Air Quality Data – Frequently Asked Questions

Bay Area Air Quality Management District

What are the best resources for air quality data?

- The most accurate air quality data comes from the *Air District's air monitoring stations*. These data are available in the *Air Quality Index (AQI)* format on an hourly basis for sub-regions within the Bay Area at the Air District's website: https://bit.ly/2p7UFgs. Alternatively, air pollutant concentration data are also available on the website.

- EPA's AirNow Fire and Smoke Map shows data from the Air District's monitoring stations, temporary monitors that agencies have placed to monitor wildfire smoke events, and PurpleAir *low-cost sensors*. This map was created for the specific purpose of providing air quality information to the public during wildfire smoke events and includes low-cost sensors to supplement the Air District monitoring stations and provide broader geographic coverage of air quality data during these events. The map's user guide contains very helpful information on how to understand and use the map.

Where can I get information about preparing for and protecting my health during wildfires?

The Air District's Wildfire Safety page can help you stay informed on the latest air quality and wildfire developments, and guide you on how to prepare and protect your family's health during a smoke event.

What is the AQI and how is it calculated?

The Air Quality Index, or AQI, much like an air quality "thermometer," translates daily air pollution concentrations into a number on a scale between 0 and 500. The numbers in this scale are divided into six color-coded health ranges, as seen below.

Air Quality Index Levels of Health Concern	Numerical Value
Good	0 to 50
Moderate	51 to 100
Unhealthy for Sensitive Groups	101 to 150
Unhealthy	151 to 200
Very Unhealthy	201 to 300
Hazardous	301 to 500

The AQI numbers refer to specific amounts of pollution in the air. They are based on the federal air quality standards for six major pollutants - ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and two sizes of particulate matter.

In most cases, the federal standard for these air pollutants corresponds to the number 100 on the AQI chart. For example, the $PM_{2.5}$ AQI is 100 when the 24-hour average concentration is 35 $\mu g/m^3$.

When the Air District prepares its daily AQI forecast, we take the anticipated 24-hour concentration measurements for each of the major pollutants, convert them into AQI numbers, and post the highest AQI number for each reporting zone. The AQI for each pollutant are not combined. For example, the AQI for $PM_{2.5}$ only includes $PM_{2.5}$ data and does not include ozone values.

An AQI value can be estimated at a given point in time using EPA's NowCast methodology. Since the AQI for $PM_{2.5}$ applies to a 24-hour average, the NowCast algorithm is needed to estimate the current AQI using data from the current hour and multiple past hours. Data on the Air District website and on EPA's Fire and Smoke Map both apply this calculation when showing the latest hour's AQI.

To learn more about AQI, go to https://www.airnow.gov/aqi/aqi-basics/.

What determines the location of Air District air quality monitors?

The Air District is the regional agency responsible for protecting air quality in the nine-county Bay Area. Air District monitoring stations have been placed throughout the region to measure ambient air quality in sub-regions throughout the Bay Area and are subject to stringent EPA design criteria. These monitoring stations provide accurate air quality data to the public and ensure the region is meeting federal and state air quality standards.

Data from Air District monitoring stations are validated according to rigorous quality control and quality assurance requirements from the EPA to ensure that the air quality data is consistent and accurate, and to determine if the Bay Area is meeting air quality standards.

Air District monitoring stations are sited to follow specific requirements established under federal EPA regulations, which are primarily driven by population and level of pollution as well as meteorology and wind patterns, topography, and nearby pollution sources.

Although resources do not allow for placement of Air District air quality monitors in every Bay Area city, temporary monitors and low-cost sensors can provide helpful information about changes in air quality in specific areas and neighborhoods.

Should I look at Air Quality data from low-cost sensors?

While low-cost sensor can provide useful information about changes in air quality, accuracy can vary greatly from manufacturer to manufacturer, and from sensor to sensor, and can change over time.

PurpleAir, Clarity, and other low-cost sensors, can run higher than the Air District's EPA-certified air monitors under certain conditions, such as wildfires, but they can provide important information about real-time air quality on a neighborhood by neighborhood basis. Further information on PurpleAir and Clarity sensor data can be found at the PurpleAir FAQ and the Clarity blog.

For example, low-cost sensors can be used to understand how air quality is changing throughout a neighborhood (i.e., *Are concentrations generally increasing or decreasing?*).

Also, low-cost sensor networks are much denser than the Air District's monitoring network and can be used to qualitatively track how levels of pollution vary from place to place during events such as wildfires (i.e., *Is my neighborhood being impacted by wildfire smoke?*).

However, numerical AQI or concentration readings from low-cost air quality sensors should be viewed cautiously, and always in conjunction with the Air District's monitoring data or other supporting information, due to the following reasons:

- Low-cost sensors can be subject to interferences that may impact readings that may not be related to air quality (fog, relative humidity, temperature, etc.)
- Low-cost sensors may be placed in a location that is only representative of a very small area (under an outside awing or near pollution sources such as roadways, cooking devices, cigarette smoke) or may not be appropriately maintained, which adds to the uncertainty when interpreting these data.
- Different sources of low-cost sensor data could apply different corrections or use different AQI methodology, leading to site to site differences in sensor readings.