Wildfire preparation and response for building owners and workers

Risk Control Services
from Liberty Mutual Insurance

Many hazardous chemicals can be contained in wildfire smoke. The major pollutants include “particulate matter” (tiny particles suspended in the air), ground-level ozone, carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2).

Exposure to wildfire smoke can be associated with a range of health effects such as eye irritation, respiratory irritation, and bronchitis. Those with existing lung and heart disease are at greater risk of health effects.

Reducing the risk of health impacts from wildfire smoke events requires a comprehensive approach to controlling particulates and other pollutants in commercial buildings. These approaches consist of limiting smoke infiltration into buildings, filtering smoke in HVAC systems, and using supplemental mobile air filtration units.

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Strategies to help reduce exposures to wildfire smoke

The following strategies are offered to help with pre-wildfire smoke event planning and actions to take during an event.

Limit smoke infiltration into the building

- A tight building envelope can help limit smoke infiltration. Check the entire building envelope for leaks, including the windows, wall and roof penetrations, door seals and sweeps, and gaskets. Ensure that all windows are always closed.
- Limit the number of building entrance and exit points if feasible, and try to limit the number of times doors open and close, by encouraging workers to enter and exit together. Do not lock or make emergency exits inaccessible.

Control smoke with HVAC systems

Upgrade the building's HVAC system filters to a minimum MERV 11 but preferably MERV 13. The Environmental Protection Agency (EPA) and Centers for Disease Control and Prevention (CDC) recommend MERV 13 filters as they can remove more than 90% of the fine particulate in smoke. The higher the MERV rating, the more efficient the filtration.

- Consult the HVAC system manufacturer or qualified ventilation professional to ensure the building's HVAC system can accommodate the higher MERV filter. This should be done in preparation for wildfire season to help ensure sufficient filter supplies. During a wildfire event, high-efficiency filters may not be readily available
- Ensure that filters fit tightly in their racks to reduce the risk of unfiltered air bypassing the system.
- Run the HVAC system continuously to maximize filtration.
- Inspect filters daily during smoke events since filters may become overloaded quickly and will need to be replaced. Gauges can be installed to measure the pressure drop from excessive filter loading and determine the timing for a filter change.
- Consider adding temporary, supplemental filtration directly to the outdoor air intakes for the building's HVAC system.
- Disable the building's HVAC air economizer, which is designed to maximize the use of outdoor air when temperatures allow. Provide the minimum volume of outdoor air to meet ventilation standards during wildfire smoke events.

- Use the HVAC system to positively pressurize the building and force air to flow from indoors to the outdoors. This will help limit the intake of smoke into the building.

Deploy portable air-cleaning units

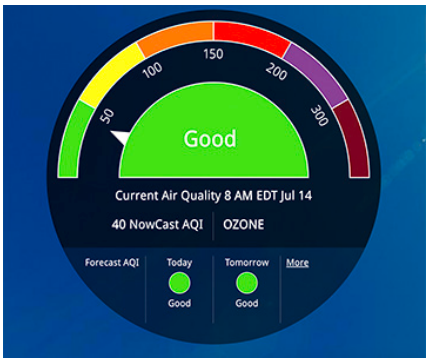
Consider adding temporary, portable air-cleaning units, especially when the building's HVAC system is not capable of handling higher-efficiency filters. The effectiveness of portable air cleaners can be highly variable so they should be sized appropriately depending on the room's air exchange rate and room volume.

The most efficient portable air cleaners use High Efficiency Particulate Air (HEPA) filters that are designed to remove 99.97% of fine particulate. Manufacturers of these air cleaners use a recommended standard called the Clean Air Delivery Rate (CADR) for rating the effectiveness of the unit. The larger the CADR the greater the amount of air that the unit will clean.

Portable air cleaning units may also be an effective strategy for tenants who have limited control over their building's HVAC system.

Consider purchasing replacement filters ahead of time due to supply constraints that commonly occur during wildfire season. Pre-plan and coordinate with suppliers of HEPA units to help ensure if an event does occur and a portable unit is required, that your organization has a plan for obtaining the units.

EPA's Air Quality Index



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The EPA uses an Air Quality Index (AQI) to communicate air pollution levels and health risks associated with wildfire smoke events. The EPA is required to report daily AQI data at their AirNow website (https://www.airnow.gov) for areas across the U.S., Canada, and Mexico.

The following color-coded chart, taken from the EPA, shows the six "levels of concern" health categories for the AQI. When the AQI exceeds or is expected to exceed 100, be prepared to take action to help protect building occupants.

AQI basics for ozone and particle pollution

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

Outdoor workers

For information on protecting outdoor workers, refer to the National Institute for Occupational Safety and Health (NIOSH) topic page, *Outdoor Workers Exposed to Wildfire Smoke*.[1]

As of June, 2023, three states have implemented or proposed occupational wildfire smoke regulations to protect workers' health, especially for outdoor workers. Each state references the EPA AQI as an indicator of overall air quality.

1. California OSHA adopted an emergency regulation in 2019 that requires employers to protect workers from the harmful effects of wildfire smoke.[2] The standard applies to workplaces where the current AQI is 151 or greater.
2. Washington State Department of Labor and Industries filed proposed draft language for a permanent wildfire smoke rule in May, 2023.[3] Currently, employers can choose to voluntarily follow safety measures in the expired wildfire smoke emergency rules.[4] The proposed standard applies to workplaces with an AQI of 69 or greater.
3. Oregon has a permanent wildfire smoke rule which became effective July 1, 2022.[5] The standard applies to workplaces where the current AQI is 101 or greater.

Summary

Exposure to wildfire smoke can have a major impact on human health if not controlled, even when working indoors. The information presented here can help organizations limit employee exposures to particulate matter and other pollutants in wildfire smoke and help reduce the risk of discomfort and illness.

References

1. NIOSH. (May, 2023). *Outdoor workers exposed to wildfire smoke.* https://www.cdc.gov/niosh/topics/firefighting/wffsmoke.html
2. California OSHA. *Protection from wildfire smoke.* https://www.dir.ca.gov/title8/5141_1.html
3. Washington State Department of Labor and Industries. *Proposed wildfire smoke permanent rules.* https://www.lni.wa.gov/safety-health/safety-topics/topics/wildfire-smoke
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5. Oregon state. *Rules to address employee exposure to wildfire smoke.* (2022). https://osha.oregon.gov/OSHARules/adopted/2022/ao4-2022-text-smoke-exposure.pdf

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