

The selection of an appropriate safety factor should be based on both the quantity of data and the quality of that data. For example, you may want to use a higher percentile in those cases where the quality of the emissions factor is rated “below average” or “poor,” or where data from a “less representative” emissions unit is being used. For a more in-depth description of emissions factor development, see “Procedures for Preparing Emission Factor Documents,” USEPA, EPA-454/R-95-015.

As a specific example, consider an oil and natural gas facility (as defined in 40 CFR Part 63, Subpart HH) that is attempting to determine applicability prior to the compliance date of Subpart HH. The facility consists of two, 2,250-hp, Cooper-Bessemer GMVH-10, 2-Stroke Lean-Burn engines that use 6,900 BTU/hp-hr of natural gas as fuel.

The February 1997 AP-42 gives the formaldehyde emissions factor as 0.263 lb/hp-hr (pounds of formaldehyde emitted per engine horsepower per hour). This results in a PTE of 5.7 TPY (tons per year) of formaldehyde for each engine. The emissions factor rating is “C,” or “average.” Thus, applying a safety factor of 2.13 (corresponding to the 95th percentile maximum likelihood estimator and conservatively considering the “average” factor as the “geometric mean”), a conservative estimate for the emissions factor would actually be $0.263 \cdot 2.13 = 0.56$ lb/hp-hr, which results in a PTE of 12.1 TPY. Note that, using the “safety factor,” each individual engine at the facility would be considered a major source for HAPs. Since it is the responsibility of the permittee to accurately estimate emissions, it would most likely be in their benefit to perform stack testing to confirm the emissions rate, and thus determine Subpart HH applicability. However, note that testing must correspond to “worst-case” operating conditions to determine the PTE.

The importance of using a safety factor to calculate emissions becomes more apparent when you consider the same scenario, with the availability of new information. The July 2000 AP-42 gives the formaldehyde emissions factor as 0.0552 lb/MMBTU (pounds of formaldehyde emitted per million British thermal units worth of fuel combusted). This results in a PTE of 3.7 TPY of formaldehyde for each engine. The emissions factor rating is “A,” or “excellent.” However, applying a safety factor of 1.74 (corresponding to the 90th percentile maximum likelihood estimator, a conservative estimate for the emissions factor would actually be $0.0552 \cdot 1.74 = 0.096$ lb/MMBTU, which results in a PTE of 6.5 TPY. Thus, using the “safety factor,” the facility would still be considered a major source for HAPs, and thus subject to Subpart HH. Again, it would most likely be to the permittee’s benefit to perform stack testing to confirm the emissions rate, and thus determine Subpart HH applicability. However, as mentioned previously, testing should correspond to “worst-case” operating conditions to determine PTE. In addition, note that a safety factor should most likely also be used with manufacturer’s emissions factors, unless guaranteed. In those cases where a guarantee is made, additional monitoring of other associated parameters is typically required.