

Carbon Monoxide & Health

CATEGORIES

Topics Health, Air Pollution, Indoor Air Quality & Exposure

Programs Outdoor Air Quality Standards, Exposure

Type Information

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What is carbon monoxide?

Carbon monoxide (CO) is a colorless, odorless gas. It results from the incomplete combustion of carbon-containing fuels such as natural gas, gasoline, or wood, and is emitted by a wide variety of combustion sources, including motor vehicles, power plants, wildfires, and incinerators. Nationally and, particularly in urban areas, the majority of outdoor CO emissions to ambient air come from mobile sources. Carbon monoxide can also be formed through photochemical reactions in the atmosphere from methane and non-methane hydrocarbons, other volatile organic hydrocarbons in the atmosphere, and organic molecules in surface waters and soils. There are also a number of indoor sources of CO that contribute to total exposure.

Why do CARB and U.S. EPA focus on carbon monoxide?

Air quality regulators are concerned about air pollutants which may reasonably be anticipated to endanger public health and welfare. There is substantial evidence that CO can adversely affect health, participate in atmospheric chemical reactions that result in formation of ozone air pollution, and contribute to climate change.

What kinds of harmful effects can carbon monoxide cause?

Carbon monoxide is harmful because it binds to hemoglobin in the blood, reducing the ability of blood to carry oxygen. This interferes with oxygen delivery to the body's organs. The most common effects of CO exposure are fatigue, headaches, confusion, and dizziness due to inadequate oxygen delivery to the brain. For people with cardiovascular disease, short-term CO exposure can further reduce their body's already compromised ability to respond to the increased oxygen demands of exercise, exertion, or stress. Inadequate oxygen delivery to the heart muscle leads to chest pain and decreased exercise tolerance. Unborn babies whose mothers experience high levels of CO exposure during pregnancy are at risk of adverse developmental effects.

Who is at the greatest risk from exposure to carbon monoxide?

Unborn babies, infants, elderly people, and people with anemia or with a history of heart or respiratory disease are most likely to experience health effects with exposure to elevated levels of CO.

How does carbon monoxide affect the environment?

U.S. EPA conducted an extensive literature search as part of the review of the National Ambient Air Quality Standard for Carbon Monoxide that was completed in 2011, and did not identify any evidence for ecological effects of CO at levels at or near ambient. Consequently, there is no secondary (welfare) standard for CO.

CO contributes indirectly to climate change because it participates in chemical reactions in the atmosphere that produce ozone, which is a climate change gas. CO also has a weak direct effect on climate. For these reasons, CO is classified as a short-lived climate forcing agent, prompting CO emission reductions to be considered as a possible strategy to mitigate effects of global warming.

Is carbon monoxide a problem indoors?

Indoor CO levels can be considerably higher than outdoors. There are a number of potential sources of CO indoors, including gas stoves, malfunctioning or improperly vented gas appliances (i.e., water heaters, furnaces, clothes dryers), space heaters, fireplaces, tobacco smoke, and car or truck exhaust that enters from attached garages.

WARNING

During the cold season CO poisoning cases tend to increase. These are most often related to elevated indoor CO levels resulting from use of improperly vented space heaters and use of gas ranges to heat the house. Over 400 people die each year in the U.S., due to CO poisoning. Of these, 13 to 36 individuals have died each year since 2000 from non-fire-related CO poisoning in California. Because of the health risk of CO poisoning, California has mandated installation of CO detectors in all housing units in the state.

What is the Ambient Air Quality Standard for carbon monoxide?

	1-Hour Average	8-Hour Average
National Ambient Air Quality Standard	35 ppm	9 ppm
California Ambient Air Quality Standard	20 ppm	9.0 ppm

Additional Information

- Carbon monoxide in the home

RELATED RESOURCES

**Selected References:
Children's School Bus
Exposure and
Mitigation Studies**

**Children's School Bus
Exposure and
Mitigation Studies**

**Estimating the Health
Benefits of Reductions
in Emissions of PM2.5
or its Precursors:
Short Description**

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