RTI INTERNATIONAL | Memorandum

Date: November 16, 2012

Subject: Reconsideration of the National Emission Standards for Hazardous Air Pollutants (NESHAP) Maximum Achievable Control Technology (MACT) Floor Analysis for Coal- and Oil-fired Electric Utility Steam Generating Units, Proposed Rule

From: Stephen M. Boone (RTI International)

To: Bill Maxwell and Nick Hutson
OAQPS/SPPD/ESG (D243-01)
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

I. Introduction

On February 16, 2012, the U.S. Environmental Protection Agency (EPA) published final rules entitled "National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units" (77 FR 9304). This rule is commonly referred to as the Mercury and Air Toxics Standards (MATS). Subsequently, on July 20, 2012, the EPA announced plans to reconsider certain standards applicable to new sources under the MATS.

Section 112 of the Clean Air Act (CAA) requires that the EPA establish National Emission Standards for Hazardous Air Pollutants (NESHAP) for the control of the hazardous air pollutants (HAP) emitted from new sources in a source category. CAA section 112(d)(2) requires that these standards reflect the maximum degree of reduction in HAP emissions that "the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable…." These standards are commonly referred to as "Maximum Achievable Control Technology" or "MACT" standards.

CAA section 112(d)(3) states that MACT standards for new sources may not be "less stringent than the emission control that is achieved in practice by the best-controlled similar source, as determined by the Administrator." In setting the minimum stringency level, or "MACT floor," EPA uses available emission data or other information from the best performing source for each HAP or HAP surrogate in the source category. After EPA establishes the MACT floor, it considers the costs and non-air quality health and environmental impacts and energy requirements to determine whether a more stringent, or "beyond-the-floor," level of control should be established.

This memorandum describes the EPA's process for establishing the new source MACT floors in the proposed reconsideration rule "Reconsideration of Certain New Source and Startup/Shutdown Issues: National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-

Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units."

II. Scope of Reconsideration of New Source Standards

As stated in the preamble to the proposed reconsideration rulemaking, the EPA is reconsidering certain new source standards. Specifically, the EPA is proposing new source standards for the identified HAP or HAP surrogates in the following subcategories (using the same subcategory numbers as were used in docket entry EPA-HQ-OAR-2009-0234-20132):

1. Subcategory 1 – New EGUs designed to burn a coal having a calorific value (moist, mineral matter-free basis) of greater than or equal to 19,305 kJ/kg (8,300 Btu/lb) that are not coal-fired EGUs in the "unit designed for low rank, virgin coal" – particulate matter (PM), hydrochloric acid (HCl), mercury (Hg), sulfur dioxide (SO_2), lead, and selenium.

2. Subcategory 2 – New EGUs designed to burn and burning nonagglomerating virgin coal having a calorific value (moist, mineral matter-free basis) of less than 19,305 kJ/kg (8,300 Btu/lb) that are constructed and operated at or near the mine that produces such coal – PM, HCl, SO_2, lead, and selenium.[1]

3. Subcategory 4 – New EGUs located inside the continental United States that burn liquid oil and have an annual oil-fired capacity factor of greater than or equal to 8 percent – PM

4. Subcategory 7 – New EGUs that burn solid oil-derived fuel – PM and SO_2.

In the December 16, 2011, final rule, the EPA used the stack test data with the lowest emission average submitted by each respondent to the MATS Information Collection Request (ICR) to identify the best performing similar source for each HAP or HAP surrogate. The EPA then calculated the new source MACT floors in the final rule using only the single best stack test available for the best performing sources, even if multiple tests were available for the best performing sources. During reconsideration, the EPA considered all available data in the record for the best performing sources when establishing the MACT floors for the proposed new source limits.

The EPA used the following approach in establishing new source MACT floors for the HAP or HAP surrogate standards that are being proposed in this reconsideration rulemaking:

Step 1. All available stack test data points (typically based on 3-run test averages) from the MATS ICR were ranked from lowest to highest for each HAP or HAP surrogate for each EGU in each subcategory (e.g., Subcategory 1- EGUs designed to burn a coal having a calorific value (moist, mineral matter-free basis) of greater than or equal to 19,305 kJ/kg (8,300 Btu/lb) that are not coal-fired EGUs in the "unit designed for low rank, virgin coal").

[1] Subcategory 1 and 2 identified above have the same limits for PM, HCl, SO_2, selenium, and lead. Only the Hg limits are different between the two subcategories, and, as stated in the preamble to the proposed rule, EPA is taking comment on whether to revise the new source Hg limit for Subcategory 2

Step 2. For each EGU within a given MACT floor data set (i.e., subcategory), the stack test data point with the lowest emissions rate for the relevant pollutant was determined and placed in a separate data set.

Step 3. This separate data set was then ranked, with the highest ranking source (No. 1) defined as the member of the subcategory with the lowest reported "single-test 3-run average" emissions rate.

Step 4. As part of selecting the best performing similar source, we evaluated the design of the unit and other aspects of the unit, including air pollution control equipment, to assess whether the unit was comparable to units built recently that are complying with all federal requirements, including the pre-construction requirements under the EPA's New Source Review (NSR) program codified at 40 CFR 52.21 and 40 CFR 51.166. The NSR program includes requirements for new EGUs to achieve "the maximum degree of reduction" of regulated air pollutants, including particulate matter and sulfur dioxide (which are both HAP surrogates). The EPA undertook this analysis because in certain situations the controls for one pollutant can increase the emissions of, or negatively impact the control of, other pollutants. For example, for PM, if the highest ranked source did not have advanced flue gas desulfurization (FGD) system for SO_2 control, the source was eliminated from consideration as the unit that demonstrates the level of control that could be achieved by a new EGU, because state-of-the-art FGD systems can add PM to the flue gas stream. We also eliminated stoker units as we did not believe that they represented the type of new boiler technology that is likely to be built in the future.

Step 5. All available data for each best similar source were reviewed to determine if there were any quality assurance (QA) issues with the data for the unit. Data sets were evaluated using Tukey's test to determine statistical outliers. Test data sheets were also evaluated to ensure that all method-specific QA measures were met during sampling. Data that did not pass QA measures within a relevant EPA reference method were not used to determine the MACT floor.

Step 6. This step was dependant on the quantity and type of data available in the record for the best performing source. If data from three or more stack tests were available for the best performing source, test averages (typically the average of 3 runs) were used in the MACT floor calculations. If data from less than three stack tests were available in the record (i.e., one or two stack tests were available), data from the individual test runs were used in the MACT floor calculations.

Step 7. Each set of run averages or test averages was evaluated for Kurtosis and skewness to determine if the data set for the best performing source was normally distributed. If these tests indicated the data set was normally distributed, the data set was treated as normally distributed in subsequent upper predictive limit (UPL) calculations. If either of these tests indicated the data set was not normally distributed, the data set was log transformed, and the log transformed data set was evaluated for Kurtosis and skewness. If these tests indicated the data set was log-normally distributed, the data set was treated as log-normally distributed in subsequent UPL calculations. If either

of these tests indicated the log transformed data set was not log-normally distributed, the data set was treated as non-normally distributed in subsequent UPL calculations.

Step 8. After completing the determination of the type of data distribution for the best performing source's data set, the data set was input to the series of calculations necessary to calculate the UPL as discussed on pages 5-9 of the MACT Floor Memo published at promulgation; the memo can be viewed in the rulemaking docket (EPA-HQ-OAR-2009-0234) and at the following link: http://www.epa.gov/ttn/atw/utility/a1_egu_mact_floor_memo_121611.pdf

Step 9. For each pollutant, the results of the UPL calculation were compared to the emission limit value determined to be equivalent to 3 times the representative detection limit (3xRDL) of the relevant performance test method(s). If the calculated UPL value was less than the emission limit value determined to be equivalent to 3xRDL value, the 3xRDL value was used as the basis for the standard because the 3xRDL value provides the lowest emission rate that can be measured using the performance test method while maintaining a relative method precision on the order of 10 to 20 percent of the measured value. If the UPL value was equal to or greater than the 3xRDL value, then the UPL value was used as the basis for the standard. See "Data and procedure for handling below detection level data in analyzing various pollutant emissions databases for MACT and RTR emissions limits" (docket entry EPA-HQ-OAR-2009-0234-20062) for a discussion of the RDL approach generally, and the memo "Determination of Representative Detection Level (RDL) and 3 X RDL Values for Mercury Measured Using Sorbent Trap Technologies" (docket EPA-HQ-OAR-2009-0234) for a discussion of our approach for establishing an RDL for Hg. The RDL and 3xRDL procedures are further described on pages 9 and 10 of the MACT Floor Memo at the link provided in Step 8.

Exhibit II-1 presents the 10 standards proposed for revision in the reconsideration rule.

Exhibit II-1: Reconsidered New Source Standards

Subcategory (Description)	HAP or Surrogate	Promulgated Standard[2]	Reconsidered Standard[2]	Best Performer	3xRDL[3]	Count of Tests or Runs	Data Distribution[4]
Subcategory 1 (New EGUs designed to burn a coal having a calorific value (moist, mineral matter-free basis) of greater than or equal to 19,305 kJ/kg (8,300 Btu/lb) that are not coal-fired EGUs in the "unit designed for low rank, virgin coal") and **Subcategory 2** (New EGUs designed to burn and burning nonagglomerating virgin coal having a calorific value (moist, mineral matter-free basis) of less than 19,305 kJ/kg (8,300 Btu/lb) that are constructed and operated at or near the mine that produces such coal)	Filterable PM	7.0E–3 lb/MWh (3xRDL)	9.0E-2 lb/MWh (UPL)	Springerville Unit 3	6.40E-3 lb/MWh	5 Tests	Lognormal
	Lead (Pb)	2.0E–3 lb/GWh (3xRDL)	3.0E-2 lb/GWh (UPL)	Weston Unit 4	2.0E-3 lb/GWh	6 Runs	Normal
	Selenium (Se)	6.0E–3 lb/GWh (3xRDL)	5.0E-2 lb/GWh (UPL)	Logan Unit B01	6.0E-3 lb/GWh	5 Runs	Non normal
	Hydrogen chloride (HCl)	4.0E–4 lb/MWh (3xRDL)	1.0E-2 lb/MWh[5] (beyond floor)	Logan Unit B01	4.0E-4 lb/MWh	6 Tests	Lognormal
	Sulfur dioxide (SO_2)	4.0E–1 lb/MWh (UPL)	1.0E0 lb/MWh (UPL)	Sandow Unit 5A	n/a	6 Runs	Lognormal
Subcategory 1 (New EGUs designed to burn a coal having a calorific value (moist, mineral matter-free basis) of greater than or equal to 19,305 kJ/kg (8,300 Btu/lb) that are not coal-fired EGUs in the "unit designed for low rank, virgin coal")	Mercury (Hg)	2.0E–4 lb/GWh (UPL)	3.0E-3 lb/GWh (3xRDL)	Nucla Unit 1	3.0E-3 lb/GWh	3 Tests	Normal

[2] The standard is derived either from the UPL calculation, from the 3xRDL comparison, or from a beyond-the-floor analysis.
[3] 3xRDL: This value reflects the lowest emission rate that can be measured using the performance test method while maintaining a relative method precision on the order of 10 to 20 percent of the measured value. The 3xRDL value is calculated based on a standard diluent concentration and an F-factor of 9,780. There was no SO_2 data below the detection limit so no SO_2 RDL was calculated.
[4] Data Distribution Type: This is the data distribution of the sample set of runs or tests used in the MATS statistical analysis.
[5] Beyond-the-floor values; the calculated UPL floor value was 2.0E-2 lb/MWh.

Subcategory 2 (New EGUs designed to burn and burning nonagglomerating virgin coal having a calorific value (moist, mineral matter-free basis) of less than 19,305 kJ/kg (8,300 Btu/lb) that are constructed and operated at or near the mine that produces such coal)	Mercury (Hg)	4.0E–2 lb/GWh (UPL)	3.0E-2 lb/GWh[6] (UPL)	Sandow Unit 5B	3.0E-3 lb/GWh	6 Runs	Normal
Subcategory 4 (New EGUs located inside the continental United States that burn liquid oil and have an annual oil-fired capacity factor of greater than or equal to 8 percent)	Filterable PM	7.0E–2 lb/MWh (UPL)	4.0E-1 lb/MWh (UPL)	Port Everglades Unit PPE3	6.40E-3 lb/MWh	4 Tests	Non normal
Subcategory 7 (New EGUs that burn solid oil-derived fuel (e.g., petroleum coke-fired units))	Filterable PM	2.0E–2 lb/MWh (UPL)	3.0E-2 lb/MWh (UPL)	Northside Unit 1A	6.40E-3 lb/MWh	3 Tests	Normal
	Sulfur dioxide (SO_2)	4.0E–1 lb/MWh (UPL)	1.0E0 lb/MWh (UPL)	Hanford Unit CB1302	n/a	6 Tests	Normal

[6] As stated in the preamble to the proposed rule, EPA is taking comment on whether to revise the Hg limit for Subcategory 2 based on the additional data in the record.