

Monitoring Monday – Wildfire Smoke Protection for Workers and Volunteers

Join us each Monday as the Clean Water Team shares information and resources on water quality monitoring. This Monday we will look at wildfire smoke protection for workers and volunteers.

Smoke from wildfires may contribute to poor air quality in your area and be a risk to your employees and volunteers. Wildfire smoke is composed of harmful chemicals and tiny particles suspended in the air that present a significant health hazard for workers exposed to it. The greatest hazard comes from breathing these fine particles in the air. These particles can irritate the lungs and cause serious or even fatal health effects, such as reduced lung function, bronchitis, worsen asthma and other existing heart and lung conditions, and cause coughing, wheezing and difficulty breathing, and even lead to heart failure.

Wildfire smoke concerns follow the wildfire season, that time of year when wildfires are most likely to take place. In the past, the wildfire season was mainly from May through October. However, with climate change as a contributing factor, fire season begins earlier and ends later each year, with some experts suggesting that the fire season in California is now year-round. As of November 14, 2022, a total of 7,329 fires have been recorded in California, totaling approximately 362,403 acres across the state, and there are still active fires.

To protect workers (and volunteers) from the hazards associated from wildfire smoke CalOSHA implemented [Section 5141.1 “Protection from Wildfire Smoke”](#) (California Code of Regulations Title 18) in 2019. It uses the local air quality index (AQI) for PM2.5 to determine when worker protections are needed. PM stands for particulate matter (also called particle pollution): the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope. PM2.5 are fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller. How small is 2.5 micrometers? Think about a single hair from your head. The average human hair is about 70 micrometers in diameter – making it 30 times larger than the largest fine particle.

Which employers must comply with the regulation? Employers with workplaces and operations must comply with the full standard when both of the following conditions apply:

- The current AQI for PM2.5 is 151 or greater, regardless of the AQI for other pollutants
- The employer should reasonably anticipate that employees may be exposed to wildfire smoke

Section 5141.1 created the following requirements for employers to protect workers from wildfire smoke:

- 1) Monitor the Air Quality Index (AQI) for PM2.5

- 2) Implement a system for communicating wildfire smoke hazards in a language and manner readily understandable by employees.
- 3) Provide training and instruction information including how to determine AQI, identify health effects of wildfire smoke exposure, and how to use NIOSH-approved respirators
- 4) Establish worker protection procedures, including a plan to reduce worker exposure to wildfire smoke. With certain exceptions, employers must reduce workers' exposure to wildfire smoke in the following ways:
 - If feasible, by providing an enclosed location with filtered air so that employee exposure to PM2.5 is less than a current AQI of 151, or to the extent feasible.
 - If that is not feasible or adequate, by relocating to another outdoor location where the current AQI for PM2.5 is lower, changing work/volunteer schedules, reducing work intensity, or providing more rest periods.
 - With respiratory protective equipment if employers cannot reduce workers' exposure to PM2.5 to a current AQI of less than 151.
 - Where the current AQI for PM2.5 is from 151 to 500, employers must provide a sufficient number of NIOSH-approved particulate respirators, such as N95 masks, to all employees for voluntary use, and training on the regulation, the health effects of wildfire smoke, and the safe use and maintenance of respirators.
 - Where the current AQI for PM2.5 is higher than 500, the employer must provide and require employees to use NIOSH-approved particulate respirators that will reduce employee exposure to PM2.5 to an equivalent of an AQI less than 151.

As you can imagine, canceling water quality monitoring and other field work and rescheduling it for a time when the AQI is healthy has been a preferred choice amongst watershed groups.

How to Determine Current AQI and PM2.5 levels

Employers may use the Air Quality Index or their own direct reading instruments to determine employee exposure to wildfire smoke.

Current Air Quality Index (Current AQI) is the method used by the U.S. Environmental Protection Agency (U.S. EPA) to report air quality on a real-time basis. Current AQI is also referred to as the “NowCast,” and represents data collected over time of varying length in order to reflect present conditions as accurately as possible.

The current AQI is divided into six categories as shown in the table below.

Air Quality Index (AQI) Categories for PM2.5	Levels of Health Concern
0 to 50	Good
51 to 100	Moderate
101 to 150	Unhealthy for Sensitive Groups
151 to 200	Unhealthy
201 to 300	Very Unhealthy
301 to 500	Hazardous

Direct reading instruments: If an employer monitors the PM2.5 levels at the worksite using a direct reading instrument, the employer must do so in accordance with the information contained in Appendix A and is required to use the following table to convert the PM2.5 concentration to the AQI for PM2.5:

PM2.5 in Micrograms per Cubic Meter ($\mu\text{g}/\text{m}^3$)	Air Quality Index (AQI) Categories for PM2.5
0 to 12.0	0 to 50
12.1 to 35.4	51 to 100
35.5 to 55.4	101 to 150
55.5 to 150.4	151 to 200
150.5 to 250.4	201 to 300
250.5 to 500.4	301 to 500

How to Determine if there is Harmful Exposure Using AirNow

AirNow is your one-stop source for air quality data. Our recently redesigned site highlights air quality in your local area first, while still providing air quality information at state, national, and world views. A new interactive map even lets you zoom out to get the big picture or drill down to see data for a single air quality monitor. AirNow reports air quality using the official U.S. Air Quality Index (AQI), a color-coded index designed to communicate whether air quality is healthy or unhealthy for you. When you know the AQI in your area, you can take steps to protect your health. www.airnow.gov/

EPA's AirNow app has a sleek new look and improved functionality! Download the updated app for free on the [Apple App Store](#) or the [Google Play Store](#).

Regulations & Resources:

Cal/OSHA Protection from Wildfire Smoke Training ([Video](#))

CalFire Incident Map

www.fire.ca.gov/incidents/

Fire Activity Map

<https://ucanr.edu/sites/fire/Safety/Current/>

California Wildfires: Protect Yourself from Wildfire Smoke

Hot and dry conditions are driving an increase in wildfire activity across California. Learn how to protect yourself from wildfire smoke.

<https://ww2.arb.ca.gov/protecting-yourself-wildfire-smoke>

- California Air Districts
<https://ww2.arb.ca.gov/california-air-districts>
- California Map for Local Air District Websites
<https://ww3.arb.ca.gov/capcoa/dismap.htm>

Interagency Wildland Fire Air Quality Response Program

The Interagency Wildland Fire Air Quality Response Program (IWFAQRP) was created to directly assess, communicate, and address risks posed by wildland fire smoke to the public as well as fire personnel. The program depends on four primary components: specially trained personnel called Air Resource Advisors, air quality monitoring, smoke concentration and dispersion modeling, and coordination and cooperation with agency partners.

www.wildlandfiresmoke.net/

National Significant Wildland Fire Potential Outlook

www.predictiveservices.nifc.gov/outlooks/monthly_seasonal_outlook.pdf

NOAA Hazard Mapping System Fire and Smoke Product

www.ospo.noaa.gov/Products/land/hms.html#maps

Particulate Matter (PM) Basics

Learn “What is PM, and how does it get into the air?”, “What are the harmful effects of PM?”, “What is being done to reduce particle pollution?”, and “How can I reduce my exposure to PM?”

www.epa.gov/pm-pollution/particulate-matter-pm-basics

Protecting Outdoor Workers Exposed to Smoke from Wildfires

This webpage discusses respiratory hazards for outdoor workers such as farm workers and others who work in locations where wildfire smoke can travel. It does not discuss additional respiratory hazards for firefighters and others who work in close proximity to active wildfires.

www.dir.ca.gov/dosh/wildfire/worker-protection-from-wildfire-smoke.html

[N95 Mask Commonly Asked Questions](#)

["Using Disposable Respirators" \(in English and Spanish\)](#)

[Respiratory Protection in the Workplace: A Practical Guide for Small-Business](#)

[Employers](#). Page 8 of this document contains a simple flowchart that summarizes the requirements for filtering face piece respirators.

See How Wildfire Smoke Spread Across America

www.nytimes.com/interactive/2021/07/21/climate/wildfire-smoke-map.html

Training Resources

- Wildfire Smoke Employer Training Poster ([English/Spanish](#))
- Wildfire Smoke Employer Training Discussion Guide ([English/Spanish](#))
- Worksite Checklist ([English & Spanish](#))
- Cal/OSHA Training Video on the Use of N95 Respirators ([Video](#))

When is California fire season?

www.frontlinewildfire.com/wildfire-news-and-resources/california-fire-season/

Wildland Fire / Air Quality Tools

This page provides links to the most recent versions of tools produced by the U.S. Forest Service PNW Research Station's Pacific Wildland Fire Sciences Laboratory in support of the Wildland Fire Air Quality Response Program and wildland fire operations.

<https://portal.airfire.org/>

Worker Protection from Wildfire Smoke

This web page provides an overview of Cal/OSHA's regulation to protect workers from wildfire smoke.

www.dir.ca.gov/dosh/doshreg/Protection-from-Wildfire-Smoke/Wildfire-smoke-emergency-standard.html

Worker Safety and Health in Wildfire Regions

Wildfire smoke and cleanup presents hazards that employers and workers in affected regions must understand. Smoke from wildfires contains chemicals, gases and fine particles that can harm health. Hazards continue even after fires have been extinguished and cleanup work begins. Proper protective equipment and training is required for worker safety in wildfire regions.

www.dir.ca.gov/dosh/worker-health-and-safety-in-wildfire-regions.html

Advice, graphics, images, and information is presented for general educational and information purposes and to increase overall safety awareness. It is not intended to be legal, medical or other expert advice or services, and should not be used in place of consultation with appropriate professionals. The information should not be considered exhaustive and the reader/user should seek the advice of appropriate professionals.

Erick Burres

Citizen Monitoring Coordinator

Clean Water Team @ State Water Resources Control Board

erick.burres@waterboards.ca.gov

213 712 6862 mobile

www.waterboards.ca.gov/water_issues/programs/swamp/cwt_general_mon.html

www.waterboards.ca.gov/water_issues/programs/swamp/cwt_volunteer.html

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www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.html