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September 6, 2002

Mr. William Maxwell, P.E.
Environmental Engineer
U. S. Environmental Protection Agency
Office of Air Quality Planning and Standards
109 T. W. Alexander Drive, C439-01
Research Triangle Park, North Carolina 27711

Re: Statistical Analysis of Mercury Test Data Variability

Dear Bill:

As the subcommittee moves toward developing its report to the full Clean Air Act Advisory Committee, a great deal of clarification and analysis regarding Mercury MACT has been accomplished. This letter is submitted to identify a critical aspect of the MACT analysis that requires further clarification.

Based on the information on the EPA web site, and presented at various public meetings, EPA has recognized the need when computing the MACT floor to address the impact of test-test variability and unit-unit variability. Indeed, after considering all comments, it now appears that the Agency is properly addressing test-test variability. The EPA approach to unit-unit variability is, however, lacking in certain critical detail and accuracy. While EPA acknowledges the issue of unit-unit variability (also called "operational variability"), there has been a less than thorough analysis of "operational variability" in considering how to set the MACT floor. The result is that it appears that EPA is prepared to propose an upper confidence interval of the mean value for the best units as its MACT floor, without any real compliance margin for unit-unit variability. The current record indicates that a significant cause of expected operational variability will result from differences in coal quality; mercury and chlorine content. That aspect of variability is not fully addressed anywhere in EPA's record, and I believe this must be explicitly addressed in any presentation to the full Committee.

Based on the currently available materials, it appears that EPA has assumed that:

1. The best units are a population unto themselves and any unit to unit variability must come from the test results for those units; and,

2. The MACT floor is determined by a hypothetical "MACT unit" that is actually less variable than the population of best units. No real reason is apparent for the basis for these assumptions.

Unfortunately, the EPA database does not appear to fully consider the actual operational variability that will be encountered in the real world. This fact, however, does not mean that such variability can be ignored or underestimated in setting a MACT floor.

In summary, my review of the current record indicates:

1. EPA has adequately addressed test-test variability.

2. EPA has not fully considered (conceptually) or adequately allowed for (practically) the issue of unit-unit or "operational variability."

3. EPA has to define the MACT floor with due regard for the variability among the population of all units in its data set utilizing the MACT technology.

4. Unit-Unit variability must be estimated using a data set that is larger than just the best units so that it is adequately representative of the operational variability experienced in the industry.

5. Because of the need for utilities to be able to use coals of varying mercury and chlorine content, those two parameters in particular need to be addressed.

6. The full set of test data may be adequate for addressing operating variability of units with similar control methods but it is likely that coal characteristics (mercury and chlorine content) will need to be addressed separately, and the data base can be used to quantify this and other important aspects of operational variability.

A review of the best-performing units in the EPA database indicates one common control feature – they all have fabric filters. To this point, however, EPA has provided no technical means for distinguishing between performance exhibited in the test results for the units with fabric filters that are in the top 12% and those with fabric filters that are not in the top 12%. The units with the lower emissions rates may have performed better during their three tests because of the coal they were burning during those tests. They may have done better than other fabric filter units because of the operating conditions of the unit or the impact of ambient conditions during those three tests. It is important to remember that the three tests were not performed under randomly chosen conditions. Yet, the MACT floor must be achievable by these units, and other units with comparable fabric filters over a wide range of coal qualities and operating conditions. With these factors in mind, the following approach should be considered by EPA for calculating the MACT floor:

Step 1: Use the EPRI database on the effects of coal mercury and chlorine content on emission from units with fabric filters to establish a correlation between the emissions of fabric filter units and these two critical coal characteristics. That correlation can then be applied to the database test results for all units with fabric filters to adjust the test results to a common coal specification and in that way isolate the variability that is due to coal quality from the variability due to factors other than coal quality.

Step 2: Complete a variability analysis of the adjusted emissions rate data for all the units with fabric filters, isolating test-test variability and unit-unit variability. In this case the unit-unit variability that will be only that which is due to factors other than coal mercury and chlorine content.

Step 3: Determine the emissions rate that a fabric filter unit burning the standardized coal can meet with 99% confidence when both the test-test and the unit-unit variability are considered.

Step 4: Use the correlations derived in Step 1 and the emissions rate determined in Step 3 to create an equation that gives a MACT floor standard as a function of coal mercury and chlorine content.

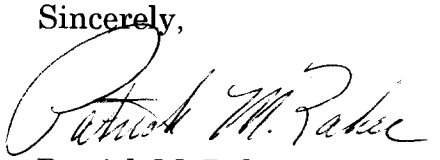
Step 5: Decide what the worst (from an emissions perspective) level of coal mercury content (high) and chlorine content (low) can be for reach type of coal.

Step 6: Use the equation in Step 4 and the characteristics in Step 5 to derive a standard for each coal type that allows the use of that worst-case coal for bituminous units, for sub-bituminous units and for lignite units.

Step 7: Apply the same approach to determining a floor expressed as percentage removal and set an alternative floor so that any standard based on the floor can be presented as an option of either meeting an emissions rate or a percent removal.

This approach should provide a reasonable estimate of a standard that the best-performing units can meet over a range of conditions and, therefore, would represent a defensible MACT floor. I look forward to discussing this approach with the subcommittee at our September 9, 2002 meeting.

Sincerely,



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