percent Hg control or 3 mg/MWhr (equivalent to 0.6 lbs/TBTU) by 2007

with the possibility of a five-year extension if multi-pollutant control option is chosen by the EGUs. The state of New Hampshire's proposal, subject to legislative approval, would require a statewide cap on mercury emissions from coal-fired utility boilers of 50 pounds/year by 2008, and a statewide cap of 24 pounds/year by 2011 from a current baseline of 120 pounds/year. In a recent (June 2003) MACT determination for a new coal-fired boiler the state of Iowa required a Hg control level of at least 83 percent and the use of ACI as MACT. These states actions were based on an assessment of the same technical and scientific record available to EPA including the findings from recent field studies in Florida discussed above, which show that reducing Hg emissions results in measurable decreases in Hg deposition and subsequent reductions in fish Hg concentrations over a short-time horizon of just a few years. The encouraging findings from such field studies and the fact that much more stringent state Hg standards for power plants exist raises a serious question as to how a less stringent EPA MACT standard for these sources is justified.

Stringency of State Regulations/Rules/Legislation

What is clear is that many states in the Northeast and other parts of the U.S., based on the same technical and cost information that has been widely available to the US EPA, have decided to adopt regulations/rules/legislation that are more than three times more stringent than EPA's MACT proposal under Section 112 (e.g., approximately 90 percent reduction instead of the 29 percent reduction proposed by EPA under Section 112). We are therefore troubled by a comment that the Utility Air Regulatory Group (UARG) included in its comments on EPA's proposed utility HAP regulation (dated June 29, 2004) indicating that "UARG disagrees with EPA's proposal, however, to allow states to decide not to participate in a §111 trading program." UARG further states that, "EPA *cannot*, for example, permit states to 'opt out' of that trading program" (emphasis added). NESCAUM states strongly disagree with UARG's position and strongly urge EPA to maintain the ability of state and local agencies to be more stringent than EPA.

The Clean Air Act explicitly allows states to adopt programs more stringent than those of the federal government. Specifically, Section 116 states that air quality agencies are not precluded from adopting or enforcing any standards, limitations or requirements as long as they are at least as stringent as those required under the federal program. The only exceptions are found in Section 119 of the Clean Air Act, which preempts certain state and local regulation of mobile sources. Therefore, UARG's suggested approach, in which EPA would preempt state and local agencies' ability to adopt a more stringent program that does not permit trading, is in direct conflict with Section 116 of the Clean Air Act.

For a variety of reasons, maintaining the ability of NESCAUM states to adopt more stringent programs is essential. Not the least of these reasons is that states will need some way of preventing "hot spots" in their areas. In fact, EPA appropriately acknowledged this in its January 30, 2004, proposal by stating, "[s]tates retain the power under the proposed section 111 rule to adopt stricter regulations to address local hot spots or other problems" (69 *Federal Register* 4702).

UARG expresses its concern in its comments that allowing states to opt out of the program would result in a "patchwork approach". We contend that a federal standard, such as what EPA has proposed that is less stringent than the law requires would be to blame for any patchwork effect. In fact, NESCAUM states, as noted above, have already begun to adopt their own more stringent programs to ensure adequate public health protection in their states. We believe that the best way for achieving national consistency is for EPA to adopt a protective standard consistent with the requirements of Section 112(d). Fewer states would then need to adopt different approaches.

NESCAUM's Comments on EPA's Proposed Revised Benefits Assessment:

In its NODA, EPA notes that it had included a benefits assessment in its earlier proposed CAMR. We would like to note that EPA's benefits assessment was inadequate for the important issue of establishing "Beyond-the-floor MACT." EPA goes on to state that it has "preliminarily revised its proposed approach to analyzing the benefits associated with Hg emission reductions from power plants." In our earlier comments, we did not propose a methodology for benefits assessment. Since then, as we note earlier, we have completed an extensive and comprehensive draft report "Estimating Reductions in U.S. Mercury Exposures from Decreased Power Plant Emissions and the Associated Economic Benefit," that is undergoing an intensive peer review. The extensive scientific work that forms the basis of this report was undertaken by NESCAUM with Harvard Center for Risk Analysis (HCRA), part of the Harvard School of Public Health (HSPH).

The report was prepared by Glenn Rice of HSPH as part of his doctoral work under the direction of Dr. James Hammitt, Director, Harvard Center for Risk Analysis. The report covers diverse areas of research, including: mercury emissions from sources, atmospheric transport and fate of mercury, atmospheric modeling and estimation of mercury deposition, relationship between mercury deposition and methylmercury levels in fish (and how they change with changes in emissions), current and future exposures of humans to mercury in fish, dose response functions, and finally, the monetization of the benefits related to reduced mercury emissions from coal-fired power plants. The report evaluates these effects in four sequential tasks:

Task 1: Estimation of the effect of a specified reduction in power plant emissions of mercury on changes in regional mercury deposition and the resulting concentrations of methylmercury in fish

Task 2: Estimation of the effect of changes in methylmercury concentrations in fish on human uptake

Task 3: Estimation of the effect of changes in human uptake on the incidence of adverse human health effects

Task 4: Quantification of the "monetized" value of the change in incidence of health effects

Some of the benefits of controlling mercury are monetized for two mercury control scenarios. These are based on Clear Skies Initiative (CSI) Phase I, 2010 (26 TPY cap) and Phase II, 2020 (15 TPY cap). The mercury deposition levels for the base case (2001), as well as two pairs of base case/control case scenarios (Phase I and Phase II) were developed by the EPA using the REMSAD model as part of the Agency's analysis of the Clear Skies Initiative. The NESCAUM analysis estimates two sets of monetized benefits (for Scenario 1 and Scenario 2) which are based on comparing the control case and base case deposition levels for CSI Phase I and for Phase II. The mercury emission estimates for the base case as well as for four future scenarios were also provided by EPA, based on IPM outputs.

The NESCAUM analysis evaluates the effect of changes in mercury emissions assuming no changes in the population or dietary patterns of U.S. residents. For this reason, the results are best interpreted as an estimate of the benefits of lower mercury emissions in a steady-state world with population and fish consumption patterns similar to current conditions. To estimate the benefits of reduced mercury emissions in future years would require projecting changes in human population, fish harvesting and consumption, the temporal relationship between changes in mercury emissions from power plants and levels of methyl mercury in fish, and other factors.

To account for the effects of changes in mercury deposition on methylmercury levels in fish, the U.S. landmass was divided into five regions (West, Midwest, Mid Atlantic, Southeast, and Northeast). Additionally, the surrounding waters were studied as three regions for commercial and non commercial fish (Gulf, Atlantic, and "all other marine waters."). Estimates of human uptake of methylmercury through fish consumption are based on regional patterns of consumption of fish species, both commercial and non-commercial.

The report integrates the avoided costs (or "benefits") for two endpoints associated with a reduction in the neurological effects that result from intrauterine methylmercury exposures and with reductions in adult fatal and non-fatal cardiovascular (myocardial) events related to adult methylmercury exposures. The effects of methylmercury intake on myocardial events are less certain than the effects on neurological events. The neurological benefits were valued using a cost-of-illness model based on IQ-point gains that could result from decreased methylmercury exposures. The non-fatal myocardial events were valued using a cost-of-illness approach. The premature mortality events were valued using a willingness-to-pay or value-of-statistical-life approach.

These neurological effects and the fatal and non-fatal cardiovascular effects likely account for a large fraction of the total monetary value of damage to humans that is associated with methylmercury exposures. The study also discusses two additional effects that have been observed in children and associated with intrauterine methylmercury exposures: increased blood pressure and decreased heart rate variability. However, the study does not quantify these risks, because the increased blood pressure

does not appear to persist and the clinical significance of changes in heart rate variability of otherwise healthy children is not known.

Based on the preliminary results of the detailed analysis, benefits for Scenario 1 (26 TPY cap) associated with improved IQ range from $64 million (assuming a neurotoxicity threshold equal to the RfD) to $160 million (assuming no threshold). The corresponding benefits for Scenario 2 (15 TPY cap) are $93 million to $230 million. Much larger benefits are associated with avoided cardiovascular events (fatal and non-fatal). For Scenario 1, the monetized benefits are $2.7 billion. The corresponding benefits for Scenario 2 are $3.8 billion. All of these monetized benefits are per year. The total annual benefits for the two endpoints studied range from $2.8 billion for Scenario 1 to just over $4 billion for Scenario 2.

It is important to note that there is considerable uncertainty in the analysis and this includes a difference in the degree of confidence in the underlying studies for methylmercury neurotoxicity (based on the various "islands" studies) and the studies related to effects of methylmercury on the cardiovascular system. The neurological effects associated with in utero methylmercury exposures are well documented and have been thoroughly evaluated by a number of research and advisory groups (e.g., National Research Council, 2000). However, the current published literature providing evidence for evaluating the association between cardiovascular events with adult methylmercury exposures is substantially smaller and more recent than that for the neurotoxic events.

It is also important to note that the Harvard/NESCAUM study did not evaluate monetized benefits associated with EPA's proposed MACT approach under Section 112 or EPA's preferred approach of performance standards under Section 111 of the Clean Air Act or other more stringent and technologically feasible control levels (for example, less stringent of 90 percent control (from mercury in coal) or 0.6 lb/TBTU, as proposed by the States Stakeholders, see Appendix A, Page 10-16) since EPA did not undertake modeling of these scenarios with IPM and REMSAD/CMAQ modeling. However, it should be obvious to EPA that monetized benefits would be substantially higher for the proposal offered by the States Stakeholders for only a small increase in costs (based on application of extremely cost-effective and commercially available technologies such as ACI). Thus, NESCAUM stands by its previous comments in support of a 90% reduction in mercury emissions from coal-fired EGUs.

Conclusions

Our conclusions are based on two simple facts. First, uncontrolled emissions of Hg and other HAPs from EGUs are a serious threat to public health and the environment. Second, control technologies to reduce Hg emissions by 90 percent and higher are not only commercially available now, they also are cost effective. Given these facts, we strongly oppose the three EPA proposals because they all fall far short of what we believe is needed, achievable, cost effective, and statutorily mandated. We strongly urge EPA to adopt Hg rules that reflect the Congressional intent of maximum achievable control of all coal-fired EGUs, are based on rigorous application of the requirements of the Section 112

of the Clean Air Act, and do not rely on trading of Hg emissions. Finally, we urge EPA to include the results of our Harvard/NESCAUM study when it is submitted to the Docket in January 2005.