RECOMMENDATIONS FOR THE UTILITY AIR TOXICS MACT

Final Working Group Report

October 2002

Working Group for the Utility MACT
Formed Under the Clean Air Act Advisory Committee
Subcommittee for Permits/New Source Reviews/Toxics

Submitted to:

Clean Air Act Advisory Committee

BACKGROUND

Section 112(n)(1)(A) of the Clean Air Act (CAA) requires that, after considering the results of the study mandated by the same section, the Administrator determine whether regulation of hazardous air pollutant (HAP) emissions from electric utility steam generating units was appropriate and necessary. The results of the study were documented in the Utility Air Toxics Final Report to Congress (RtC), which was finalized in February 1998 and released to Congress and the public. In the RtC, the U.S. Environmental Protection Agency (EPA) stated that, for the utility industry, mercury from coal-fired electric utility steam generating units was the HAP of greatest potential concern for public health. The report noted that for a few other HAP, "there also are still some remaining potential concerns and uncertainties that may need further study. First…dioxins and arsenic…are of potential concern (primarily from coal-fired plants); however, further evaluations and review are needed to better characterize the impacts of dioxins and arsenic from utilities. Second, nickel emissions from oil-fired utilities are of potential concern, but significant uncertainties still exist with regards to the nickel forms emitted from utilities and the health effects of those various forms."

To further inform the regulatory finding, the EPA issued an Information Collection Request (ICR) under the authority of section 114 of the CAA to all coal-fired electric utility steam generating units requesting coal data (including mercury and chlorine contents) from such units for calendar year 1999. Seventy-nine units were selected to represent a cross-section of boiler and control device types and were required to conduct stack tests to evaluate their mercury emissions. In addition, the EPA solicited data from the public through a February 29, 2000 Federal Register notice. A public meeting was held on June 13, 2000, in Chicago, Illinois, where the public was invited to provide EPA with their views on what the regulatory finding should be.

In addition, at the direction of Congress, the EPA funded the National Academy of Sciences (NAS) to perform an independent evaluation of the available data related to the health impacts of methylmercury and provide recommendations for EPA's reference dose (RfD -- the amount of a chemical which, when ingested daily over a lifetime, is anticipated to be without adverse health effects to humans, including sensitive subpopulations). The NAS conducted an 18-month study of the available data on the health effects of methylmercury and provided EPA a report of its findings in July 2000.

On December 14, 2000 (65 FR 79825; December 20, 2000), the EPA made a finding that regulation of HAP emissions from oil- and coal-fired electric utility steam generating units is appropriate and necessary. Based on the study and the regulatory finding, EPA at the same time added coal- and oil-fired electric utility steam generating units to the list of source categories in section 112(c) for which "maximum achievable control technology" (MACT) regulations must be developed under section 112(d) of the CAA. Under an existing settlement agreement, such regulations are to be proposed by December 15, 2003, and promulgated by December 15, 2004.

The EPA also undertook an evaluation of the mercury control performance of various emission control technologies that are either currently in use on coal-fired units for pollutants other than mercury or that could be applied to such units for mercury control. The evaluation was conducted along with other parties, including the Department of Energy (DOE). Their report (EPA-600/R-01-109, "Control of Mercury Emissions From Coal Fired Electric Utility Boilers: Interim Report") was issued in April 2002.

At the June 2000 public meeting noted above, the EPA indicated a willingness to keep the regulatory process open and to include all stakeholders involved. Further discussion with the various stakeholder groups about how to structure the regulatory development process so as to achieve maximum input occurred in March 2001. Following these meetings, it was decided that the most effective means of ensuring inclusion of the various groups in the process would be to form a Working Group under the

existing Permits, New Source Reviews, and Toxics Subcommittee of the Clean Air Act Advisory Committee (CAAAC), established under the Federal Advisory Committee Act (FACA).

WORKING GROUP

The Utility MACT Working Group was formed with an original constituency of 6 representatives of State/local/tribal agencies, 8 representatives of environmental organizations, and 16 representatives of affected sources/fuel producers and suppliers/labor groups. Nine members of the Working Group are formal members or alternates of CAAAC. (See Appendix A for a full list of members.)

As stated in the charge to the Working Group, the overall goal of the Working Group was to provide input to the EPA regarding Federal air emissions regulations for coal- and oil-fired electric utility steam generating units that will maximize environmental and public health benefits in a flexible framework at a reasonable cost of compliance, within the constraints of the CAA. The Working Group effort was designed to achieve this goal by:

1. Obtaining active participation from stakeholders, including environmental groups, regulated industries, and State/local/tribal regulatory agencies in all phases of regulatory development, and encouraging public input throughout the process;

2. Determining the most effective ways to address the environmental issues associated with the HAP; and

3. Considering strategies to simplify the regulations and allow flexibility in the methods of compliance while maintaining full environmental benefits.

The Working Group was formed for an initial period of one year, and first met on August 1, 2001. Subsequent meetings were held nearly every month through October, 2002, for a total of 13 meetings. A summary of each meeting, plus all relevant documents presented and discussed at each meeting, can be found at the following website: http://www.epa.gov/ttn/atw/combust/utiltox/utoxpg.html#CAAAC. Furthermore, this website will be updated in the future as additional information (e.g., IPM modeling results, new control technology evaluations, etc.) becomes available.

ISSUES

Consensus of opinion on identified issues was a goal of the Working Group; however, it was recognized early in the process that there was a divergence of opinions. Therefore, the Working Group concentrated on identifying issues, thoroughly discussing these issues, and clearly identifying the various stakeholder positions on each issue. The purpose of this document is to report to the CAAAC the issues identified along with the various stakeholder positions.

The Working Group identified the following issues which EPA must consider and resolve in its drafting of the utility MACT:

1. Subcategories for mercury,

2. Floor levels for mercury,

3. Beyond-the-floor levels for mercury,

4. Format of mercury standard,

5. Compliance method (monitoring) for mercury,

6. Compliance time,

7. Non-mercury HAP, and

8. Oil-fired units.

The following sections contain a description of each issue, the stakeholders' position (based on information available to the stakeholders at this time; more complete arguments of stakeholder positions are presented in the white papers included as appendices to this document [where available] and other stakeholder papers that are a part of the Working Group record and are posted on the EPA website), and a summary of those positions. The stakeholder positions for each of the eight issues listed above were not developed in isolation; each stakeholder developed a comprehensive set of recommendations that should be evaluated as a whole, and not taken out of context. The issues are discussed separately in this report to present a more detailed summary and a clear picture of where each stakeholder group stands on the issue. For certain issues, there exists a majority and minority opinion within the stakeholder position. These intra-stakeholder positions and their representation are more fully explained in each section. It should be noted that the positions presented in this paper may not reflect the variety of positions held by all potential stakeholders nor even of all members represented by stakeholders noted herein; the positions presented are those of the members of the Working Group. A table summarizing all the issues and positions is presented in Appendix B. It is expected that stakeholder positions may change over time, based on new information, and the CAAAC and the EPA may expect to receive these revised positions as appropriate.

SUBCATEGORIES FOR MERCURY

The issue is whether and how to subcategorize the source category "oil- and coal-fired electric utility steam generating units" for the purpose of setting the MACT emission standards. Under the MACT program, once subcategories are established emission standards are set for each subcategory. This issue was discussed at length from the outset of the Working Group. The EPA is allowed to develop MACT subcategories based on "classes, types, and sizes" of the source within a given category (section 112(d)(1) of the CAA). All stakeholders agreed some form of subcategorization is appropriate for the nation's approximately 1,143 existing units.

Stakeholder Positions

Environmental Stakeholders.[1] As noted, section 112(d)(1) gives the Administrator the discretion to distinguish among classes, types, and sizes of sources within a source category in establishing emission standards. Environmental stakeholders believe that boiler types are uniquely different systems that meet the definition of "subcategory" as defined by section 112(d)(1).

To the extent that the EPA chooses to subcategorize, the Environmental Stakeholders believe the following four subcategories are appropriate for the utility MACT standard: oil-fired boilers, conventional coal-fired boilers (i.e., cyclone and pulverized coal [PC]), fluidized bed combustion (FBC), and integrated coal gasification combined cycle (IGCC) electric generating units.

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1 The Environmental Stakeholders supporting this position are the Clean Air Task Force, National Wildlife Federation, National Environmental Trust, Natural Resources Defense Council, and Environmental Defense. The Environmental Stakeholders collectively represent about 6 million Americans.

It is the Environmental Stakeholders' view that conventional boilers, FBC, and IGCC units represent sufficiently different types of electric generating units such that they can be treated differently in establishing standards. The Environmental Stakeholders believe that distinctions based on coal type, geographic location, or process differences do not meet the statutory definition of "classes, types, or sizes" of source and, therefore, oppose subcategorization on those bases.

Industry Stakeholders.[2] The Majority Industry Group position is that the language and legislative history of the CAA shows that Congress intended for EPA to distinguish among classes, types, and sizes of sources under three core circumstances: when differences among sources affect (1) the feasibility of air pollution control technology; (2) the effectiveness of air pollution control technology; and (3) the cost of control. Subcategorization is the primary mechanism that allows the EPA to account for the fact that distinctions among classes, types, and sizes of sources may have a very real impact on the feasibility of a given control technology, the effectiveness of that control technology, and the cost of control. This group also believes that subcategorization in the utility MACT represents sound public policy because it allows EPA to formulate a MACT standard that recognizes and allows for the continued use of all coals found in the U.S. without market disruption. There exists no one fuel in sufficient quantities and availability that can be used by all parties. Many coal-fired plants, particularly in the west, do not have the option to change fuel types since they are mine-mouth plants nor do they have the necessary transportation infrastructure to use other sources of coal.

The Majority Industry Group stakeholders support the creation of a total of at least seven subcategories. Their view is first, that oil- and coal-fired units should be placed in different subcategories because the fuels are dissimilar and produce very different emissions. Second, for coal-fired units, FBC units must be separated from conventional boilers (i.e. cyclones and PC units) because they employ a fundamentally different process for burning coal and they produce emissions with different mercury characteristics. Third, conventional boilers must be subcategorized by the rank of coal burned (bituminous, subbituminous, and lignite) because combustion of those coal ranks produces emissions with widely varying percentages of the three relevant species of mercury (elemental, particulate, and gaseous ionic) and these factors are important to the feasibility of control equipment.[3] Fourth, process differences within

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2 The Majority Industry Group was principally represented by Cinergy, Class of 85 Regulatory Response Group, Edison Electric Institute, Latham & Watkins, National Mining Association, Seminole Electric Cooperative, Southern Company Generation, United Mine Workers, Utility Air Regulatory Group, West Associates, American Public Power Association, and National Rural Electric Cooperative Association. This group, along with its individual members, represents more than 95 percent of the coal-fired generation in the United States, as well as all major mining interests. In addition, the Clean Energy Group (CEG) was represented by PG&E National Energy Group, and two of its other members in the FACA process: Consolidated Edison, Inc., and Public Service Enterprise Group Incorporated. The CEG members have a significant percentage of coal generation in a diverse portfolio of generating assets in 27 States. WEST Associates is an industry association of 17 public and investor-owned utilities in the 11 Western States and North Dakota, serving over 16 million customers. WEST Associates' members own and operate approximately 90 percent of the installed coal-based electric power generation in this region. Finally the Institute of Clean Air Companies (ICAC) represented air pollution control equipment vendors (Equipment Vendors). These last three offer separate opinions on several issues, and these are noted where they differ.

3 It is the position of industry that IGCC units do not fall within the source category because the coal gasification portion of an IGCC unit does not meet the definition of an electric utility steam-generating unit. In addition, the IGCC process is so different from conventional coal boilers that even if they meet the definition of an electric utility steam generating unit, they would certainly be considered a separate subcategory.

the bituminous subcategory related to flue gas temperature can affect emission characteristics and justify further subcategorization (e.g., hot stack, saturated stack, wet stack).

In addition to the foregoing subcategories, further differentiation based on coal chemistry (e.g., content of mercury, sulfur, and chlorine) may be warranted, as coal chemistry affects the species of mercury created during combustion. WEST Associates specifically recommended further subcategorization by chlorine content within bituminous and subbituminous coal subcategories. This recommendation recognizes the dominant role chlorine plays with respect to formation of different mercury species in the boiler, and their subsequent controllability in downstream emission removal equipment for particulates and SO_2. Although not all industry representatives from regions outside the Western U.S. have endorsed such additional subcategorization, there is unanimous industry agreement that the chlorine content of coal is the dominant factor that determines the fraction of elemental mercury in total mercury emissions. Furthermore, the feasibility, effectiveness, and cost of controlling mercury emissions are distinctly different for low chlorine-content Western coal when compared to Eastern coal. This industry stakeholder group believes that these distinctions meet the definition of "classes, types, and sizes" consistent with the requirements of the CAA and past EPA practice.

The Clean Energy Group (CEG) has a different position on subcategorization. As a general rule, they oppose subcategorization. They agree that one subcategory should be FBC technology because it uses a unique combustion system that operates with cooler combustion temperatures that result in much lower mercury emissions than conventional PC boilers. A second subcategory should be PC boilers that burn lignite coals, in recognition of the higher mercury content of lignite, and the reality that few boilers in limited geographical areas make use of this low-rank coal. Finally, they recommend combining bituminous and subbituminous coals into one subcategory.

The CEG's position derives from its view that, although a regulatory regime that customizes an emission standard for each coal type and technology may be attractive to some, such an approach would, in fact, operate to constrain its members' flexibility to find the most effective solutions to environmental problems. As a result of emission trading programs, many companies think of fuel supply as a compliance option, and use various blends of coal to optimize their emission performance. The group believes that fuel switching and fuel blending may become even more common in the future, and opposes regulations that may hamper the ability to quickly optimize performance and cost to address economic and environmental considerations. These companies are concerned that a large number of subcategories may significantly limit the flexibility to manage a facility's operational conditions and fuel choice, which are of paramount importance in the context of a competitive market for electric generation.

The Equipment Vendors recommend four subcategories: bituminous, subbituminous, lignite, and FBC. They believe that existing control technologies commercially available today exhibit considerably different performance characteristics for the three primary coals, mainly related to the differing characteristics of the mercury species generated. Future control technology development is expected to overcome these differences and permit a higher, more broadly applicable standard.

State and Local Agency Stakeholders.[4] The State and Local Agency Stakeholders recommend three subcategories: oil-fired boilers, lignite-fired boilers, and a third subcategory that includes all other coal-fired boilers. Integrated coal gasification combined cycle electric generating units may or may not be included in the "all other coal-fired units," depending upon EPA definitions. These units were not

4 The State and Local Agency Stakeholders supporting this position are STAPPA/ALAPCO, Northeast States for Coordinated Air Use Management (NESCAUM), New Jersey, and the Regional Air Pollution Control Agency (RAPCA) based in Dayton, Ohio. Texas offers a separate opinion on several issues and these opinions are noted where they differ.

thoroughly evaluated in the Working Group; thus, the State and Local Agency Stakeholders have no recommendation on whether or not they should be a subcategory. The State and Local Agency Stakeholders believe that FBC units do not need a separate subcategory because their emission characteristics are similar to those of the "all other" category. The State and Local Agency Stakeholders also recommend against a subcategory based on size of coal-fired power plant or units. They reason that all coal-fired power plants can still be significant sources of HAP emissions. Additionally, they are opposed to subcategories that would distinguish between subbituminous and bituminous coals, given the increasing use of fuel blends made up of these two coal types and the goal of simplicity and flexibility for MACT standards. The State and Local Agency Stakeholders oppose subcategorization based on flue gas temperature and moisture related to existing air pollution control devices. (Texas did not take a position on this topic.) The State and Local Agency Stakeholders also stated that the range of emissions from the ICR data was similar for bituminous and subbituminous coal-fired units and that with proper design of the MACT standard (form and magnitude of the standard), two separate subcategories are not necessary or useful.

Texas agrees on the separate subcategories for oil-fired boilers and lignite-fired boilers and then recommends further subcategories for FBC and bituminous and subbituminous coal-fired plants. Texas feels the different coal ranks produce different exhaust gas temperature profiles and emissions with widely varying percentages of elemental, particulate, and ionic mercury species. Mercury speciation and temperature profile, among other factors, dictates the plants' ability to abate mercury emissions on a continuous basis.

Some Western States have requested additional time to evaluate subcategorization options. The CAAAC should expect additional comments from these States in the near future.

Summary of Positions on Subcategories for Mercury. There is agreement that oil- and coal-fired boilers should be separate subcategories. The stakeholders do not agree that IGCC units are subject to the Utility MACT. The treatment of FBC units as a subcategory is recommended by the Environmental and Industry Stakeholders and Texas. The State and Local Agency Stakeholders believe that FBC units do not need a separate subcategory because their emission characteristics are similar to those of the "all other" category. All stakeholders except the environmental groups supported a separate subcategory for lignite-fired boilers. The Majority Industry Group, the Equipment Vendors, and Texas supported separate subcategories for bituminous and subbituminous coals while the CEG, State and Local Agency Stakeholders, and environmental groups did not. WEST Associates supports additional subcategorization within bituminous and subbituminous coal ranks based on the chlorine content of Western coals because of the unique differences in the feasibility, effectiveness, and cost of control of mercury emissions from such low chlorine-content coals.

MACT FLOOR LEVELS FOR MERCURY

The issue is how the "floor level" for the MACT mercury emission limit should be calculated and what stringency is required. The EPA, as a part of its MACT rulemaking, has to recommend a "floor" (minimum level of reduction required) for mercury reductions. All parties considered the ICR data and took into account the "variability" of the process (variability of mercury and other chemicals in coal, in measurements, in sampling, and in operation of the best performing plants). However, based on different views regarding how to address variability in establishing the MACT floor, stakeholders recommended differing MACT floors for mercury.

Stakeholder Positions

Environmental Stakeholders. The Environmental Stakeholders recommend that EPA calculate a MACT floor for existing units based on the average emissions of the top 12 percent of each subcategory as required under section 112(d)(3). The Environmental Stakeholders recognize that mercury emissions, even from the same unit, can be variable. This variability is accounted for in the floor level by taking the average of the emissions of the top 12 percent, and is further accounted for by recommending a 30-day rolling averaging time for compliance purposes (using continuous emission monitors [CEM] as discussed in more detail in other sections of this document).

The Environmental Stakeholders recommend an output-based emission rate standard, based on the following input-based rates for each of the proposed boiler type subcategories and the heat rate of the specific generating unit:

- Conventional boilers 0.21 pounds per trillion Btu (lb/TBtu)
- FBC 0.19 lb/TBtu (average of four units)
- IGCC 0.54 lb/TBtu

For FBCs, the Environmental Stakeholders use four of the five "MACT-floor" units with measured mercury emissions ranging from 0.08 to 0.46 lb/TBtu. They omit the fifth unit (which utilized an electrostatic precipitator and not a fabric filter), which had measured emissions of 3.97 lb/TBtu. The Environmental Stakeholders believe that setting a standard at 0.95 lb/TBtu (the average of the five FBC units measured) would not be appropriate, in that four of the five tested units currently emit at less than half of that standard, such that the MACT standard would not reflect the emission rate that is achieved in practice. Averaging the emissions over the top four units would be one possibility, which would result in a MACT floor of 0.19 lb/TBtu, or 92 percent reduction. For IGCC units, the mercury emission limit would be 0.54 lb/TBtu. (Note the IGCC emission rate is a beyond-the-floor calculation as described in the next section of this document.)

For new sources, the Environmental Stakeholders recommend a MACT floor level that is no less stringent than the emission control that is achieved in practice by the best-controlled similar source as required by section 112(d)(3).

Industry Stakeholders. The Majority Industry Group holds that the MACT floors for the various subcategories must account for the inherent variability in mercury emissions from the best performing units and from the use of different types of fuel, including the variation seen within a given coal seam. The group's position is that a MACT standard must represent the performance of the best sources under the worst reasonably foreseeable conditions. Their analysis shows that the ICR Part III stack sampling data, with its three test runs of approximately one hour each, were not able to quantify the worst reasonably foreseeable conditions. As a result, simply averaging the stack test data is not appropriate.

There are numerous methods for addressing variability, including a correlation approach offered by the Utility Air Regulatory Group (UARG) and a statistical approach presented by EPA. The position of the Majority Industry Group is that none of the methods presented to the Working Group fully accounts for all the variability in mercury emissions from a coal-fired plant. The EPA model, for instance, does not factor in coal variability; in contrast, the UARG model does not incorporate operational variability.

The approach offered by UARG addresses fuel variability by using correlations developed by EPRI from the Part III ICR data and then using these correlations and the coal data from 1999 for the best performing units to produce cumulative distributions of emissions for 1999 from those units. This analysis was discussed at several of the Working Group meetings. Two approaches for MACT floor levels are offered in the following table. They are based on the performance of the best 12 percent of the plants tested in each category (or the average of the five best performing units for subcategories with less than 30 units) at the 95th percentile of each cumulative distribution, and provide for an alternative standard (rate based or percent reduction).

Subcategorization Approach 1 - Coal Rank - considering only fuel variability		
Subcategory	Stack Limit, lb/TBtu	Overall Reduction
Bituminous	2.2	73%
Subbituminous	4.2	31%
Lignite	6.5	47%
FBC	2.0	91%

Subcategorization Approach 2 - Coal Rank and Process - considering only fuel variability		
Subcategory	Stack Limit, lb/TBtu	Overall Reduction
Bituminous - Hot	3.7	55%
Bituminous - Saturated	2.2	63%
Bituminous - Wet	3.2	62%
Subbituminous	4.2	31%
Lignite	6.5	47%
FBC	2.0	91%

However, to fully understand the capabilities of the best performing plants, the MACT floor must consider both the fuel variability and variability from other causes such as sampling and monitoring, operational, and plant-to-plant variability.

The Majority Industry Group also points out that mercury reductions at all existing coal-fired power plants, including the "best" performing units, result from control equipment that was installed to reduce the emissions of other pollutants. New coal-fired power plants are subject to stringent regulation under a number of CAA provisions including new source performance standards (NSPS). These requirements cause new plants to install high efficiency particulate removal devices, scrubbing systems for sulfur dioxide (SO_2), and nitrogen oxides (NO_x) reduction devices. These technologies are found on existing units that achieve the "best" mercury control. Additional control strategies that specifically address mercury, such as activated carbon injection, are developmental and are not commercially available. As a result, this group's position is that the MACT floor for new units should reflect the mercury control co-benefits of NSPS devices and should not be based on speculation about the potential capability of developmental technologies. The MACT floor for new units should reflect the same categories and be at least as stringent as the MACT floor for existing units and must address the variability in mercury emissions of the best performing units.

The CEG proposes a somewhat different approach, which would (1) identify the top 12 percent of facilities from the available database; (2) identify the primary emissions control technology used by the facilities in that group with emission levels at or better than the average for the group; (3) then look to all sources in the database using the identified control technology, provided the control was well designed and operated; and then (4) set the MACT floor such that the floor accounts for operational variability. The CEG did not take a position on how best to account for variability, and, thus, does not have a numerical proposal for the MACT floor for the subcategories it proposes.

The CEG suggests that a similar methodology to the one described for existing coal-fired units be applied to new units. However, instead of using the control technology used by the best 12 percent of facilities, the emission control technology used by the best performing plant would be identified. Then, considering all facilities in the database using that technology, the floor would be set based on some mathematical or statistical measure that reflects inherent operational variability, using, for example, an average, a median or a 95 percent confidence interval value.

The Equipment Vendors based their review on pilot plant and large unit testing of new control technologies, and recommends a MACT floor for mercury set at 90 percent mercury removal for bituminous-fired units, or a comparable emission rate. For subbituminous-fired units, a floor based on a 70 percent removal rate, or comparable emission rate, is appropriate. No recommendations were offered for FBC or lignite-fired plants. For new sources, they recommend a floor based on a 90 percent mercury reduction.

State and Local Agency Stakeholders. The State and Local Agency Stakeholders evaluated the average performance of the best 12 percent in two ways: with the test data (80 tests) as well as with extrapolated test data (411 plants), based on the coal data and EPA's estimates of emissions from each of these plants. The best percent reductions were determined independently of the best rate-based limit, and do not represent an alternative limit for a combined rate or percent reduction standard.

1. Average of best 12 percent of 411 plants - 0.3 lb/TBtu (1.5 mg/MWh); 94 percent control.

2. Average of best 12 percent of 80 tests - 0.2 lb/TBtu (1.0 mg/MWh); 93 percent control.

The State and Local Agency Stakeholders believe that consideration of the variability of the data is appropriate. Although their primary recommendation is to deal with variability by averaging quarterly tests in a year (3 test runs per quarter), adding a compliance margin to the average of the best 12 percent of the actual emission level is also reasonable when determining an appropriate emission limitation.

They recommend a factor of 2 times the actual tested average as a reasonable compliance margin when an annual average of quarterly tests is used or a 30-day or greater average of CEM data is used.

The State and Local Agency Stakeholders also recommend that a percent reduction alternative be part of the MACT standard to enable any plant the opportunity to continue to burn the same coal if best available control technology (BACT) is employed. Their estimated range for the percent reduction alternative for bituminous/subbituminous coal is 90 to 95 percent. This range is also consistent with the average control efficiencies for the best 12 percent of the test data (93 percent control) and the 411 plant evaluation (94 percent control) without carbon. Hence, this MACT floor does not depend on the use of carbon. Rather, carbon and baghouse control are available as an option to comply with the 90 percent alternative limit. A 90 percent alternative limit is recommended by the State and Local Agency Stakeholders to provide a reasonable assurance of compliance if the percent reduction option is chosen.

The State and Local Agency Stakeholders' recommendation for a MACT floor for bituminous and subbituminous coal would be 0.4 lb/TBtu (2 mg/MWh) or 90 percent control, based on the data from the 80 tests; 0.2 lb/TBtu (1 mg/MWh) would be a literal reading of section 112(d) if applied to the test data with no further consideration of variability. The 0.4 lb/TBtu level includes a factor of 2 compliance margin to further address variability beyond the averaging of 12 tests or long-term CEM data.
The State and Local Agency Stakeholders also believe that consideration of information on the universe of coal plants is appropriate. If the extrapolation of the average test data to the 411 coal plants is used to develop the MACT floor, the MACT standard would be 0.6 lb/TBtu (3 mg/MWh) or 90 percent control based on the same consideration of variability. Looking at Appendix 4 in the September 9, 2002, white paper, they conclude that when a 90 percent alternative limit is used, the 0.6 lb/TBtu rate-based option is the appropriate rate level for a combination standard. In conclusion, the State and Local Agency Stakeholders recommend that the MACT floor for bituminous and subbituminous coal-fired units be 0.4 to 0.6 lb/TBtu (2 to 3 mg/MWh) or 90 percent control.

Texas holds a different position than the other State and local stakeholders in pointing out that section 112(d)(3) requires that "Emission standards promulgated under this subsection for existing sources in a category or subcategory may be less stringent than standards for new sources in the same category or subcategory but shall not be less stringent, and may be more stringent than the average emission limitation achieved by the best performing 12 percent of the existing sources (for which the Administrator has emissions information)." The term "emission limitation" is defined in section 302(k) as "a requirement established by the State or the Administrator which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirement relating to the operation or maintenance of a source to assure continuous emission reduction, and any design, equipment, work practice or operational standard promulgated under this Act." Therefore, the CAA requires the MACT floor for existing units to be based on existing State or Federal requirements, which limit emissions on a continuous basis. Any recommendations beyond this standard would be "beyond the MACT floor."

Some Western States have requested additional time to evaluate MACT floor level options. The CAAAC should expect additional comments from these States in the near future.

Summary of Positions on MACT Floor Levels for Mercury. Stakeholders' recommendations for MACT floor levels are driven by how each handles the issue of subcategories (how many and on what basis, since floor determination for each category is based on the ICR data for that subcategory) and the issue of variability. Also, the form of the standard (emissions rate alone as offered by environmental groups, a combination standard as offered by others) determines the actual numerical values proposed. All stakeholders agree that addressing variability in mercury emissions in setting the MACT floor for mercury is important, but suggest different ways of accomplishing this. The Environmental Stakeholders

recommend addressing variability through the averaging of the top twelve percent of performers for existing units, and by an extended compliance monitoring time for new and existing units. The industry stakeholders contend that simply averaging the ICR Part III stack sampling results does not represent the performance of the best sources under the worst reasonably foreseeable conditions. As a result of their analysis, they recommend MACT floors based on an analysis of ICR Part II and III data. The State and Local Agency Stakeholders recommend a factor of 2 compliance margin and the use of long-term averages to address variability.

For new sources, all of the stakeholders agree that the best performing similar source will be the basis for new source MACT. The Equipment Vendors recommend a standard for bituminous of 90 percent removal, or a comparable emission rate; a standard for subbituminous of 70 percent removal, or a comparable emission rate; and made no recommendations for lignite or FBC.

BEYOND-THE-FLOOR LEVELS FOR MERCURY

The issue is, should EPA establish MACT standards for mercury that are more stringent than those established by the floor analyses based on the statutory requirement to consider "the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements" in establishing such standards. The various stakeholders hold differing views on whether the EPA should develop these more stringent standards ("beyond-the-floor").

Stakeholder Positions

Environmental Stakeholders. The Environmental Stakeholders recommend that beyond-the-floor MACT standards for mercury be developed for IGCC units. With IGCC plants becoming a more attractive option for new electric generation, the Environmental Stakeholders assert that MACT for this source type should not be set at uncontrolled levels. A recent analysis by the DOE illustrates that a fixed carbon bed, similar to those already in use by industrial gasifiers, is readily adapted to an IGCC power plant at a reasonable cost and can achieve mercury reductions of 90 percent or higher (as high as 99 percent if the carbon beds are placed in series). The Environmental Stakeholders recommend 90 percent removal from existing levels. This level of control results in a mercury emission rate of 0.54 lb/TBtu. Because of insufficient data, the Environmental Stakeholders do not have a recommendation for beyond-the-floor levels for other boiler types.

Industry Stakeholders. The Majority Industry Group believes that, based on information in EPA's Utility and Mercury Studies, it is unlikely that a case can be made for regulation beyond the MACT floor. The remaining mercury emissions from coal-fired power plants will be small and constitute a very small percentage of the overall mercury pool. Hence, further control will have little incremental effect on public health while the costs of achieving additional control will be very high.

The Majority Industry Group believes that, at this time, insufficient information has been presented to draw a definitive conclusion on whether regulation is needed beyond the MACT floor. Beyond-the-floor analyses require EPA to look at the cost of achieving more stringent emission reductions, any non-air quality health and environmental impact of further reductions, and energy requirements. Thus, EPA must complete: (1) its IPM runs to assess the cost impacts of regulation, (2) its REMSAD (or equivalent) runs to understand mercury deposition and possible health effects, and (3) an assessment of the energy requirements of additional control. Moreover, because beyond-the-floor control technologies (e.g., activated carbon) are generally not commercially available, EPA must carefully assess the cost and actual availability of those technologies. According to this group, only when this work is concluded, and made available for public comment, will EPA be in a position to make a reasoned decision on whether regulation is needed beyond the MACT floor.

The CEG, however, observes that a number of new technologies for reducing mercury emissions are in various stages of research and development. They observe that some of these new technologies may prove to be attractive control options for mercury, based on the results of studies performed thus far. They point to activated carbon injection as a potentially cost effective technology. Beyond-the-floor analyses will require EPA to weigh cost, energy requirements, and non-air quality impacts to determine whether a mercury MACT standard stricter than the floor level is achievable.

It is noted that the MACT recommendations of the Equipment Vendors (70 percent mercury control for subbituminous coal-fired boilers and 90 percent mercury control for bituminous coal-fired boilers) is not an "average of the best 12 percent" approach. Rather, it is really a beyond-the-floor recommendation, based on technology which this industry group believes will be available for compliance.

State and Local Agency Stakeholders. The State and Local Agency Stakeholders recommend that EPA consider several factors for "beyond-the-floor" limits for mercury emissions from coal.

- Emissions data for control of the criteria pollutants (particulates, SO_2, volatile organic substances, NO_x, and carbon monoxide [CO]), BACT/LAER determinations.

- The additional mercury emissions reduction benefits of control systems which minimize other HAP, including fine-particulate HAP and acid-gas HAP.

- Technology transfer of air pollution control technologies used on other mercury source categories.

- Pilot and full-scale demonstration programs of mercury control technologies.

- The role of environmental regulation as a driver of technology innovation and implementation.

- Coal combustion is the greatest source of mercury and other HAP emissions in the U.S.

The State and Local Agency Stakeholders do not provide specific beyond-the-floor emissions limit recommendations.

Texas argues that the section 112(d)(2) of the CAA requires the Administrator to take into consideration the cost of achieving emission reductions. Texas feels some of the controls being considered, such as activated carbon injection, are beyond-the-floor requirements which may prove to be unreasonably expensive.

Summary of Positions on Beyond-the-floor Levels for Mercury. As with the MACT floor levels, there is little agreement on the need for beyond-the-floor controls for mercury. Because of insufficient information, the Environmental Stakeholders do not specifically advocate beyond-the-floor controls, except for IGCC units. The State and Local Agency Stakeholders do not provide specific beyond-the-floor limits but provide criteria for EPA to consider in developing beyond-the-floor limits. The Majority Industry Group maintains that it is premature to discuss the need for beyond-the-floor controls, as substantial additional modeling is needed from the EPA first. The CEG, however, holds that beyond-the-floor emerging technologies may prove to be attractive control options for mercury.

FORMAT OF MERCURY STANDARD

At issue here is whether the mercury standard should be in the form of an emissions limit, a percent reduction, or a combination of the two. There is also an issue of input- vs. output-based emission limits. The various stakeholders hold differing views on the form of the mercury standard.

Stakeholder Positions

Environmental Stakeholders. The Environmental Stakeholders do not recommend a standard that offers a choice between an emission rate and a percent reduction standard (an "either/or" approach). The Environmental Stakeholders believe that a percent reduction approach results in a weaker standard than an emission rate approach if the percent reduction target were calculated using a methodology consistent with the one they used to calculate a MACT floor emission rate. Therefore, a percent reduction requirement that more closely correlates with the emission rate would be needed.

The Environmental Stakeholders recommend an output-based standard to reward efficiency and provide compliance flexibility by adding unit efficiency to the mix of available compliance strategies. They believe that an output-based standard more closely reflects the language of section 112(d) as interpreted by the courts that encourages investment in alternative compliance methods in addition to stack controls, such as process changes and work practice standards. Several States have adopted output-based standards for electric generating units under the NO_x SIP Call, demonstrating the feasibility of such an approach.

The Environmental Stakeholders support compliance on a unit-by-unit basis.

Industry Stakeholders. All of industry recommends that MACT standards afford plants flexibility in demonstrating compliance with the emission limits. The MACT standard for electric utility steam generating units should specify both an emission rate limit and a percent reduction. Plants should be given the option of demonstrating compliance with either of these limits. With the exception of the CEG, industry holds that the emissions rate limit should be based on heat input and not energy output. The Majority Industry Group points out that sources already have an incentive to maximize fuel efficiency, because fuel costs account for over three-quarters of variable production costs. In addition, this group's position is that regulations specifying output-based limits would become overly complex because of the many technical details that would have to be addressed. (Examples include the cogeneration of steam, common systems where multiple boilers feed one or more steam turbines, and the need for appropriate instrumentation.) The CEG, however, strongly endorses expressing the rate-based standard on an output basis rather than a heat input basis, and notes that output-based standards are currently used in EPA's recent NO_x NSPS for new utility boilers, as well as in the air pollution regulations of a number of States. The Majority Industry Group also recommends that fuel blending and/or switching (i.e. using both bituminous and subbituminous in the same compliance period) should be handled using a blended standard.

The industry groups observe that there is a precedent in other MACT standards to require compliance on a facility basis. Therefore, compliance with MACT limits should be on a facility basis (i.e. averaged across all the coal fired boilers at a facility) rather than on a boiler-by-boiler (unit-by-unit) basis. A facility-based limit allows some flexibility in unit operation without having any adverse impact on total emissions.

State and Local Agency Stakeholders. The State and Local Agency Stakeholders prefer an output-based standard to reward higher efficiency plants and encourage higher efficiency (and lower emissions) in new and modified plants. The State and Local Agency Stakeholders believe that a combination either/or standard could be an acceptable format. However, the State and Local Agency Stakeholders

recognize that a combination standard would have to be sufficiently stringent so as to approximate, in terms of national emissions remaining, a standard based on an emission rate alone or a percent reduction requirement alone. The reason for incorporating a percent reduction requirement (based on inlet-outlet concentration across the control device) in a combination standard is to provide a mechanism to meet the standard for units burning a high mercury coal. Compliance determination with a percent reduction limit is usually based on simultaneous boiler outlet and stack testing, but simultaneous testing of coal and stack may be feasible with representative testing of the coal as fired. The State and Local Agency Stakeholders are agreeable to a facility-wide compliance basis, if limited to coal units in the same subcategory.

Texas feels that any mercury MACT standard should allow facilities to choose between a percentage reduction limit (between mercury in the coal and mercury in the flue gas) and a concentration limit (either a stack concentration limit or an input concentration limit).

Summary of Positions on Format of Mercury Standard. All stakeholders, except the Environmental Stakeholders, support allowing some form of facility-wide averaging as a means of providing flexibility and enhancing the cost-effectiveness of the rules. The State and Local Agency Stakeholders, Environmental Stakeholders, and CEG support using output-based, rather than input-based, emissions limits, although this position is strongly opposed by the Majority Industry Group. The State and Local Agency Stakeholders note that an input-based standard could be acceptable. The industry and State and Local Agency Stakeholders support allowing sources to comply with the rule either by meeting an emission rate or a percent reduction standard, although this approach is opposed by the Environmental Stakeholders.

COMPLIANCE METHOD (MONITORING) FOR MERCURY

The issue is which are the appropriate measurement methods, protocols, and averaging times for determining compliance with the applicable mercury MACT standards. The stakeholders hold varying opinions regarding which measurement methods, protocols, and averaging times should be used.

Stakeholder Positions

Environmental Stakeholders. The Environmental Stakeholders recommend that CEM systems be used for compliance with the mercury MACT standard. These units simply represent the most accurate way to measure stack emissions. Mercury CEM are already commercially available and there are ongoing EPA validation programs. The Environmental Stakeholders are confident that if the MACT standard requires CEM, by December 2007 manufacturers will have several commercially available options for power plants. To account for variability in stack emissions, the Environmental Stakeholders recommend a 30-day rolling average with periodic stack tests (at least annually) using Method 101A or Method 29 to calibrate the CEM. The Environmental Stakeholders also recommend that if a facility-wide standard were adopted over their objections, EPA should explore the feasibility of allowing a multi-unit facility to meet the MACT emissions rate across all the units comprising the major source, even if one of the units switches to a cleaner fuel not subject to the MACT standard. For example, a source comprised of four coal-fired units that switched one unit to natural gas, could still include that unit in the defined source that must meet the MACT emissions rate. This would allow the rate to be spread, in effect, over the three remaining coal-fired units, while taking advantage of the MWh electric output of the gas-fired unit in the compliance averaging.

Industry Stakeholders. The industry position is based on the potential health concerns identified by EPA in its December 2000 listing decision for mercury and in the extensive studies on which that decision is based arise from the long-term accumulation of mercury in the environment. Accordingly, short compliance averaging periods (e.g., hourly or daily) are unnecessary. In addition, there has not been

any suggestion that compliance with a mercury MACT should be based on anything other than total mercury. As a result, speciated mercury data are not required for compliance purposes.

Industry believes EPA can not assume that mercury CEM will be available when regulations are promulgated. The EPRI and DOE continue to have their automated CEM projects continuously staffed in order to achieve reasonably reliable results, and there is no certainty that these issues will be resolved prior to proposal of the mercury MACT. Therefore, compliance should be monitored using EPA Method 101A, which is currently the only approved method for sampling and analyzing total mercury. Sources would have the option to use the Ontario Hydro method since it is a variation of Method 101A. Once properly validated, EPA can adopt CEM for measuring compliance through an appropriate regulatory process.

The scheduling and performance of compliance testing should provide utilities sufficient flexibility to assure system reliability and economic dispatch of their systems. Title V permits will include compliance assurance monitoring (CAM) plans for periods between compliance tests. Industry recommends an initial compliance demonstration followed by annual testing for large sources and biennial testing for small sources to demonstrate compliance with mercury MACT limits.

The Equipment Vendors recommend a compliance averaging period of 30 days based on their belief that CEM will be available before they are needed for use with this rulemaking. A 30-day averaging period accommodates variability (e.g., coal type, plant operation). If, however, manual measurements are needed, then they support an averaging time on the order of a year due to the needed turnaround time and to accommodate the number of samples that might be recognized as constituting an accurate representation of a given plant's performance.

State and Local Agency Stakeholders. The State and Local Agency Stakeholders recommend using Method 29A for measurement of mercury and other metals. They further recommend that there should be a transition to CEM, once CEM are demonstrated, reliable, and commercially available. At that time, the standard should be based on either a monthly average or a 12-month rolling average. In the interim (while Method 29A is being used), there should be quarterly testing, with compliance assessed using the average of 4 quarterly averages (each of which includes 3 test runs).

Summary of Positions on Compliance Method (Monitoring) for Mercury. All parties agree that the mercury MACT standard, and its compliance method, should be based on evaluating long-term loadings (30-day standard to as long as an annual standard). Industry's position is that CEM will not be sufficiently automated, accurate, reliable, and validated at the time a MACT standard is promulgated. As a result, they recommend stack testing for compliance (at least in the short term), as do other stakeholders, should CEM not be available. The difference in recommended stack testing methods (Method 101A for Industry Stakeholders versus Method 29A for State and Local Agency Stakeholders) results from their differing positions on the regulation of non-mercury HAP. If EPA regulates only mercury (as Industry Stakeholders recommend), then there is no need to use Method 29A, which measures mercury in addition to other metals. In contrast, if EPA regulates multiple metals, Method 29A makes more sense. The Industry Stakeholders recommend annual/biennial stack testing, while the State and Local Agency Stakeholders recommend quarterly stack testing. The Environmental Stakeholders and Equipment Vendors recommend that CEM be used for compliance beginning in December 2007 and are confident that CEM will be validated and commercially available in that time frame. The State and Local Agency Stakeholders believe that a transition to CEM should be made as soon as they are available. The Environmental Stakeholders' recommended 30-day rolling average for compliance testing is supported by the Equipment Vendors and the State and Local Agency Stakeholders, although the State and Local Agency Stakeholders also recommend consideration of an annual rolling-average standard.

COMPLIANCE TIME

The issue is the statutorily-defined compliance time and the considerations by which extensions may be granted. This issue received limited discussion during the Working Group process, and it was agreed that the provisions outlined in the CAA for installation of controls and compliance may be triggered.

Summary of Positions on Compliance Time. Stakeholders agree that a utility mercury MACT regulation has the potential to require retrofit controls to be installed at existing generating units. The CAA outlines timeframes in which compliance must be achieved, and includes additional time to install controls when necessary. Implementation of these CAA provisions may be triggered during the utility mercury MACT regulatory process.

NON-MERCURY HAP

The issue is whether EPA is obligated to set emission standards for HAP other than mercury for coal-fired boilers, and HAP other than nickel for oil-fired boilers. The various stakeholder groups hold differing views on this issue.

Stakeholder Positions

Environmental Stakeholders. The Environmental Stakeholders recommend that EPA set emission standards for all HAP (in addition to mercury) because they believe these HAP also pose a public health and environmental risk and that such emissions should be minimized. If EPA finds that the available data for non-metal HAP are inadequate to set standards, then EPA should immediately initiate efforts to gather additional data for the other emitted HAP. The EPA's regulatory determination listed the source category "coal- and oil-fired electric utility steam generating units" and declared that regulating HAP emitted by this source category is appropriate and necessary. The determination advised that the HAP of "greatest potential concern" for coal-fired units was mercury, and nickel for oil-fired units. The EPA also determined that several metals are of "potential concern for carcinogenic effects." The determination also advised that hydrogen chloride (HCl), hydrogen fluoride (HF), and dioxins are three additional HAP of potential concern which may be further evaluated during the regulatory process. The Environmental Stakeholders believe the statutory language of CAA section 112(d) and existing case law support the requirement that regulation of all HAP on the section 112(b) list is required for each listed category or subcategory of major sources. They believe the regulatory determination had the legal effect of listing power plants on the section 112(c) source category list, thereby triggering the requirement of section 112(c)(5) for EPA to set MACT emission standards for listed HAP emitted by this source category. The regulatory determination, in and of itself, cannot limit EPA to setting emission standards only for the HAP listed under section 112(b) that were discussed in the determination.

When EPA sets standards for the non-mercury HAP, the Environmental Stakeholders recommend promulgation of an output-based standard for the non-mercury HAP metals based on the average of the best performing top 12 percent of the tested units. A percent reduction standard also could be developed, but is not preferred by the Environmental Stakeholders because it is more difficult to determine compliance compared to an emission rate standard. A surrogate approach to regulating non-mercury HAP also could be acceptable, so long as the surrogate measure: (1) reflects the actual emissions of the grouped pollutants, (2) represents the calculated floor, (3) has substantially the same properties as the grouped pollutants, and (4) is controlled by the same mechanisms or measures as the grouped pollutants. Recommended pollutant groupings are "low-volatility HAP metals," "semi-volatile HAP metals," "acid gases," "radionuclides," "organic HAP other than dioxins/furans," and "dioxin/furans." The table below lists the input-based emission rates that represent the average of the best performing 12 percent for the tested units, from which an output-based standard can be calculated.

Metal	Emission Rate, lb/TBtu	Metal	Emission Rate, lb/TBtu
Antimony	0.15	Copper	1.3
Arsenic	0.24	Lead compounds	0.34
Barium	1.34	Manganese	2.38
Beryllium	0.01	Molybdenum	0.61
Cadmium	0.16	Nickel	1.34
Chromium	0.91	Selenium	0.19
Cobalt	0.19	Vanadium	0.58

The Environmental Stakeholders support creation of MACT emission limits for acid gases and organics, but do not offer specific recommendations as to what those limits should be.

Industry Stakeholders. The Industry Stakeholders take the position that EPA's authority under section 112 is limited to regulating mercury emissions from coal-fired plants. Electric utility steam generating units are treated differently than other sources under section 112. Section 112(n)(1)(A) requires EPA to study the hazards to public health reasonably anticipated to occur as a result of HAP emissions from electric utility steam generating units. The EPA is then to regulate as is "appropriate and necessary" to protect public health. The EPA's decision to list coal- and oil-fired electric utility steam generating units under section 112(c) was based on a conclusion that mercury emissions from coal-fired power plants presented public health concerns. The EPA did not identify public health concerns associated with the emissions of any other HAP. Thus, EPA's December 2000 listing decision must be viewed as only involving mercury emissions from coal-fired plants. The EPA can regulate non-mercury HAP only if it concludes that emissions of these HAP from power plants pose an unacceptable risk to human health.

Even if EPA identifies health concerns associated with non-mercury HAP, the Industry Stakeholders believe historical sampling data are insufficient either to characterize non-mercury HAP emissions from coal- or oil-fired units or to set MACT floors. They believe that before EPA can regulate these compounds, it must fill existing data gaps by collecting emissions data at a representative group of electric utility steam generating units using validated sampling and analytical methods.

The Majority Industry Group takes the position that suggestions for grouping non-mercury HAP or designating "surrogate" compounds are, therefore, premature and inappropriate. The CEG, however, urges that if EPA decides to regulate other HAP from coal- and oil-fired utility generating units, the EPA use appropriate "surrogates" for certain classes of HAP emitted from these units, including metals, acid gases, and organic compounds. These surrogates should be used not only in the MACT determination process, but also in the determination of compliance.

State and Local Agency Stakeholders. The State and Local Agency Stakeholders agree with the basis for regulating non-mercury HAP and stated that the non-mercury HAP emissions from power plants are a significant fraction of the national loadings of these pollutants (including metals and acid gases), and

should be regulated. Pollutants of particular concern include metals (especially arsenic, cadmium, chromium, lead and manganese), acid gases (HCl and HF) and organics (including dioxins). The State and Local Agency Stakeholders support the conclusion that, consistent with past EPA precedent, the technology-based MACT program should ensure that all significant sources of HAP implement controls to reduce emissions of all HAP to the maximum extent achievable.

The State and Local Agency Stakeholders recommend grouping HAP from power plants into four categories: (1) mercury; (2) fine-particulate HAP (including arsenic, cadmium, and chromium; radionuclides; and polycyclic organic matter [POM]); (3) acid gases; and, (4) organic HAP such as dioxins, polycyclic organic matter (POM) and other products of incomplete combustion (PICs).[5] The State and Local Agency Stakeholders recommend the use of surrogates as a practical mechanism to address the large number of non-mercury HAP emitted by power plants. The following surrogates and limits are recommended:

- Fine particulate HAP: Particulate emissions should be used as a surrogate, with a floor level of 0.030 lb/million Btu (lb/MMBtu) for total particulates based on the NSPS, and a beyond-the-floor limit of total particulates at 0.0150 lb/MMBtu based on BACT. The State and Local Agency Stakeholders prefer that the particulate limit be based on the fine particulate fraction if the NSPS and BACT levels for total particulate can be converted to fine particulate equivalents.

- Acid Gases: SO_2 or HCl should be used as a surrogate. When SO_2 is chosen as a surrogate for HCl and HF, the States and locals recommend a floor limit of 90 percent SO_2 reduction based on NSPS, and a beyond-the-floor limit of 95 percent SO_2 reduction based on BACT. The same or greater reductions are appropriate if HC1 is used as a representative acid gas HAP.

- Organic HAP: Carbon monoxide should be used as a surrogate, with a floor limit of 100 parts per million (ppm) CO on a 24 hour average (reasonable available control technology, RACT). The State and Local Agency Stakeholders do not recommend a specific beyond-the-floor limit, but believe EPA should consider recent BACT/LAER determinations in identifying an appropriate MACT level. The EPA should consider an averaging time as low as one hour to address high emission of HAP PIC over shorter time periods of poor combustion conditions.

Texas does not support the regulation of HAP other than mercury and cites section 112(n)(1) of the CAA which requires the Administrator to "regulate electric utility steam generating units under this section, if the Administrator finds such regulation is appropriate and necessary after considering the results of the study required by the subparagraph." The RtC provides justification for regulating mercury from coal-fired power plants, but then states "[f]or a few other HAP, there also are still some remaining potential concerns and uncertainties that may need further study." No further study was conducted to establish the need to control HAP other than mercury from coal-fired plants.

Summary of Positions on Non-mercury HAP. There is disagreement among the stakeholders regarding EPA's authority to set a MACT standard for non-mercury HAP. The Environmental and State and Local Agency Stakeholders (except Texas) believe that EPA has the obligation to set such standards. Industry and Texas cite section 112(n)(1)(a) and believe that EPA's failure to make a health determination for non-mercury HAP precludes EPA from regulating anything but mercury. All stakeholders agree that the available data for the non-mercury HAP could be strengthened, although the Environmental Stakeholders

5 Note: The State and Local Agency Stakeholders include POM in both the fine particulate HAP and the organic HAP groupings and believe that both good combustion and particulate controls are necessary to minimize POM emissions.

and State and Local Agency Stakeholders (except Texas) believe the data for metals are sufficient to establish MACT floors. The Environmental Stakeholders further believe the data are adequate to set emission limits for all non-metal HAP. However, if EPA determines that current data for these pollutants are insufficient, the Environmental Stakeholders also support EPA conducting further data collection to enable the development of MACT limits for non-metal HAP. However, the State and Local Agency Stakeholders (except Texas) take a different approach. They believe EPA can derive MACT floors from the use of surrogates and existing NSPS and RACT determinations for relevant criteria pollutants, and the beyond-the-floor limits from the use of BACT/LAER determinations for relevant criteria pollutants.

OIL-FIRED UNITS

The issue is how to set MACT standards for oil-fired generators. This issue encompasses all of the issues that have been raised for coal-fired generators, namely what pollutants must be regulated, the required level and format of the floor for the standards, what compliance methods are required, and how much time is permitted for existing sources to meet the MACT standards once promulgated. The stakeholders have differing views on these issues.

Stakeholder Positions

Environmental Stakeholders. The EPA's December 20, 2000 Notice of Regulatory Finding listed coal- and oil-fired electric steam generating units as a source category under section 112(c). Section 112(c)(5) requires that "emissions standards under [section 112(d)] for the category or subcategory shall be promulgated." Section 112(d) requires regulation of all HAP for each listed category or subcategory of major sources. The Environmental Stakeholders read that the District of Columbia Circuit Court further held, in *National Lime Ass'n v. EPA*, that section 112(d) defines a "clear statutory obligation" on the part of EPA "to set emission standards" for all the HAP listed in the statute at section 112(b). If the EPA finds that the data are inadequate for setting standards for all of the non-mercury HAP, then the EPA should immediately gather additional data, using its authority under section 114 of the CAA or through other means. However, the Environmental Stakeholders emphatically believe that the nickel emissions data for oil-fired units is adequate for the purpose of setting emission standards.

The Environmental Stakeholders believe EPA should set a MACT floor for nickel emitted by oil-fired units. The Environmental Stakeholders lack information as to whether oil-fired units burning lighter than number 2 oil should be exempt. They conclude that about 90 facilities burn 100 percent oil. The 12 data points represent about 13 percent of the facilities. Using the top 12 percent of facilities with data would result in a standard set from the average of the top 2 facilities. On this basis, the MACT standard would be 26.05 lb/TBtu. If EPA excludes the fabric filter pilot test, the standard would then be 144 lb/TBtu.

Although the Environmental Stakeholders do not have specific MACT floor recommendations for HAP other than nickel, they recommend EPA establish limits for these materials. An "either/or" standard may be appropriate provided appropriately stringent targets are set. The concerns previously expressed for coal also pertain to HAP from oil-fired units (or their surrogates). For new sources, the MACT floor should reflect the best performing unit. In all cases, the standards for all HAP should be on an output basis.

Similarly to non-mercury HAP for coal units, a surrogate approach for oil-fired units is acceptable provided the surrogate reflects the emissions of the represented pollutants, and the surrogate emission rate represents the calculated floor. A surrogate would at a minimum have to have substantially the same properties as the grouped pollutants and be controlled by the same mechanism or measures. Compliance should be based on monthly composite sample of oil, determining a weighted average, and the amount of

oil used each month. Where particulate controls are in place, additional annual testing of the control device should be required to determine metal removal efficiency.

Each unit would be required to meet the floor over a quarterly averaging period. There is high variability in the data set from the small number of data points and seasonal variation in oil use. Providing facilities a long compliance period allows them flexibility in dealing with variability. Although utilities may prefer an annual averaging period, such a long time period is not necessary as long as facilities have the ability to burn less oil as a compliance option. This approach, unlike a tonnage cap, does not rely on historical data on oil use to establish a standard, which may not be indicative of future use.

Industry Stakeholders. The EPA did not identify specific health concerns associated with HAP emissions from oil-fired units when it listed those units under section 112(c). Until EPA demonstrates specific public health concerns, there is no jurisdiction to regulate HAP emissions from these units.

The EPA has stack-test data from 12 of the 130 to 145 oil-fired units. The tests show an extremely broad range of nickel emissions ranging from 50 lb/TBtu to over 2,167 lb/TBtu, even with similar controls. The EPA also has limited data on the nickel content of oil that also reflects extreme variability. Similarly, EPA's data on non-nickel HAP is of even lesser quality such that it is insufficient to set a standard. The limited available data makes it very difficult, if not impossible, to set a MACT standard that meets the section 112 achievability and performance requirements. The CAA requires EPA to set a MACT standard for existing sources based on the "average emission limitation achieved by the best performing 12 percent of the existing sources (for which the Administrator has emissions information)." The same section states that, for source categories with less than 30 sources, the standard should be based on "the average emission limitation achieved by the best performing 5 sources (for which the Administrator has or could reasonably obtain emissions information)." If EPA sets the standard based on the top 12 percent of all units, it would need data from 16 to 17 units. If EPA chooses not to obtain additional data, it should establish the MACT using the data it has from all 12 units. It should not set the MACT standard based on two data points, as has been suggested by some stakeholders, or use only the lowest five stack tests from the limited data base. Any MACT standard must be based on all relevant data, *excluding* pilot plant research testing.

If power plant nickel emissions do pose a risk, the objective should be to reduce the total mass emissions. The Majority Industry Group holds that the preferred option is for an annual mass-emissions standard. This approach would allow units greater flexibility, while achieving the same environmental objective. The group takes the position that the alternative would be to establish a rate-based standard with an annual compliance period. They argue that most of the oil-fired generators in the country are utilized for non-baseload purposes. Many have dual-fuel capability. Dual fuel capability is critical for many units to ensuring reliability from frequent winter gas curtailments. Without this ability, many units would be forced to retire. Similarly, requiring peaking units to install control devices to meet a short-term emission rate limit will likely force many units to retire. According to this group, the standard must also be fuel neutral, based on total heat input, or be output based (i.e., lb/MWh). Finally, low-utilization and small units should be exempted from applicability based on an amount of fuel burned.

The CEG shares much of the perspective of the Majority Industry Group on these issues. It argues strongly for a fuel neutral approach, with an annual averaging period and an output-based standard.

State and Local Agency Stakeholders. The State and Local Agency Stakeholders believe that MACT standards should be developed for HAP from all units which combust oil heavier than light or number 2 oil. There should be no subcategories for power generating units burning heavy oil. Effective particulate control and good combustion should be the goal of the MACT for heavy-oil combustion. The MACT requirements should be set for particulate HAP and organic HAP emitted by heavy oil combustion.

Nickel may be appropriate as a representative HAP for the heavy metals in oil. Alternatively, a limit on fine particulate emissions may be an appropriate surrogate for HAP heavy metals. Carbon monoxide would be an appropriate surrogate for organic HAP, which are PIC. The State and Local Agency Stakeholders have not determined a MACT floor limit for nickel. A rate-based standard using energy output is the preferred form of the standard. A rate-based standard using heat input is also useful, but not preferred.

If a fine particulate emission rate is used as a surrogate, the MACT floor should be no higher than the floor for coal (i.e., no higher than 0.030 lb/MMBtu). A "beyond-the-floor" level should also be considered at the 0.015 lb/MMBtu level. These total particulate limits should be adjusted, if possible, to create a fine particulate emission limit to reflect the fact that metals in oil, like trace metals in coal, accumulate in the fine particulate fraction.

Organic HAP should be controlled using CO as a surrogate. The floor should be set no higher than 100 ppm (at 7 percent oxygen). An averaging period between 1 and 24 hours should be considered. BACT and LAER determinations should be considered for a "beyond-the-floor" MACT limit. Oxidation catalysts should be considered, but good combustion control should be sufficient in most cases. Carbon monoxide CEM should be used to determine compliance.

If nickel is used as a surrogate for metal HAP emissions, then a composite oil sample should be tested monthly, and the efficiency of the fine particulate air pollution control, if any, should be tested annually. A weighted annual average of the nickel emissions per MWh can be determined based on the monthly amount of electricity produced, and the rate of nickel emitted can be adjusted by the efficiency of the particulate air pollution control. If fine particulates are used as a MACT surrogate, then an annual particulate test would be appropriate, using standard EPA methods and averaging three test runs.

Future BACT and LAER determinations for particulate and CO emissions from new oil-fired units should be sufficient to reduce HAP levels from new units to lower levels than for existing units, provided New Source Review (NSR) technology requirements remain for new major units.

Summary of Positions on Oil-fired Units. There is little agreement on the regulation of oil-fired units. The Environmental and State and Local Agency Stakeholders recommend regulating all HAP (including nickel) from oil-fired plants. The industry stakeholders question EPA's legal authority even to regulate nickel, claiming the absence of any specific regulatory finding for nickel, and believe EPA has no legal authority to regulate any HAP other than nickel from oil-fired boilers. The Environmental Stakeholders firmly believe the nickel emission data are adequate to set standards and recommend that if EPA makes of finding of inadequacy, then the EPA act immediately to collect additional data on the other non-mercury HAP. The State and Local Agency Stakeholders generally consider the data adequate to set standards. The Industry Stakeholders believe that if EPA regulates nickel, it must use all 12 available data points, while the Environmental Stakeholders believe that the top 2 data points are sufficient. The State and Local Agency Stakeholders believe that the MACT limits can be set by evaluating NSPS, BACT,/LAER, and RACT limits established for surrogates, such as fine particulate (for metals such as nickel). The Industry Stakeholders support a mass limit with an annual emission rate as an alternative (the latter being CEG's preference), with both industry groups strongly supporting a fuel neutral annual standard, while the Environmental Stakeholders support a quarterly averaging period as being sufficient to address variability. The State and Local Agency Stakeholders support performance standards and annual testing for HAP metals (using particulate as a surrogate), and continuous monitoring for organic HAP (using CO as a surrogate).

Appendix A

Membership of Utility MACT Working Group

Name	Constituency	Representing
Bill Becker	State/local/tribal	STAPPA/ALAPCO
Bill O'Sullivan	State/local/tribal	New Jersey Department of Environmental Protection; STAPPA/ALAPCO
Praveen Amar	State/local/tribal	NESCAUM
David Schanbacher	State/local/tribal	Texas Commission on Environmental Quality (formerly Texas Natural Resources Conservation Commission or TNRCC); Environmental Council of the States (ECOS)
Wilson Laughter *(alternate: Mike Connolly)*	State/local/tribal	Navajo Air Quality Control Program (NAQCP)
John Paul (Co-chair)	State/local/tribal	Regional Air Pollution Control Association/Dayton; STAPPA/ALAPCO
Patricio Silva	Environmental	Natural Resources Defense Council (NRDC)
Wilma Subra	Environmental	Louisiana Environmental Action Network; Environmental justice
Michael Shore	Environmental	Environmental Defense
Martha Keating *(alternate: Ann Weeks)*	Environmental	Clean Air Task Force (CATF)
Felice Stadler	Environmental	National Wildlife Federation
Tom Natan *(alternate: John Stanton)*	Environmental	National Environmental Trust
Sandra Schubert *(alternate: Jim Pew)*	Environmental	Earthjustice
Eric Uram	Environmental	Sierra Club Midwest
Jeffrey Smith	Vendors	Institute of Clean Air Companies (ICAC)
Frank Cassidy *(alternate: Mark S. Brownstein)*	Industry	PSEG Power
Charles Goodman *(alternate: Larry Monroe)*	Industry	Southern Company Generation
William Tyndall *(alternate: Michael Geers)*	Industry	Cinergy
Robert LaCount *(alternate: Ann Berwick)*	Industry	PG&E National Energy Group; Clean Energy Group
Bill Bumpers *(alternate: Debra Jezouit)*	Industry	Baker Botts; Class of 85 Regulatory Response Group
Peter Jonker	Industry	Consultant
Patrick Raher	Industry	Hogan & Hartson
Dick Wilson	Industry	National Environmental Strategies; Consultant
Robert Wyman *(alternate: Claudia O'Brien)*	Industry	Latham & Watkins; Energy for a Clean Air Future (ECAF)
John Shanahan	Industry	National Mining Association
Michael Rossler *(alternate: Quin Shea)*	Industry	Edison Electric Institute (EEI)
Lee Zeugin	Industry	Hunton & Williams; Utility Air Regulatory Group (UARG)
Richard Midulla *(alternate: Mike Opalinski)*	Industry	Seminole Elec. Coop.; Rural Electric Cooperatives
Dan Cunningham	Industry	Con Edison
David Steele *(alternate: C.V.Mathai)*	Industry	WEST Associates
Gene Trisko	Unions	United Mine Workers

Members of the CAAAC are noted in **bold**.

Appendix B

Summary of Issues and Stakeholder Positions

Summary of Stakeholder Positions

Issue	Environmental Groups	Majority Industry Group	CEG	WEST Associates	ICAC	State/local Air Agencies	Texas
Subcategories for mercury	- Coal FBC IGCC All others - Oil	- Coal Bit Hot stack Sat stack Wet stack Subbit Lignite FBC IGCC (not within scope of rule) - Oil	- Coal Bit/subbit Lignite FBC - Oil	- Coal Bit High Cl Low Cl Subbit High Cl Low Cl Lignite FBC - Oil	- Coal Bit Subbit Lignite FBC - Oil	- Coal Bit/subbit Lignite - Oil Heavy oil	- Coal Bit Subbit Lignite FBC - Oil
Floor levels for mercury (unless otherwise noted; lb/TBtu unless otherwise noted)	- FBC - 0.19 - IGCC - 0.54 - Others - 0.21	- Bit Hot stack - 3.7 Sat stack - 2.2 Wet stack - 3.2 - Subbit - 4.2 - Lignite - 6.5 - FBC - 2.0	- Approach to setting floor levels proposed	- To be determined	- Bit - 90% red. - Subbit - 70% red. - Lignite - TBD - FBC - TBD	- Bit/subbit - range from 0.4 to 0.6 or 90% removal for mercury; 0.03 lb/MMBtu for PM; 90% removal for SO_2; 100 ppm for CO - Lignite - TBD	
Beyond-the-floor for mercury	- Beyond-the-floor levels recommended for IGCC units	- No beyond-the-floor levels - EPA's analyses are not complete	- Will require significant further analysis, but	- No beyond-the-floor levels - EPA' analyses are not complete	- Limits specified are beyond-the-floor	- Provided criteria for mercury; use BACT levels	

Issue	Environmental Groups	Majority Industry Group	CEG	WEST Associates	ICAC	State/local Air Agencies	Texas
			emerging technologies look promising			for surrogates (e.g., 0.015 lb/MMBtu for PM; 95% for SO_2)	
Format of mercury standard	- Output-based emission rate - No percent removal unless standard is equivalent to recommended floor levels	- Less stringent of lb/MMBtu or percent removal	- Less stringent of emission rate (output-based preferred) or percent removal	- Less stringent of lb/MMBtu or percent removal	- Less stringent of lb/MMBtu or percent removal	- Less stringent of emission rate (output-based preferred) or percent removal	- % reduction limit or concentration limit
Compliance method (monitoring) for mercury	- Mercury CEM	- EPA Method 101A	- EPA Method 101A until CEM performance is satisfactory	- EPA Method 101A	- Assume CEM will be available	- EPA Method 29A; transition to CEM for mercury; annual test for PM; CEM for SO_2 and CO	
Compliance time	- As required by CAA (3 years plus 1 allowed under Title V)	- 3 years is too short - 5-8 years likely to be needed		- 3 years is too short - 5-8 years likely to be needed		- Extension of time beyond the 12/15/07 deadline can be considered if justified by scope of retrofits	

Issue	Environmental Groups	Majority Industry Group	CEG	WEST Associates	ICAC	State/local Air Agencies	Texas
Non-mercury HAP	- Should be regulated - Surrogates may be acceptable (e.g., fine PM for metals; SO_2 for acid gases)	- Should not be regulated	- Current determination does not provide legal authority - If EPA does so, surrogates should be used	- Should not be regulated	- No position whether EPA should regulate - Surrogates (PM for metals; SO_2 for acid gases) should be used	- Should be regulated - Surrogates should be used (PM for metals; HCl or SO_2 for acid gases; CO for organics)	- Should not be regulated
Averaging period	- 30-day rolling average	- Annual stack test (biennial for small sources)	- Annual stack test	- Annual stack test (biennial for small sources)	- 30-day rolling average	- Quarterly stack test, averaged annually (rolling 4-quarter average) - Once CEM are available, 30-day or 12-month rolling average	
Compliance unit	- Unit	- Facility (allows emissions averaging among units at same facility)	- Facility	- Facility (allows emissions averaging among units at same facility)		- All coal-burning units in same subcategory at a facility	
Oil-fired units	- Limits for nickel and other non-mercury HAP	- No legal authority to regulate -If EPA decides to	- If EPA decides to regulate	- No legal authority to regulate -If EPA decides to		- Limits for PM and CO for heavier	

Issue	Environmental Groups	Majority Industry Group	CEG	WEST Associates	ICAC	State/local Air Agencies	Texas
		regulate nickel, prefer an annual mass-based standard to maximize flexibility; otherwise, input-based standard with 12-month compliance period	nickel, prefer an output-based annual standard; fuel-neutral to utilize gas as a compliance alternative to address emissions	regulate nickel, prefer an annual mass-based standard to maximize flexibility; otherwise, input-based standard with 12-month compliance period		than No. 2 oil; nickel can be used instead of PM; output-based standard preferred	
Variability	- Combination of average of top 12% of sources and 30-day rolling average adequately addresses variability	- MACT floor must consider variability under worst foreseeable circumstances - ICR Part III stack test data do not represent the reasonably foreseeable worst-case level of performance or even average performance of the units tested - Floor recommendations include consideration of fuel variability; variability from other causes, such	- MACT floor must consider variability under worst reasonably foreseeable circumstances - Recommend options for how to address	- MACT floor must consider variability under worst foreseeable circumstances - ICR Part III stack test data do not represent the reasonably foreseeable worst-case level of performance or even average performance of the units tested - Floor recommendations include consideration of fuel variability; variability from other causes, such		- Variability primarily addressed through more frequent testing and annual averaging (or CEM) - Additionally, provide a factor of 2 compliance margin on the average of the best 12% of the test data	

Issue	Environmental Groups	Majority Industry Group	CEG	WEST Associates	ICAC	State/local Air Agencies	Texas
		as sampling and monitoring, operational, and plant-to-plant, also need to be addressed		as sampling and monitoring, operational, and plant-to-plant, also need to be addressed			

Appendix C

Stakeholder Position Papers

Utility MACT for Coal- and Oil-Fired Electric Utility Boilers

Recommendations by:

Clean Air Task Force, Environmental Defense, National Environmental Trust, National Wildlife Federation, Natural Resources Defense Council

Submitted September 9, 2002 (revised September 20, 2002)

MERCURY MACT FOR COAL-FIRED ELECTRIC GENERATING UNITS

A. Subcategories

Recommendation: Three "boiler type" subcategories are recommended: fluidized bed combustors, conventional boilers, and coal gasification.

Rationale: Based on the information provided to the Utility Working Group there appears justification for treating conventional boilers differently than fluidized bed combustors and coal gasification units because they are uniquely different systems.

Other subcategories are not appropriate, especially subcategorizing by fuel type, because fuel type does not represent a "class, type or size" distinction, as defined under Section 112 of the Clean Air Act.

B. Emission standards

a. New sources

Recommendation: We recommend that for new sources, the MACT for mercury should reflect the best performing unit in each boiler type subcategory, except for coal gasification units. For these units, given that cost-effective technology is commercially available and has been demonstrated in industrial applications, a 95% control level or greater for these units is appropriate.

b. Existing sources

Recommendation: We recommend an output based emission rate standard, calculated using the following input based rates for each of the proposed boiler type subcategories and the boilers' specific heat rates efficiencies:

FBC boilers (averaged over 4 units—the 5th unit appears to be an outlier and thus should not be included)	0.19 lbs/TBtu
Conventional boilers (averaged over 7 units)	0.21 lbs/TBtu
Coal gasification (beyond-the-floor)	0.54 lbs/TBtu (90% control)

Rationale for emissions standards for FBC and coal gasification units*:* For fluidized bed combustors, four of the five "MACT-floor" units measured mercury emissions ranging from 0.08 to 0.46 lbs/TBtu; the fifth unit measured emissions at 3.97 lbs/TBtu (it was equipped with a CS-ESP whereas all the other units had baghouses installed.). Setting a standard at 0.95 lbs/TBtu (the average over the five FBC units measured) would not have the desired effect that a MACT standard should have: It would allow more mercury to be emitted than is currently measured at existing units. For this reason, a standard more

stringent than the 0.95 lbs/TBtu would be appropriate. Averaging the emissions over the top four units would be one possibility, which would result in a MACT floor of 0.19 lbs/TBtu, or 92% reduction.

For coal gasification units, demonstrated cost-effective technology is commercially available that would allow these units to get significant mercury reductions. Carbon filter beds for metals cleanup from syngas have already been demonstrated on industrial gasification units. In addition, the U.S. Department of Energy has already completed an engineering analysis for installation of a carbon filter bed at Tampa Electric's Polk Station that would achieve a 99% mercury removal at a very reasonable cost. A 90% beyond the floor control level for coal gasification units is appropriate given the likely ease with which units can meet this level. New integrated gasification combined cycle units are being proposed and far more are likely in the future. Thus, without a mercury emission standard, this will be a source category of increasing concern with respect to mercury emissions.

C. Format of Standard

a. Input versus output

Recommendation: We recommend an output-based standard (lbs/MWh) using net generation as reported to EIA Form 767.

Rationale: An output-based standard rewards efficiency and provides utilities with compliance flexibility by adding efficiency to the mix of ways to meet an emission limit. Given that current boilers operate, on average, at 30% efficiency significant gains can be made if the Agency takes steps to promote increased efficiency through establishment of output based emissions standards. For example, analyses completed by DOE found plants that raised their heat rates from 30% to 36% increased their efficiency by 20%. An output based standard also most closely reflects the spirit of Sec. 112, where it was Congress' intent to establish a toxics regulatory program that encouraged investment in compliance methods in addition to stack controls, including process changes, work practice standards, etc., to meet a new emission limit.

b. Percent reduction versus emission rate versus both

Recommendation: We recommend the use of an output-based emission rate that would apply to each category/subcategory of units.

Rationale: We believe that output-based standards promote efficiency, as described above. In addition, setting an output-based emission rate takes into consideration already installed equipment that captures mercury; and lends itself to more reliable and less burdensome compliance monitoring than what would be required through alternate approaches like percent removal (which would require a combination of coal sampling and stack testing, raising verification/accuracy issues).

Not only would compliance monitoring be more difficult under a percent reduction standard, it would also be more burdensome to industry, thereby potentially discouraging coal blending or switching as a control option. This is a crucial consideration given that historically power producers have relied heavily on fuel switching as a cost effective regulatory compliance strategy.

c. Alternate EITHER/OR standard:

Recommendation: We recommend *against* an either/or approach (i.e., the facility chooses whether to meet an emission rate or a percent reduction requirement). .

Rationale: Our analysis of the ICR data shows that the percent reduction approach is always less stringent than the emission rate approach (this holds true for nearly every power plant) for bituminous and subbituminous coals. For lignite coals, under the top 12% scenario there are a few power plants where

the emission rate (4.01 lb/Tbtu) is less stringent than a percent reduction scenario (70%). This is because they already are achieving an emission rate lower than 4.01 lb/Tbtu. In these instances, the plants would actually be allowed to emit more than they are emitting now.

If EPA is inclined to promulgate an either/or standard, it should consider appropriately stringent targets to avoid this effect.

D. Averaging period

Recommendation: We recommend using a 30-day averaging period to take into account variability that has been measured in stack tests.

Rationale: A 30-day averaging period addresses the inherent variability found in mercury flue gas. EPRI's April 14, 2002 presentation on the initial results of its SCEM data showed that as averaging times increased (from hourly to daily and then over several days), variability decreased. The 30-day averaging period will provide facilities an even longer timeframe over which to meet the emission rate.

E. Compliance monitoring method(s)

Recommendation: We recommend the use of continuous emissions monitors (CEMs) for mercury.

Rationale: It is the most accurate method for measuring stack emissions, and given the variability that has been observed through short term stack tests, and the verification/accuracy issues observed while using combined coal sampling and stack testing (to measure % reduction), CEM's are the best tool.

Several mercury CEMs already are commercially available. A project underway at EPRI uses a mercury CEM that takes measurements at 2.5 minute intervals. While there are some technical issues that need to be worked out (specifically the issue re: frequent oversight to ensure that the equipment is functioning properly) the compliance deadline of December 2007 gives manufacturers ample time to perfect the technology and to develop several CEM options for the industry.

MACT FOR NON-MERCURY HAZARDOUS AIR POLLUTANTS FOR COAL- AND OIL-FIRED ELECTRIC GENERATING UNITS.

A. Emission Standards

We firmly believe that EPA has a clear statutory duty to set emission standards for all of the non-mercury HAPs emitted from coal- and oil-fired power plants.

Recommendation: If the Agency finds that the data are inadequate for the purpose of fulfilling its statutory duty of setting standards for all of the non-mercury HAPs, we recommend that EPA immediately initiate efforts to gather additional data, using its authority under section 114 of the Act or through other means (e.g., state emissions tests data), in order to meet its legal requirement.

Rationale*:* EPA's December 20, 2000 Notice of Regulatory Finding, 65 Fed. Reg. 79825 (Dec. 20, 2000), had the legal effect of listing coal- and oil-fired electric steam generating units as a source category under section 112(c). See *UARG v. EPA*, No. 01-1074, (D.C. Cir. July 26, 2001)(order dismissing industry's challenge to the Notice of Regulatory Finding, on the grounds that "judicial review of the listing of a source category under section 112(c) of the Act is not available until after emission standards are issued.") The listing of these electric generating units had the legal effect of triggering the requirement in section 112(c)(5) of the Act that "emissions standards under [section 112(d)] for the

category or subcategory shall be promulgated . . . " Section 112(d) requires that regulation of all HAPs is required for each listed category or subcategory of major sources. The D.C. Circuit further held, in *National Lime Ass'n v. EPA*, 233 F.3d 625, 634 (D.C. Cir. 2000), that section 112(d) defines a "clear statutory obligation" on the part of EPA, "to set emission standards" for all the HAPs listed in the statute at section 112(b), for the enumerated major source categories.

B. MACT Floor for Existing Sources

Currently, we do not have recommendations for specific MACT floor levels for pollutants other than non-mercury metals emitted by coal-fired electric generating units. Similarly, we do not have recommendations for MACT floor levels for pollutants other than nickel emitted by oil-fired electric generating units.

Recommendation: We believe that the available stack test data are sufficient to support a floor for 'non-mercury HAP metals' emitted by coal fired units and recommend that the Agency use these data to set emission standards for all of the non-mercury HAP metals.

A floor for the non-mercury HAP metals emitted by coal-fired units is represented by the average of the best performing 12 percent of the 30 power plants tested. Based on these data we recommend a MACT floor in the form of an output-based emission rate that would reflect a 99 percent removal for all metals (or each non-mercury HAP metals groups. See section D.b. below for a discussion of an alternate surrogate approach). Alternatively, an emission rate could also be set for each individual metal based on measured stack test data. The table below lists the input-based emission rates that represent the average of the best performing 12 percent for the tested units from which an output-based standard can be calculated.

Metal	Emission Rate (lb/Trillion Btu)
Antimony	0.15
Arsenic	0.24
Barium	1.34
Beryllium	0.01
Cadmium	0.16
Chromium	0.91
Cobalt	0.19
Copper	1.3
Lead Compounds	0.34
Manganese	2.38
Molybdenum	0.61
Nickel	1.34
Selenium	0.19
Vanadium	0.58

For oil fired units, set a MACT floor for nickel emitted by those units.

About 90 facilities burn 100% oil. With 12 data points, we have data for about 13% of the facilities. The top 12% of the facilities for which we have data would result in a standard derived from the top 2 facilities**.** Thus, the standard would be based on the average of the top 2 facilities (1.60 and 50.50 lbs/trillion Btu). The MACT standard would be 26.05 lbs/tBtu.

If EPA determines that the emissions data from the top performing facility should not be used to calculate the floor because it is a pilot test, the standard would be the average of top second and third performers (50.50 and 238.00 lbs/tBtu). The MACT standard would be 144 lbs/tBtu.

C. MACT Floor for New Sources

***Recommendation**:* For new sources, the MACT floor for the non-mercury HAPs should reflect the best performing unit.

D. Format of the Standard

a. Input v. output

***Recommendation**:* We prefer an output-based standard and recommend exploring the feasibility of establishing such a standard for the non-mercury HAPs (or groups of non-mercury HAPs). We further recommend the use of a nickel output-based standard for oil-fired units.

Rationale: An output-based standard rewards efficiency which in the case of electric generating units, can play a significant role in determining a unit's emissions in relation to its electricity generation. Improving efficiency should be a compliance option, much like burning alternate fuels or installing control devices. Only through issuance of an output-based standard will this more likely be the case.

b. Alternate Surrogate Standard

We understand that in previous rulemakings the Agency has chosen to group pollutants and establish surrogate measures as an alternate approach to setting individual emission rates. A surrogate approach to regulating non-mercury HAPs could also be acceptable, but only if it can be shown that the surrogate measure reflects the actual emissions of the represented pollutants, and the surrogate emission rate represents the calculated floor. In addition, any surrogate would, at a minimum have to have substantially the same properties as the grouped pollutants and be controlled by the same mechanism or measures. Controls could include feed rate or type of coal as well as control technologies.

***Recommendation**:* If a surrogate approach is taken we recommend that the non-mercury HAP metals be grouped into two categories for the purpose of setting a MACT floor: a 'low-volatility HAP metals' category and also a 'semi-volatile HAP metals' category. The 'low-volatility HAP metals' group includes antimony, barium, beryllium, chromium, cobalt, copper, manganese, molybdenum, nickel, vanadium. The 'semi-volatile HAP metals' group includes lead compounds, cadmium, arsenic and selenium.

In theory, other groupings of non-Hg HAPs make sense, based on the similar properties within the group. These groupings could include 'Acid Gases', 'Radionuclides,' 'Organics other than dioxins/furans,' and 'Dioxins/Furans.' For acid gases, we believe that additional data must currently be available. For example, there are emission factors for HCl and HF that are used to calculate acid gas emissions for the purpose of reporting to the Toxics Release Inventory. These emission factors required the development of an underlying dataset that could be made available to EPA. We urge EPA to take all necessary steps required for the control of acid gas emissions.

c. Alternate Emission Rate/ Percent Reduction Standard

An 'either/or' standard may be appropriate if appropriately stringent targets are set. The concerns noted above relating to the either/or form of the mercury standard would also pertain to the non-Hg HAPs (or its surrogates).

d. Averaging Period

Recommendation: We recommend a 30-day averaging period for the non-mercury HAPs emitted by coal-fired units, to be consistent with the averaging period for mercury.

For oil-fired units, each unit would be required to meet the floor over a quarterly averaging period.

Rationale for oil-fired units: There is high variability in the data set from the small number of data points and seasonal variation in oil use. Providing facilities a long compliance period allows them flexibility in dealing with variability and in finding cost effective ways to comply with the standard. Although utilities may prefer an annual averaging period, such a long time period is not necessary as long as facilities have the ability to burn less oil as a compliance option. This approach, unlike a tonnage cap, does not rely on historical data on oil use to establish a standard, which may not be indicative of future use.

E. Compliance Monitoring Method

Recommendation*:* In the case of individual emission standards for the non-mercury HAPs emitted by coal-fired units, we recommend that EPA devise a monitoring system of sufficient frequency to ensure compliance with the standard.

If a surrogate approach is taken, we recommend continuous emission monitoring of the surrogate pollutant (e.g., SO2 for the acid gases). In addition, to ensure that the surrogate reflects each individual HAP emission rate (or percent reduction, depending on the format of the standard), a periodic compliance test should be required (at least semi-annually) during which each pollutant should be measured as well as the surrogate so there are data for a direct comparison.

For oil-fired units:

a. where no particulate controls are in place: (1) analyze monthly composite sample of oil; (2) determine annual weighted average based on rolling12 months; and (3) weight average by amount of oil used each month.

b. where particulate controls are in place: In addition to the oil sampling, (1) do annual testing of control device to determine metal removal efficiency, and (2) apply that efficiency factor to the metal emission rate as determined.

EXPLANATION OF INDUSTRY STAKEHOLDER RECOMMENDATIONS TO EPA

HAPs To Be Regulated

EPA's authority under the MACT provisions of §§ 112(c) and (d) is limited to regulating mercury emissions from coal-fired plants. This limitation results from the unique way electric utility steam generating units are treated under § 112 of the Clean Air Act and in particular § 112(n)(1)(A). Section 112(n)(1)(A) requires EPA to study the hazards to public health reasonably anticipated to occur as a result of hazardous air pollutant (HAP) emissions from electric utility steam generating units. EPA is then to regulate as is "appropriate and necessary" to protect public health. EPA's decision to list coal- and oil-fired electric utility steam generating units under § 112(c) was based on a conclusion that mercury emissions from coal- and oil-fired power plants presented public health concerns. EPA did not identify public health concerns associated with the emissions of any other HAP. Thus, EPA's December 2000 listing decision must be viewed as only involving mercury emissions from coal-fired plants. EPA can regulate non-mercury HAPs only if it concludes that emissions of those HAPs pose an unacceptable risk to human health and further concludes that controlling those emissions will reduce human health risks to acceptable levels.[6]

Even if EPA identifies health concerns associated with non-mercury HAPs, historical sampling data are insufficient either to characterize non-mercury HAP emissions from coal- or oil-fired units or to set MACT floors. Before EPA can regulate these compounds it must fill existing data gaps by collecting emissions data at a representative group of electric utility steam generating units using validated sampling and analytical methods. Suggestions for grouping non-mercury HAPs or designating "surrogate" compounds are therefore premature and inappropriate.

Subcategorization

The legislative history of the Clean Air Act makes clear that Congress intended EPA to distinguish among classes, types, and sizes of sources under three core circumstances: when differences among sources affect (1) the feasibility of air pollution control technology; (2) the effectiveness of air pollution control technology; and (3) the cost of control. Subcategorization is the primary mechanism that allows the agency to account for the fact that distinctions among classes, types and sizes of sources may have a very real impact on the feasibility of a given control technology, the effectiveness of that control technology, and the cost of control. EPA's past practices and case law support the use of this discretion.[7]

The industry stakeholder group believes that the primary objective for subcategorization is to formulate a MACT standard that recognizes and allows for the continued use of the wide range of coals found in the U.S. There exists no one fuel in sufficient quantities and availability that can be used by all parties. The recommended subcategorization scheme outlined in the following paragraph, coupled with the flexibility of alternate standards (emission rate limit or percent reduction) would work to achieve this objective.

The source category of electric utility steam generating units must be subcategorized before MACT limits are set. Subcategorization is justified and required for a number of reasons. First, oil- and coal-fired units should be placed in different subcategories because the fuels are dissimilar and produce very different

[6] Additional information was presented in the paper "Legal and Policy Basis for EPA to Forego the Regulation of Non-Mercury HAP Emissions From Utility Boilers", by Wyman, O'Brien, and Gertler, August 5, 2002.

[7] Additional information was presented in the paper "Basis and Rational For Potential Subcategorization Of Coal-Fired Electric Utility Steam Generating Units," by Geers and O'Brien, March 8, 2002

emissions. Second, for coal-fired units, fluidized bed combustion (FBC) units must be separated from conventional boilers because they employ a fundamentally different process for burning coal and they produce emissions with different mercury characteristics. (IGCC units do not fall within the source category because the coal gasification portion of an IGCC unit does not meet the definition of an electric utility steam generating unit.) Third, conventional boilers (pulverized coal, cyclones) must be subcategorized by the rank of coal burned (bituminous, subbituminous and lignite) because combustion of those coal ranks produces emissions with widely varying percentages of the three relevant species of mercury (elemental, particulate and gaseous ionic). Fourth, process differences related to temperature can affect emission characteristics and justify further subcategorization. Fifth, coal chemistry (e.g., content of mercury, sulfur and chlorine) affects the species of mercury created during combustion and hence support further subcategorization.

MACT Floors

MACT floors for these subcategories must account for the inherent variability in mercury emissions from the best performing units and from the use of different types of fuel. There are numerous methods for addressing variability, including a correlation approach offered by UARG and a statistical approach presented by EPA. None of the methods that have been presented at the Working Group meetings fully accounts for all the variability in mercury emissions from a coal-fired plant. The approach offered by UARG addresses fuel variability by using correlations developed by EPRI from the Part III ICR data and then using these correlations and the coal data from 1999 for the best performing units to produce cumulative distributions of emissions for 1999 from those units. MACT floor levels in the following tables look at the performance of the best 12% of the plants tested in each category (or the average of the five best performing units for subcategories with less than 30 units) at the 95^{th} percentile of each cumulative distribution. However, to fully understand the capabilities of the best performing plants, the MACT floor must consider both the fuel variability and variability from other causes such as sampling and monitoring, operational and plant to plant variability.

New Sources

Mercury reductions at all existing coal-fired power plants, including the "best" performing units, result from control equipment that was installed to reduce the emissions of other pollutants. New coal-fired power plants are subject to stringent regulation under a number of Clean Air Act provisions including new source performance standards (NSPS). These requirements cause new plants to install high efficiency particulate removal devices, scrubbing systems and NO_x reduction devices. These technologies are found on existing units that achieve the "best" mercury control. Additional control strategies that specifically address mercury, such as activated carbon injection, are developmental and are not commercially available. As a result, the MACT floor for new units should reflect the mercury control co-benefits of NSPS devices and should not be based on speculation about the potential capability of developmental technologies. The MACT floor for new units should reflect the same categories and be at least as stringent as the MACT floor for existing units and must address the variability in mercury emissions of the best performing units.

Beyond-the-Floor Regulation

Based on information in EPA's Utility and Mercury Studies, it is unlikely that a case can be made for regulation beyond the MACT floor. The remaining mercury emissions from coal-fired power plants will be small and constitute a very small percentage of the overall mercury pool. Hence, further control will have little incremental effect on public health while the costs of achieving additional control will be very high.

Insufficient information has been presented to draw a definitive conclusion on whether regulation is needed beyond the MACT floor. Beyond-the-floor analyses require EPA to look at the cost of achieving

more stringent emission reductions, any non-air quality health and environmental impact of further reductions, and energy requirements. Thus, EPA must complete (1) its IPM runs to assess the cost impacts of regulation, (2) its REMSAD (or equivalent) runs to understand mercury deposition and possible health effects, and (3) an assessment of the energy requirements of additional control. Moreover, because beyond-the-floor control technologies (e.g., activated carbon) are generally not commercially available, EPA must carefully assess the cost and actual availability of those technologies. Only when this work is concluded, and made available for public comment, will EPA be in a position to make a reasoned decision on whether regulation is needed beyond the MACT floor.

Industry does note however that at the May 13, 2002 workgroup meeting, EPA presented some initial IPM modeling results. The modeling process and the assumptions used were discussed in greater detail at a dedicated modeling meeting held on May 30, 2002. During both meetings industry expressed concerns with the accuracies of the modeling and its assumptions. These concerns were documented in presentations and papers provided to the entire workgroup.[8] [9]

Format of Standard and Compliance Monitoring Method

MACT standards should afford plants flexibility in demonstrating compliance with the emission limits. The MACT standard for electric utility steam generating units should specify both an emission rate limit and a percent reduction. Plants should be given the option of demonstrating compliance with either of these limits. The emissions rate limit should be based on heat input and not energy output. Sources already have a powerful incentive to maximize fuel efficiency because fuel costs account for over three quarters of variable production costs. In addition, regulations specifying output-based limits would become overly complex because of the many technical details that would have to be addressed. (Examples include the cogeneration of steam, common systems where multiple boiler feed one or more steam turbines, and the need for appropriate instrumentation.)

The mercury health concerns identified by EPA in its December 2000 listing decision are chronic in nature and not acute. Accordingly, short compliance averaging periods (e.g., hourly or daily) are unnecessary. In addition, the only currently approved method for sampling and analyzing total mercury is EPA's Method 101A—a cumbersome and labor-intensive sampling method. While work is ongoing to develop mercury CEMs, those efforts have yet to produce a validated instrument that can be reasonably maintained. Compliance should be monitored using EPA Method 101A. The Ontario Hydro method could be specified as an alternative compliance method, but the lack of need for speciation data suggests the choice of the simpler Method 101A.

The scheduling and performance of compliance testing should provide utilities sufficient flexibility to assure system reliability and economic dispatch of their systems. Title V permits will include compliance assurance monitoring (CAM) plans for periods between compliance tests. There should be an initial compliance demonstration followed by annual testing for large sources and biennial testing for small sources to demonstrate compliance with mercury MACT limits.

EPA should avoid assuming, as some Working Group members have suggested, that mercury CEMs will be available when compliance is required. EPRI projects indicate that insufficient progress has been

[8] UARG paper "Comments on Selected EPA assumptions Regarding Mercury Control Costs" presented at the June 3, 2002 Utility MACT Workgroup Meeting

[4] "Comments concerning EPA's Initial IPM Modeling For The Utility MACT Workgroup, " by Geers and O'Brien, May 24, 2002

made in the last few years with respect to mercury CEMs achieving the reliability and accuracy needed for compliance monitoring. EPRI and DOE continue to have their automated CEMs projects continuously staffed in order to achieve reasonably reliable results.

Compliance Unit

There is a precedent in other MACTs to require compliance on a facility basis. Therefore, compliance with MACT limits should be on a facility basis rather than on a boiler-by-boiler basis. A facility or unit-by-unit standard should result in the same amount of mercury being emitted by the facility. A facility-based limit would allow some flexibility in unit operation without any adverse impact on total emissions.

Compliance Time

The presumptive three-year compliance period contained in § 112(d) is too short to bring all coal-fired units into compliance with mercury MACT limits. The reasons why a three-year compliance period is too short are numerous, including: the amount of total electric generation affected by this rulemaking (some 325,000 MWe of capacity), the need to provide reliable electric service while mercury control retrofits are ongoing, the time needed to permit, assess, design, procure and install the equipment needed to meet the MACT limit (for example, it will take more than three years to design, procure and install a scrubber, should that be the chosen control option), the availability of control equipment and raw materials (like activated carbon and baghouse bags), the limited supply of construction equipment and skilled craft labor to install mercury control equipment, and the time needed for start-up testing. Additionally, the installation of necessary mercury controls at coal-fired electric generating plants must be integrated with existing and new particulate, sulfur dioxide and nitrogen oxide controls over the next decade. EPA should conduct an analysis of the time needed for all utilities to comply with new MACT limits while maintaining a reliable electric supply in the United States.

Based on the above considerations, and particularly for those facilities that would be required to make major capital expenditures (e.g., installing a scrubber), it will take five years or more to bring all coal-fired electric utility steam generating units into compliance with a mercury MACT limit. The time for compliance could be even longer if more stringent MACT limits than those presented in the attached tables are imposed, as the technologies required for high levels of control are still under development.

Oil-Fired Plants

Similar to the discussion of non-mercury HAPs above, EPA did not identify specific health concerns associated with HAP emissions from oil-fired units when it listed those units under § 112(c). *See* 65 Fed. Reg. 79,830 col. 2 (Dec. 20, 2000). Until EPA identifies and factually supports specific public health concerns associated with the emission of a given HAP, the Agency does not have jurisdiction to regulate that HAP emission from oil-fired units. Further, EPA's limited database of 13 stack tests is inadequate to establish a MACT standard for a source category with 140+ units.

Additional Information from EPA

Industry members of the Working Group agree that additional information from U.S. EPA would facilitate understanding of the complex issues involved in the utility MACT standard-setting process. Additional information that should be provided to the Working Group includes, for example:

1. Further analyses of statistical variability as discussed in the August 8, 2002, memorandum from Jeffery Cole to William Maxwell;
2. Additional analyses of statistical variability taking into account variability reflected in the ICR coal data;

3. IPM modeling results for alternative MACT floors, including projected cost and coal market impacts;
4. REMSAD modeling results for alternative MACT floors; and
5. Analysis of the reliability implications of achieving alternative MACT floors.

Subcategorization Approach 1 - Coal Rank

Subcategory	Stack Limit, lb/10^{12} Btu*	Overall Reduction
Bituminous	2.2	73%
Subbituminous	4.2	31%
Lignite	6.5	47%
FBCs	2.0	91%

Subcategorization Approach 2 - Coal Rank and Process

Subcategory	Stack Limit, lb/10^{12} Btu*	Overall Reduction
Bituminous - Hot	3.7	55%
Bituminous - Sat.	2.2	63%
Bituminous - Wet	3.2	62%
Subbituminous	4.2	31%
Lignite	6.5	47%
FBCs	2.0	91%

* Limits include only a consideration of fuel variability and not other forms of variability.

The Clean Energy Group

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September 6, 2002

Ms. Sally Shaver, Co-Chair
Mr. John Paul, Co-Chair
U.S. EPA Mercury Work Group
Permits/New Source Review/Air Toxics Subcommittee
Clean Air Act Advisory Committee
Washington, D.C.
(via e-mail)

Re: The Clean Energy Group's Position on the Utility MACT Issues

Dear Ms. Shaver and Mr. Paul:

The Clean Energy Group (CEG) appreciates the opportunity to convey its positions to EPA on the issues that the Agency must resolve in setting MACT standards for electric utility steam generating units.

1. HAPs To Be Regulated

Section 112(c)(2) of the Clean Air Act (the Act) requires EPA to establish emission standards for listed categories and subcategories of hazardous air pollutants (HAPs). However, Congress elected to address the electric utility steam generating unit category separately under § 112(n)(1)(A) of the Act. Under this subsection, EPA is authorized to regulate HAP emissions emitted from electric utility steam generating units only if the Agency finds that it is "appropriate and necessary" to do so in order to protect public health. To date, EPA has concluded that such regulation is necessary with respect to mercury emissions from coal-fired units and, potentially, with respect to nickel from oil-fired units. Although EPA has indicated that other pollutants may be cause for concern, it has not made a formal determination that it is "appropriate and necessary" to regulate other HAPs associated with electric utility steam generating units. The CEG members would be pleased to work with the agency in developing the data and analysis required for EPA to reach a decision on these other HAPs, but – in contrast to the determination to regulate mercury – we do not believe that EPA has currently made the case to proceed with regulating other HAPs.

That said, it is also true that many of the emission reduction strategies necessary to reduce mercury emissions from electric utility steam generating units will have beneficial effects in reducing other HAPs from these units. Likewise, emission reduction strategies likely to be employed to meet coming requirements associated with the federal health standard for fine particulates and federal regional haze requirements may also have beneficial effects in reducing utility HAPs. Irrespective of EPA's decision to proceed with a determination on the need to regulate other electric utility HAPs, we encourage the Agency to think about the multi-pollutant effects of any emission reduction requirement imposed upon our industry and incorporate both the benefits and costs of these multipollutant effects in the Agency's regulatory decision making.

During the course of FACA discussions it has been suggested that EPA address the broader category of electric utility HAPs through the use of "surrogates." If EPA decides to regulate other HAPs from coal and oil-fired utility generating units, CEG believes that the Agency should use appropriate "surrogates" for certain classes of HAPs emitted from these units, including metals, acid gases and organic

compounds. It is important that these surrogates be used not only in the MACT determination process, but also in the determination of compliance.

2. Subcategorization

As a general rule, CEG members oppose subcategorization. Although the notion of a regulatory regime that customizes an emission standard for each coal type consumed and technology employed is attractive, we believe that the practical reality of such a regulatory regime would be the worst form of command-and-control regulation. As companies that are active in competitive wholesale energy markets, we cannot tolerate environmental regulations that constrain our flexibility to find the most effective solutions to environmental problems.

Over the past ten years, there has been a tremendous change in our industry as a result of FERC Order 888 and other federal and state initiatives to encourage competition in both wholesale and retail electricity markets. In many jurisdictions, operating costs that were once directly passed on to retail customers through periodically adjusted fuel tariffs incorporated into retail rates are now borne solely by wholesale generation companies, which have no other mechanism for recovering costs other than through the wholesale price of energy determined in a competitive market. Among all companies doing business in these markets, this new dynamic has heightened attention to fuel costs, which account for approximately 75 percent on any generating unit's variable cost. The trend in the industry has been away from long-term fixed price contracts for coal and other fuels toward contracts of a year or two - at most - as companies strive to capture these subtle changes in fuel price while using newly developed financial strategies to hedge against fuel price risk.

At the same time, the compliance flexibility afforded companies through the federal Acid Rain Program and other emission trading programs has encouraged companies to think of fuel supply as a compliance option, and today many companies use various blends of coals to optimize their emission performance. The variability we see in EPA's mercury ICR data, and the role that chlorine content, sulfur content, and other constituents in coal may play in optimizing the effectiveness of various control technology options suggest to us that fuel switching and fuel blending may become even more common in the years ahead. We would oppose any regulation that hampers our ability to quickly optimize performance and cost as necessary to meet the economic demands of the market and the environmental expectations of the public.

Today, in most jurisdictions, we enjoy the ability to shift among fuel supplies and suppliers at will, without the need to seek the time-consuming approval of regulators to switch. Schemes that tie emission rate to fuel type imply a regulator's interest in the fuel being used. We can only imagine the permit conditions surrounding fuel choice that will be written and the reports on fuel use that will be required to provide the regulatory community with comfort that the regulatory obligation is being met. This may be particularly problematic in cases where a unit utilizes more than one fuel category, such as those facilities that burn blends of bituminous and sub-bituminous coal. In sum, from the perspective of the electric utilities a large number of subcategories may significantly limit the flexibility to manage a facility's operational conditions and fuel choice. In the context of a competitive market for supplying electric generation, operational flexibility and fuel choice are of paramount importance. Overly prescriptive emissions standards are not consistent with these objectives.

At the same time, we concede that the design and operation of electric utility steam generating units differ such that certain subcategories should be established before MACT limits are set. CEG believes that one such subcategory should be Fluidized Bed Combustion (FBC) technology because it uses a unique combustion system that operates with cooler combustion temperatures that result in much lower mercury emissions than conventional pulverized coal (PC) boilers. A second subcategory should be PC boilers that burn lignite coal, in recognition of the high mercury content in lignite, and the reality that few boilers in limited geographical areas make use of this low-BTU coal. The third subcategory should be PC boilers

that burn bituminous and/or sub-bituminous coal. The grouping together of bituminous and subbituminous coals will provide the flexibility needed for coal blending and coal switching.

3. MACT Floor

A MACT floor for the three subcategories of existing sources identified above (i.e., FBC, PC boilers burning lignite and PC boilers burning bituminous and/or sub-bituminous coal) must be established through a determination of the "average emission limitation achieved by the best performing 12 percent of the existing sources" for which emission test data is available. The issue is how to determine the average performance of the top 12 percent of existing facilities, considering the variability in emissions at the best performing sources under the worst foreseeable circumstances.

We propose the following approach:

- For existing sources, EPA should first identify the top 12 percent of facilities from the available database.
- The Agency should then identify the primary emissions control technology used by the facilities in that group with emission levels at or better than the average for the group.
- EPA should then look to all sources in the database using the identified control technology, provided the control was well designed and operated.
- Finally, EPA should set the MACT floor such that the floor accounts for operational variability. CEG does not currently have a view as to how best to account for variability, but believes that the approach outlined sets forth a reasonable strategy for establishing a mercury MACT floor for coal-fired power plants that reflects emissions variability under worst-case operating conditions.

With respect to new sources, the Act requires that MACT standards not be less stringent than the control level achieved in practice by the best controlled similar source. CEG suggests that a similar methodology to the one described above for setting the MACT floor for existing coal-fired units be applied to new units. In the case of new sources, however, instead of identifying the control technology used by the best 12 percent of facilities, the emission control technology used by the *best* performing plant would be identified. Then, considering all facilities in the database using that technology, the floor would be set based on some mathematical or statistical measure that reflects inherent operational variability, using, for example, an average, a median or a 95 percent confidence interval value.

4. Beyond-the-Floor Regulation

Beyond-the-floor analyses will require EPA to weigh cost, energy requirements, and non-air quality impacts to determine whether a mercury MACT standard stricter than the floor level is achievable. A number of new technologies for reducing mercury emissions from coal-fired boilers are in various stages of research and development. Some of these new technologies may prove to be attractive control options for mercury, based on the results of studies performed thus far. For example, activated carbon injection is a potentially cost-effective technology for achieving high levels of mercury reduction from coal-fired electric utility generating units.

5. Format of Standard

As indicated earlier, MACT standards should provide facilities with operational flexibility in demonstrating compliance with the standards, including flexibility with regard to fuel choice. One option for the format of the MACT standard for electric utility steam generating units is an emission rate; another is an emission control efficiency level. One advantage of an emission rate approach as opposed to an emission control efficiency approach is that the former gives a greater degree of certainty in terms of emissions. In addition, an emission rate standard would be administratively simple to implement. On the

other hand, if a facility installs MACT controls, the public will expect it to operate at optimal performance efficiency even if the current coal stock is low in mercury content. A control efficiency standard could be a better alternative for the utilities if there is a wide variability in the mercury content of the coal purchased. A third option is a combined standard that allows the opportunity to meet either the emission rate or the control efficiency. Without specifying the appropriate rate or control efficiency, CEG supports the either/or approach, since it is most responsive to the need for operational flexibility in achieving compliance. Additionally, CEG generally supports output-based standards.

With respect to the averaging time for a mercury MACT standard, CEG recommends that a long-term (i.e., annual) averaging time be adopted. The potential health concerns identified by EPA in its December 2000 listing decision for mercury and in the extensive studies on which that decision is based are believed to arise from the long-term accumulation of mercury in the environment; thus, there is no demonstrated need for a short-term averaging period.

6. Compliance Monitoring Method

The ability to comply with a long-term standard typically involves the use of a continuous emission monitoring (CEM) system. Currently, work is on-going to develop mercury CEMs. To date, however, mercury CEMs have not been proven to have the necessary accuracy and reliability to be used as a compliance tool. Until the CEM accuracy and reliability issue is resolved to EPA's satisfaction, compliance should be monitored using EPA Method 101A for total mercury. This testing should be performed on an annual basis in conjunction with annual RATA (relative accuracy test audit) testing. To ensure compliance prior to the availability of mercury CEMs, in addition to annual testing using method 101A, parametric monitoring of pollution control equipment could be required on a reasonably frequent basis. For example, appropriate parametric measures such as scrubber slurry rates (gpm) for scrubbed units or, for units with ESPs, appropriate amp rate, spark rate and/or rapping rate could be considered. There should be an initial compliance demonstration using Method 101A, as a means to calibrate the CEM, followed by additional testing that would become less frequent as the accuracy of the CEM is validated and the transition to this monitoring method occurs.

7. The Compliance Unit

Compliance with MACT limits should be on a *facility* basis rather than on a boiler-by-boiler basis. In many cases, the emission control equipment handles multiple units at a facility. A facility-based limit would allow some flexibility in unit operation without any adverse impact on total emissions.

8. Oil-Fired Units (Nickel)

If EPA finds it appropriate and necessary to regulate nickel from oil-fired units, we recommend, consistent with the views put forth above, that MACT standards provide facilities with operational flexibility for compliance, including flexibility with regard to fuel choice. In that regard, we recommend a rate-based standard, regardless of fuel burned. In many cases, oil-burning units have the ability to burn natural gas. Use of natural gas as a means to comply with a rate-based MACT standard will increase operational flexibility while decreasing the amount of nickel emitted.

As mentioned above with respect to the averaging time for a mercury MACT standard, CEG recommends a long-term (i.e., annual) averaging time for any nickel standard. Possible health effects from nickel, as from mercury, are believed to arise from the long-term accumulation of nickel in the environment, thus obviating the need for a short-term averaging period.

That said, CEG shares the views of other stakeholders that the database for nickel raises serious concerns, both because of its small size and because of the apparent absence of discernable trends.

Sincerely,

Robert LaCount

for The Clean Energy Group and
PG&E National Energy Group

INSTITUTE OF CLEAN AIR COMPANIES

August 27, 2002

Via Email

Ms. Sally Shaver, Co-Chair
Mr. John Paul, Co-Chair
U.S. EPA Mercury Work Group
Permits/New Source Review/Air Toxics Subcommittee
Clean Air Act Advisory Committee
Washington, D.C.

Re: ICAC Recommendations for Coal-Fired Plants

Dear Sally and John:

The following recommendations for coal-fired facilities assume facility averaging. They are not based on the "average of the best-performing 12%" of facilities in each subcategory. Rather, they are based on technology available today, and consider the goals of flexibility and cost-effective mercury reductions. Although this basis differs from the statutory MACT analysis, the issue of "achievability" and cost-effective compliance on a wide-spread basis is one the Mercury MACT Work Group has spent a lot of time on, and is of course central to the compliance efforts of affected sources. Thus, we feel these opinions will be helpful.

1. There should be four subcategories: bituminous, sub-bituminous, lignite, and fluidized bed combustors (FBC). Existing control technologies commercially available today exhibit considerably different performance characteristics for the three primary coals, mainly related to the differing characteristics of the mercury species generated. Future control technology development is expected to overcome these differences and permit a higher, more broadly applicable standard.

2. Sources should be allowed to meet either a percent reduction (percent mercury removed as difference between mercury in coal and mercury emitted from stack) or an emission rate (stack concentration in lb/Tbtu). An alternative standard allows the greatest opportunity to select among control options to achieve the most cost-effective compliance, and also does the most to accommodate variability in coals and control technology performance.

3. The emission rate should be input-based (stack concentration in lb/TBTU) for reasons of ease of measurement and comparability with other common emission limits (particulate, SO_2, NO_x).

4. The standard for bituminous should be 90% removal or a comparable emission rate. The standard for sub-bituminous should be 70% removal or a comparable emission rate. These limits can be achieved. We make no recommendations for lignite or FBC.

5. The averaging period should be 30 days on the assumption (which we believe is valid) that CEMS will be available before they are needed for use with this rulemaking. A 30-day averaging period accommodates variability, e.g., coal type, plant operation. If, however, manual measurements are needed, then we support an averaging time on the order of a year due to the needed turnaround time and to accommodate the number of samples that might be recognized as constituting an accurate representation of a given plant's performance.

6. For new sources, current information and experience supports best achievable control technology yielding a mercury reduction percentage of 90%.

7. If EPA decides to regulate non-mercury hazardous air pollutants (HAPS), then $PM_{2.5}$ should be used as a surrogate for metal HAPS (e.g., cadmium, chromium, and lead). (N.B. some air toxics, especially selenium and arsenic, could be in the vapor phase). SO_2 should be used as a surrogate for HCl and HF removal, provided a calcium-based scrubber is used for SO_2 removal. Removal of these surrogates correlates well with the air toxics indicated.

ICAC appreciates the opportunity to participate on the Work Group and looks forward to assisting the U.S. EPA as development of this rule progresses.

Sincerely,

Jeffrey C. Smith

October 22, 2002

STATE AND LOCAL AIR POLLUTION CONTROL OFFICIALS RECOMMENDATIONS FOR UTILITY MACT STANDARDS (DISCUSSED AT SEPTEMBER 9, 2002 AND OCTOBER 17, 2002 UTILITY MACT WORKGROUP MEETINGS AND AMENDED OCTOBER 22, 2002)

PRAVEEN AMAR, NESCAUM

WILLIAM O'SULLIVAN, NEW JERSEY

JOHN PAUL, DAYTON, OHIO

A. BACKGROUND AND INTRODUCTION

The state and local agency representatives on this working group would like to thank EPA for convening the group and providing the opportunity to meet and discuss this important MACT standard. We sincerely appreciate the time, effort, and resources that EPA has devoted to this process. We would also like to thank our fellow working group members and acknowledge the dedication of many to the process. Those that participated in the "mini" work groups to address specific issues, and those that authored and presented various special reports throughout the process are deserving of special thanks. We believe this has been a useful process and we trust EPA feels the time spent in our discussions will be helpful in its writing of the Utility MACT standard.

State and local agency participation in the working group was somewhat limited by the size of the committee. Some Western states have recently indicated an interest in evaluating the utility MACT workgroup recommendations and may present alternative or supplemental recommendations. We recommend that EPA consider this Western States submission, as well as any other state or local agency opinions which may be submitted on this topic. Those of us that have been on the working group have taken steps to incorporate STAPPA/ALAPCO membership positions into our report,and we have communicated with our membership on the process throughout the past year.

Regarding the incorporation of STAPPA/ALAPCO positions, cited below from STAPPA/ALAPCO documents are three references to non-mercury HAPs from utility boilers.

On June 5, 1998, STAPPA toxics committee chair Bliss Higgins of Louisiana sent a letter to EPA regarding the U.S. Environmental Protection Agency's (EPA) proposed Information Collection Request (ICR) related to coal-fired electric utilities proposed in the Federal Register on April 9, 1998 (63 FR 17406). In that letter a number of recommendations were made, including one that EPA "should seriously consider also requiring the analysis of other chemicals of concern in the coal, ash, and flue gases. Most of the cost of stack testing is related to the labor of obtaining the samples and the supporting measurements, not the analysis of the mercury. To add the analysis of arsenic and other chemicals of concern would add insignificantly to the overall cost. The collection of these samples represents an opportunity for obtaining statistically representative data on other chemicals very cost-effectively."

On June 12, 2000 STAPPA/ALAPCO sent a letter to Administrator Carol Browner regarding the pending regulatory determination to regulate hazardous air pollutants from electric utility steam generating units (Public Docket No. A92-55). Quoting from that letter, "STAPPA and ALAPCO believe a regulation is warranted and strongly recommend that the U.S. Environmental Protection Agency (EPA) establish standards to control emissions of HAPs from electric utilities, including, but not limited to, mercury. Other pollutants you may wish to consider addressing include dioxin, arsenic, nickel and acid gases."

In May, 2002 the STAPPA/ALAPCO membership adopted a set of "Principles for a Multi-Pollutant Strategy for Power Plants." Quoting from that document, "Power plants also emit substantial quantities of hazardous air pollutants. EPA's Study of Hazardous Air Pollutant Emissions from Electric Utility Generating Units – Final Report to Congress *(1998) concludes that electric utility steam generating units emit 67 hazardous air pollutants (HAPs), including mercury, arsenic, nickel, hydrogen chloride and dioxins. In fact, electric generating units are the major emitter of hydrochloric acid, which is the HAP emitted in the greatest quantity in the U.S… Given the significant contribution of power plant emissions to public health and environmental problems in the U.S., the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) believe that, if properly structured, a comprehensive, integrated control strategy for electric utilities is an appropriate approach that will offer multiple important benefits."*

Clearly, it can be seen in these documents that state and local agencies desire that EPA consider carefully the control of all HAPs emitted by utilities.

In addition to the written documentation on this issue, we also considered an electric utilities MACT project stakeholder meeting EPA held with 17 state and local representatives on March 12, 2001. At that meeting, the State/local/tribal representatives indicated that their preferred outcome would be a rule that provided for:

– minimal subcategorization of the industry;

– the most stringent levels of mercury control possible;

– a multi-pollutant approach;

– limited flexibility by the sources so as to enhance the States ability to implement the standards;

– early compliance encouraged through the use of incentives; and

– no trading of toxics.

The recommendations included in this report reflect the historical positions taken by STAPPA/ALAPCO, our personal knowledge, and our observations gleaned from the working group meetings. Our general views were presented to the STAPPA/ALAPCO Board of Directors on July 27th and to the STAPPA/ALAPCO toxics committee on September 6th. Also, an overview of our recommendations was provided to the STAPPA/ALAPCO membership on September 29, 2002, along with copies of the presentation for the September 9 workgroup meeting. The authors of this paper are Praveen Amar (NESCAUM), Bill O'Sullivan (N.J.) and John Paul (Dayton, Ohio). This paper does not reflect the views of the Hg MACT workgroup member, Dave Schanbacher (Texas) who has provided separate recommendations.

B. SUMMARY

A good summary of the recommendations contained in this white paper are included in the Workgroup's Final Report to the CAAAC. Within that report the States and Local's column in the Table entitled "Summary of Stakeholder's Positions on Key Issues" gives a thumbnail sketch of recommendations in this white paper.

C. COAL MACT RECOMMENDATIONS

1. COAL HAPS TO BE REGULATED

In addition to mercury, which has been identified as the hazardous air pollutant (HAP) of "greatest potential concern," many other HAPs are emitted by coal-fired power plants in significant amounts and also are of potential concern. In EPA's electric utility study, specific concerns were identified for arsenic, dioxin, and radionuclides. Additionally, coal-fired utilities are the largest source category of hydrochloric acid and hydrofluoric acid emissions in the US. Coal-fired utilities are also the largest, or among the largest, emitters of many other HAPs.

On December 2000, the EPA made the "Regulatory Finding" that regulation of HAP emissions from coal-fired and oil-fired electric steam generating units under section 112 is appropriate and necessary (Federal Register Volume 65, p. 79825-79831). The "Regulatory Finding" stated the following: "With regard to the other HAPs, arsenic and a few other metals (e.g., chromium, nickel, cadmium) are of potential concern for carcinogenic effects. Although the results of the risk assessment indicate that cancer

risks are not high, they are not low enough to eliminate those metals as a potential concern for public health. Dioxins, hydrogen chloride, and hydrogen fluoride are three additional HAP that are of potential concern and may be evaluated further during the regulatory development process. The other HAPs studied in the risk assessment do not appear to be a concern for public health based on the available information. However, because of data gaps and uncertainties, it is possible that future data collection efforts or analyses may identify other HAPs of potential concern."

This same "Regulatory Finding" estimated HAP emissions from coal as follows:

Arsenic	61 tons/year
Chromium	73 tons/year
Lead	75 tons/year
Manganese	164 tons/year
Mercury	46 tons/year
Hydrogen chloride	143,000 tons/year
Hydrogen fluoride	19,500 tons/year

In keeping with precedents to regulate all significant HAPs when a MACT rule is developed for a source category, EPA's MACT rules for coal-fired utilities must include HAP emission limits which address the majority of HAPs emitted by coal-fired power plants. The technology-based MACT program under the Clean Air Act (CAA)is designed to ensure that all significant sources of HAPs implement controls to reduce emissions to the maximum extent achievable. High stacks, which are common to coal-fired power plants, should not be relied upon to limit high local risk from HAPs and are not an acceptable substitute for MACT. Power plants contribute to the nationwide soup of toxic air pollutants, which need to be minimized consistent with the MACT mandate of the Clean Air Act.

a. Coal HAP Groupings

Coal HAPs can be grouped by chemical and physical properties relevant to air pollution control measures for the purpose of developing MACT limits. The following groups of HAPs from coal-fired power plants cover most of the HAPs emitted from coal-fired power plants.

i. Mercury - Mercury and its compounds require a separate grouping for MACT limitation because of the unique chemical and physical properties of mercury with respect to air pollution control.

ii. Fine-particulate HAPs – Fine-particulate HAPs include the heavy metals, including but not limited to arsenic, cadmium, and chromium; radionuclides; and polycyclic organic matter (POM). Some of the adverse health effects of fine particulates (PM 2.5) are certain to be related to these HAPs, which are components of PM 2.5 in the ambient air. For the purpose of MACT standards for heavy metals, it may be appropriate to have a subgroup of HAP particulates which are semi-volatile at temperatures present in boilers.

iii. Acid-Gas HAPs - These are primarily hydrochloric acid (HCl) and hydrofluoric acid (HF). These acid-gas HAPs are the bulk of the 784 million pounds of HAP emissions reported by utilities in the 1998 Toxic Release Inventory (TRI) and account for over 1/3 of the entire TRI inventory.

iv. Organic HAPs – Coal-fired power plants are a major emitter of polycyclic organic matter (POM) and other products of incomplete combustion (PICs). Dioxin is a PIC of potential concern where combustion is inefficient.

b. Surrogates

One practical way to address the large number of non-mercury HAPs emitted by coal-fired boilers is through the use of surrogates. Surrogates may be non-HAPs (for example, CO or PM2.5 mass) or a single HAP that is representative of many HAPs. This approach is useful to efficiently and effectively address the majority of HAPs emitted by coal-fired power plants.

A surrogate is useful if efforts to minimize the surrogate also result in the minimization of a group of HAPs which have common air pollution control properties. Under section 112(d) of the CAA, the Administrator is directed to use emission information to set MACT limits. The Administrator is not limited to using only HAP emission information, and it is reasonable to conclude the Administrator may also use information on other emissions which are associated with HAP emissions. A surrogate is particularly useful if it can be continuously monitored and serve as a continuous indicator of HAP emissions.

A representative HAP is a HAP within a group of HAPs where its emission minimization indicates the emissions of other HAPs in the group are also being minimized.

Using the above (C.1.a.) HAP groupings for coal- fired power plants, the following surrogates or representative HAPs are reasonable choices to regulate the majority of HAPs from coal-fired power plants:

i. Fine-particulate HAPs - Fine particulate mass emissions may be an adequate surrogate. Alternatively, representative HAPs such as arsenic (semi-volatile) and chromium (non-volatile) could have MACT limits. POM control is best achieved by good combustion, and consequently, the CO surrogate discussed in C.1.b.iii. below is most relevant to POM.

ii. Acid-Gas HAPs - Hydrochloric acid is the HAP emitted in greatest amounts from coal-fired power plants. An HCl limit may be adequate for all acid-gas HAPs, but there are insufficient data on HF emissions to confirm that an HCl limit would be adequate for the control of HF. Additional testing of HF should be required to show that HCl minimization also minimizes HF emissions, or that a separate MACT standard for HF may be more appropriate. Alternatively, sulfur dioxide limits may be an appropriate surrogate for acid-gas HAPs since scrubbers used to control SO2 have been shown to control HCl at even higher efficiencies. Using SO2 as a surrogate for acid-gas HAPs has the added advantage of continuous emission monitoring for SO2.

iii. Organic HAPs - These HAPs are products of incomplete combustion (PICs), which can be largely avoided with good combustion control. The traditional and most common indicator of good combustion is a low concentration of carbon monoxide (CO), which is generally monitored continuously in large fossil-fuel-fired boilers. Hence, a reasonable surrogate for limiting organic HAP emissions is setting a MACT limit for carbon monoxide. Additional testing is needed to confirm that the CO MACT limit results in negligible amounts of all organic HAP emissions. Special emphasis needs to be placed during this testing on evaluating the relationship between combustion temperatures and the concentrations of CO and organic HAPs.

2. COAL SUBCATEGORIES

Depending on the design of the MACT mercury standard for coal-fired power plants, subcategorization may not be necessary or useful, especially subcategorization based on the use of bituminous and subbituminous coals. However, a subcategory for lignite may be acceptable for reasons described below.

a. Lignite

Lignite is burned in relatively few plants, and therefore, such subcategorization has relatively low impact on overall mercury emissions from coal-fired power plants as a group. If separate MACT limits are set for lignite, the limits should not be so different from MACT limits for bituminous/subbituminous coals that existing lignite fired boilers remain uncontrolled for mercury or the construction of new high mercury emitting lignite plants is encouraged over much lower emitting power plants burning other fuels.

b. Bituminous and Subbituminous

The majority of the coal-fired plants in the USA are fired with bituminous or subbituminous coals, or a combination of these. The increasing use of bituminous and subbituminous blends argues against different standards for each of these coals. Also, the use of an emission rate standard as the primary limit for both bituminous and subbituminous coal can address the different properties of these coals. The generally lower mercury content of subbituminous coal is offset by the greater proportion of elemental mercury emitted, as compared to bituminous coal. These properties tend to offset each other with respect to resultant mercury emissions after control. Also, EPA analysis of potential floors for bituminous and subbituminous coal showed little difference. The minor potential difference in limits and the difficulty in applying separate standards to mixtures of bituminous and subbituminous coal makes it unnecessary to differentiate between these two most commonly used coals. Therefore, we recommend that a single standard should be developed for both bituminous and subbituminous coal. We do note that Texas supported a separate subcategory for subbituminous coal, and some Western states are considering this issue further.

c. Small Power Plants

EPA should not subcategorize or exempt coal-fired power plants based on the size of the power plant or units. Relative to other sources of HAP emissions, even the smallest coal-fired power plants are a significant source of HAP emissions.

d. Stack Gas Parameters

EPA should not subcategorize based on flue gas temperature or moisture content related to the air pollution control system in place. This may inappropriately exempt currently poorly controlled power plants from any further HAP reductions or inappropriately limit the extent and the effect of MACT application.

e. FBC and IGCC

Fluidized bed combustors (FBCs) do not need a separate category because their emissions characteristics are similar to either bituminous/subbituminous coals or lignite coal for other types of coal combustors. Integrated gasification combined cycle (IGCC) electric generating units might also be included with "all other coal fired units." However, these units were not thoroughly evaluated by the working group, and we have no specific recommendation on whether or not they be a separate subcategory.

3. MERCURY LIMITS FOR COAL COMBUSTION

a. Format of Hg MACT Limit for Coal

The primary MACT emission limit should be based on useful energy output to reward higher efficiency plants and encourage higher efficiency (and lower emissions) in new and modified power plants. For example, emission limits in units of milligrams per MWhr are appropriate for an output-based standard.

Conversion of useful heat output from a cogeneration facility to MWhr units would be necessary to provide credit for more efficient energy use from such facilities.

A percentage reduction component to the emission limit can be added to the primary emission rate limit to form a "combination standard." Precedents for combination standards include the mercury limits for municipal solid waste incinerators and the NSPS for sulfur dioxide from coal-fired power plants. In the case of mercury from coal-fired power plants, the percent reduction component of a combination standard could provide a reasonable alternative limit for those coal-fired units that burn high mercury content coal.

The percent reduction option, however, needs to be developed in such a manner that it does not result in a less stringent alternative for "average" mercury content coal. Rather, the output based emission limit standard should be applicable to most units because emission limits based on useful output are economically and environmentally preferable to a percent reduction limit. Also, an important benefit of an emission rate standard is the relative ease of determining compliance since it does not rely on simultaneous testing of "before and after" emission controls. The corollary of this, however, is that one must develop an effective compliance strategy for those units that choose the percentage reduction option since it requires the clear determination of baseline, e.g. the determination of "what" in the "percentage reduction of WHAT". Rather than attempt to simultaneously test the mercury in the coal being burned, it would be more appropriate to test the outlet of the boiler, prior to the air pollution control system, to obtain the uncontrolled mercury emission rate for determining the percent emission reduction.

The format of the combination standard could be "X mg of mercury per MWhr or Y percentage reduction of mercury, whichever is less stringent. " An alternative, but less desirable, combination standard could be input based in the form of "A lbs per trillion Btu or B percentage reduction of mercury, whichever is less stringent."

As discussed in C.3.b. below, when a combination standard is developed, the specific numerical values of emission rates and percentage reduction need to be chosen in such a way that they result in a national, controlled mercury emission level (in TPY) that is as stringent as the ones that will be achieved through MACT floor levels determined for a percentage reduction standard alone or an emission rate standard alone. Appendix 3 estimates the national tons per year of resultant mercury emissions for various combinations of emission rates and percentage reductions. Appendix 4 is the same as Appendix 3 but focuses on mercury emission rate limits below 1.00 lb per trillion Btu. These graphs demonstrate a combination standard achieves an equivalent degree of emission reductions as a standard based on percent reduction alone or emission rate alone.

b. Floor for Hg MACT Limit for Coal

This section relates to setting a mercury MACT limit for all coal-fired power plants without subcategorization. See the discussion in section 2 above for potential subcategories, which could result in different limits for lignite. If higher limits are set for lignite, then the floor for bituminous/subbituminous may be lower than indicated below.

The floor for mercury must be no higher than the mercury emission levels achieved by the best performing 12% of the power plants for which there are emission data. Emission data should consider all the estimated HAP emission rates that EPA derived from application of stack test and plant specific data to the approximately 450 coal-fired power plants in the USA.

The floor level depends on the format of the standard discussed in C.3.a. above. The recommended combination standard (output emission rate level or percent reduction level, whichever is less stringent) should be evaluated holistically and not rely on separate evaluations of the "12% best emission rate performers" or the "12% best percent reduction performers." Instead, evaluation of each of these two parameters can be done to set boundaries for each of the two parameters for the combination standard.

The "12% best combination standard" logically results in a lower mercury emission rate component and a higher percent reduction component than the best 12% of each of these levels when evaluated individually.

Mercury emission rate estimates can be evaluated for 411 out of 452 coal-fired power plants in the US EPA Utility Air Toxics Study data. USEPA plant by plant emissions estimates were obtained from the wpd file, "plant by plant emissions estimates", downloaded from www.epa.gov/ttn/atw/combust/utiltox/utoxpg.html, 3/26/02. These data were compared with data on mercury concentrations in coal purchased by power plants obtained from the 1st, 2nd, 3rd, and 4th quarter coal data, downloaded from the same source. There were 411 plants for which both coal data and EPA plant emissions estimates existed for mercury. Subsequent analyses of emissions rates and percentage reductions were limited to these 411 plants.

Appendix 1 groups power plants by levels of emissions based on heat input, in units of lbs of mercury emitted per trillion Btu. Output rates can be derived by approximating the heat rate at 10,000 Btu per KWhr. This graph indicates that approximately 50 of the 411 plants in the database have emissions of less than 1 lb per trillion Btu. These 50 plants constitute just over 12% of the 411 plants. Hence, the baseline for an input heat rate based mercury MACT emission limit where there are no subcategories should be no higher than 1 lb per trillion Btu, and should be lower when the average of the best 12% is considered.

Appendix 2 is a similar evaluation of "percentage reduction" estimates in the US EPA Utility Air Toxics Study data. The percentage reductions are based on the emissions of mercury estimated from the stacks compared to the mercury in the coal. Appendix 2 includes 411 plants for which removal efficiency data could be estimated. This evaluation of data indicates that approximately 55 of the 411 plants had mercury removal efficiencies of greater than 80%. 55 out of 411 is about 13.4% of the plants. Therefore, a MACT floor based solely on the percentage control efficiency of mercury removal from the coal being burned should be no lower than 80%, and should be higher than 80% when the average of the "best 12%" is considered.

A combined MACT limit in terms of lbs per trillion Btu or percentage reduction should be more stringent than combining the best 12% derived from the components individually. Therefore, a combined limit floor should have components which require an emission rate limit more stringent than 1 lb. per trillion Btu and a percentage reduction greater than 80% if based on heat input.

As discussed in C.3.a. above, the preferable standard is output based. Conversion to an output based limit using a heat rate of 10,000 Btu per kWh gives an upper floor level of 4.54 mg/MWhr. Increasing the stringency of both the efficiency and the output based limit, to account for the ability to choose the less stringent component of a combined standard, gives a MACT floor of about "4.00 mg/MWhr or 85 percent reduction (0.0800 lb per trillion Btu or 85%). This standard would result in about 10.5 TPY of national mercury emissions from coal-fired power plants, based on data from USEPA's Utility Air Toxics Study. (See Appendix 4, which evaluates combination standards using this data.)

Also, as discussed in 3.a. above, the purpose of including a percentage reduction component in a combined standard is to provide a "safety valve" for coals with very high mercury content, rather than being a less stringent choice for "average mercury" content coal. Hence, the percentage reduction component should be reflective of the best removal efficiencies achieved with the best control systems possible. While control efficiencies of up to about 98% have been demonstrated for some plants, the efficiency component would more reasonably be in the range of 90 to 95%.

Choosing a higher control efficiency component allows a higher emission rate component, while still maintaining equivalent national emission reductions.

Following are examples of "combination standard" which would result in estimated USA mercury emissions between 8.5 and 11.5 tons per year. Similar alternatives can be developed for the MACT floor recommendation of about 7 tons per year.

Combination Standard Floor	Hg (TPY)
1.0 or 85%	11.5
1.1 or 90%	11
0.9 or 85%	11
0.8 or 85%	10.5
1.0 or 90%	10
0.9 or 90%	9.0
0.8 or 90%	8.5

Based on discussion at the September 9, 2002, Utility MACT Working Group meeting, we reevaluated the recommendations made in our white paper for that meeting. The September 9, 2002, white paper used the "worst" of the "Best 12 percent" of the test data and extrapolated the 80 tests to 411 plants to determine a generous MACT floor which also considered variability beyond the averaging procedure specified in section 112(d). We have reevaluated the MACT floor based on the literal reading of section 112(d) which specifies the "average emission limitation" for the best 12 percent of the sources for which there is emission information. We have averaged the test results of the "Best 12 percent" for the 80 ICR stack tests, as well as the extrapolated emissions information for 411 plants.

Following are results of this reevaluation. It compares the average performance of the best 12 percent in two ways, with the test data (80 tests), as well as with the extrapolated test data (411 plants), based on EPA's estimates of emissions from each of these plants. The best "percent reductions" were determined independently of the best "rate-based limits," and do not represent stand-alone alternative limits to a "combined rate or percent reduction standard."

1. *Average of best 12 percent of 411 plants – 0.3 lb/Tbtu (1.5 mg/MWh); 94 percent control.*

2. *Average of best 12 percent of 80 tests – 0.2 lb/Tbtu (1.0 mg/MWh); 93 percent control.*

We believe that consideration of the variability of the data is appropriate. Although our primary recommendation is to deal with variability by averaging quarterly tests in a year (3 test runs per quarter), adding a compliance margin to the average of the best 12 percent of the actual emission level is also reasonable when determining an appropriate emission limitation. We recommend a factor of 2 times the actual tested average as a reasonable compliance margin when an annual average of quarterly tests is used or a 30-day or greater average of continuous emission monitor (CEM) data is used.

We also recommend that a percent reduction alternative be part of the MACT standard to enable any plant the opportunity to continue to burn the same coal if best available control technology (BACT) is employed. Our estimated range for the percent reduction alternative for bituminous/subbituminous coal is 90 to 95 percent. This range is consistent with the average control efficiencies for the best 12 percent of the test data (93 percent control) and the 411-plant evaluation (94 percent control) without activated carbon injection. Hence, this MACT floor does not depend on the use of activated carbon injection (ACI). Rather, ACI and baghouse control are available as an option to comply with the 90 percent alternative limit. A 90 percent alternative limit is recommended to provide a reasonable assurance of compliance if the percent reduction option is chosen.

Our recommendation for a MACT floor for bituminous and subbituminous coals would be 0.4 lb/Tbtu (2 mg/MWh) or 90 percent control, based on the data from the 80 tests. The 0.2 lb/Tbtu emisison limit (1 mg/MWh) would be a literal reading of section 112(d) if applied to the test data with no further

consideration of variability. The 0.4 lb/Tbtu emission limit includes the factor of 2 compliance margin to further address variability beyond the averaging of 12 tests or long-term CEM data.

We also believe that consideration of information on the total population of coal plants in the US is appropriate. If the extrapolation of the average tests data to the 411 coal plants is used to develop the MACT floor, the MACT standard would be 0.6 lb/Tbtu (3 mg/MWh) or 90 percent control based on the same consideration of variability. Looking at Appendix 4 we conclude that when a 90 percent alternative limit is used, the 0.6 lb/Tbtu rate-based option is the preferred rate level for a combination standard. This is because there is little difference in the overall amount of mercury control between these two combination standards, and the 0.6 or 90% standard provides more flexibility and an higher incentive to use the simpler component (e.g. rate based component) of the combination standard. In conclusion, we recommend that the MACT floor be in the range of 0.40 to 0.60 lb/Tbtu (2 to 3 mg/MWh) or 90% control, with a preference for the 0.60 lb/Tbtu level.

c. Beyond-the-Floor for Mercury from Coal

Beyond-the-floor refers to setting a MACT standard which is more stringent than the floor level (best 12%). EPA should establish "beyond-the-floor" limits for mercury emissions from coal by considering:

i. Emissions data for control of the criteria pollutants (particulates, sulfur dioxide, volatile organic substances, nitrogen oxides, and carbon monoxide), including BACT/LAER determinations, as discussed in section E.3;

ii. The additional mercury emissions reduction benefits of control systems which minimize other HAPs, including fine-particulate HAPs and acid-gas HAPs;

iii. Technology transfer of air pollution control technologies used on other mercury source categories, especially carbon injection and fabric-filter control of municipal solid waste incinerators;

iv. Pilot and full scale demonstration programs for mercury control technology for coal-fired power plants, especially carbon injection along with fabric-filter control;

v. The well-documented history of the role of environmental regulation as a strong driver of technology innovation and implementation for the electricity-generating sector in the US. (For example, see the September 2000 NESCAUM report "Environmental Regulation and Technology Innovation: Controlling Mercury Emissions from Coal-Fired Boilers"). The major advances in the development of control technologies and substantial reductions in costs will occur only after (and not before) EPA adopts performance-based emission standards and clear time schedules; and

vi. The fact that coal combustion is the single greatest source category for mercury and other HAP emissions in the US.

In going beyond the floor, EPA should not put significant emphasis on estimates of control technology costs, which will certainly decrease significantly in the future as a result of technology innovation that will occur in response to well- defined environmental regulation. Instead, EPA needs to put more emphasis on the latest information on the technical feasibility of meeting the maximum achievable emission reductions. This includes the recent results from full-scale field tests completed at the three power plants in Alabama, Wisconsin, and Massachusetts.

d. Averaging Method and Monitoring Requirements for Hg from Coal

Selection of reasonable averaging time periods is appropriate and necessary to address the issue of variability of mercury concentrations in coal and flue streams. Until such time as mercury continuous emission monitors(CEMs) are proven(which appears likely), annual averaging of quarterly emission rates, determined by averaging 3 test runs per quarter, is appropriate. Compliance determination with a percent reduction limit is usually based on simultaneous boiler outlet and stack testing, but simultaneous testing of coal and stack may be feasible with representative testing of the coal as fired. This periodic testing should be replaced with monthly or annual averages of CEM data when Hg CEMs become commercially available. Averages might be weighted by the amount of coal burned or electricity generated. The CEM averaging could be a 12-month moving average, calculated each month, or a monthly average. The interim quarterly periodic testing should be a 12-month moving average, calculated each quarter. EPA method 29 is most appropriate in order to obtain data on mercury and other metals.

e. Types of Mercury Control Expected

The mercury MACT standard for coal-fired power plants should reflect the following best control measures:

i. Fabric filtration

ii. Wet or dry scrubbing

iii. Activated carbon injection

We note that a large electrostatic precipitator (ESP) may approach a fabric filter in control efficiency for TSPs or total particulates (99 to 99.7% for cold-side ESPs, 99 to 99.9% for fabric filters), but is inferior to a fabric filter for both the fine particulate control (less than PM2.5, the fraction where most of the trace metal HAPs are expected to accumulate) and mercury control. For example, EPA ORD's April 2002 report, "Control of Mercury Emissions from Coal-Fired Electric Utility Boilers" notes that cold-side ESPs are only 80 to 95% efficient in controlling PM less than 0.3 micron compared to 99 to 99.8% control efficiency of baghouses for the same size fraction. Also, experience with ESPs and fabric filters on MSW incinerators has shown fabric filters to have about 5 times lower mercury emissions with the same carbon injection rate. In some cases large ESPs, along with scrubbers and carbon injection, may result in low mercury emissions and achieve the eventual MACT standard, but the MACT standard should not be designed with the intent of not requiring existing ESPs to be supplemented with or replaced by fabric filters. For plants with existing ESPs, the most cost-effective mercury control measure to achieve significant mercury reductions is likely to be the addition of a polishing fabric filter (similar to EPRI's COHPAC system) with carbon injection.

Scrubbers can be wet or wet/dry. They will assist with minimizing mercury emissions, as well as provide effective control of acid-gas HAPs. In addition, EPA should evaluate the most recent data on the effectiveness of the joint SCR-FGD/SDA systems in controlling emissions for units burning either bituminous or subbituminous coals.

Activated carbon injection with fabric-filter control should be able to consistently reduce mercury emissions by over 90%. For MSW incinerators with baghouses, initial testing of activated carbon injection showed over 90% mercury control of the flue gas, and the technology subsequently proved out at over 98% control. While use of activated carbon for control of Hg from coal is also expected to show improvement as the technology is applied, 98% is not likely to be routinely achieved because of lower mercury inlet concentrations in coal. The 90% or better expected control efficiency is based on pilot and full scale demonstration tests indicating that 90% control is reachable and the expected refinement of the technology as it is applied to coal.

f. New Coal Electric Generating Units

An emission rate limit for new coal-fired boilers should be set to reflect the lowest mercury limits being met, and the presumptive MACT limit should be based on the application of the following technologies: fabric filters, activated carbon injection and wet/dry scrubbing. The mercury limit for new units should be near the lower end of the range recommended in C.3.b. above.

4. RECOMMENDATIONS ON OTHER HAPS FROM COAL

See section C above on the coal HAPs to be regulated. This section will address MACT emission limits for these groups of HAPs, other than mercury.

a. Floors and "Beyond-the-Floors" for Other HAPs from Coal

i. Particulate HAPs - We believe there is sufficient information to calculate floors for individual heavy metal HAPs. However, use of a fine particulate (PM2.5) emission mass limit as a surrogate for particulate HAPs emitted by coal combustion may eliminate the need for floor calculations for individual heavy metal HAPs, other than mercury. If there are sufficient data, EPA might use the best 12% of the criteria pollutant fine particulate emission data from coal firing to develop a surrogate particulate HAP floor. Using the reasoning in section E.3., the particulate HAP floor should be no higher than the 0.030 lb. per million Btu New Source Performance Standard (NSPS) for particulate emissions adjusted to incorporate the fine fraction since the 0.030 limit is for total PM. BACT and LAER limits for particulate emissions should be considered in determining a "beyond-the-floor" particulate emission limit. BACT limits for total particulate emissions have been set and achieved at the 0.0150 lb. per million Btu level, which may be an appropriate "beyond- the-floor" surrogate limit for particulate HAPs. A particulate MACT limit based on fine particulate emissions(PM-2.5) is preferable, since heavy metals are found mostly in the fine fraction. EPA may be able to establish a MACT limit based on the available total or PM10 emissions data with appropriate adjustment to estimate the PM2.5 fraction.

If test data for fine particulates (PM2.5 or PM10) are insufficient for developing a particulate HAP surrogate standard, and if converting total particulate test data to estimate fine particulate levels is not reasonable, then total particulate test data should be used to develop a total particulate HAP surrogate at this time. Subsequently, additional testing should be done to determine if the adopted total particulate MACT standard is sufficient to minimize the emissions of particulate HAPs.

ii. Acid-Gas HAPs - The floor for acid-gas HAPs should be in the range of 90% to 95% control of sulfur dioxide (non-HAP surrogate) or hydrochloric acid (representative HAP surrogate). The number of coal plants with scrubbers and the general knowledge that these are routinely over 90% efficient, and typically greater than 95% efficient, at removing acid gases, should be sufficient emission information to set a floor for acid-gas HAPs which requires such wet or wet/dry scrubbing. Utility emission factors and estimates of hydrochloric acid emissions when reporting emissions pursuant to "Right to Know" are other useful pieces of emission information which are relevant in establishing the MACT floor for acid-gas HAPs. Also, NSPS limits for sulfur dioxide could be the basis for an acid-gas HAP floor, and the more recent BACT/LAER decisions for sulfur dioxide could be the basis for a "beyond the floor" acid-gas HAP limit if sulfur dioxide is used as a surrogate for acid-gas HAPs.

iii. Organic HAPs - Since organic HAP emissions are products of incomplete combustion, carbon monoxide (CO), which is the most common product of incomplete combustion, could be used as a surrogate for setting the MACT floor for organic HAPs and ensuring efficient combustion. New Jersey has a 100 ppm (corrected to 7% oxygen) RACT emission limitation for

CO, and this level may be a potential highest floor for organic HAPs. More recent BACT and LAER decisions for carbon monoxide should be considered in a "beyond-the- floor" determination. Oxidation catalysts also should be considered in the "beyond-the-floor" determination.

b. Format of Standards for Other HAPs from Coal

If a fine particulate limit is used as a surrogate for particulate HAPs, then EPA's adopted test methods for fine particulate concentrations in lb. per million Btu should be used. If representative HAPs are selected for particulate HAP MACT limits, then there should be quarterly testing of those HAPs (along with quarterly testing for mercury), and the format of the limits should be the same as for mercury.

Where continuous emission monitors are used to determine compliance, as should be the case if SO2 and CO are selected as surrogates for acid gas and organic HAPs, then the emission limit should be a concentration limit in the form of ppmv with a correction factor for oxygen.

For the acid gases, a "combination standard" of the form "ppmv or % reduction, less stringent of the two" is reasonable to address high chlorine coal.

c. Averaging and Monitoring Methods for Other HAPs from Coal

Where criteria pollutant surrogates are selected as surrogate MACT limits, the traditional testing and monitoring methods for criteria pollutant limitations should be used. Averaging times may be different and should reflect the probability of short-term unusually high emissions and whether there are adverse health effects associated with these short-term peak values. EPA method 29 would be appropriate to obtain data on multiple metals, even if a surrogate limit for one metal is adopted.

i. For particulate limits, the average of 3 test runs is traditional and should be retained. Annual particulate testing would be appropriate. If representative HAPs are selected for particulate HAP MACT limits, then quarterly testing and the same averaging procedure as recommended for periodic testing of mercury could be used to address variability of metal emission levels.

ii. If SO2 is used as an acid-gas HAP surrogate, daily limits with compliance determined by CEMs is appropriate. If HCl is used as a representative acid-gas HAP, then annual testing and averaging 3 test runs (similar to particulate testing) is appropriate.

iii. For products of incomplete combustion, a short-term (hourly to daily) limit for CO and the requirement of a CO CEM are appropriate.

d. New Coal-Fired Electric Generating Units

Future BACT and LAER determinations for criteria pollutants emitted by new coal units should provide for equal or lower emissions than MACT limits which are consistent with today's BACT and LAER technology, which should be applied to existing plants. Hence, setting separate MACT emission limits for other than mercury from new coal-fired power units may not be necessary, provided New Source Review (NSR) technology requirements remain for new units.

e. Additional HAP Testing of Coal Combustion

Where a surrogate criteria pollutant or a representative HAP is used as a MACT performance standard for a group of similar HAPs, the MACT rule should include testing for some or all of those HAPs to confirm

effective control. This is especially prudent for the organic HAPs for which there are little test data at this time.

D. OIL MACT RECOMMENDATIONS

MACT standards should be developed for electric generating units which combust other than light oil. Effective particulate control and good combustion should be the goal of the MACT for heavy-oil combustion.

1. OIL HAPS TO BE REGULATED

MACT requirements should be set for particulate HAPs and organic HAPs emitted by heavy oil combustion. Nickel may be appropriate as a representative HAP for the heavy metals in oil. Alternatively, a limit on fine particulate emissions may be an appropriate surrogate for both heavy metals and particulate organic matter emissions which contain HAPs. Carbon monoxide would be an appropriate surrogate for organic HAPs which are products of incomplete combustion.

2. OIL SUBCATEGORIES

There should be no subcategories for power generating units burning heavy oil. All oil heavier than number 2 oil should be subject to the same MACT requirements.

3. OIL MACT LIMITS AND FORMAT

a. Particulate HAPs

We have not determined a MACT limit for nickel. An output-based standard is preferred in the form of milligrams per megawatt hour. An input standard in the units of lb. per million Btu is also useful, but less desirable. If a fine particulate emission rate is used as a surrogate, the MACT floor should be no higher than the floor for coal, i.e., no higher than 0.030 lb. per million Btu. A “beyond-the-floor” level should also be considered at the 0.015 lb. per million Btu level. These total particulate limits should be adjusted, if possible, to reflect the fact that metals in oil, like trace metals in coal, accumulate in the fine fraction of PM (see the earlier section 4.a.i)

b. Organic HAPs

The carbon monoxide floor should be no higher than 100 ppm (at 7% oxygen) averaged daily, which is the New Jersey RACT limit for both coal and oil fired boilers.

An averaging period between 1 and 24 hours should be considered. BACT and LAER determinations should be considered for a “beyond-the-floor” MACT limit. Oxidation catalysts should be considered, but good combustion control should be sufficient in most cases.

4. OIL HAP AVERAGING AND MONITORING METHODS

a. Particulate HAPs

If nickel is used as a surrogate for metal HAP emission from heavy oil combustion, then the nickel in a monthly composite oil sample should be tested monthly, and the efficiency of the fine particulate air pollution control should be tested annually. A weighted annual average of the nickel emissions per MWhr can be determined based on the monthly amount of electricity produced, and the rate of nickel emitted can be adjusted by the efficiency of the particulate air pollution control. If fine particulates are

used as a MACT surrogate, then an annual particulate test would be appropriate, using standard EPA methods and averaging 3 test runs.

b. Organic HAPs

Carbon monoxide CEMs should be used to determine short-term (hourly to daily) average emission concentrations.

5. NEW OIL ELECTRIC GENERATING UNITS

Future BACT and LAER determinations for particulate and carbon monoxide emissions from new oil fired electric generating units should be sufficient to reduce HAP levels from new units to lower levels than for existing units, provided New Source Review (NSR) technology requirements remain for new major units.

E. OTHER CONSIDERATIONS

1. DATA SUFFICIENCY

There are a wealth of data for setting MACT limits for mercury emitted by coal combustion. EPA's testing of many electric generating units during the 1999 ICR (Information Collection Request), and the application of those test data to similar units that were not tested is appropriate and sufficient to set a mercury emission limit for coal combustion.

For other HAPs emitted by coal, there are less emission data, and for some HAPs the data is not sufficient for setting a MACT emission limit specific to that HAP. There are, however, sufficient data for setting HAP-specific MACT emission limits for most heavy metals. There are not sufficient data to set HAP specific limits for organic HAPs.

Emission data other than HAP emission data should also be used in determining MACT limits for coal and oil fired power plants. Criteria pollutant emission data for particulates (including data on fine particulate mass), sulfur dioxide, carbon monoxide, and volatile organic substances are relevant to HAP emissions, which are mostly fine particulates, acid gases and products of incomplete combustion. For example, emission data on the effectiveness of SO2 control should be used to help determine a MACT emission limit for HCl.

Data on criteria pollutant emissions are particularly relevant when they are used as surrogates for groups of HAPs with similar properties relevant to controlling their emissions. Continuous emission monitoring data for sulfur dioxide and carbon monoxide would be useful for setting surrogate HAP standards, as well as determining compliance with those standards.

Emission data provided by utilities in response to "Right to Know" surveys are of lower quality than stack test data, but nonetheless also relevant and useful in determining MACT emission limits. All emission data which are available and related to HAP emissions should be considered holistically in developing MACT emission limits.

2. VARIABILITY OF DATA

Variability of emission data is not new to HAPs. For mercury and other heavy metals which have a wide range of concentrations in coal and oil, this variability is best addressed through the optimum design of the magnitude and form of the standard and through the selection of averaging time period and procedures. Equally important, the numerical value, form, and averaging time period of the standard should be based not on the variability of the incoming Hg concentrations in coal or the flue gases, but on

the best evaluation of how control technologies are capable of handling and "damping" the incoming variability through equipment and operating design (for example, activated carbon injection based systems should be able to meet a fixed output limit by injecting more or less carbon; feedback control systems can be used for wet scrubber-based systems).

Statistical manipulation of the coal or test data to generate unreasonably high emission limits is inappropriate. To reasonably address variability in the system (monitoring, sampling, mercury content of coal,etc.), we recommend using the combination of these three components: 1. the average of emissions from the "best 12%" of the units, 2. a factor-of-2 compliance margin, and 3. the use of long term averaging of compliance data for mercury or other individual HAPs.

For periodic testing of mercury, quarterly testing and averaging 3 test runs each quarter and the 4 quarters each year should be sufficient to provide a reasonable determination of average annual emission rate. Similar procedures have been successfully used for municipal solid waste incineration which has more mercury variability than coal.

When CEMs are used for mercury emission determination, there are many ways to average the data to address variability and obtain a reasonable determination of average emission rates. A moving 12-month average of the average emission rate for each month is a common procedure. A monthly average should also be sufficient to address variability of mercury.

Where criteria pollutants are used as surrogates for HAP emissions, there is also sufficient experience to develop appropriate averaging procedures.

3. SPECIAL CONCERN ABOUT VARIABILITY OF HAP PRODUCTS OF INCOMPLETE COMBUSTION

The variability of carbon monoxide (and HAP products of incomplete combustion) is not directly related to coal or oil properties, but rather is related to operation of the unit. Very high carbon monoxide and other products of incomplete combustion (including HAP organics) can result from poor combustion practices over a relatively short period of time. Therefore, the MACT standards for HAPs which are products of incomplete combustion should be of sufficiently short averaging time to promote good combustion practice at all times and not enable poor combustion practices to be lost in long averaging time. The MACT standard for HAP products of incomplete combustion should catch bad combustion practice and cause corrective actions to be taken immediately. The use of continuous emission monitors for carbon monoxide is appropriate to instantaneously determine a poor combustion problem and enable timely corrective action. To encourage timely corrective action, the averaging time for carbon monoxide should be no greater than 24 hours and could be as low as 1 hour.

4. RELATIONSHIP OF MACT TO RACT, NSPS, BACT AND LAER

MACT is an emission limit based on maximum achievable control technology, including pollution prevention measures. Section 112(d) of the Clean Air Act requires that beyond-the-floor MACT standards "require the maximum degree of reduction in emissions of the hazardous air pollutants...taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements.....achievable for new or existing sources..." Other technology based emission limits required by the Clean Air Act include, in order of least stringent to most stringent: Reasonably Available Control Technology (RACT); New Source Performance Standards (NSPS); Best Available Control Technology (BACT); and Lowest Achievable Emission Rate (LAER). These 4 technology-based emission standards are applied to the criteria pollutants and their precursors, including fine particulates (PM2.5 and PM10), sulfur dioxide, oxides of nitrogen, volatile organic substances, carbon monoxide, and lead. These criteria pollutant emission limits are also relevant to HAPs from coal-fired power plants which emit significant amounts of HAP particulates, HAP acid gases and

HAP products of incomplete combustion; all of which can be controlled by the same air pollution control technologies as used for the more encompassing criteria pollutant category.

Comparing the definition of MACT for HAPs with RACT, NSPS, BACT and LAER for criteria pollutants shows similar language for MACT, BACT and LAER. Therefore, BACT and LAER technology for criteria pollutants is equally relevant for HAPs which are also within the same criteria pollutant category. In addition, HAPs should be minimized to an even greater degree than criteria pollutants in view of their higher toxicity. Hence, MACT standards for fine-particulate HAPs, acid-gas HAPs, and products-of-incomplete-combustion HAPs should result in more stringent air pollution control technology requirements (including pollution prevention) than RACT and NSPS standards for criteria-pollutant requirements for particulates, sulfur dioxide, volatile organic substances and carbon monoxide. MACT standards should be consistent with BACT and LAER determinations for the analogous criteria pollutants.

Current BACT limits for coal-fired power plants require baghouse control or the equivalent, wet or dry scrubbers, and good combustion. These technologies and measures are also directly relevant to minimizing HAPs from coal-fired power plants. BACT limits have been set for many power plants to control particulates, acid gases, and products of incomplete combustion (CO and VOC). BACT/LAER limit should be considered for "beyond-the-floor" MACT limits for all coal-fired power plants.

RACT and NSPS are generally less stringent than MACT, but can be considered as highest MACT floors where criteria pollutants are used as surrogates for HAPs.

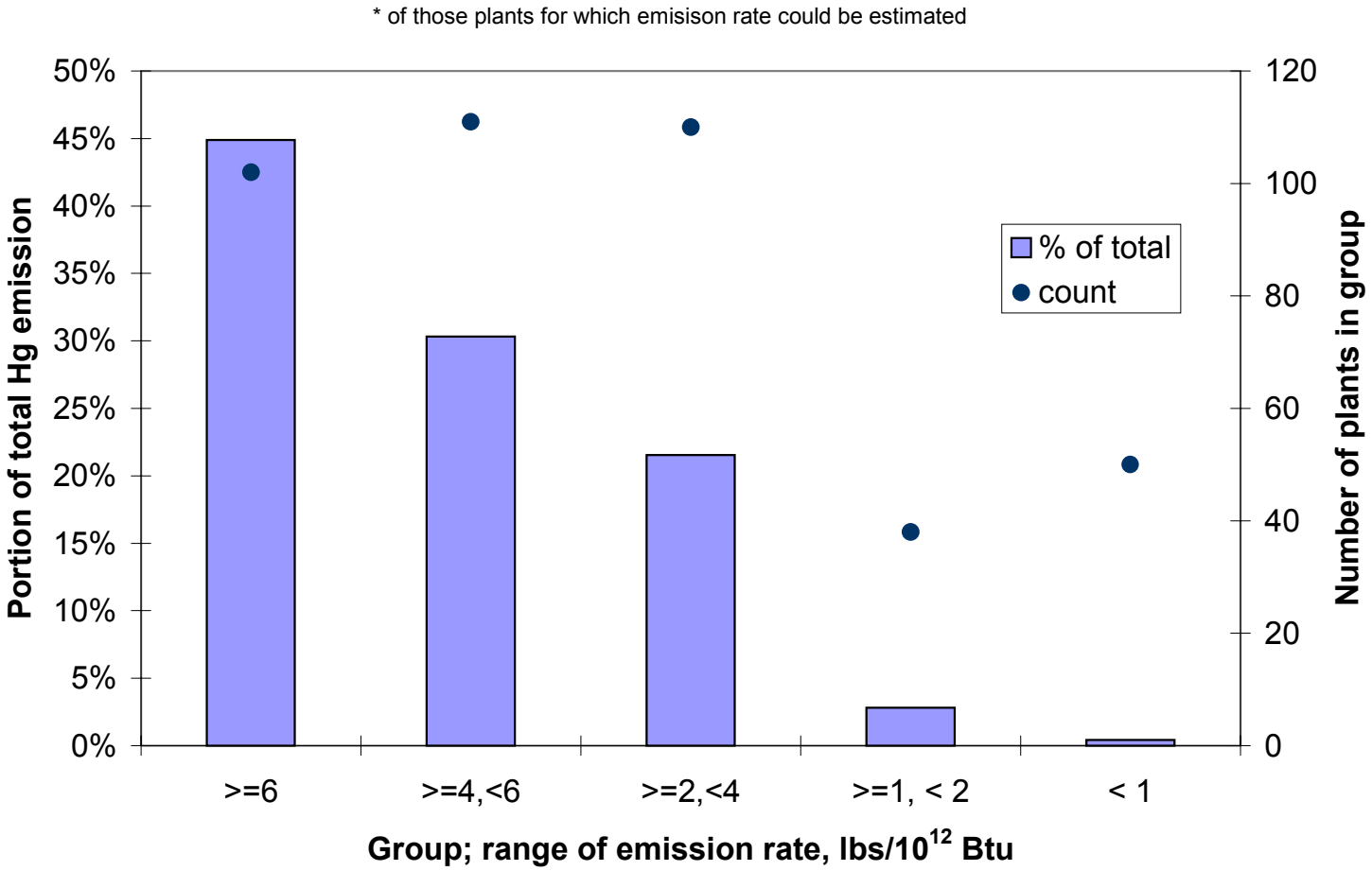
5. AIR POLLUTION CONTROL TECHNOLOGY: INNOVATION, IMPLEMENTATION AND TECHNOLOGY TRANSFER

It is important for EPA to recognize the important role the EPA MACT determination (“environmental driver”) will play in the near-term future innovation in alternative technologies and strategies for controlling mercury emissions. In the long-term, the full-scale field implementation of different technologies and strategies will result in even more innovation and substantial cost reduction through the optimum selection of combination of technologies, operating methods, and fuels. These are expected to include: pollution prevention, coal cleaning, fuel blending and switching, injection of carbon or other sorbents, enhanced wet scrubbing, catalysts to oxidize mercury in flue streams before its capture in wet or dry scrubbers, SCR-FGD/SDA combinations to capture Hg besides controlling NOx and SO2. In addition, there are a number of emerging technologies including electro-catalytic oxidation (ECO) that may find commercial application once the MACT standards are established. The historical fact that more effective control technologies have always appeared in the marketplace after (and not before) the performance standards are set is of particular importance when EPA establishes “beyond-the floor” MACT limits as it takes into account not only the current status of technology, but its realistic future potential.

The technology-transfer capability from other sources also needs to be taken into consideration by the EPA. The successful use of carbon injection and baghouse control on municipal solid waste (MSW) incinerators should be considered in developing the MACT standard for mercury from coal-fired power plants. While uncontrolled mercury concentrations in the flue gas of MSW incinerators are much higher than for coal combustion, pilot and full-scale testing of carbon injection on coal shows the same relationships as for MSW incineration. The more carbon injected, the better the mercury control, up to a point. The MSW experience has shown that baghouses are far superior for mercury control than ESPs and can be used to avoid high carbon use and the associated costs, as well as to effectively control fine-particulate HAPs. Thus, while the working experience with other sources such as waste combustors may not be directly transferable to large coal-fired boilers because of their different flue-gas characteristics, it is nevertheless helpful in informing the MACT determination for the coal-fired boilers.

Appendix 1

Contribution to Hg total emissions by groups, groups based on estimated emission rate*

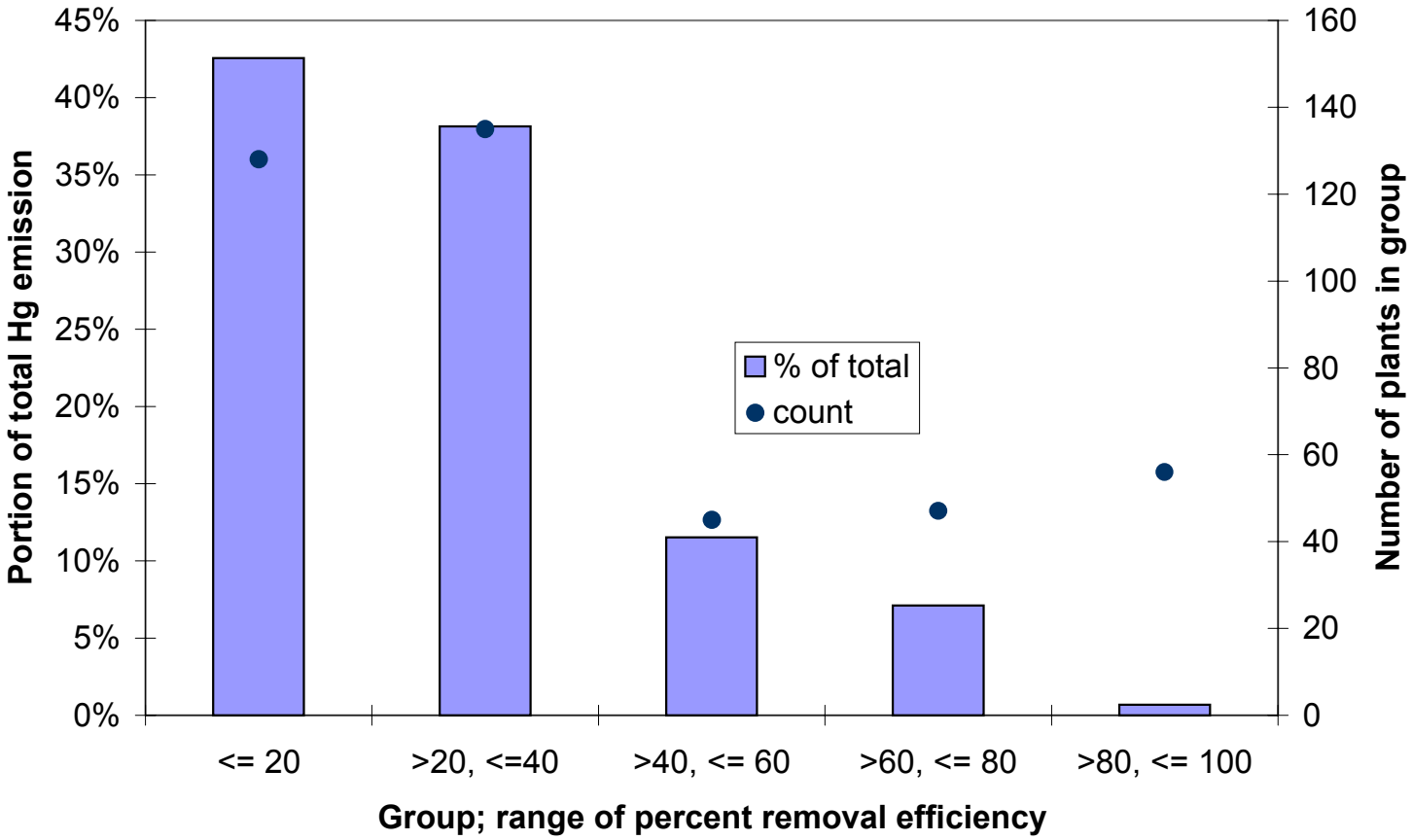


Note: Estimates are based on data for 411 coal-burning power plants for which plant by plant emissions data and coal analysis data were both available. Emission rates are based on pounds per year per plant as estimated by USEPA in the file "plant by plant emissions estimates" divided by total Btu content of coal purchased by that plant obtained from the 1st, 2nd, 3rd, and 4th quarter coal data. All files were dated June, 2001, and were downloaded from www.epa.gov/ttn/atw/combust/utiltox/utoxpg.html, 3/26/02.

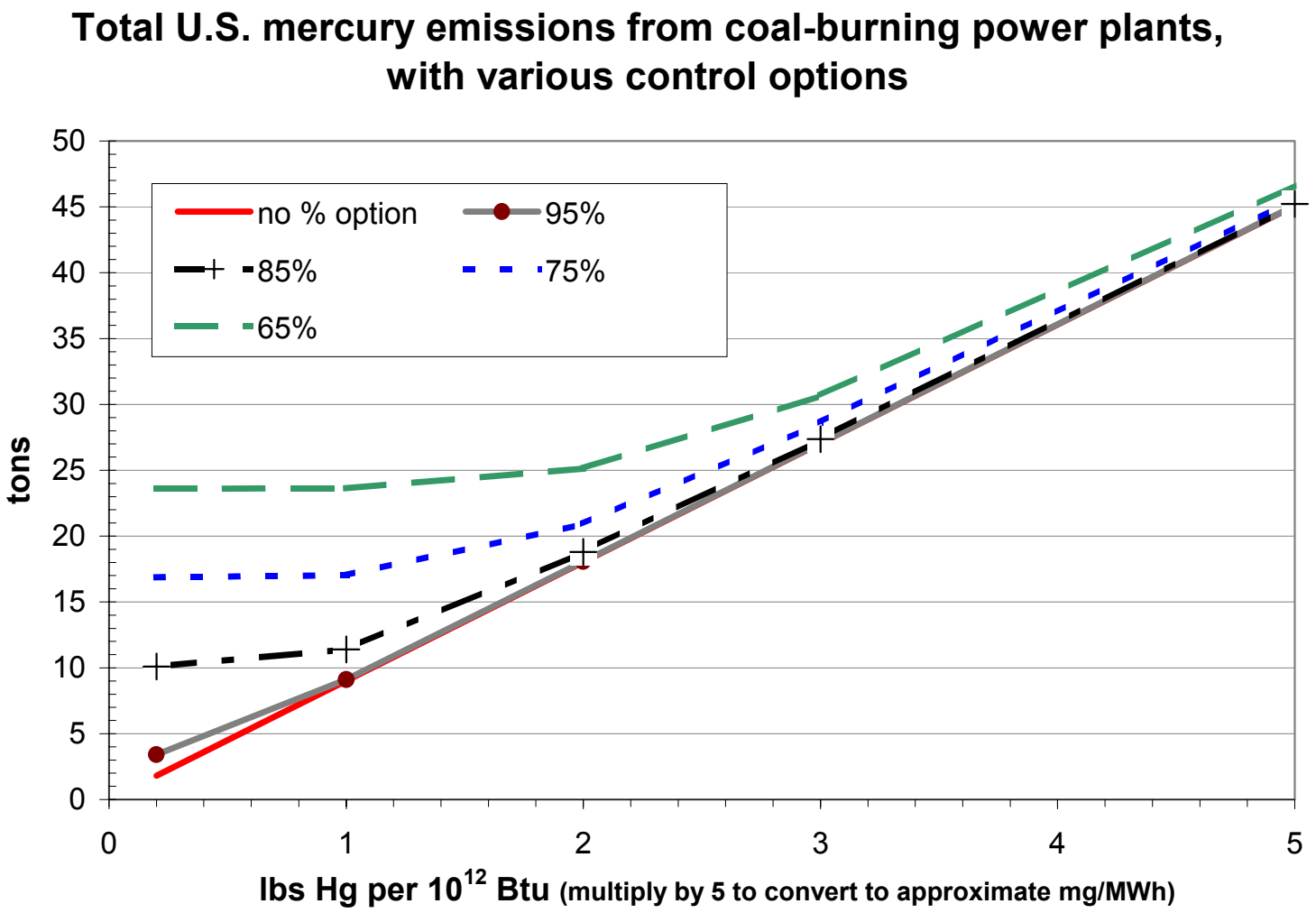
Appendix 2

Contribution to Hg total emissions by groups, groups based on estimated percent removal efficiency*

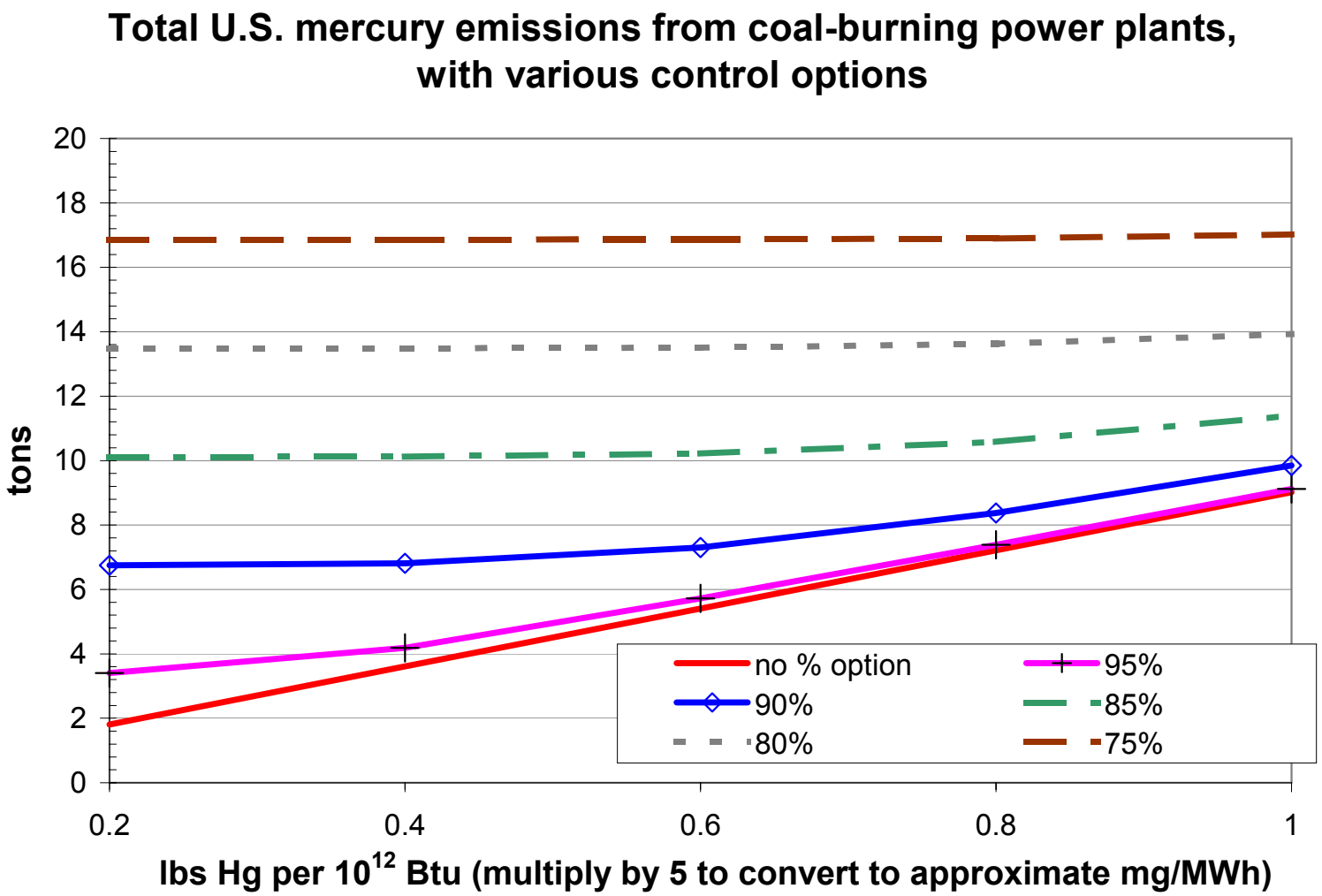
* of those plants for which removal efficiency data could be estimated



Note: Data source is the same as Appendix 1. Percent removal efficiency was based on comparison of USEPA estimated plant by plant emissions compared with total mercury content of coal purchased by that plant, as estimated from the quarterly coal data files.



Note: Plant by plant emissions were estimated for various combination standards in the form of A lbs. per trillion Btu or B percentage reduction of mercury (based on coal mercury content), whichever is less stringent, with the assumption that a plant's emissions will reflect the less stringent applicable standard. Estimated emissions for all plants were totaled. Data source is the same as Appendix 1.



Note: This graph is identical to graph in Appendix 3, except that the lbs. per trillion Btu scale (x-axis) extends only to 1 lb. per trillion Btu, 80% and 90% reduction options have been added, and the 65% option is not included. Data source is the same as Appendix 1.