

APPENDIX D
METHOD FOR THE DERIVATION OF HAZARDOUS AMBIENT AIR STANDARD

This appendix presents the standard procedure which shall be used by the Secretary when deriving a *Hazardous Ambient Air Standard (HAAS)*, in micrograms per cubic meter, for a *hazardous air contaminant*. In the event the United States Environmental Protection Agency (U.S. EPA) adopts an *ambient air quality standard* or a standardized method for determining such a standard for a *hazardous air contaminant*, the Secretary may set the HAAS for the contaminant at the level or by the method so established by the U.S. EPA. The HAAS may be no less stringent than the Federal ambient air quality standard.

CATEGORY I:

Hazardous Air Contaminants that are Known or Suspected Carcinogens

Hazardous air contaminants that have been listed as potentially carcinogenic by the U.S. EPA, or International Agency for Research on Cancer, or are reported to induce cancer in two or more tests by the National Toxicological Program or National Cancer Institute shall be classified as Category I: known or suspected carcinogens (except for HACs solely categorized by IARC as Group 1, inhaled in a form from occupational sources). Hazardous air contaminants that are reported to induce cancer in two or more species by the National Toxicological Program may also be classified as known or suspected carcinogens by the Secretary after consultation with the Vermont Department of Health.

The HAAS for each Category 1 hazardous air contaminant known or suspected carcinogens shall be set at a level estimated to correspond to an excess lifetime carcinogenic risk of one in one million assuming continual inhalation exposure, which represents an excess risk of one additional cancer case per million exposed population assuming constant exposure to the contaminant at the HAAS concentration for a lifetime. In cases where there is insufficient data available to derive such a value, establish this risk level, the HAAS shall be set at 0.01 ug/m³.

The averaging period for known or suspected carcinogens shall be annual.

CATEGORIES II AND III:

Hazardous Air Contaminants Believed to Cause Chronic Systemic Toxicity due to Long-term Exposure or Short-term Irritant Effects

~~**Chemicals Which Cause Chronic or Irritant Health Effects**~~

Those hazardous air contaminants not identified as potentially carcinogenic as defined above, are referred to as noncarcinogens and are divided into two categories:

Category II: Hazardous Air Contaminants Believed to Cause Chronic Systemic Toxicity due to Long-term Exposure; and

Category III: Hazardous Air Contaminants Believed to Cause Short-term Irritant Effects.

For both types of effects, it is generally assumed that some threshold level of toxicity exists (i.e. there is some level of exposure below which no adverse health effects are likely to occur).

Because the actual threshold level of exposure will vary from individual to individual, assessment of such compounds focuses on estimating a population threshold level. The HAAS for each Category II and Category III compound shall be set at a level estimated to correspond to such a threshold based on continual inhalation exposure.

Various sources of toxicity information shall be examined in the development of a HAAS for each Category II and Category III hazardous air contaminants. These sources shall include, but are not limited to: US EPA RfCs, occupational values (e.g. ACGIH TLVs, NIOSH RELS, VOSHA PELs), ATSDR MRLs, California EPA RELs, National AEGLs and reports published in the peer reviewed literature.

~~The HAAS for a chemical which causes either chronic or irritant health effects shall be set at the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), in micrograms per cubic meter, for that chemical divided by an uncertainty factor and an accumulation factor.~~

Uncertainty Factor

One or more uncertainty factors, each ranging from 1 to 10, may be applied in the development of a HAAS for each Category II or Category III hazardous air contaminant. Where appropriate, an additional modifying factor, typically ranging from 1 to 10, may be included in the calculation. The total adjustment factor applied will depend on the nature and extent of chemical specific toxicity information available for review.

~~The uncertainty factor chosen for a chemical when deriving an HAAS from a TLV shall be either 10, 100, or 1000 based on the following National Academy of Sciences method of extrapolating experimental exposure data:~~

- ~~1. Valid experimental results from studies on prolonged ingestion by man with no indication of carcinogenicity.~~

~~Uncertainty Factor = 10~~

- ~~2. Experimental results of studies of human ingestion not available or scanty (e.g., acute exposure only). Valid results of long term feeding studies on experimental animals or in the absence of human studies, valid animal studies on one or more species. No indication of carcinogenicity.~~

~~Uncertainty Factor = 100~~

- ~~3. No long term or acute human data. Scanty results on experimental animals. No indication of carcinogenicity.~~

~~Uncertainty Factor = 1,000~~

Accumulation Factor

~~For a chemical associated with either a chronic health effect or a cumulative irritant health effect, the accumulation factor shall be 4.2. For a chemical associated with a non-cumulative irritant health effect, the accumulation factor shall be 1.~~

Averaging Time

The averaging period for Category II hazardous air contaminants shall be annual. A 24 hour averaging period will be employed for Category III hazardous air contaminants.

~~All chemicals which display chronic toxicity shall have HAAS's based on an annual averaging time. HAAS's for irritant chemicals which display cumulative properties shall be set at a twenty four hour averaging time. HAAS's for irritant chemicals that do not display cumulative properties shall be set at an eight hour averaging time.~~

Alternative Methods

In the event that insufficient toxicological information is available with which to derive a HAAS for Category II and Category III hazardous air contaminants, a default value shall be set for each category at the median value of all HAAS published in Appendix C for the given category. The action level shall be derived in accordance with Appendix E.

- a. The Category II median HAAS is 20 $\mu\text{g}/\text{m}^3$ and its representative action level is 1.7 lbs/8 h.
- b. The Category III median HAAS is 36 $\mu\text{g}/\text{m}^3$ and its representative action level is 1.9 lbs/8 h.

~~If an ACCIH TLV is not established for a hazardous air contaminant under review by the Secretary, the Secretary shall determine if an occupational standard established by either the U.S. Department of Health, Education, and Welfare National Institute for Occupational Safety and Health (NIOSH) or the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) exists for that contaminant. If such an occupational standard does exist, the Secretary shall use that standard for that contaminant and derive an HAAS in that same manner as described for an ACCIH TLV.~~

~~If an occupational standard has not been established by ACCIH, NIOSH, or OSHA for a contaminant under review, the Secretary shall consult the NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) and review all information contained therein on the known toxic and biological effects of the contaminant. The Secretary may then establish an HAAS for the contaminant under review based on an evaluation of the toxicity data presented in RTECS.~~