

Communicating Daily and Real-time Air Quality with the Air Quality Index and the NowCast

Presentation for the National Association of Clean Air Agencies

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Questions We'll Answer

- What is the Air Quality Index (AQI)?
- What is the NowCast, and how does it relate to the AQI?
- How does the NowCast work?
- What does the NowCast look like?
- How do Enviroflash Alerts work with the NowCast?

What Is the Air Quality Index?

- The Air Quality Index (AQI) is EPA's color-coded tool for telling the public how clean or polluted the air is
- It recommends steps people can take to reduce their daily exposure to pollution
- The AQI converts pollutant concentrations to a number on a scale from 0 to 500
- Cities and states use the AQI for reporting and forecasting air quality
- Metropolitan statistical areas with a population over 350,000 are required to report the daily AQI value (40 CFR Part 58 Appendix G)
- You can get daily AQI data and annual summary reports from the AirData website:
<https://www.epa.gov/outdoor-air-quality-data>

Issued Under the Clean Air Act and Tied to Health Standards

- Section 319 of the Clean Air Act directs EPA to set “a nationally uniform index”
 - “promulgate regulations establishing an air quality monitoring system throughout the United States which utilizes uniform air quality monitoring criteria and methodology and measures such air quality according to a uniform air quality index” and “provides for daily analysis and reporting of air quality based upon such uniform air quality index”
- Codified Ambient Air Quality Surveillance Network 40 CFR Part 58
 - Specific requirements for reporting the index
 - Revised through notice and comment rulemaking

Keyed to health regulations

- National Ambient Air Quality Standards (NAAQS) 40 CFR Part 50
- Prevention of Air Pollution Emergency Episodes 40 CFR Part 51
 - Emergency Episode Plans
 - Significant Harm Level

Electronic Code of Federal Regulations (eCFR): <http://www.ecfr.gov/cgi-bin/ECFR?page=browse>

Air Quality Index

- Pollutant-specific health effects and cautionary statements address question “who will be affected”
- Advisories based on health information supporting the NAAQS
 - Controlled human exposure, epidemiological studies exposure/risk assessments used to set breakpoints
 - Epidemiological studies useful for identifying risk factors and more serious effects
 - Controlled human exposure studies useful for identifying proportion of healthy population affected, symptoms, mechanisms of effects, genetic variability
 - Exposure assessments help identify at-risk groups

In controlled human exposure studies, we calculate the dose of inhaled pollution:

Dose = Concentration x Ventilation rate x Time

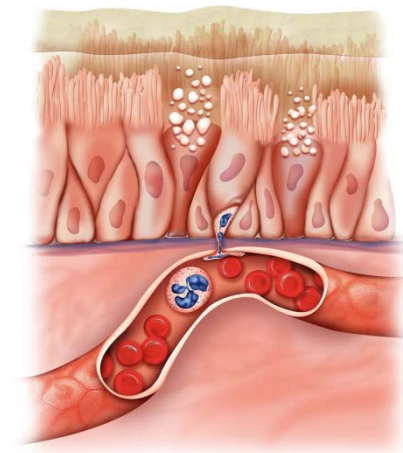
AQI advisories describe how to reduce this dose

C - be active outdoors when air quality is better

V - take it easier when active outdoors

T - spend less time being active outdoors

PAY ATTENTION TO SYMPTOMS!



AQI Categories and Health Messages



Level of Health Concern	Index Value	Message
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health alert: everyone may experience more serious health effects.
Hazardous	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.

AQI with Pollutant Breakpoints

These Breakpoints...							...equal this AQI	...and this category
O ₃ (ppm) 8-hour	O ₃ (ppm) 1-hour ¹	PM _{2.5} (µg/m ³) 24-hour	PM ₁₀ (µg/m ³) 24-hour	CO (ppm) 8-hour	SO ₂ (ppb) 1-hour	NO ₂ (ppb) 1-hour	AQI	
0.000 - 0.054	-	0.0 – 12.0	0 - 54	0.0 - 4.4	0 - 35	0 - 53	0 - 50	Good
0.055 - 0.070	-	12.1 – 35.4	55 - 154	4.5 - 9.4	36 - 75	54 - 100	51 - 100	Moderate
0.071 - 0.085	0.125 - 0.164	35.5 – 55.4	155 - 254	9.5 - 12.4	76 - 185	101 - 360	101 - 150	Unhealthy for Sensitive Groups
0.086 - 0.105	0.165 - 0.204	55.5 - 150.4	255 - 354	12.5 - 15.4	186 - 304	361 - 649	151 - 200	Unhealthy
0.106 - 0.200	0.205 - 0.404	150.5 - 250.4	355 - 424	15.5 - 30.4	305 - 604	650 - 1249	201 - 300	Very unhealthy
-	0.405 - 0.504	250.5 - 350.4	425 - 504	30.5 - 40.4	605 - 804	1250 - 1649	301 - 400	Hazardous
-	0.505 - 0.604	350.5 - 500.4	505 - 604	40.5 - 50.4	805 - 1004	1650 - 2049	401 - 500	Hazardous

What Is the NowCast and How Does It Relate to the AQI?

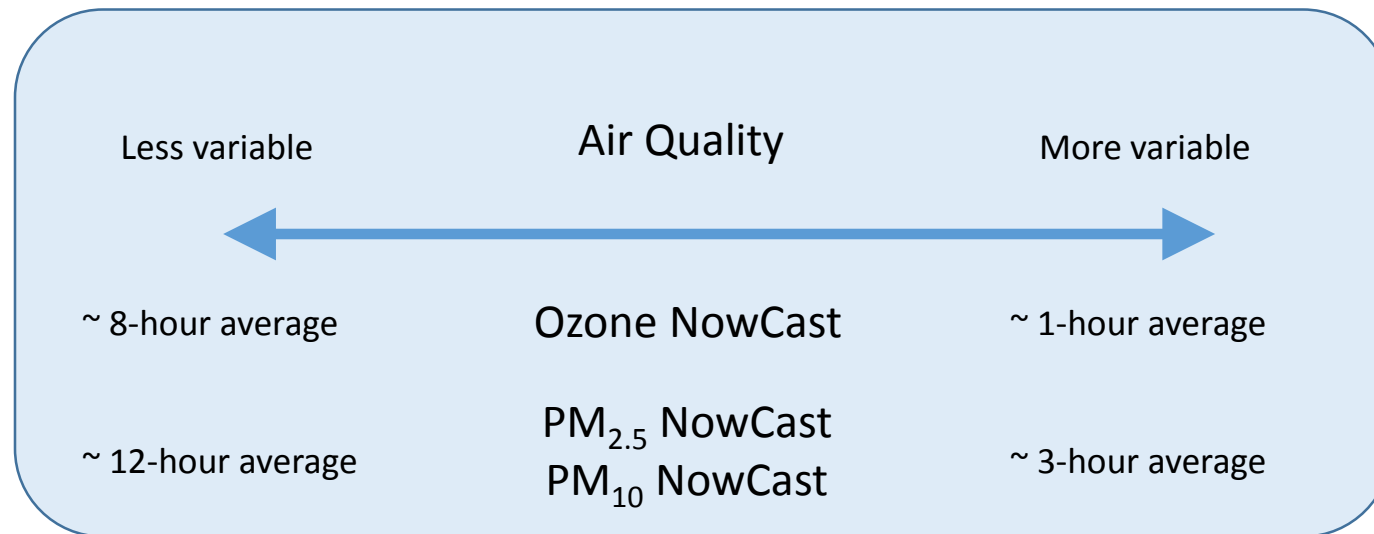
- The purpose of the NowCast is to give people real-time information so they can take action to reduce their exposure to high levels of air pollution.
- The **AQI** is used for reporting **daily** air quality and is based on a daily maximum 8-hour average for ozone and a midnight to midnight 24-hour average for PM.
- By the time those time periods are complete, it's too late for people to take actions that reduce their pollution exposure. So we use short-term data to report current air quality in terms of the AQI.
- The **NowCast** is EPA's method for relating short-term (less than 24-hour) data to the Air Quality Index for the purposes of **real-time** reporting.

NowCast History

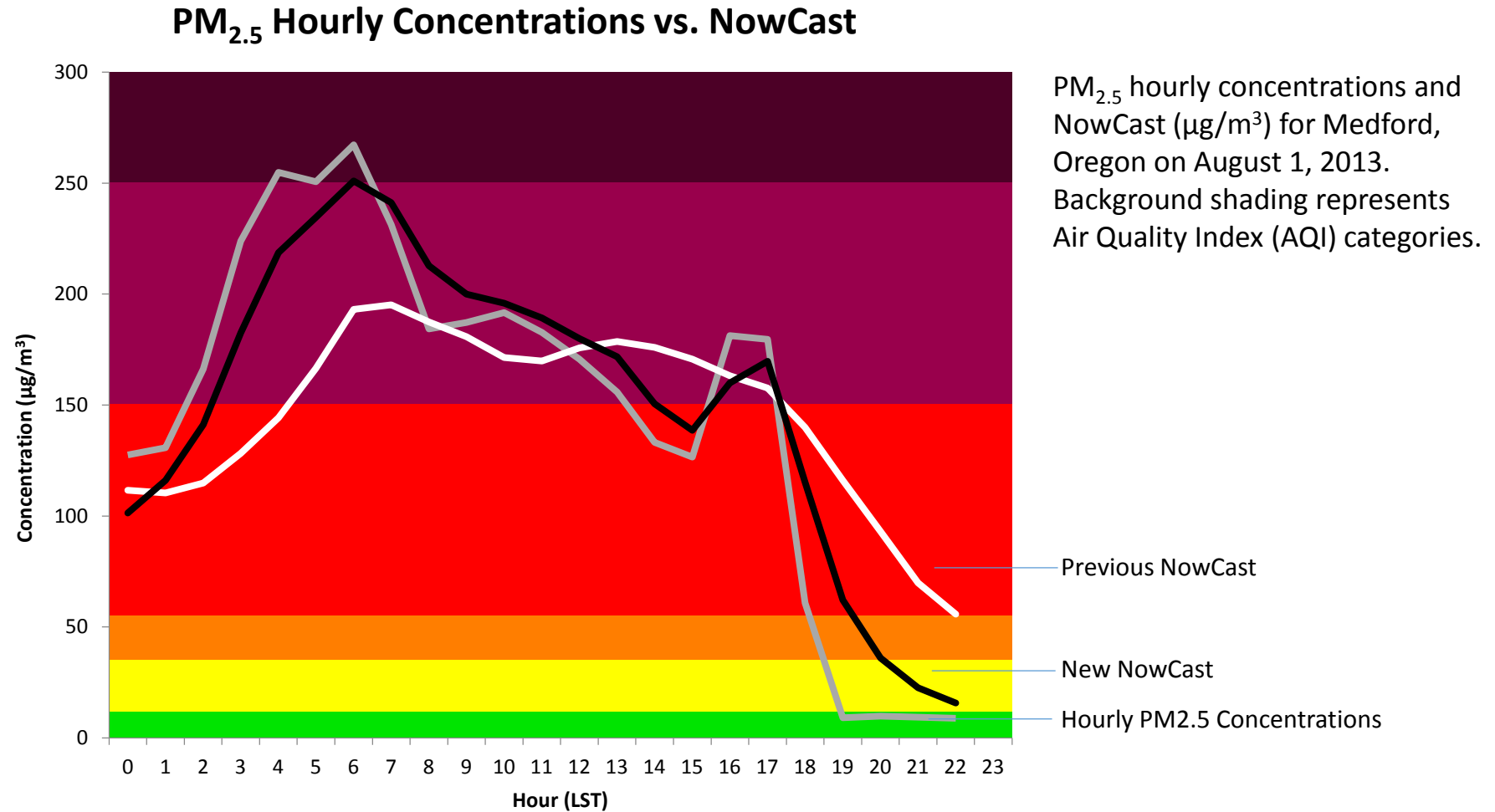
- We have been using a NowCast ever since we started reporting real-time air quality on AirNow over a decade ago.
- The previous NowCast method was developed in 2003 and was designed so that “current conditions” represented the 24-hour PM_{2.5} standard as closely as possible.
- At that time, EPA and our partners had little experience reporting PM_{2.5} values to the public. We also had less information about shorter-term PM_{2.5} health effects.
- The previous method was slow to respond when air quality changed rapidly.
- EPA updated the NowCast methodology in 2013 for PM_{2.5} (and later for PM₁₀ and ozone).
- We analyzed millions of data points in developing the new NowCast method.
- The updated NowCast method responds more quickly to rapidly changing air quality conditions, such as those we see during wildfire conditions.

How Does the NowCast Work?

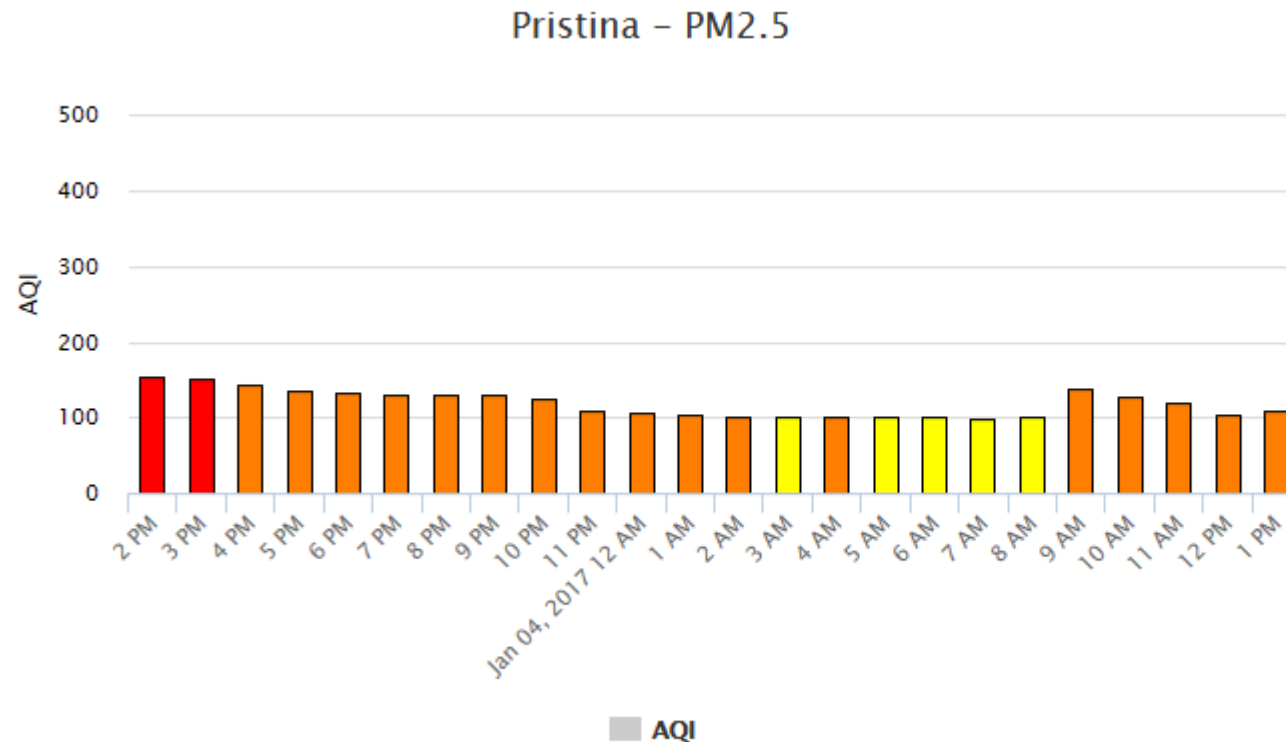
- The NowCast is simply a way to express real-time air quality in the context of the AQI
- For ozone, it is the average of the previous 8 hours
- For $PM_{2.5}$ and PM_{10} , it's the average of the previous 12 hours
- **If air quality is more variable, then recent hours are weighted more heavily in the average**



What Does the NowCast Look Like?



What Does the NowCast Look Like Over 24 hours?



Current Conditions
observed at
Jan 4, 2017 1:00 PM (LT)

109 AQI
Unhealthy for Sensitive Groups
PM2.5

Health Message
Members of sensitive groups may experience health effects. The general public is not likely to be affected.

Note: Values above 500 are considered Beyond the AQI. Follow recommendations for the Hazardous category. Additional information on reducing exposure to extremely high levels of particle pollution is available [here](#).

The NowCast and EnviroFlash

- Enviroflash offers two alert options
 - Forecast
 - Realtime data
- Forecast option
 - During periods of rapidly changing air quality, the NowCast may exceed the daily forecast
- Realtime alert option
 - Some agencies allow subscribers to get EnviroFlash alerts based on the realtime data, in addition to the forecast
 - Realtime data is calculated using the NowCast
 - When the NowCast reacts to rapidly changing air quality, realtime alerts may be issued
- Realtime data approval option
 - Enviroflash offers the option to approve or disapprove alerts before they go out
 - A screenshot of this option is on the next slide

EnviroFlash Super User Controls

Maryland Department of the Environment

[System Stats](#) [Sign-Up Stats](#) [Subscriber/Sendout Stats](#) [Reporting Area Archive](#)

Realtime Configuration > All Cities

Which city would you like to configure?

All Cities in Your Region

Realtime Email Settings


Require Approval Email Address:

Realtime Email Content

From - Friendly Name:

Subject:

Short Subject:

Email Header Logo:

 No file selected. Default header will be used.

Summary: The NowCast and Health

The AQI for PM is a 24-hour index. How can a NowCast accurately represent that?

- We want to give people information they can use to reduce their exposure to air pollution and protect their health.
- We use the NowCast to approximate the 24-hour AQI in any given hour. This gives people the power to take action. They can use this information to reduce their exposure – reducing exposures if PM is high only during a few hours a day will help reduce a person’s total exposure over a 24-hour period.
- With the NowCast, our current conditions maps should align more closely with what people are seeing/experiencing. We hope this will increase individual action to reduce exposure.

Comments/Questions to Alison Davis

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