

systematic error, into the sampling procedure. In the context of an aggregate of data collected by different personnel using different procedures and different equipment under different physical conditions, this bias could have the effect of increasing the variability of the data. The emissions sample results for the five turbines evaluated for the proposed rule were provided by state agencies, and samples were not collected by the same sampling personnel, or even personnel acting in coordination with one another and following the same sampling plan and methodologies, increasing the non-systematic sampling-induced variability across the five sets of turbine samples and also increasing the chance that any bias imposed on each set of turbine samples might also increase the variability of the results. Moreover, two different sampling and analysis procedures were used to collect the samples, EPA Method 0011 and CARB Method 430, likely introducing additional variability into the sampling procedure. For example, EPA generally recognizes that the quality assurance/quality control (QA/QC) protocols for CARB Method 430 are more rigorous than those for EPA Method 0011. Similar to sampling variability, variability occurs when samples are analyzed at the same time in the same laboratory (e.g., variability is seen in the results of a laboratory's repeated analysis of the same sample) and occurs when samples are analyzed by different laboratories. For example, analytic variability may result from the use of different analytical procedures, different equipment, different laboratory environments, different reagents, different sampling handling procedures, and different analysts. The emissions samples evaluated for the proposed rule were analyzed in different laboratories, by different analysts, and using two different analytical procedures. The EPA suspects that sampling and analytic variability may be a significant source of the variability of formaldehyde emissions results reported for the five tested turbines, and that if stricter QA/QC protocols were followed, the results for the five turbines might have been closer in magnitude.

One measure of overall variability (*i.e.*, variability from all sources—environmental, operational, test method, etc.) is the variability of formaldehyde concentration that the best performing turbine demonstrated during the three test runs. The formaldehyde concentration varied between 5.1 and 7.7 ppb formaldehyde, a factor of 1.5 during only a 3-hour

period. Another measure of formaldehyde concentration variability is the variability in formaldehyde concentration from the five lean premix combustion turbines tested. As stated previously, the average formaldehyde concentration varied between 6.1 and 41 ppb (a factor of seven). We reviewed the emission test reports and could not find any specific reason to account for the variability. These tests were properly conducted, and the lean premix combustion turbines were operating properly. Therefore, we believe that at least some portion, and possibly all, of that variability is due to factors other than turbine performance. As a result, we believe that some variability in formaldehyde concentration of the best performing turbine will occur beyond the variability reflected by the three test runs. It is our judgement that if the best performing turbine were tested at various times during the year and at various locations throughout the U.S., the overall formaldehyde concentration of the best performing turbine could vary by a factor of seven or more. This factor is based on the short term variability of the test data from the best performing turbine and also on the test data from the five turbine tests mentioned previously. Therefore, we believe that 43 ppbvd formaldehyde is a reasonable approximation of the performance of the best performing turbine, taking into account all of the types of variability discussed above. As a result, we are proposing an emission limit of 43 ppbvd formaldehyde as the MACT floor for existing lean premix combustion turbines.

The lean premix combustor turbine technology varies to some extent regarding its uncontrolled emissions of NO<sub>x</sub> and CO and possibly HAP. The data that we have obtained for the five source tests were based primarily on lean premix combustor turbines that can achieve lower than 15 ppm NO<sub>x</sub> and less than 5 ppm CO (at full load) at 15 percent O<sub>2</sub> without add-on controls. Lean premix combustor turbines which have these characteristics are the types of lean premix combustor turbines that we believe will most likely achieve the 43 ppb formaldehyde emission limit. Other types of lean premix combustor turbines which achieve 45 ppm NO<sub>x</sub> and as high as 200 ppm CO at 15 percent O<sub>2</sub> may not achieve the 43 ppb formaldehyde emission limit. Typically, the lean premix combustor turbines in the latter category are smaller aeroderivative turbines.

Therefore, we realize that not all lean premix combustor turbines will be able to achieve the 43 ppb formaldehyde emission limitation and some will have

to install add-on controls. Most new turbines projected to be installed at power plants are expected to be able to achieve the 43 ppb emission limitation.

We request public comment on the proposed MACT floor level for existing lean premix combustion turbines. We are particularly interested in obtaining information on the annual/seasonal and geographic variability in formaldehyde emissions that occur for lean premix combustion turbines. Formaldehyde emission test reports that were conducted over time for the same lean premix combustion turbine would be especially helpful. We are also soliciting information regarding the contribution of ambient formaldehyde to the variability of outlet stack concentrations of formaldehyde.

#### 4. MACT for Existing Lean Premix Combustion Turbines

To determine MACT for existing stationary lean premix combustion turbines, we evaluated regulatory alternatives more stringent than the MACT floor. For existing lean premix turbines, in terms of an emission control technology which could serve as the basis for MACT, we considered the use of an oxidation catalyst emission control device. According to catalyst vendors, oxidation catalyst emission control is being used on some existing lean premix combustion turbines, however, we lack specific data regarding the performance of turbines with such controls. The concentration of formaldehyde in the exhaust stream from lean premix combustion turbines is already significantly lower than the concentration of formaldehyde in the exhaust stream from diffusion flame combustion turbines, and any reduction achieved by oxidation catalyst control would be difficult to measure. Thus, we concluded that the incremental cost per ton of HAP removed for that option is excessive. We also considered the use of good operating practices to reduce HAP emissions, but determined that we could not identify specific good operating practices that would reduce HAP emissions. Similarly, we also considered requiring the use of a particular fuel to reduce HAP emissions but concluded that fuel switching would not result in further HAP emissions reductions. As a result, we are proposing to set MACT for existing lean premix combustion turbines at the MACT floor (*i.e.*, 43 ppbvd formaldehyde).