General Public Document

# DEQ's Air Quality Index: Frequently Asked Questions

Q. Why is DEQ's Air Quality Index real-time 24-hour average different than the smoke blog or AIRNow's AQI?
A. DEQ still uses the old Conroy equation that EPA used to use to estimate the current conditions. EPA now uses the much more complex NowCast equation. DEQ is in the process of moving to the NowCast equation and hopes to have it in place before next wildfire season. More detail about each equation is shown below.

Q. How can the one-hour particulate matter 2.5 (PM2.5) average be moderate all day but the 24-hour average is listed as unhealthy for sensitive groups?
A. The one-hour average is meant to protect against acute exposure and the 24-hour average is meant to protect against more long-term exposure at lower levels. Both will impact your health and the easiest way to explain them is that they measure different exposure types and they should be considered different measurements with different purposes. For example, if you are planning a two-hour football practice, you should use the one-hour average. If you are going to be working outside all day, you may want to use the 24-hour average and keep an eye on the one hour averages throughout the day.

Q. What pollutant or averaging time do the colors on the map refer to?
A. Each dot shows a monitoring site. The color of the dot refers to the most protective or highest AQI calculated at that site. So if the PM2.5 AQI is higher than the ozone AQI the dot will show the PM2.5 AQI's color.

Q. In Medford, Portland, The Dalles and Hermiston, why is there a green dot surrounded by orange dots on the map?
A. Some sites only have ozone monitors and will appear green in the morning as ozone is an afternoon pollutant. Ozone forms with sunlight, heat, nitrogen oxide, volatile organic compounds, and low winds whereas PM2.5 is a primary pollutant that can happen anytime under any conditions. For wildfire smoke, ozone seems to be created by aged forest fire smoke (smoke that has been in the air awhile) but does not always increase when high concentrations of smoke are present. This may be because of the make-up of smoke from nearby sources or because the ultraviolet light needed for ozone formation is reduced under heavy smoke.

Q. What are the units in the Air Quality Index bar graphs.
A. The bar graphs show the Air Quality Index values, not the concentration levels.

Q. Why are the times on the "Hourly Data" page two hours behind the times on the map.
A. One hour is because during the summer, the map show values in Pacific Daylight Time but the Hourly Data Page gives times in Pacific Standard Time. The data is collected in PST year round and we like to keep the real time data in PST for people who want to down load the data and use it in spreadsheets. This allows them to compare winter and summer data. We change it on the map to PDT to make it easier to view for immediate use.
A. The second hour is different because the data on the real time page is show from the bottom of the hour. This means that the 2:00pm to 3:00pm average is given as 2:00pm. The

State of Oregon
Department of Environmental Quality

**Air Quality**
700 NE Multnomah St.
Suite 600
Portland, OR 97232
Phone: 503-229-5696
800-452-4011
Fax: 503-229-5850
Contact:
Anthony Barnack

www.oregon.gov/DEQ

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

map just list that last time the data was uploaded which would be at the top of the hour or 3:00pm for this example.

# AIR Quality Index Calculations

Here is an explanation of the various Air Quality Index calculations currently used in Oregon. The goal is to bring DEQ's Air Quality Index into alignment with AIRNow and use its calculation. We are waiting to purchase software to do this.

### PM2.5 Calculation:

### 1. DEQ Air Quality Index

### 1.1 One hour average

- Average the PM2.5 over one hour.
- Use one-hour breakpoints from 2008 version of the "Wildfire Smoke A Guide for Public Health Officials" There is a 2016 version of this document but it does not include one-hour average break points. Instead it uses the 24-hour breakpoints only and expects the states to use the NowCast calculation discussed below.

### 1.2 24-hour real time equation

DEQ currently uses the Conroy equation to calculate the real-time 24-hour average used on the Air Quality Index. This is an older equation formally used by the EPA to emphasize the current conditions over conditions older than 12 hours when calculating the 24-hour average. The Conroy Equation combines both the four-hour average and the 12-hour average in the following manner:

a. Calculate the average of the previous 12 hours.
b. Calculate the ratio of the most recent hour to the average of the previous 12 hours.
c. Calculate an "adjusted" hourly value:
   i. The adjusted hourly value is equal to the actual hourly value, if the actual hourly value is less than 30 micrograms per cubic meter
   ii. The adjusted hourly value is equal to the actual hourly value, if the actual hourly value is greater than 30 micrograms per cubic meter and the ratio of most recent hourly value to the average of most recent 12 hourly values is less than 0.9 or greater than 1.7.
   iii. Otherwise, the adjusted hourly value is equal to 0.75 times the actual hourly value.
d. Calculate the "adjusted" four-hour average, which is the average of the four most recent "adjusted" hourly values.
e. Estimate the Mid-24 as:
   (12*(12-hour average) + 12*(four-hour adjusted average))/24.

### 1.3 24 hour average historic equation

DEQ calculates a 24-hour average from midnight to midnight for historic Air Quality Index 24-hour values used after the fact.

### 1.4 The past AQI web page uses the maximum real time 24 hour AQI for the day instead of the midnight to midnight average.

### 2. EPA AIRNow – PM2.5

EPA uses NowCast https://forum.airnowtech.org/t/the-nowcast-for-ozone-and-pm/172 to approximate the complete daily Air Quality Index during any given hour. Even on days when the AQI forecast predicts unhealthy conditions, pollution levels may be lower and better for outdoor activities

during some parts of the day. Providing current conditions gives people the power to take action to reduce outdoor activities and exposure when necessary and protect their health.
The NowCast calculation uses longer averages during periods of stable air quality and shorter averages when air quality is changing rapidly, such as during a wildfire. The NowCast allows current conditions maps to align more closely with what people are actually seeing or experiencing

### 3. EPA's breakpoint calculations

Refer to EPA AIRNow or the EPA Technical Assistance Document for the Reporting of Daily Air Quality – the Air Quality Index (AQI)

**Accessibility -** Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email **deqinfo@deq.state.or.us.**