

## 2025 Air Exposure Durations

07/11/2025

Air guidance values represent air concentrations that are likely to pose little or no health risk to humans, including vulnerable subpopulations. Values are calculated by taking into account how toxic a chemical is (e.g., the minimum amount that will cause health effects) and the duration of the exposure. Chemical toxicity also varies depending on when exposure occurs during the human lifecycle. Understanding the relationship between timing, duration and magnitude of exposure is essential in deriving health-based values that are protective of sensitive life stages (e.g., early life-stages or critical developmental windows) and short periods of high exposure.

Typically, shorter-duration values will be higher than longer-duration values for a given chemical because the human body can usually tolerate a higher dose when the exposure duration is short, even though that dose may be harmful when it occurs over a longer duration. It is possible, however, that the value for a shorter duration is the same as, or in some cases, lower than the value for longer durations. This could result if a short duration was sufficient to elicit an adverse effect – such as if a more sensitive endpoint was assessed in the shorter-duration study (e.g., respiratory irritation, developmental, and immune toxicological studies generally involve short exposure durations) – or if a different species or life stage was assessed. When this occurs, the longer-duration value is set equal to the lower, shorter-duration value. This ensures that the value for a longer duration is also protective of sensitive shorter exposures.

The air value durations were updated in 2025 to increase the utility of the values for public health protection and risk evaluation. The development of values for each duration are dependent on the availability of toxicity data.

Current durations are shown in the table below. Changes include:

- Creating two acute durations – 1-hour and 24-hour. For quick-acting toxic substances like airway irritants, 1-hour acute values are the most appropriate duration. For evaluating facility emissions, air dispersion models calculate 1-hour maximum exposures using data entered in pounds of pollutants per hour. 1-hour air guidance values can be commonly used to evaluate facility property line exposures. For acute exposures beyond a facility property line, for example, a 24-hour duration air guidance value would likely be more health protective, particularly for residential applications.
- Combining short-term and subchronic values in an intermediate duration. Evaluation of short-term studies is important because the values may be more protective than values from a longer duration study. These studies will continue to be evaluated and are included in the new definition of intermediate. The most protective value within this duration will be used.
- Redefining chronic duration as > 1 year. Annual averages are common ways to describe air quality data and this provides a matching duration for annual data.

## 2025 AIR EXPOSURE DURATIONS

Updated air exposure durations were adopted in February 2025. Toxicological summaries for chemicals reviewed prior to 2025 include durations under the previous methodology; however, durations on the air values table reflects the use of the new durations (1- hour, 24-hour, or intermediate) as supported by the data and MDH review.

### 2025 Durations

| Duration Name | Proposed Duration Application | Toxicological Study Duration Example   |
|---------------|-------------------------------|--|
| Acute 1-hr    | 1-hour                        | Acute human or animal toxicity studies where the exposure duration is typically less than 24 hours and time adjustment is defensible for the critical effect.  |
| Acute 24-hr   | 24-hours                      | Acute human or animal toxicity studies where the exposure duration is 6-24 hours or for a multi-day study where the critical effects may occur in 24 hours or less.  |
| Intermediate  | > 24 hours to 1 year          | Intermediate human study durations include exposures ranging from greater than 24 hours up to approximately 10% of a lifetime; animal studies would include exposure durations greater than one day and up to 90 days.<br><br>The most protective value is chosen for the intermediate duration. |
| Chronic       | >1 year to a lifetime         | Long-term human study durations include exposures ranging from greater than approximately 10% of a lifetime; animal studies would include an exposure duration of 90 days or longer.   |
| Cancer        | Lifetime (70 years)           | Human epidemiological studies will generally cover a range of years individuals are working in an industry or living near a site with known levels of chemical contamination; lifetime animal studies are used.  |

### Air Durations History

As shown in the table below, the 2002 Health Risk Value (HRV) Rule used four durations. In 2020, MDH updated the durations for values derived between 2020 and 2024. Previous air guidance value exposure duration application may be evaluated on a case-by-case basis in consultation with MDH staff.

## 2025 AIR EXPOSURE DURATIONS

| Duration   | 2002 HRV Rule             | 2020-2024              |
|------------|---------------------------|------------------------|
| Acute      | 1-hour averaged exposure  | ≤ 24 hours             |
| Short-term | NA                        | > 24 hours to 30 days  |
| Subchronic | 13-week averaged exposure | > 30 days to ~ 8 years |
| Chronic    | Annual averaged exposure  | > 8 years              |
| Cancer     | Lifetime (70 years)       | Lifetime (70 years)    |

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