A SYSTEM-WIDE COMPLIANCE ALTERNATIVE FOR MERCURY EMISSIONS FROM ELECTRIC UTILITY STEAM GENERATING UNITS – LEGAL AND POLICY BASIS

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A. Introduction

On December 20, 2000, EPA issued a Regulatory Finding under § 112(n)(1)(A) of the Clean Air Act ("CAA") that regulation of HAP emissions from coal-fired electric utility steam generating units under § 112 is appropriate and necessary. 65 Fed. Reg. 79825 ("Regulatory Finding"). Specifically, EPA determined that it is appropriate and necessary to regulate mercury emissions from coal-fired units due to the potential hazards associated with human exposure to mercury emissions.[1]

This white paper addresses the question of whether EPA has the authority under the CAA to implement a system-wide or pooled performance standard pursuant to its regulation of mercury emissions from electric utility steam generating units.[2] It concludes that EPA does have such authority because EPA's authority to regulate mercury emissions from power plants derives from § 112(n)(1)(A), not § 112(d). Unlike § 112(d), EPA's regulation under the distinct framework of § 112(n)(1)(A) is risk-based. Under § 112(n)(1)(A), EPA may implement a system-wide or pooled performance standard so long as the relevant standard addresses the risk of harm § 112(n) was intended to ameliorate. The white paper further concludes that, because health risks associated with mercury emissions from power plants are uniquely global rather than local, unit-specific or facility-specific reductions are not necessary to address any risks that may be associated with power plant mercury emissions. Finally, the white paper concludes that public policy favors the implementation a system-wide standard. Emissions averaging in other contexts has resulted in greater compliance and environmental benefits at lower costs. Additionally, such programs have demonstrated that geographic shifts in emissions do not result, suggesting that a system-wide standard for mercury will not create problems with hot spots. Rather, a system-wide performance standard would afford affected sources the flexibility to find the best and cheapest methods of compliance, and will achieve the desired environmental benefits while lowering the cost of emissions reduction.

B. EPA's Authority To Regulate Mercury Emissions From Power Plants Derives From CAA § 112(n), Not § 112(d), And § 112(n) Permits The Implementation Of A System-Wide Performance Standard

Section 112(n)(1)(A) of the CAA provides that EPA is to regulate HAP emissions from electric utility steam generating units only if EPA determines that such regulation is "appropriate and necessary" following a study of the health impacts of HAP emissions from such units. EPA's authority to regulate HAP emissions from electricity generators is contained in its entirety in CAA § 112(n)(1)(A),[3] which states:

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1 65 Fed. Reg. 79825, 79828.

2 The rationale described herein would also allow for an inter-facility trading compliance alternative.

3 42 U.S.C. § 7412(n)(1)(A) (2003).

> The Administrator shall perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (b) of this section after imposition of the requirements of this chapter. The Administrator shall report the results of this study to the Congress within 3 years after November 15, 1990. The Administrator shall develop and describe in the Administrator's report to Congress alternative control strategies for emissions which may warrant regulation under this section. The Administrator shall 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 this subparagraph.

42 U.S.C. § 7412(n)(1)(A).

In accordance with its statutory mandate, EPA issued its Regulatory Finding under § 112(n)(1)(A) on December 20, 2000 which concluded that it is appropriate and necessary to regulate HAP emissions from electricity generators due to hazards to public health attributable to emissions of mercury from coal-fired units.[4] EPA's Regulatory Finding, therefore, establishes the factual predicate for EPA's regulation under § 112(n)(1)(A) of mercury emissions from coal-fired units.

1. Unlike Regulation Pursuant To § 112(d), EPA's Regulation Of Mercury Emissions Under The Distinct Framework of § 112(n) Is Risk-Based And, Therefore, Must Address Health Risks Posed By Mercury Emissions From Power Plants.

EPA derives its authority to regulate power plant mercury emissions from CAA § 112(n), rather than § 112(d). The distinction is significant because § 112(n) sets very different standards for regulation than § 112(d) does. Section 112(n)(1)(A) prescribes a selective and purely risk-based protocol for the regulation of power plant HAP emissions. This approach is based on Congress's recognition that electricity generator emissions already are regulated to a great extent under other provisions of the CAA. Indeed, in § 112(n)(1)(A), Congress instructed EPA to regulate HAP emissions from power plants only to the extent that they pose a health risk *after* imposition of other requirements of the CAA. In contrast, the benchmark for EPA's standard setting under § 112(d) is the emissions limitation achieved by the best controlled similar source (with respect to new sources) or the best controlled 12 percent of similar sources (with respect to existing sources).[5] Thus, while § 112(d) creates a rebuttable presumption of regulation based on the emissions performance of the best-controlled

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4 65 Fed. Reg. at 79828. For purposes of analysis, industry assumes, without conceding, that EPA validly determined that regulation of mercury emissions from power plants is appropriate and necessary.

5 42 U.S.C. § 7412(d)(3).

sources in the category or subcategory,[6] § 112(n) calls for selective regulation of power plant HAP emissions premised entirely on a finding of health risk.

This distinction is particularly apparent in § 112(n)'s "appropriate and necessary" language, for which § 112(d) contains no analogue. While § 112(d) calls for regulation of all major sources of HAPs[7] based on the emissions limitation achieved by similar sources, § 112(n) calls for regulation of power plant HAP emissions only insofar as it is "appropriate and necessary after considering the results of the study [of health risk] required by this subparagraph," even though virtually all power plants are "major sources." Congress provided a distinct regulatory mandate for power plant HAPs "because of the logic of basing any decision to regulate on the results of scientific study and because of the emission reductions that will be achieved and the extremely high costs that electricity generators will face under other provisions of the new Clean Air Act amendments."[8]

That Congress intended EPA to regulate HAP emissions under § 112(n) independently of § 112(d) is further evidenced by § 112(n)'s provision for EPA to develop alternative control strategies. In § 112(n), Congress charged the Administrator with developing and reporting alternative control strategies for ameliorating hazards to the public health that the Administrator determines are reasonably anticipated to occur as a result of emissions by electric utility steam generating units. According to § 112(n), when EPA determines that regulation of emissions from power plants is appropriate and necessary under § 112(n)(1)(A), EPA is to regulate such emissions. Under the framework of § 112(n), EPA is to do so by developing and implementing alternative control strategies that address reasonably anticipated hazards posed to public health. That the statute does not expressly instruct EPA to implement such strategies does not mean that Congress intended EPA to regulate such emissions under § 112(d). Had Congress intended for EPA to regulate under § 112(d), the requirement that EPA develop and report alternative control strategies would be nothing more than a meaningless exercise. Such cannot be not the case. Congress imposed the requirement that EPA develop and report alternative control strategies because it intended that EPA implement them, not that it regulate them under the framework of § 112(d). *See Public Lands Council v. Babbitt*, 120 S. Ct. 1815, 1826 (2000) ("Why would Congress add the words . . . if . . . they add nothing?"); *Moskal v. United States*, 498 U.S. 103, 109-10 (1990) (recognizing the "established principle that a court should 'give effect, if possible, to every clause and word of a statute.'").

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6 Section 112 provides EPA with discretion to set risk-based standards for the control of HAP emissions from all source categories and subcategories and the ability to remove from regulation low risk source categories. *See* 42 U.S.C. § 7412(d)(4); § 7412(c)(9).

7 The term "major source" means any source "that emits or has the potential to emit, . . .in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants." 42 U.S.C. § 7412(a)(1).

8 A&P Cong. Record E3670, E3671.

2. EPA Has Discretion Under The More Flexible Framework Of § 112(n) To Implement Alternative Control Strategies For Emissions, Such As A System-Wide Performance Standard, As Long As EPA's Strategies Address The Risk Of Harm That § 112(n) Was Intended To Ameliorate.

Section 112(n) does not prohibit EPA from implementing a system-wide or pooled performance standard with regard to mercury emissions from power plants. Rather, section 112(n) confers discretion on EPA by permitting it to develop alternative control strategies for emissions from electric utility steam generating units rather than forcing power plant HAP regulation into the rigid, technology-based framework of § 112(d).[9] Section § 112(n)(1)(A) calls for EPA to potentially regulate electricity generator HAP emissions as the final step in a three-part process. As EPA acknowledged in the Report to Congress mandated by the provision,[10] § 112(n) calls for EPA to:

1. Perform a study of the health impacts of HAP emissions from electric utility steam generating units;[11]

2. "develop and describe . . . alternative control strategies for [HAP] emissions which [on the basis of the study of health hazards] may warrant regulation under this section";[12] and

3. "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 this subparagraph."[13]

Put simply in the context of mercury emissions, EPA's first duty was to study the hazards to public health reasonably anticipated to occur as a result of mercury emissions from power plants. EPA was then required to develop alternative strategies for controlling mercury emissions and report them to Congress. Finally, upon EPA's determination that regulation of mercury emissions is appropriate and necessary, § 112(n) requires EPA to regulate. EPA must do so under the framework created by Steps One and Two: EPA must address hazards to public health identified in Step One and may do so by way of alternative control strategies developed pursuant to Step 2.

Notably, nothing in § 112(n) requires that EPA control each source as § 112(d) arguably does.[14] Therefore, to the extent that EPA has interpreted § 112(d) as prohibiting a system-wide

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9 42 U.S.C. § 7412(n)(1)(A).

10 EPA, "Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress," EPA-453/R-98-004a, February 1998, Volume 1 at ES-1.

11 *See* 42 U.S.C. § 7412(n)(1)(A).

12 *Id.*

13 *Id.*

14 42 U.S.C. § 7412(d)(1). EPA has implicitly taken the position in prior MACT standards that a system-wide or pooled performance standard is not permitted under CAA § 112(d). Nonetheless, there is nothing in § 112(d) that expressly requires that each source be subject to controls. Thus, a system-wide standard arguably is allowable under § 112(d) as well.

performance standard, there is no such limitation in § 112(n)(1). Having established that § 112(n) does not prohibit a system-wide or pooled performance standard, the appropriate inquiry is whether source-specific reductions are necessary to address the hazards that § 112(n) was intended to ameliorate.

C. A System-Wide Performance Standard Is Permissible Under § 112(n) Because Unit-Specific Reductions Are Not Necessary To Address Risks Associated With Power Plant Mercury Emissions

Unit-specific, or even facility-specific, reductions of mercury emissions are not necessary to reduce the risk of harm that regulation pursuant to § 112(n)(1)(A) is intended to address. To the extent that mercury emissions from power plants pose a hazard to public health, they do so almost entirely as a result of their contribution to the mercury "global pool," not from "hot spots" created through local deposition.[15] A system-wide performance standard is consonant with § 112(n) because it would not affect the net contribution by U.S. power plants to the global pool of mercury emissions.

1. According To EPA, U.S. Power Plants Contribute Only Negligibly To Human Mercury Exposures.

In its Mercury Study Report to Congress, EPA estimated worldwide emissions of mercury in 1995 to be approximately 5,500 Mg.[16] These emissions were derived from natural sources, such as the release of geologically bound mercury, anthropogenic sources, and re-emission by mass transfer of mercury already deposited on the earth's surface.[17] EPA estimated that 50 to 75 percent of total yearly output was derived from all anthropogenic sources combined.[18]

EPA further estimated that total 1995 anthropogenic emissions from all human sources in the United States totaled 158 Mg.[19] Thus, according to EPA's estimate, in 1995 U.S. anthropogenic sources accounted for no more than approximately 3 percent of total worldwide mercury emissions in that year.[20] According to EPA, coal-fired power plants were responsible for 46.9 Mg of this emissions total, while municipal waste combustion accounted for 26.9 Mg, commercial/industrial boilers for 25.8 Mg, and medical waste incinerators for 14.6 Mg.[21] EPA's estimates demonstrate that coal-fired power plant boilers were responsible for less than 30

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15 The potential to identify selected hot spots issues near specific sources of mercury emissions need not foreclose a system-wide compliance provision. The regulations could expressly provide that, in the rare event that EPA identifies hot spots near specific sources, EPA may simply disallow those sources from being included in the system or pool.

16 EPA, *Mercury Study Report to Congress* at I, 0-1 (Dec. 1997) ("The Mercury Study Report").

17 *Id.* at I, 2-1.

18 *Id.* at III, 2-3.

19 *Id.* at I, 0-1.

20 *Id.*

21 *Id.* at III, 2-8.

percent of United States anthropogenic mercury emissions in 1995, and less than 1 percent of worldwide anthropogenic mercury emissions in that year.

Applying a computer model of long-range mercury transport, EPA estimated that 52 Mg of U.S. anthropogenic emissions in 1995 were deposited within the lower 48 states, with the remainder transported outside the U.S.[22] Using the same computer modeling, EPA estimated that 35 Mg of mercury were deposited from non-U.S. sources, suggesting that slightly more than 67 percent of U.S. mercury deposition in 1995 was derived from U.S. sources.[23]

The amount of local deposition of mercury is in part a function of the speciation of the mercury emitted from the source. Mercury is typically emitted both in its elemental form and as oxidized mercury. When emitted from facilities with tall stacks, such as power plants, the distance that mercury travels from its source depends largely on its form at the time it is emitted. Elemental mercury tends to enter the global mercury cycle, and may be retained in the atmosphere for up to one year before deposition, creating the possibility that it will travel around the earth several times before deposition.[24] Elemental mercury deposition is presumed to "be distributed fairly even[ly] in the troposphere."[25] Oxidized mercury, on the other hand, is more likely to deposit relatively quickly, suggesting the possibility of local or regional deposition shortly after emission.[26]

2. EPA's Computer Modeling Of Mercury Deposition Suggests That Local Deposition Attributable To Coal-Fired Power Plants Is Negligible.

In its 1997 Mercury Study Report, EPA undertook extensive computer modeling in order to predict the environmental fate of mercury emitted from the stacks of combustion sources.[27] EPA acknowledged that a modeling approach was necessary, given the lack of actual data regarding mercury deposition from specific combustion sources.[28] One model used by EPA, ISC3, was applied in order to predict the average annual atmospheric mercury concentration and deposition fluxes within 50 km of the mercury emission source.[29] In its ISC3 modeling, EPA recognized that elemental mercury "is not expected to deposit close to the facility. In contrast, [oxidized mercury] is expected to deposit in greater quantities closer to the emission sources."[30] Rather than use actual emission sources in its models, EPA developed

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22 *Id.* at I, 0-1.

23 *Id.*

24 *Id.* at 2-4.

25 *Id.* at 2-7.

26 *Id.*

27 *Id.* at I, 0-1.

28 *Id.* at 3-31. As EPA stated, "[t]hese data are not derived from a comprehensive study for mercury around the sources of interest. Despite the obvious need for such an effort, such a study does not appear to exist." *Id.*

29 *Id.* at 4-1.

30 *Id.* at 4-16.

several model plants, hypothetical facilities intended to simulate actual emission sources, including municipal waste combustors, coal and oil-fired boilers of different sizes, medical waste incinerators, and chlor-alkali plants.[31] These model plants were designed to simulate source emissions in both humid and arid locations to reflect the assumed greater deposition of oxidized mercury in locations with more precipitation.[32]

In configuring its model large coal-fired plant, EPA assumed a stack height of 223 meters, and an emission speciation of 50% elemental mercury, 30% oxidized mercury vapor, and 20% particulate oxidized mercury.[33] Given these assumptions, EPA predicted that at its hypothetical "humid" plant location, only 6.7% of total mercury emissions would be deposited within 50 km of the stack.[34] At its hypothetical "arid" plant location, even less mercury was predicted to deposit locally, with EPA estimating that only 2.1% of total emitted mercury would deposit within 50 km of the stack.[35]

Similarly, in configuring its model of a medium coal-fired plant, EPA assumed a stack height of 142 meters, with an emission speciation of 50% elemental mercury, 30% oxidized mercury vapor, and 20% particulate oxidized mercury.[36] At its "humid" location, EPA predicted that only 8.5% of total emitted mercury would be deposited within 50 km of the stack, while at its "arid" site, only 3.7% of total emitted mercury would be deposited within this radius.

Finally, in configuring its model of a small coal-fired plant, EPA assumed a stack height of 81 meters, and the same emission speciation of 50% elemental mercury, 30% oxidized mercury vapor, and 20% particulate oxidized mercury.[37] Based on these assumptions, EPA predicted that at its "humid" site, 13.7% of total emitted mercury would be deposited within 50 km of the stack.[38] At its "arid" site, EPA predicted that 8.5% of total emissions would be deposited within this radius.[39]

Based on these predictions, EPA stated that for <u>all</u> power plant boilers "*less than 15 percent of the total mercury emitted is predicted to deposit within 50 km* [due to] the high effective stacks predicted for this source class."[40] More broadly, EPA concluded that "[b]ased on the local scale atmospheric modeling results in flat terrain, *at least 75 percent of the emitted mercury from each facility [including all emission sources] is predicted to be transported more*

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31 *Id.* at 4-21.

32 *Id.* at 4-22.

33 *Id.* at 5-42.

34 *Id.* at 5-42.

35 *Id.* at 5-43.

36 *Id.* at 5-42.

37 *Id.* at 5-42.

38 *Id.* at 5-42.

39 *Id.* at 5-43.

40 *Id.* at 5-44 (emphasis added).

than 50 km from the facility."[41] In 1998, EPA presented even lower estimates of local deposition. In its *Utilities Report to Congress*, EPA stated that "[a]n estimated *5 to 10 percent of primary [oxidized] Hg(II) emissions are deposited within 100 km of the point of emission* and a larger fraction on a regional scale."[42] In its *Utilities Report*, EPA also noted that "*most of the mercury emitted to the atmosphere is deposited more than 50 km away from the source*, especially sources that have tall stacks."[43]

It should be further noted that, in contrast with EPA's assumed speciation percentages, the Electric Power Research Institute has estimated that in 1999, the 45 tons of mercury emitted by coal-fired power plants consisted of 26 tons of elemental mercury (57%), 18 tons of oxidized mercury (40%), and less than one ton of particulate mercury (2%).[44] Given that elemental mercury is substantially less likely to deposit locally, EPRI's estimate suggests even less local deposition than does EPA's model.[45]

3. Relatively Recent Studies of Mercury Deposition Do Not Support Claims Of Significant Local Deposition From Coal-Fired Sources.

Despite its own low estimates of local mercury deposition due to emissions from coal-fired power plant boilers, EPA has stated that "studies in the Great Lakes region and in Florida show that mercury emissions on local scales can greatly influence loadings in some locations when local sources have significant emissions of divalent and particulate forms of mercury. For example, the South Florida Atmospheric Mercury Monitoring Study . . . was able to demonstrate that local anthropogenic sources strongly influence mercury wet deposition levels."[46] Similarly, in a study of atmospheric deposition of several toxics in the Great Lakes, it was suggested that approximately 80 percent of mercury found in Lake Michigan comes from atmospheric deposition, with "localized sources, such as Chicago, contribut[ing] approximately 30 percent of the total regional atmospheric loading to the lake."[47] Significantly, there is no

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41 *Id*. at 7-4 (emphasis added).

42 EPA, *Mercury: Utilities Report to Congress* (1998) at 7-5 (emphasis added).

43 *Id*. at 7-45 (emphasis added). Nonetheless, EPA also concluded that in some circumstances, "deposition within 10 km of a facility is [sic] may be dominated by emissions from the local source." *Id*. at 7-4. At no point, however, does EPA make such a suggestion with regard to coal-fired power plant sources. *See id.* (giving example of chlor-alkali facilities as source of dominant local deposition).

44 EPRI, *An Assessment of Mercury Emissions from U.S. Coal-Fired Power Plants*, at xiv (2000) (utilizing data gathered as a result of EPA's 1998 Information Collection Request).

45 *See also* EPRI, *Assessment of Mercury Emissions, Transport, Fate and Cycling for the Continental United States* (Dec. 2000) (finding that "[t]he average speciation developed from the ICR for coal-burning utilities [was] 54/44/2 for bituminous, 56/42/2 for anthracite … and 75/24/1 for other coals").

46 EPA, *Deposition of Air Pollutants to the Great Waters: 3rd Report to Congress*, at II-8 (2000).

47 Delta Institute, *Atmospheric Deposition of Toxics in the Great Lakes: Integrating Science and Policy*, at 2 (2000) (citing Mason & Sullivan, *Mercury in Lake Michigan*, Envir. Sci. & Tech. 31:942 (1997)).

apparent attempt made in these studies to differentiate between emissions sources other than to refer to "localized sources, such as Chicago," which would include chlor-alkali facilities, municipal waste combustion, medical waste incinerators, and other sources. Given EPA's own acknowledgement that mercury emission sources other than coal-fired power plant boilers are likely to be responsible for substantially more local deposition than coal-fired sources, no conclusions can be drawn from these studies that would suggest significant local deposition due to such coal-fired emissions sources. Indeed, given EPA's modeling of power plants as compared to other sources, it seems highly likely that local sources other than power plants are responsible for those loadings. For example, EPA in its *Mercury Report* predicted that its model small hospital medical waste incinerator would deposit 43.3% of its total emitted mercury within 50 km of the "humid" source location.[48]

Similarly, in a 1998 study, Swedish and Chinese scientists surveyed mercury deposition at a nature reserve "surrounded by six large scale industrial Hg producer [sic] at distances from about 25 to 200 km."[49] This study determined that "Hg concentrations in the air, soil and moss are all several hundred times higher than the corresponding background levels …. Considering the distance between [the emissions sources and the nature reserve] it would be no doubt [sic] that Hg emitted to the atmosphere would have been deposited to [the reserve]."[50] Nonetheless, the emissions sources in the Fanjing study appear to have been mercury mines and mercury production facilities, and the authors of the study explicitly cautioned that "[t]he contributions from other Hg producer [sic] … are unclear, especially the part from coal burning, the potentially biggest emission sources in this province."[51] Here again, as the study's authors suggest, there is no evidence supporting a finding of significant local deposition from coal-fired power plants.

In another report, the Minnesota Pollution Control Agency stated that based on an unpublished study, "[l]akes in the urban and suburban areas of Minneapolis-St. Paul may receive about 35% more mercury deposition due to the aggregate of local emissions."[52] Nonetheless, the Minnesota study does not attempt to differentiate the specific sources responsible for this possibly elevated local deposition, and makes no conclusions regarding the amount of deposition attributable to coal-fired sources. Similarly, a study by the Chesapeake Biological Laboratory observed that "[l]ocal sources may also contribute to the variability [in mercury deposition at one monitoring site]. Waste incinerators and power plants are known point sources of Hg, and there is at least one of each in close proximity to [this site]."[53] However, the Maryland study fails to differentiate or even make an attempt to quantify the amounts of deposition purportedly derived

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48 *Mercury Study Report* at 5-42.

49 Xiao, Sommar, & Lindqvist, *Atmospheric Mercury Deposition on Fanjing Mountain Nature Reserve*, Chemosphere, Vol. 36, No. 10, at 2191-2 (1998).

50 *Id*. at 2195.

51 *Id*. at 2199.

52 Minnesota Pollution Control Agency, *Report on the Mercury Contamination Reduction Initiative Advisory Council's Results and Recommendations*, at 49-50 (March 1999).

53 Mason, Lawson, & Sheu, *Annual and Seasonal Trends in Mercury Deposition in Maryland*, Atmospheric Environment 34:1691, at 1698 (2000).

from power plants as opposed to waste incinerators. Thus, the Maryland study similarly fails to make a case for significant local deposition from coal-fired emissions sources.

In contrast, data suggest that coal-fired emissions sources are not a significant source of local mercury deposition. In addition to EPA's own results, which suggest a very low rate of local deposition for mercury emitted from coal-fired power plants, other studies have also suggested that local deposition is not generally significant. In a 1998 study, a study by the Northeast States for Coordinated Air Use Management using EPA's computer modeling estimated that only 13 percent of Northeast regional emissions of mercury were derived from electric power plant boilers.[54] In addition, the Minnesota study cited above found that "[i]t is thought that more than half of the mercury deposited in Minnesota is global atmospheric contamination that remains in the atmosphere for up to a year before it is deposited. It is estimated that *10% of the deposition in Minnesota is due to mercury emitted in Minnesota*."[55] On the basis of these findings, the Minnesota Pollution Control Agency found that "a 50% reduction in mercury air emissions in Minnesota is estimated to result in a 5% reduction in mercury deposition in the state."[56] Significantly, these figures include *all* mercury emissions in Minnesota, and thus the emissions from electric power plant boilers would account for even less than the 10% deposition figure estimated by the agency.[57]

There is also growing evidence that concentration levels of methylmercury itself tend to be fairly uniform compared to deposition levels of oxidized mercury, suggesting that local emission sources may not be creating methylmercury "hot spots" at all. For example, EPA observed that in a 1998 study, researchers sampled mercury contamination in fish populations in Green Bay, Lake Michigan, and found that "[t]he overall distribution of mercury tissue concentrations was fairly uniform within the bay, *indicating that mercury contamination originates primarily from non-point sources, including atmospheric deposition*."[58] Similarly, the Maryland study cited above found that "[w]hile seasonality and local sources appear to impact total Hg in wet deposition, there appears to be less variability in the MMHg [methylmercury] concentration and flux. Although there is less data for MMHg, the results suggest no strong . . . differences between the urban and regional sites . . . . Thus, it does not appear that urban sources are as important a source of MMHg as they are for total Hg."[59] These results indicate that there

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54 NESCAUM, *Atmospheric Mercury Emissions in the Northeastern States*, February 1998, http://www.nescaum.org/pdf/mercury.pdf (last visited, June 8, 2001).

55 Minnesota Pollution Control Agency, *Report on the Mercury Contamination Reduction Initiative Advisory Council's Results and Recommendations*, at 10 (March 1999) (emphasis added).

56 *Id.*

57 Extrapolating from EPA's own estimates of nationwide source contributions of mercury emissions, *see* n. 20 *supra*, coal-fired sources in Minnesota would be responsible for only 2.9% of Minnesota's total anthropogenic mercury deposition.

58 EPA, *Great Waters: 3rd Report*, at II-17 (emphasis added).

59 Mason, Lawson, & Sheu, *Annual and Seasonal Trends in Mercury Deposition in Maryland*, at 1698 (2000). It is also worth noting that EPA has stated that "new measurement methods suggest that natural mercury emissions rates from mercury-rich soils and bedrocks may be larger than past estimates," further suggesting that current anthropogenic emissions may be responsible for

may be no demonstrable correlation between local deposition of mercury and local concentrations of methylmercury, further underscoring the absence of any linkage between coal-fired emissions sources and local mercury "hot spots."

Most recently, data published by the Electric Power Research Institute, Inc. ("EPRI") suggest that, when emitted from power plants, oxidized mercury may rapidly transform in ambient air to elemental mercury, further supporting the conclusion that mercury hot spots from power plants are unlikely to occur.[60] Underscoring the tenuousness of the link between mercury emissions from power plants and hot spots is EPRI's conclusion that if electricity generators in the U.S. were to reduce mercury emissions by nearly half – from 49 tons per year to 24 tons – the cut would only achieve a 3 percent reduction in actual mercury deposits in the U.S. including fresh water lakes, rivers and streams.[61] Wild fresh water fish in the U.S. would be expected to show greater reduction in mercury content than ocean or farmed fish, but wild fresh water fish are a relatively small part of the U.S. diet.[62] Therefore, "a drop of nearly half in utility mercury emissions results in a drop of 3 [percent] (on average) in mercury depositing to the ground, and a drop of less than one-tenth of a [percent] in the number of children 'at risk' [who would be born to mothers consuming fish with lower mercury levels]."[63]

In sum, the above-referenced studies show that, to the extent that power plant mercury emissions pose a hazard to human health, the risks are quite small and finite. In addition, data show that hazards to human health due to local deposition of mercury from power plants are negligible. Therefore, unit- or facility- specific reductions in mercury emissions are not necessary to reduce associated risks of harm to public health. EPA's authority to regulate power plant mercury emissions pursuant to CAA § 112(n) requires that EPA address the harm posed by mercury emissions from power plants. Hazards posed to human health in the U.S. by mercury emissions from power plants are almost exclusively due to the contribution of mercury emissions to the global pool. EPA's ultimate goal, therefore, should be to reduce total contribution of power plant mercury emissions to the global pool. EPA may do so through the implementation of system-wide or pooled performance standards.

D. Public Policy Supports The Implementation Of A System-Wide Performance Standard For Mercury Emissions From Power Plants

In addition to being supportable on legal grounds, a system-wide or pooled performance standard represents sound public policy. Achievements obtained through EPA's Acid Rain Programs for sulfur dioxide ("SO_2") emissions and nitrogen oxide ("NO_x") emissions

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less total mercury emitted than EPA had previously argued. EPA, *Great Waters: 3rd Report*, at II-5.

60 Dennis L. Laudal, *JV Task 24 – Investigation of the Fate of Mercury in a Coal Combustion Plume Using a Static Plume Dilution Chamber*, 2001-EERC-11-01, at 32 (November 2001), *at* http://www.netl.doe.gov/coalpower/environment/air_q/docs/SPDC-Rpt.pdf.

61 Leonard Levin, Ph.D., *Remarks to the Committee on Environment and Public Works, United States Senate* (July 29, 2003).

62 *Id.*

63 *Id.*

demonstrate that emissions averaging and its functional equivalent, emissions trading, are effective techniques for meeting or exceeding environmental objectives at lower cost and with greater flexibility tailored to individual affected facilities. For example, to regulate SO_2 emissions pursuant to the Acid Rain Program, the CAA imposed a nationwide cap for emissions from U.S. electric power plants. As mandated by the CAA, EPA has implemented a system whereby facilities may trade allowances for SO_2 emissions.[64] As a result of the trading program, facilities have successfully and efficiently reduced SO_2. The "cap-and-trade" system has given facilities flexibility to implement the most efficient compliance methods and has encouraged technological innovation.[65] According to EPA, the program's flexibility has reduced significantly the cost of achieving SO_2 emissions reductions relative to the cost associated with a technology-based rule or fixed-emission rate.[66]

Notably, EPA's 2001 Progress Report observed that, under the trading program, there were no significant geographic shifts in emissions.[67] Such evidence suggests that a system-wide standard for mercury emissions will not cause shifts in mercury emissions that could create or aggravate any potential hazards associated with hot spots. In addition, EPA reported virtually total compliance in 2001. Of 2,792 regulated sources, all but two complied with the programs emissions requirements[68] – a compliance rate of 99.93%.[69] A comparable rate of compliance has not been achieved to date under traditional command-and-control programs.

Similar efficiencies are being achieved under EPA's Acid Rain Program regulating NO_x emissions. Title IV of the 1990 Clean Air Act establishes requirements for the reduction of NO_x emissions from coal-fired electric generating units. Under the program, regulated electricity generators are permitted to select, among other options, an emissions averaging compliance alternative.[70] Companies opting to meet emissions requirements through emissions averaging comply by choosing to make a group of NO_x affected boilers subject to a group NO_x limit rather than meeting individual NO_x limits for each unit.[71] The Acid Rain NO_x program is a reasonable model upon which EPA may base a system-wide or pooled performance standard for mercury emissions. Should EPA decide to implement such a standard, an averaging technique similar to the one implemented in the Acid Rain NO_x program would be appropriate. The Acid Rain NO_x program's emissions averaging provision requires sources to demonstrate compliance based on the following equation:

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64 EPA, *Acid Rain Program: 2001 Progress Report* at 2 (Nov. 2002).

65 *Id.* at 12.

66 *Id.*

67 *Id.* at 5.

68 *Id.*

69 EPA reported a comparable compliance rate with the Acid Rain NO_x program. Of 1,045 affected sources, all but one failed to meet its NO_x emissions limits in 2001 – a compliance rate of 99.90%. *See id.* at 18.

70 *Id.* at 17.

71 *Id.*

$$\frac{\sum_{i=1}^{n}\left(R_{ai}\times HI_{ai}\right)}{\sum_{i=1}^{n}HI_{ai}} \le \frac{\sum_{i=1}^{n}\left(R_{li}\times HI_{ai}\right)}{\sum_{i=1}^{n}HI_{ai}} \qquad \text{(Equation 2)}$$

where:

R_{ai} = Actual annual weight averaged emission rate for unit i, lb/mmBtu, as determined using the procedures in part 75 of this chapter. For units in an averaging plan utilizing a common stack pursuant to § 75.17(a)(2)(i)(B) of this chapter, use the same NO_x emission rate value for each unit utilizing the common stack, and calculate this value in accordance with appendix F to part 75 of this chapter;

R_{li} = Applicable annual emission limitation for unit i lb/mmBtu, as specified in § 76.5, 76.6, or 76.7, except that for early election units, which may be included in an averaging plan only on or after January 1, 2000, R_{li} shall equal the most stringent applicable emission limitation under § 76.5 or 76.7;

HI_{ai} = Actual annual heat input for unit i, mmBtu, as determined using the procedures in part 75 of this chapter;

n = Number of units in the averaging plan.

40 C.F.R. § 76.11(d)(1)(ii)(A) (2003). This protocol for emissions averaging would be appropriate, with one change: the mercury emissions rate of a given unit should be weight-averaged by heat input before being averaged with other emissions units in the pool. Accordingly, R_{ai} should be defined as the actual annual weight averaged emission rate for unit i, lb/mmBtu, as determined using the procedures in Part 75 of Chapter 1, *except that each hour's emissions rate shall be prorated by heat input for that hour*. As with the Acid Rain Program, the "pool" of units could include units from two or more facilities under common ownership or operator control.[72]

As with the Acid Rain NO_x program, by giving sources of mercury emissions flexibility to meet emissions standards, EPA will address the risk of harm posed by such emissions as required by § 112(n), providing equivalent environmental benefits but reducing compliance costs by permitting sources to choose the most efficient means of compliance.

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[72] *See* 40 C.F.R. § 76.11(a) ("In lieu of complying with the applicable emission limitation in § 76.5, § 76.6, or 76.7, any affected units subject to such emission limitation, under control of the same owner or operator, and having the same designated representative may average their NO_x emissions under an averaging plan approved under this section.").

E. Conclusion

We appreciate the opportunity to submit this white paper in support of a system-wide performance standard for mercury emissions from electric utility steam generating units. Nothing in § 112(n) prohibits such an alternative; rather § 112(n) permits it because a system-wide or pooled performance standard will not affect the risk of harm to public health upon which EPA's authority to regulate is premised and which § 112(n) regulation is intended to ameliorate. Scientific data establish that the risk of harm associated with mercury emissions from power plants is almost exclusively due to the contribution of such sources to the mercury emissions global pool, not from hot spots near sources of emission. Therefore, a system-wide performance standard that does not affect the overall emissions reductions required by EPA would be entirely consistent with § 112(n)'s design to address the harm posed by mercury emissions. In addition, public policy favors the implementation of such a scheme. Use of cap-and-trade and source-wide emissions averaging in programs such as the Acid Rain Program demonstrates that such compliance alternatives achieve the desired environmental objectives at lower cost by giving sources flexibility to choose the most efficient means of compliance.