

Chapter 6 – Wildfire Smoke

6.1 Introduction to Wildfire Smoke

Wildfire smoke contains a mix of gasses and fine particles from burning trees, buildings and other materials into the air we breathe. Wildfires emit a variety of pollutants: particulate matter, black carbon, nitrogen dioxide, carbon monoxide, volatile organic compounds, polycyclic aromatic hydrocarbons and metals.⁷⁸ Wildfire smoke particles can be inhaled and absorbed into peoples' lungs and bloodstream, and effects can be felt immediately. The most common health effects from smoke exposure include: coughing, trouble breathing, wheezing, asthma attacks, stinging eyes, scratchy throat, runny nose, irritated sinuses, headaches, tiredness, chest pain and elevated heart rate. Changes in sleep patterns, appetite and mental health effects have also been documented. The severity of these effects can vary based on a person's age, health and lifestyle. Smoke can blow into our communities from fires burning across the Pacific Northwest. Even smoke from distant wildfires can be extremely hazardous to health.

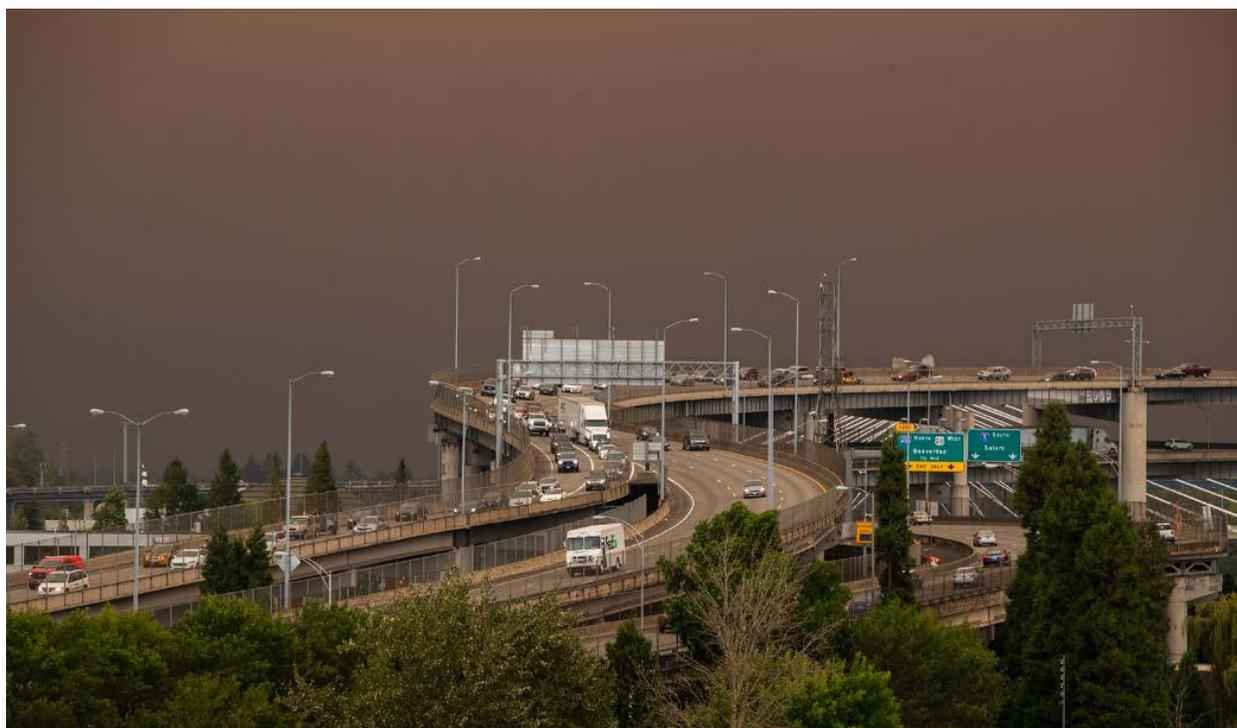


Figure 76 - Thick smoke settles over Portland on September 9, 2020

⁷⁸ [Wildfire Smoke Trends and the Air Quality](#), Oregon Department of Environmental Quality, 2022

6.1.1 Particulate Matter

Particulate matter (PM) is a general term for a mixture of solid and liquid droplets suspended in the air. PM can come from many sources and is always in the air we breathe. It can be present in many sizes and shapes, and is categorized based on size. Larger particles usually do not enter the lungs but can still irritate the eyes, nose, and throat. Particles that are less than 10 micrometers in diameter can pass through the nose and throat and enter the lungs.⁷⁹

Particles less than 2.5 micrometers are referred to as fine particulate matter, or PM_{2.5}, and represent approximately 90% of the pollutants emitted from wildfire smoke. PM_{2.5} can affect the lungs and heart, and can cause serious health effects. There is growing scientific evidence that links a heightened risk of cardiovascular and respiratory effects as a result of wildfire smoke exposure, particularly as the intensity of the smoke increases.

Fine, inhalable particulate matter (PM_{2.5}) is the air pollutant of greatest concern to public health from wildfire smoke because it can travel deep into the lungs and may even enter the bloodstream.

- U.S. EPA

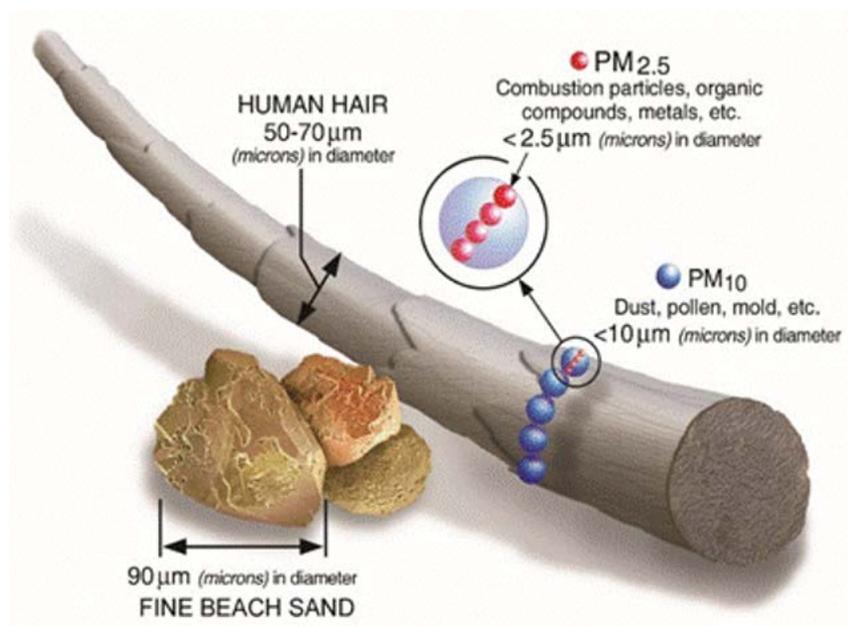


Figure 77 - EPA's illustration of fine, inhalable particulate matter (PM_{2.5}), the air pollutant of greatest concern to public health from wildfire smoke, as they can enter the lungs and bloodstream.

⁷⁹ [Why Wildfire Smoke is a Health Concern](#), U.S. Environmental Protection Agency, 2023

6.1.2 Air Quality Index

The Air Quality Index (AQI) is the Environmental Protection Agency's (EPA's) tool for reporting air quality. AQI measurements are used to determine if the air is healthy to breathe. The index measures six major air pollutants regulated by the EPA through the Clean Air Act: 1) ground level ozone, 2) particle pollution, 3) carbon monoxide, 4) sulfur dioxide, 5) nitrogen dioxide and 6) lead. The AQI includes a scale from 0 to 500 that is divided into six levels of concern ranging from healthy to unhealthy to hazardous, with each identified by a color. The index lists health effects that can be experienced within a few hours or days after exposure to each level of concern.

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

Figure 78 - Air Quality Index with levels of concern and descriptions of air quality, from www.airnow.gov

On a typical day, the AQI in Multnomah County is in the 0 to 50 (green) range, posing little or no risk. Throughout the year, air quality conditions can change based on natural- and human-caused conditions, such as wildfire smoke or emissions from wood-burning stoves and fireplaces.

The Oregon Department of Environmental Quality (DEQ) has been monitoring air quality year-round since 1985. Prior to 2015, AQI values in the Portland area had zero days that measured above 100 PM due to wildfire smoke with air quality considered unhealthy for sensitive populations or worse. Since 2015, air quality in the county has reached unhealthy levels multiple times due to smoke from fires burning across the Pacific Northwest, including Canada.⁸⁰

⁸⁰ [Wildfire Smoke Trends Report](#), Oregon Department of Environmental Quality. 2022.