



Public Health Guidance for Wildfire Smoke Events

Public Health – Seattle & King County (PHSKC) offers the following considerations and recommendations to support regional coordination and response actions across King County during a wildfire smoke event.

HAZARD OVERVIEW

Wildfires are increasing in frequency and severity across the western United States and Canada. While areas directly impacted by wildfires may be far removed from densely populated centers, smoke plumes they generate can be carried by atmospheric currents – referred to as “long-range transport” – and cause impacts to air quality that affect areas far removed, including densely populated metropolitan areas as well as the more rural communities across our county. These plumes can result in poor air quality conditions that can last anywhere from a few days to weeks on end, placing large populations at risk to the health effects of wildfire smoke exposure.

Wildfire smoke is a complex mixture of carbon dioxide (CO₂), water vapor, carbon monoxide (CO), hydrocarbons, nitrogen oxides (NO_x), volatile organic compounds (VOCs), trace minerals, and particulate matter (PM). Of principal concern to public health are the risks associated with particulate matter including:

- PM10: particles less than 10 microns in size that affect the upper respiratory tract and can irritate mucus membranes of the body.
- PM2.5: particles smaller than 2.5 microns in size (about 20 times smaller than the width of a human hair) and can be drawn deep into the body through breathing, resulting in impacts to respiratory and cardiovascular systems of the body. These particles are of the greatest health concern.

NOTE ON THRESHOLDS AND RECOMMENDATIONS

Wildfire smoke affects everyone differently and some individuals may be more sensitive to wildfire smoke exposure at lower thresholds than others due to factors such as their environment, level of activity, occupational setting, age, or underlying health conditions. However, during wildfire smoke events, especially events that cause significant impacts to air quality or span for an extended duration, everyone is at risk of adverse health impacts associated with wildfire smoke exposure, including those who consider themselves to be young and healthy. Furthermore, it is important to note that adverse health impacts associated with wildfire smoke may not be experienced immediately and the risk of severe health outcomes [have been observed to increase in the days immediately following exposure](#).

The following recommendations are intended to prevent or reduce the risk of adverse health impacts from wildfire smoke and are established to be protective of those most vulnerable to the health impacts of wildfire smoke. The following recommendations should not be construed in any way that expands or limits the administrative rules, regulations, or authorities of Public Health – Seattle & King County.

The following guidance is offered to aid King County departments and local jurisdictions in their decision-making processes. However, action thresholds pertaining to a wildfire smoke response are not static and additional factors must be taken into account, including:

- Individual sensitivities and levels of exposure

- Infiltration rates of smoke into indoor environments and filtration capacity to remove wildfire smoke particulates from the air
- Anticipated duration of wildfire smoke event and cumulative impact on health

AIR QUALITY INDEX (AQI) & PARTICULATE MATTER

The U.S. Environmental Protection Agency (EPA)'s Air Quality Index (AQI) is used as the primary measure for air quality and the health risks associated with air pollution – including wildfire smoke. The AQI is a numeric based index that runs from 0 to 500, with higher AQI values representing a greater level of air pollution and coinciding with a greater risk to public health. The AQI is divided into six risk categories with each category corresponding to a different level of health concern. Each category has a specific color to enable quick determination of when air quality is reaching unhealthy levels.

The U.S. EPA establishes an AQI for each of the five major air pollutants regulated by the Clean Air Act, including: ground-level ozone, particulate matter (including PM2.5 and PM10), carbon monoxide, sulfur dioxide, and nitrogen dioxide. Each of these pollutants has a national air quality standard set by EPA to protect public health that distinguishes AQI threshold cut points for each pollutant.

To determine recommended action thresholds during wildfire smoke events, Public Health uses the AQI specific to particulate matter – also referred to as “particle pollution”.

AQI Category (AQI Values)	PM2.5 $\mu\text{g}/\text{m}^3$ 24-hr avg	Health Effects
Good (0-50)	0 – 12	None expected
Moderate (51-100)	12.1 – 35.4	Possible aggravation of heart or lung disease among particularly sensitive individuals
Unhealthy for Sensitive Groups (101-150)	35.5 – 55.4	Increasing likelihood of respiratory or cardiac symptoms in sensitive individuals, aggravation of heart or lung disease, and premature mortality in people with heart or lung disease and older adults
Unhealthy for All (151-200)	55.5 – 150.4	Increased aggravation of heart or lung disease and premature mortality in persons with heart or lung disease and older adults; increased respiratory effects in general population
Very Unhealthy (201-300)	150.5 – 250.4	Significant aggravation of heart or lung disease, premature mortality in persons with heart or lung disease and older adults; significant increase in respiratory effects in general population
Hazardous (> 300)	250.5 > 500	Serious aggravation of heart or lung disease, premature mortality in persons with heart or lung disease and older adults; serious risk of respiratory effects in general population

Table 1: Overview of AQI Categories and Health Risks

RESPONSE CONSIDERATIONS

Wildfire smoke events and their impacts on air quality can be highly dynamic and sudden changes in forecast conditions may occur. The following guidance and recommendations are intended to aid King County departments and local jurisdictions in decision making processes and the coordination of response efforts during a wildfire smoke event. They have been developed for harm prevention and harm reduction purposes and are designed to be protective of those most vulnerable to the health impacts of wildfire smoke events.

Response partners should take the following into consideration when planning wildfire smoke response operations:

Pre-identification of Cleaner Air Sites

The most effective mitigation measures to reduce the health risks of exposure to wildfire smoke are the availability and access to locations that can offer cleaner air, referred to as cleaner air sites. These sites can consist of public or private facilities equipped with air filtration systems, such as HVAC systems equipped with filters rated as MERV 13 or higher, or achieved through ensuring sites have access to supplemental air filtration technologies, such as a portable HEPA air filtration system or D.I.Y. Box Fan Filter kits.

Ensuring cleaner air sites are properly equipped with necessary air filtration technologies can be time intensive. Public Health encourages partners responsible for coordination of sheltering operations for both the general population and people experiencing homelessness identify locations that may be used as cleaner air sites in advance of a wildfire smoke event. Refer to [commercial building guidance](#) on heating, ventilation, and air conditioning (HVAC) and building measures to minimize occupant exposures and health impacts from wildfire smoke.

Resource Mobilization & Forecast Conditions

It is important that response partners [consider forecast conditions](#) when planning for resource mobilization. Air quality conditions during a wildfire smoke event may rapidly fluctuate over the period of a long-duration event or even throughout a single day, resulting in changing AQI values that may trigger different levels of response recommendations.

In some instances, AQI values may only reach *Unhealthy* or *Very Unhealthy* levels for a brief period of time and may not warrant the mobilization of resources for the Public Health recommendation for that particular AQI value.

Alternatively, during long-duration events that result in prolonged AQI values in the *Moderate* or *Unhealthy for Sensitive Groups*, conditions may warrant taking actions that are recommended at a higher AQI value given the potential for rapid changes in conditions that may lead to further degradation of air quality (higher AQI levels) and increased risk to public health. It is the responsibility of response partners who oversee cleaner air site operations to take proactive steps for the protection of public health as conditions warrant and as available resources permit.

Public Messaging

The recommendations provided in this document are intended to guide response partners and coordination of response operations. Washington State Department of Health (WA DOH) has developed the [Washington Air Quality Guide for Particle Pollution](#). Messaging and public health actions for the public are outlined for each AQI level. PHSKC also maintains public messaging and guidance that is

available on its [Wildfire Smoke Preparedness webpage](#) and can be used for public health risk communications during a wildfire smoke event.

While the following recommendations guide responder activities, partners should also be prepared to share guidance with their communities throughout a wildfire smoke event. Three key pieces of information should be shared to help communities take action to protect themselves based on their own risk levels:

- Where to find accurate information on current levels of local wildfire smoke pollution
 - Puget Sound Clean Air Agency's [Sensor Maps](#) on Instant setting
- How to create cleaner air in their homes
 - Provide guidance on [how to keep indoor air clean on smoky days](#) and [DIY Box Fan Filters](#)
- Where to go for cleaner air respite if they cannot create cleaner air in their homes
 - Provide information on available cleaner air site locations

Schools & Childcare Activities

Washington State Department of Health (WA DOH) has specific guidance that is available pertaining to schools and childcare activities. Public Health's recommendations in this document includes recommendations applicable for schools and children's activities in alignment with WA DOH guidance. Schools, childcare, and activity providers should be directed to the [guidance available from WA DOH](#).

Employee Guidance and WA Labor & Industries Requirements

In May 2023, Washington Department of Labor & Industries' (WA L&I) filed proposed draft language for a permanent [Wildfire Smoke Rule](#) to protect the health of workers who are exposed to wildfire smoke while on the job, including all personnel who spend one or more hour(s) outdoors while performing their occupational duties. Public comment on the draft rule concluded on August 4, 2023, and WA L&I is anticipated to finalize the rule in Fall 2023.

As wildfires continue, employers are expected to protect workers from wildfire smoke. Note that the draft WA L&I [Wildfire Smoke Rule](#) requires employers make [respirators available upon staff request for voluntary use](#) at PM 2.5 threshold of 20.5 $\mu\text{g}/\text{m}^3$, which falls in the middle of the Moderate AQI category. PHSKC recommends employers acquaint themselves with the draft wildfire smoke rule and begin to voluntarily follow safety measures in the draft [rule](#) to fulfill this responsibility. For more information regarding the specifics of these requirements, employers and human resource departments are advised to visit the [WA Labor & Industries webpage on Wildfire Smoke](#).

Local Health Officer Authorities – Cancellation of Outdoor Events and Activities

Wildfire smoke events have the potential to cause air quality conditions that are hazardous to human health. In such cases when the air quality index (AQI) reaches Hazardous Levels, PHSKC may issue a Local Health Officer order temporarily suspending non-essential public outdoor events and activities, including concerts, festivals, fairs, or major sporting events that have the potential to result in the exposure of large crowds to hazardous conditions. In instances when AQI values remain below the Hazardous Level, PHSKC may issue general recommendations, which may include the temporary suspension or cancellation of outdoor events. In these cases, it remains the discretion of the event organizer to take appropriate action(s) to limit the potential for public exposure to conditions that may be harmful to public health.

PUBLIC HEALTH RECOMMENDATIONS

The following table provides recommended actions to take when AQI levels for particulate matter reach orange, red, and purple categories due to a wildfire smoke event.

U.S. EPA AQI Values	Public Health Recommendations
<p>Unhealthy for Sensitive Groups (AQI 101 – 150)</p>	<p>INITIATE EARLY WARNING, PUBLIC MESSAGING, AND RESPONSE ACTIVITIES</p> <ul style="list-style-type: none"> • Recommend sharing public health messaging regarding health effects of wildfire smoke exposure and public mitigation measures to reduce wildfire smoke exposure, particularly for sensitive groups (e.g., how to create cleaner air rooms at home or locations that might be made available to the public to access cleaner air during a wildfire smoke event, such as libraries, shopping centers, and other locations). • Consider cancelling children’s outdoor recess, physical education, athletic practices, and games, or moving them indoors or to an area with good air quality. • Consider resource mobilization for locations to serve as cleaner air sites for individuals experiencing homelessness. ¹ • Consider activation and opening of cleaner air sites for individuals experiencing homelessness.
<p>Unhealthy for All (AQI 151 – 200)</p>	<p>RECOMMEND ACTIVATION OF CLEANER AIR SITES & REDUCTION IN OUTDOOR ACTIVITIES</p> <ul style="list-style-type: none"> • Recommend activation and opening of cleaner air sites for individuals experiencing homelessness. • Consider activation and opening of cleaner air sites for general population or directing people to locations where they can access cleaner air during a wildfire smoke event.² • Recommend cancelation and/or rescheduling of outdoor children’s activities, athletic practices and games, or moving them indoors or to an area with better air quality. • Recommend amplifying public health messaging and sharing information on available locations where individuals and families can go to seek cleaner air within your jurisdiction. • Recommend reduction of strenuous outdoor activities for all populations. • Consider canceling outdoor public events and activities.
<p>Very Unhealthy for All (AQI 201 – 300)</p>	<p>RECOMMEND CANCELATION OF OUTDOOR EVENTS AND ACTIVITIES</p> <ul style="list-style-type: none"> • Recommend activation and opening of cleaner air sites for general population or directing people to locations where they can access cleaner air during a wildfire smoke event.² • Recommend expanding hours of operation for cleaner air sites for people experiencing homelessness to accommodate overnight-use. • Recommend event organizers cancel of outdoor public events and activities. • If school is in session, recommend school closure if indoor air PM 2.5 levels cannot be kept lower than 150.5 µg/m3 (AQI value of 201).

	<ul style="list-style-type: none">• Recommend amplifying public health messaging and sharing information sharing on available locations where individuals and families can go to seek cleaner air if unable to maintain healthy indoor air quality at home.• Recommend limiting strenuous outdoors activities to essential functions.
Hazardous (AQI > 300)	<p>LOCAL HEALTH OFFICER ACTIONS FOR POPULATION HEALTH</p> <ul style="list-style-type: none">• Local Health Officer may use authority granted by WAC 246-101-505 to suspend outdoor events and activities at risk from hazardous wildfire smoke exposure, including concerts, sporting events, festivals, fairs, and other outdoor gatherings.• For extended duration events at this air quality level, the Local Health Officer may recommend temporary voluntary relocation of sensitive groups outside of the impacted region.

¹ If warranted based upon county-wide wildfire smoke 5-day forecast conditions indicated by the WA Dept. of Ecology's [Air Monitoring Network](#)

² Locations that might serve as cleaner air sites should be identified prior to the onset of a wildfire smoke event

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