

TABLE 2.—DOSE-RESPONSE ASSESSMENT VALUES FOR SOME HAP REPORTED EMITTED BY THE PLYWOOD AND COMPOSITE WOOD PRODUCTS SOURCE CATEGORY <sup>a, b</sup>—Continued

Chemical name	CAS No.	Reference concentration <sup>c</sup> (mg/m <sup>3</sup> )	Unit risk estimate <sup>d</sup> (1/(ug/m <sup>3</sup> ))
Phenol .....	108–95–2	2.0E–01 (CAL)	

<sup>a</sup> Propionaldehyde, a HAP emitted by the PCWP source category, is not included in Table 2 because there are no dose-response values for it.

<sup>b</sup> The table includes many, but not all, of the HAP emitted by the PCWP source category. The following additional HAP have been detected at more than one PCWP facility: cumene, methyl isobutyl ketone (MIBK), styrene, toluene, m,p-xylene, o-xylene, methylene diphenyl diisocyanate (MDI), chloromethane, and ethyl benzene. In addition, the following HAP have been detected at only one PCWP facility: acetophenone, biphenyl, bis-(2-ethylhexyl phthalate), bromomethane, carbon disulfide, di-n-butyl phthalate, ethyl benzene, hydroquinone, n-hexane, 1,1,1-trichloroethane, 4-methyl-2-pentanone, chloroethane, m,p-cresol, and o-cresol. Other HAP, including metal compounds (in addition to manganese compounds) may be emitted by facilities in the PCWP source category.

<sup>c</sup> *Reference Concentration*: An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups which include children, asthmatics and the elderly) that is likely to be without an appreciable risk of deleterious effects during a lifetime. It can be derived from various types of human or animal data, with uncertainty factors generally applied to reflect limitations of the data used.

<sup>d</sup> *Unit Risk Estimate*: The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 µg/m<sup>3</sup> in air. The interpretation of the Unit Risk Estimate would be as follows: if the Unit Risk Estimate =  $1.5 \times 10^{-6}$  per µg/m<sup>3</sup>, 1.5 excess tumors are expected to develop per 1,000,000 people if exposed daily for a lifetime to 1 µg of the chemical in 1 cubic meter of air. Unit Risk Estimates are considered upper bound estimates, meaning they represent a plausible upper limit to the true value. (Note that this is usually not a true statistical confidence limit.) The true risk is likely to be less, but could be greater.

<sup>e</sup> This HAP was detected at only one PCWP facility.

#### Sources:

IRIS = EPA Integrated Risk Information System (<http://www.epa.gov/iris/subst/index.html>).

ATSDR = U.S. Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/mrls.html>).

CAL = California Office of Environmental Health Hazard Assessment ([http://www.oehha.ca.gov/air/hot\\_spots/index.html](http://www.oehha.ca.gov/air/hot_spots/index.html)).

HEAST = EPA Health Effects Assessment Summary Tables (#PB=97–921199, July 1997).

To establish an applicability cutoff under section 112(d)(4), EPA would need to define ambient air exposure concentration limits for any threshold pollutants involved. There are several factors to consider when establishing such concentrations. First, we would need to ensure that the concentrations that would be established would protect public health with an ample margin of safety. As discussed above, the approach EPA commonly uses when evaluating the potential hazard of a threshold air pollutant is to calculate the pollutant's hazard quotient, which is the exposure concentration divided by the RfC.

The EPA's "Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures" suggests that the noncancer health effects associated with a mixture of pollutants ideally are assessed by considering the pollutants' common mechanisms of toxicity.<sup>4</sup> The guidance also suggests, however, that when exposures to mixtures of pollutants are being evaluated, the risk assessor may calculate an HI. The recommended method is to calculate multiple hazard indices for each exposure route of interest and for a single specific toxic effect or toxicity to a single target organ. The default approach recommended by the guidance is to sum the hazard quotients for those pollutants that induce the same toxic effect or affect the same target organ. A mixture is then assessed by several HI, each representing one toxic effect or

target organ. The guidance notes that the pollutants included in the HI calculation are any pollutants that show the effect being assessed, regardless of the critical effect upon which the RfC is based. The guidance cautions that if the target organ or toxic effect for which the HI is calculated is different from the RfC's critical effect, then the RfC for that chemical can be an overestimate, that is, the resultant HI potentially may be overprotective. Conversely, since the calculation of an HI does not account for the fact that the potency of a mixture of HAP can be more potent than the sum of the individual HAP potencies, an HI may potentially be underprotective in some situations.

*Options for establishing a hazard index limit.* One consideration in establishing a hazard index limit is whether the analysis considers the total ambient air concentrations of all the emitted HAP to which the public is exposed.<sup>5</sup> There are at least several options for establishing a hazard index limit for the section 112(d)(4) analysis that reflect, to varying degrees, public exposure.

One option is to allow the hazard index posed by all threshold HAP emitted from PCWP sources at the facility to be no greater than one. This approach is protective if no additional threshold HAP exposures would be anticipated from other sources in the

vicinity of the facility or through other routes of exposure (e.g., through ingestion).

A second option is to adopt a "default percentage" approach, whereby the hazard index limit of the HAP emitted by the facility is set at some percentage of one (e.g., 20 percent or 0.2). This approach recognizes the fact that the facility in question is only one of many sources of threshold HAP to which people are typically exposed every day. Because noncancer risk assessment is predicated on total exposure or dose, and because risk assessments focus only on an individual source, establishing a hazard index limit of 0.2 would account for an assumption that 20 percent of an individual's total exposure is from that individual source. For the purposes of this discussion, we will call all sources of HAP, other than the facility in question, "background" sources. If the facility is allowed to emit HAP such that its own impacts could result in HI values of one, total exposures to threshold HAP in the vicinity of the facility could be substantially greater than one due to background sources, and this would not be protective of public health since only HI values below one are considered to be without appreciable risk of adverse health effects. Thus, setting the hazard index limit for the facility at some default percentage of one will provide a buffer which would help to ensure that total exposures to threshold HAP near the facility (i.e., in combination with exposures due to background sources) will generally not exceed one and can

<sup>4</sup> Ibid.

<sup>5</sup> Senate Debate on Conference Report (October 27, 1990), reprinted in "A Legislative History of the Clean Air Act Amendments of 1990," Comm. Print S. Prt. 103–38 (1993) ("Legis. Hist." at 868).