

DANCING THE EMISSIONS LIMITATION LIMBO: HOW LOW DARE YOU GO?

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ABSTRACT

After promulgation of the New Source Performance Standards (NSPS) and Emissions Guidelines (EG) for Large and Small Municipal Waste Combustors (MWCs), the Environmental Protection Agency (EPA) entered a new regulatory arena – regulating the remaining risks to public health and the environment after Maximum Available Control Technology (MACT) is applied. The residual risk from MWCs is expected to be negligible; however, the public, and some state and local regulators are now looking for ways to assure continuation of the exemplary emissions performance being measured at many of these retrofit sources. Hence, the question now becomes: how low can an achievable emissions limitation be?

Confidence should not be placed in a source's ability to continually meet the low emissions limitations embodied in the MWC EGs and NSPSs. Contrary to assertions in the Response to Comments for the Small MWC regulations [1], the Environmental Protection Agency could not have properly considered and incorporated measurement uncertainty into its dioxin guidelines; no one knew the uncertainty of total dioxin measurements above 28 ng/dsm³ corrected to 7 percent O₂ until 2001 when the work supporting this paper was performed. When the 13 ng/dsm³ corrected to 7 percent O₂ NSPS for MWCs was developed, the data needed to determine measurement uncertainty of most Section 129 pollutants had not even been collected. Further, asserting that the data used to derive the NSPS emissions limitations include measurement error, and therefore, any data-derived emissions limitations inherently consider that error, is only true if the measurement error is much smaller (say less than 10 percent) than the short and long term variations in emissions performance.

Beginning with a set of three total dioxin measurements that averaged 4 ng/dsm³ corrected to 7 percent O₂, the emissions limitation meeting the 95 percent statistical confidence level criterion underlying many NSPS, is almost 15 ng/dsm³ corrected to 7 percent O₂. If the statistical criterion is changed to inclusion of "almost all" the expected results when these facilities continue to emit as they did during the original data ac-

quisition, the emissions limitation becomes almost 18 ng/dsm³ corrected to 7 percent O₂. Consequently, sources must not agree to standards that do not properly consider measurement method precision if they want to avoid exceedances when everything is working properly.

HOW THICK IS THE BAR?

In February 2001, the American Society of Mechanical Engineers Center for Research and Technology Development published the Reference Method Accuracy and Precision (ReMAP) report [2]. It documents the first objective of the ReMAP project – a procedure for determining expanded measurement uncertainty (the range within which repeated measurements of a sample are likely to reside) given the unique characteristics of stack testing. The ReMAP report also assembles the available data and provides the expanded uncertainty (the range of results likely to be encountered due to random error) derived from using specific methods.

Monte Carlo Simulation (MCS) was used to upgrade the traditional ReMAP procedure because some of the inherent statistical characteristics of the data differ from those implicitly assumed in the traditional ReMAP procedure.

MCS can be thought of as writing each possible value on the number of slips of paper equal to the chance that it will be realized. The slips are put into a fish bowl and thoroughly mixed. A slip is pulled out and the number used. The slip is returned to the jar and another number drawn. For example, to simulate 3-run testing, this process is repeated three times and the "test" average is computed by averaging the three draws. Repeating this entire process many, many times generates a distribution of the likely results. This distribution describes interesting percentage points such as the value unlikely to be exceeded – the achievable emissions limitation.

I determined the statistical characteristics and expanded uncertainty of total (sum of tetra- through octa-polychlorinated dibenzo-p-dioxins and dibenzofurans), and International (ITEQ) and World Health Organization (WHO₉₈) toxic equivalent dioxins. The uncertainty