X. MONITORING AND AVERAGING

A. EPA Should Strengthen Its Monitoring Requirements

1. Continuous Emission Monitoring Systems Should Be Uniformaly Required

The compliance provisions, as drafted, allow monitoring by either continuous emission monitoring systems ("CEMS") or periodic testing of emissions and/or fuel, along with operational monitoring. The latter periodic approach is very complex, including a large and confusing array of options that may prove difficult to enforce. More importantly, the prescribed periodic testing is unlikely to result in continuous compliance; it does not require continuous testing of the subject HAPs, whose emissions are highly variable, even when the operating parameters monitored as surrogates by EPA remain steady. Typically, only monthly or every other month emission testing is required, coupled with monitoring of operating parameters and an annual or every five year checkup to confirm relationships between HAP emission, surrogates, and operating parameters.

The frequency of testing should depend upon the variability of each parameter. When a parameter is variable, more frequent monitoring is required to assure continuous compliance; as a rule, where a parameter fluctuates significantly over a period of time shorter than the specified monitoring interval, the monitoring cannot assure continuous compliance.

EPA's proposed limits are heavily premised upon the claim that the regulated emissions are very highly variable – this is, in essence, the justification for the Agency's use of extraordinarily aggressive statistical adjustments. EPA's calculations predict emissions from existing sources which range from 2 to 56 times greater than the average data yielded from a test. For new sources, EPA's calculations predict emissions from 2 to 6 times greater than the average. *See* Table X-1, below. And according to EPA's

beyond-the-floor analysis (or lack thereof) there are no operational methods available to reduce that variability. Given the unavoidable variation, continuous compliance cannot be determined using the periodic testing proposed in the rule. If emissions vary by a factor of 2 to 50 (or more), and there is no method available to reduce that variability, direct measurement of emissions every month (or every other month) with annual to every five year re-tests, will not ensure continuous compliance between those tests.[1]

The monitoring of operational parameters as proposed under some scenarios does not assure continuous compliance with emissions limits that are only measure annually or every five years. The amount of each HAP that is emitted ultimately depends on the amount in the coal, which is not tested more frequently than monthly (or upon a change of fuel type) under any of the compliance scenarios. The HAP content of fuel is highly variable even within fuel types.[2]

Stack emissions should be directly monitored continuously to assure continuous compliance. Continuous emission monitoring systems directly measure stack emissions and exist for all of the regulated HAPs as well as most of the surrogates. There is, accordingly, no reason to depart from CEMS-based monitoring. All of the direct metal HAP parameters can be

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[1] If, on the other hand, operational constraints can reduce emissions variability, EPA has erred by failing to include such operational methods in a beyond-the-floor analysis.

[2] G.D. Stricker and M.S. Ellis, Coal Quality and Geochemistry, Powder River Basin, Wyoming and Montana, U.S. Geological Survey Professional Paper 1625-A, 1999, available online at http://pubs.usgs.gov/pp/p1625a/; Harold J. Gluskoter and O.W. Rees, Chlorine in Illinois Coal, Illinois State Geological Survey, Circular 372, 1964 (Attachment X-1); David A. Tilman and others, Chlorine in Solid Fuels Fired in Pulverized Coal Boilers – Sources, Forms, Reactions and Consequences: A Literature Review, Fuel Quality Conference, September 28 - October 3, 2008 (Attachment X-2).

monitored by CEMS. The Xact CEMS[3] measures all subject non-Hg metallic HAPs including Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, and Se using reel-to-reel filter tape sampling and nondestructive x-ray fluorescence (XRF) analysis. Vapor phase and particulate metals are deposited on the tape and measured continuously. The Xact 640 CEMS, available from Pall Corp., was the first multi-metal CEMS verified through the EPA ETV program.[4] The EPA has approved the Xact 640 CEMS as an alternative method for periodic Method 29 testing (required in the draft EGU MACT regulation) for hazardous waste incinerators.

Total PM, comprising the sum of filterable PM (Method 5) and condensable PM (Method 202), is proposed as a surrogate for non-Hg metal HAPs. As discussed above, we believe that total PM is not an appropriate surrogate for non-Hg metal HAPs – especially since the individual HAPs can be accurately measured by CEMS. However, if EPA retains total PM as a surrogate, a PM CEMS should be required, not optional, to determine compliance. PM CEMS have been required in Consent Decrees and PSD permits to determine compliance, and are in wide use at EGUs.

For SO2 and HCl, EPA's proposal endorses both SO2 and HCl CEMS as methods to determine compliance. We support the use of SO2 and HCl CEMS and believe they should be required, rather than presented as an

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[3] Single Sample Producing Multi Element Measurements (Attachment 11-), available at: http://cooperenvironmental.com/wp-content/uploads/2010/01/Technical-Spotlight-1.pdf.

[4] Xact 640 Monitoring System - Multi-Metal Continuous Emissions Monitoring System, available at: http://www.pall.com/industrialmaterials_54712.asp; EPA, Environmental Technology Verification Report, Cooper Environmental Services XCEM Multi-Metals Continuous Emission Monitor, May 2002, available at: http://www.epa.gov/etv/pubs/02_vr_cooper_xmcem.pdf.

option. HCl CEMS are available, and have been demonstrated to be accurate at the levels required to monitor compliance with the prescribed limits. Exs. 11-a & b.

2. The Standard And Compliance Averaging Times Should Be Consistent

The proposed MACT emission limits were estimated from 1-hour test data by adjusting average concentrations using a 99% upper prediction limit (UPL), rounding up, and otherwise significantly increased – nominally to address HAP emission variability.

The manipulations used to estimate the MACT standards – a 99% UPL, rounding, and miscellaneous other adjustments – result in MACT standards for existing sources that range from 2 to 56 times greater than the average of the same data, and for new sources from 2 to 6 times greater than the average. *See* Table X-1, below. EPA proposes compliance be measured by a straightforward average of three tests, for all parameters not measured by CEMS.

As an initial matter, by comparing *average* emissions of any sort with a standard based upon an 99% Upper Prediction Limit (UPL), EPA departs from the statutory requirement: ensuring that air toxics emissions are no higher than those of the best performing source sources. The 99% UPL is designed to assure that all future measurements fall below the predicted value, with 99% confidence. In other words, the UPL estimates what future values will be, based on present and past values, providing a number higher than future measurements (with a high degree of certainty). EPA's Upper Prediction Limit thus aims at a number that *exceeds* the actual emissions of the best-performing plants from which it is calculated. Any exceedance of the UPL represents pollution in excess of that of those best performing plants.. EPA should not, therefore, permit owners to compare *average* emissions with a standard based upon the UPL; *all* emissions must remain below the UPL,

in order for EPA's standards to remain consistent with the statutory standard.

Table X-1
Ratio of the Proposed Standard for Existing and New Units to the Average of Measured Values

	EXISTING UNITS Ratio of Standard to Average	NEW UNITS Ratio of Standard to Average
Acid Gases		
HCl	9.1	2.3
HF	4.7	2.9
SO_2	2.7	5.6
Non-Hg Metal HAPS		
PM total	2.3	4.6
Metal total	2.7	1.4
Antimony (Sb)	2.9	5.2
Arsenic (As)	4.9	1.6
Beryllium (Be)	4.1	2.9
Cadmium (Cd)	3.0	5.0
Chromium (Cr)	2.3	4.8
Cobalt (Co)	2.8	5.2
Lead (Pb)	3.7	3.1
Manganese (Mn)	3.0	1.5
Nickel (Ni)	2.8	2.9
Selenium (Se)	3.4	2.3
Mercury		
Mercury - All coal	56.5	3.5
Mercury - Coal > 8,300 Btu/lb	56.5	3.5
Mercury - Coal < 8,300 Btu/lb	9.9	3.2
Mercury - ACI	37.9	2.4

Further, fidelity to the statute requires compliance to be measured according to the same basic form and averaging convention whose variability EPA assessed to establish the underlying standard. The variability of

emissions measured over one hour is higher than variability of emissions over thirty operating days. In other words, the worst-case emissions over one hour are higher than the worst-case emissions over a longer period; a standard measured over a thirty-operating-day average, accordingly, cannot be based on worst-case one-hour emissions, without permitting emissions in excess of even the worst-case emissions of the best-performing sources.

The proposed compliance provisions essentially account for variability multiple times – through EPA's statistical manipulations, the use of long averaging times, and the use of boiler operating days – resulting in standards that fail to ensure that EGUs' air toxics emissions are no higher than those of the best performing source or sources. *See* 42 U.S.C. § 7412(d). The EPA proposes to measure compliance using a 30-day rolling average based on a boiler operating day for Hg, SO2, and HCl when measured by CEMS. 76 Fed. Reg. at 25,031. A 30-day rolling average based on boiler operating day dampens out the variability assumed in standard development. For other parameters, the average of three tests is proposed to determine compliance – absent rounding, or any other of the manipulations EPA applies to the test data used to calculate its standards. The result is a standard which permits emissions well in excess of that of the best-performing sources.

3. No Compliance Monitoring Is Required During Startups, Shutdowns, and Malfunctions

Sources must comply with emission standards at all times, including start-up, shut-down and malfunction. *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008). The monitoring provisions do not require any testing during periods of startup, shutdown, and malfunction and thus provide no means to determine if the standards are met during these periods.

EPA's proposal states that the standards apply at all times and that startups and shutdowns are accounted for by requiring the use of "a default

diluent value of 10.0 percent O2 or the corresponding fuel specific CO2 concentration for calculating emissions in units of lb/MMBtu or lb/TBtu during startup or shutdown periods." 76 Fed. Reg. 25,028. This does not assure continuous compliance during these periods.

First, EPA's proposal does not define startup, shutdown, or malfunction. Second, the Proposal does not require any testing during these periods. So even assuming the diluent requirement would address SSM, it would never have to be used as no SSM testing is required. Third, the Proposal does not explain how the use of a default diluent value would account for periods of SSM , even if testing occurs. Fourth, the Proposal does not explain how these diluent values were selected, nor why EPA believes they address SSM. Fifth, during these events organic HAP emissions are known to increase for short periods due to low boiler combustion temperatures, poor mixing, and low excess oxygen levels. The Proposal is silent as to how an annual tuneup would assure organic HAP emissions remain controlled during these periods.[5]

4. The Agency Should Discard its "Low Emitting Units" Monitoring Protocols.

The proposed rule defines as "a low emitting" EGU (LEE), a unit whose performance test data is less than 50% of the appropriate emission limit for non-mercury HAP, and less than 10% of the mercury limit (or less than 22.0 lb/yr to qualify). 40 C.F.R. § 63.10005(k). Because EPA's standards are based upon a 99% UPL – that is, a level that exceeds the tested emissions of the plants in EPA's dataset – a majority of plants should be able to generate test data sufficient to claim such "low emitting" status. As

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[5] The section of the proposed regulation that includes the default diluent language appears to be in a mis-numbered section of the proposed regulation. It is found at FR 25106 in Sec. 63.10005(k), Low Emitting EGUs, in the second numbered paragraph (1). This appears to be a location error. It is not obvious where this paragraph should be located.

summarized in Table X-1, EPA's proposed MACT standards exceed the tested emissions of the plants for which EPA has data by the ratio greater than 2 for all non-mercury HAPs (i.e., the tested emissions are below 50% of the standard), and greater than 10 for mercury (i.e., tested emissions are less than 10% of the standard). As a result, almost all existing and new units will likely be able to exempt themselves as LEEs; in combination, EPA's variability adjustments and LEE exemption allow most units to avoid any significant monitoring of emissions.

The unavoidable variability claimed by EPA, moreover, indicates that plant emissions range as much as 50 times higher than the results of a three-run test. As a result a plant with test data at 50% of the proposed standard will likely – indeed, almost certainly – exceed the prescribed limit during its operations. Yet the only compliance monitoring required for an LEE is an initial performance test, and subsequent check-up performance tests every 5 years, coupled with monthly fuel sampling. That monitoring provides no assurance of continuous low-HAP emissions. Fuel sampling would reveal no information about HCN, which is a byproduct of combustion and cannot be inferred from fuel sampling. Further, fuel sampling would disclose no information about HAPs that did not originate in the fuel. Additives, such as PVC, are sometimes blended with the fuel to facilitate mercury control. Metals are present in the reagents (limestone, lime) and water used in scrubbers. Metals are also released from the boiler, duct work, and control systems. These would not be detected by fuel sampling.

Monthly fuel testing does not assure continuous compliance. As explained above, EPA's variability analysis indicates HAP emissions are variable. Monthly testing does not reveal any information about emissions between the monthly tests. The LEE monitoring should be expanded to require operational parameter monitoring as required for all other compliance testing. Further, monthly fuel sampling further excludes emissions during startup and shutdown.

The LEE exemption should be eliminated, or the threshold re-defined to capture only those plants whose future emissions are assured to remain below the prescribed limits.[6]

5. EPA Should Strengthen its Monitoring of Acid Gas Emissions.

The compliance provisions for acid gases include periodic performance testing in which the surrogate, regulated pollutants, and operating parameters are monitored for three cases: (1) no CEMS and no SO2 controls; (2) no CEMS and SO2 controls; and (3) CEMS and SO2 controls. However, no periodic performance testing and operating parameter monitoring are specified for units that use CEMS but have no controls – an entirely possible scenario, given EPA's proposed limits.

6. EPA Should Strengthen Its Monitoring for Non-Mercury Metals.

The compliance provisions specify periodic performance testing in which the surrogate, regulated pollutants, and operating parameters are monitored for two cases: (1) no PM CEMS with PM controls and (2) no PM CEMS with no PM controls. However, if a PM CEMS is used, regardless of whether the units is equipped with PM controls, no operational or non-Hg metal HAP monitoring is required except during an every 5-year performance test. This is inadequate to determine continuous compliance. Further, it does not provide any testing for metals present as gases or condensables. Thus, HAPs such as selenium, which EPA admits is frequently present in the gases, would not be measured either directly with Method 29 or indirectly through a surrogate when PM CEMS is used to determine compliance. Finally, initial performance compliance provisions are missing from Table 5 for PM CEMS.

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[6] If EPA were to provide reduced monitoring for certain low-emitting units, it should use an Upper Prediction Limit for its thresholds. If data from a unit indicates that the 99% UPL of that units' emissions are below 10% of the MACT limit, EPA can be reasonably assured that that unit's future emissions will be below that threshold.

7. EPA Should Strengthen Its Compliance Requirements for Organic HAP.

The proposed regulation does not set a specific emission limit for any organic HAP, nor does it require any chemical specific compliance testing. Rather, it sets a work practice standard of an annual boiler tune-up, which can be conducted at intervals of up to 18 months to accommodate routine maintenance shutdowns. 76 Fed. Reg.25,046.

A boiler tune-up is not adequate to assure continuous minimization of organic HAP. The work practice standard assumes that all organic HAPs are created by incomplete combustion. This assumption is incorrect, as discussed elsewhere in these comments – especially for dioxins which are formed after the combustion process and whose emission rate depends in part of coal chlorine content. However, setting aside this issue, and assuming arguendo that organic HAPs originate from incomplete combustion, an annual boiler tune-up is not adequate. The work practice standard should require that all subject EGUs install real-time software to continuously optimize boiler combustion and soot cleaning. These systems continuously monitor the combustion process to determine the optimal balance of fuel and air flows in the furnace to position dampers, burner tilts, overfire air and other controllable parameters at their optimal setting. These systems are already in widespread use throughout the utility industry and have the added benefit of improving efficiency, thus reducing operating costs.[7]

B. EPA Should Not Permit Units to Average Emissions.

EPA proposes "that owners and operators of existing affected sources may demonstrate compliance by emissions averaging for units at the affected

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[7] *See, e.g.*, Rob James and Peter Spinney, Boiler Optimization and SCR Systems: Reducing NOx, Managing Tradeoffs, Power Engineering, July 2008, pp. 102 – 108 (Attachment X-3).

source that are within a single subcategory," so that units would be allowed to "emit[] above the proposed emission limit" so long as "other affected units at the same facility . . . are emitting below the proposed emission limit." 76 Fed. Reg. at 25,053. Such averaging is contrary to the Act, and the central principles underlying Section 112.

The proposed averaging would allow some coal- and oil-fired units to emit HAP in excess of the promulgated standards (so long as a neighboring unit operates below the standards) – a result prohibited by Section 112. Section 112 states that "[a]fter the effective date of any emissions standard . . . promulgated under this section and applicable to a source, no person may operate such source in violation of such standard" unless the Agency provides a more lengthy compliance schedule. 42 U.S.C.§ 7412(i)(3). *See also* 42 U.S.C. 7412(i)(1) (no person may construct "any" new source that does not meet standard). Section 112 incorporates Section 111's definition of "stationary source," as "*any* building, structure, facility, or installation which emits or may emit any air pollutant." Each coal- or oil-fired unit is, under that definition, a "stationary source"; and each coal- or oil-fired unit must, accordingly, satisfy the promulgated standards.

The Agency's discretion to construe the word "source" under the Act is constrained by the congressional policies underlying Section 112. *Chevron, U.S.A. v. Natural Resources Def. Council,* 467 U.S. 837, 866 (1984). Congress intended, in Section 112, to ensure the maximum reduction of hazardous air pollution. To that end, it constrained the Agency's ability to balance pollution-reduction with economic considerations. *See* 42 U.S.C. § 7412(d). Especially where – as here – the Agency has set most standards at the statutory minimum, Section 112 does not allow the agency to permit additional pollution in order to ease compliance. *See* 40 C.F.R. § 63.41 (sources may not average emissions to avoid compliance with Section 112 standards).

If EPA disregards the language and purpose of Section 112, and permits averaging, it should add a "discount factor" requiring lower emissions from plants which comply by averaging the emissions of multiple units. *See* 76 Fed. Reg. at 25,053 (discussing use of such discounting provision). The Agency's standards, as discussed elsewhere, have been aggressively inflated – purportedly to address variability in emissions. The Agency's variability analysis is based on emissions from three test runs from a single boiler, operating over a two (mercury and PM) or three (acid gases) hour period.[8] By allowing averaging, EPA is effectively allowing compliance to be measured based upon a far larger number of test runs, and operating hours – over which there will be far less variability. It thereby allows sources to emit hazardous pollution well in excess of the actual emissions of the best performing similar plant or plants (as EPA has defined those "actual emissions").

EPA should, as a general matter, establish standards that are consistent in their form with those the Agency uses when it assesses variability; its standards will not otherwise reflect the performance of the best source or sources. In this instance, if EPA allows units to combine their emissions for purposes of compliance, it should re-calculate the variability associated with multiple-unit emissions, and establish a corresponding "discount" in the standards for multiple units.

For example, for existing sources burning coal of greater than 8300 Btu/lb, EPA has calculated its UPL based on emissions from a single coal-fired unit at 1.18lb/Tbtu. For two units' emissions, EPA's UPL formula yields a lower floor: 0.85 lb/Tbtu. For three units, the UPL is .71 lb/Tbtu. For the category as a whole, the reduced variability of multiple units' average emissions results (by our calculation) in the following predicted emissions:

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[8] EPA's UPL formula includes amongst its variables the number of units used to calculate the average, as well as the number of runs. 76 Fed. Reg. at 25,042.

Table X-2

Effect of Multiple Units on 99 UPL - Existing Units for Coal>8300 Btu/lb Subcategory						
	Pollutant					
# Units	Mercury		PM		HCl	
	Value	Units	Value	Units	Value	Units
1	1.18	lb/TBtu	0.0264	lb/MMBtu	0.00125	lb/MMBtu
2	0.85	lb/TBtu	0.0221	lb/MMBtu	0.00095	lb/MMBtu
3	0.71	lb/TBtu	0.0202	lb/MMBtu	0.00082	lb/MMBtu

Note: Does not include rounding or the 3xMDL methodology that EPA has used in determining floors.

At a minimum, if EPA chooses to allow units to comply with average emissions, it should apply thusly reduced limits to such units, to reflect the reduced variability in multiple units' average emissions. The Agency's limits cannot otherwise be plausibly described as reflecting the actual emissions of the best performing sources.

The Agency should, moreover, make clear that emissions from units that are shut-down or otherwise non-operational cannot be used to permit adjacent units to exceed MACT standards. As a practical matter, averaging with non-operational units would allow emissions vastly exceeding the proposed standards. And as a legal matter, units that are not operating cannot be properly described as "sources" for purposes of Section 112. *See* 42 U.S.C. § 7411(a)(3) (sources are those which emit air pollutants). Finally, if the Agency retains its "Low Emitting EGU" provisions, units utilizing that relaxed compliance mechanism should not be allowed to average their emissions. The relaxed monitoring associated with such units would render it impossible to ensure continuous compliance, were compliance permitted on an average basis. Nor should LEE units be allowed to average emissions with other units; doing so would effectively permit averaging between units subject to different standards, and destroy the homogeneity which the Agency recognizes as a minimum prerequisite to averaging between units. 76 Fed. Reg. at 25,053.