

## Using the Air Quality Index (AQI) to Assess Wildfire Smoke



State of Oregon  
Department of  
Environmental  
Quality

### Introduction

Oregon Occupational Safety and Health issued emergency rules on Aug. 9, 2021 to protect workers from wildfire smoke. The [Oregon OSHA rules](#) apply to employers whose employees are exposed to wildfire smoke while at work, based on concentrations of fine particulate matter, also called [PM<sub>2.5</sub>](#), as shown on the [Air Quality Index](#) (AQI). The AQI is a tool for assessing air quality around the state using information from DEQ air quality monitoring stations.

### Assessing Wildfire Smoke in your area

There are a number of ways employers can assess the level of air pollution from wildfire smoke in their area. These include county-level air quality advisories, state and federal AQI websites and smartphone apps, as well as employer-maintained air quality monitors.

There are many variables that can impact concentrations of wildfire smoke, including proximity to a fire, local topography, and wind speed and direction. Therefore, there is no standard for how close you need to be to a DEQ monitor to use the information it provides.

### Air Quality Advisories

DEQ issues air quality advisories by county when air quality conditions are likely to exceed unhealthy levels for sensitive groups for several hours or more. These advisories are determined by a team of professionals who evaluate weather, wildfires and potential health impacts, and include updated forecasts as conditions change. DEQ sends advisories to an email/text signup list and local media outlets, and posts them on the [Oregon Smoke Information](#) blog and [DEQ's AQI website](#) and free smartphone app, [OregonAir](#). Sign up for email or text advisory notifications at [ordeq.org/AQ-Advisory-Signup](http://ordeq.org/AQ-Advisory-Signup).

### The Air Quality Index

The U.S. Environmental Protection Agency developed the [Air Quality Index](#) for determining potential health impacts of air pollution. The AQI is calculated from air pollutant concentrations and uses a 0-500 scale for assessing health impacts. An AQI above 101 is considered unhealthy for sensitive groups, above 151 is unhealthy for all people, above 201 is very unhealthy, and the index increases to hazardous levels when the AQI exceeds 301. AQI details can be found on the EPA [AirNow website](#).

DEQ operates air quality monitoring sites across Oregon and maintains the state's AQI. The agency follows strict quality control and assurance procedures to ensure the monitoring sites provide accurate, reliable and complete data. The data are shown in near real time on [DEQ's AQI website](#), DEQ's OregonAir mobile app for [Android](#) and [iPhone](#), the [Oregon Smoke Information Blog](#) and EPA's [AirNow map](#). The AQI pulls data from DEQ's monitoring locations and uses a calculation called [NowCast](#) to derive the index value. The NowCast shows you air quality for the most current hour, using longer averages during periods of stable air quality and shorter averages when air quality is changing rapidly, such as during a wildfire. The AQI values account for changes in exposure to smoke over time. *Please note that the AQI is in Pacific Standard Time (PST), with no adjustment for daylight savings. For example, 10 a.m. PST is 11 a.m. during daylight savings time from March to November.*

Air quality forecasting is extremely challenging. It is a combination of forecasting weather and predicting wildfire behavior. Forecasts are available through [EPA's AirNow.gov](#) but they are limited by location and may not be reliable beyond one or two days.

### EPA's Fire and Smoke Map

The EPA and U.S. Forest Service developed the [EPA Fire and Smoke](#) map, a pilot project that fuses data from state agency monitoring sites, temporary smoke monitors and individually owned low-cost air sensors. The combined data provides good coverage in Oregon and can help employers estimate the AQI near their location. The system performs basic quality control screening of the data and applies a national correction for wildfire smoke that is not specific to Oregon. While the accuracy of sensors for wildfire smoke is improving, individual low-cost sensor measurements are of unknown quality. If there are discrepancies on the map between DEQ monitors and sensors owned by individuals, employers should rely on the DEQ monitors.

### Air Quality Monitoring

DEQ Laboratory  
7202 NE Evergreen Parkway  
Hillsboro, OR 97124  
Phone: 503-693-5700  
800-452-4011  
Contact: Dan Johnson  
971-806-5323

[www.oregon.gov/DEQ](http://www.oregon.gov/DEQ)

*DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.*

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## Individually Owned Monitors

Anyone can purchase and maintain their own particulate matter monitors. Owning a monitor may be useful in areas where observations are limited or where wildfires may have local impacts. There are a number of challenges associated with operating air monitoring equipment, including siting, cost and maintenance.

Many low-cost sensors for monitoring smoke-related particulate matter are available commercially. These include the PurpleAir sensor that is shown on the [EPA Fire and Smoke](#) map. California's South Coast Air Quality Management District provides a list of air quality sensors and reviews their performance on the [AQ-SPEC](#) website. The quality and accuracy of low-cost air sensor measurements may vary.

## The 5-3-1 Visibility Index

Wildfires may occur in remote areas where there are no nearby air monitors collecting data for the AQI. In this situation, visual observations provide a simple and immediate way of estimating smoke levels and what precautions to take. OSHA advocates using the 5-3-1 visibility index in the absence of other AQI estimates. The numbers refer to visibility of five miles, three miles or one mile, and the method relies on people evaluating the visibility of familiar landmarks. Lesser visibility means higher AQI. DEQ has a webpage that describes how to use the [5-3-1 visibility index](#).

## DEQ's Next Steps

DEQ is working with communities to meet increasing air quality information needs related to wildfire smoke. This includes expanding DEQ's air monitoring network as well as providing technical support to communities that are interested in establishing their own local air monitoring networks.

## Contacts

DEQ - [AQM.Questions@deq.state.or.us](mailto:AQM.Questions@deq.state.or.us)

OHA - [OHA Wildfire and Smoke Resource Page](#)

## Links

Oregon OSHA Wildfire Smoke Rulemaking  
<https://osha.oregon.gov/rules/advisory/smoke/>

PM 2.5  
<https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>

Air Quality Index Basics  
<https://oraqi.deq.state.or.us/home/text/80>

Oregon Smoke Information Blog  
<https://oregonsmoke.blogspot.com/>

Request Air Quality Advisories  
[ordeg.org/AQ-Advisory-Signup](http://ordeg.org/AQ-Advisory-Signup)

Oregon DEQ's AQI Website  
<https://oraqi.deq.state.or.us>

OregonAir mobile app for Android  
<https://ordeg.org/OregonAirAndroid>

OregonAir mobile app for iPhone  
<https://ordeg.org/OregonAirApple>

EPA's Air Now Map  
<https://gispub.epa.gov/airnow/>

EPA's AirNow.gov  
<https://www.airnow.gov/>

EPA Nowcast AQI  
<https://www.airnow.gov/aqi/aqi-basics/using-air-quality-index/>

EPA Fire and Smoke Map  
<https://fire.airnow.gov/>

South Coast AQMD's AQ-SPEC  
<http://www.aqmd.gov/aq-spec>

5-3-1 Visibility Index  
<https://ordeg.org/5-3-1>

## Alternative formats

DEQ can provide documents in an alternate format or in a language other than English upon request. Call DEQ at 800-452-4011 or email [deqinfo@deq.state.or.us](mailto:deqinfo@deq.state.or.us).