

health in the largest number of urban areas. Of the four predominant HAP, three (acetaldehyde, benzene, and formaldehyde) are included on this list for the EPA's Urban Air Toxics Program. Eleven of the other emitted HAP (acrolein, arsenic compounds, beryllium compounds, 1,3-butadiene, cadmium compounds, chromium compounds, lead compounds, manganese compounds, mercury compounds, nickel compounds, and PAH (as POM)) also appear on the list. In November 1998, EPA published "A Multimedia Strategy for Priority Persistent, Bioaccumulative, and Toxic (PBT) Pollutants." None of the predominant four HAP emitted by stationary combustion turbine operations appears on the published list of compounds referred to in the EPA's PBT strategy. Three of the other HAP (mercury compounds, cadmium compounds, and PAH) appear on the list.

Of the HAP emitted by stationary combustion turbine operations, fifteen (acetaldehyde, acrolein, arsenic compounds, benzene, beryllium compounds, 1,3-butadiene, cadmium compounds, chromium compounds, formaldehyde, lead compounds, mercury compounds, naphthalene, nickel compounds, PAH, and propylene oxide) are carcinogens that, at present, are not considered to have thresholds for cancer effects. Formaldehyde, however, is a potential threshold carcinogen, and EPA is currently revising the dose-response assessment for formaldehyde.

## 2. Applicability Cutoffs for Threshold Pollutants Under Section 112(d)(4) of the CAA

The first approach is an applicability cutoff for threshold pollutants that is based on EPA's authority under CAA section 112(d)(4) to establish standards for HAP which are threshold pollutants. A threshold pollutant is one for which there is a concentration or dose below which adverse effects are not expected to occur over a lifetime of exposure. For such pollutants, CAA section 112(d)(4) allows EPA to consider the threshold level, with an ample margin of safety, when establishing emissions standards. Specifically, CAA section 112(d)(4) allows EPA to establish emission standards that are not based upon the MACT specified under CAA section 112(d)(2) for pollutants for which a health threshold has been established. Such standards may be less stringent than MACT. Historically, EPA has interpreted CAA section 112(d)(4) to allow categories of sources that emit only threshold pollutants to avoid further regulation if those emissions

result in ambient levels that do not exceed the threshold, with an ample margin of safety.<sup>2</sup>

A different interpretation would allow us to exempt individual facilities within a source category that meet the CAA section 112(d)(4) requirements. There are three potential scenarios under this interpretation of the CAA section 112(d)(4) provision. One scenario would allow an exemption for individual facilities that emit only threshold pollutants and can demonstrate that their emissions of threshold pollutants would not result in air concentrations above the threshold levels, with an ample margin of safety, even if the category is otherwise subject to MACT. A second scenario would allow the CAA section 112(d)(4) provision to be applied to both threshold and non-threshold pollutants, using the one in a million cancer risk level for decisionmaking for non-threshold pollutants.

A third scenario would allow a CAA section 112(d)(4) exemption at a facility that emits both threshold and non-threshold pollutants. For those emission points where only threshold pollutants are emitted and where emissions of the threshold pollutants would not result in air concentrations above the threshold levels, with an ample margin of safety, those emission points could be exempt from the MACT standards. The MACT standards would still apply to non-threshold emissions from other emission points at the source. For this third scenario, emission points that emit a combination of threshold and nonthreshold pollutants that are co-controlled by MACT would still be subject to the MACT level of control. However, any threshold HAP eligible for exemption under CAA section 112(d)(4) that are controlled by control devices different from those controlling nonthreshold HAP would be able to use the exemption, and the facility would still be subject to the parts of the standards that control non-threshold pollutants or that control both threshold and non-threshold pollutants.

a. Estimation of hazard quotients and hazard indices. Under the CAA section 112(d)(4) approach, EPA would have to determine that emissions of each of the threshold pollutants emitted by stationary combustion turbines at the facility do not result in exposures which exceed the threshold levels, with an ample margin of safety. The common approach for evaluating the potential hazard of a threshold air pollutant is to calculate a hazard quotient by dividing the pollutant's inhalation exposure

concentration (often assumed to be equivalent to its estimated concentration in air at a location where people could be exposed) by the pollutant's inhalation Reference Concentration (RfC). An RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure that, over a lifetime, likely would not result in the occurrence of adverse health effects in humans, including sensitive individuals.

The EPA typically establishes an RfC by applying uncertainty factors to the critical toxic effect derived from the lowest- or no-observed-adverse-effect level of a pollutant.<sup>3</sup> A hazard quotient less than one means that the exposure concentration of the pollutant is less than the RfC, and, therefore, presumed to be without appreciable risk of adverse health effects. A hazard quotient greater than one means that the exposure concentration of the pollutant is greater than the RfC. Further, EPA guidance for assessing exposures to mixtures of threshold pollutants recommends calculating a hazard index (HI) by summing the individual hazard quotients for those pollutants in the mixture that affect the same target organ or system by the same mechanism.<sup>4</sup> The HI values would be interpreted similarly to hazard quotients; values below one would generally be considered to be without appreciable risk of adverse health effects, and values above one would generally be cause for concern.

For the determinations discussed herein, EPA would generally plan to use RfC values contained in EPA's toxicology database, the Integrated Risk Information System (IRIS). When a pollutant does not have an approved RfC in IRIS, or when a pollutant is a carcinogen, EPA would have to determine whether a threshold exists based upon the availability of specific data on the pollutant's mode or mechanism of action, potentially using a health threshold value from an alternative source such as the Agency for Toxic Substances and Disease Registry (ATSDR) or the California Environmental Protection Agency (CalEPA).

Table 3 provides RfC, as well as unit risk estimates, for the HAP emitted by

<sup>3</sup> "Methods for Derivation of Inhalation Reference Concentrations and Applications of Inhalation Dosimetry." EPA-600/8-90-066F, Office of Research and Development, USEPA, October 1994.

<sup>4</sup> "Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures. Risk Assessment Forum Technical Panel," EPA/630/R-00/002. USEPA, August 2000. [http://www.epa.gov/nceawww1/pdfs/chem\\_mix/chem\\_mix\\_08\\_2001.pdf](http://www.epa.gov/nceawww1/pdfs/chem_mix/chem_mix_08_2001.pdf).

<sup>2</sup> See 63 FR 18754, 18765-66 (April 15, 1998) (Pulp and Paper Sources Proposed NESHAP)