How to use GoToWebinar

- How to use the controls

- How to ask a question

- Please write your questions in the question box as they occur to you. We will answer as many questions as we can during the webinar, and we will follow up about remaining questions after the webinar.

Ambient Air Quality Monitoring in Virginia

Virginia Department of Environmental Quality

July 2, 2024

Welcome

- Objectives
    - Define ambient air quality
    - Explain the Clean Air Act and DEQ's role in air quality protection
    - Understand how ambient air quality monitoring is conducted in Virginia
    - Explain the Air Quality Index (AQI)
    - Review other resources
    - Ask/Answer questions

Definitions

- Ambient air quality
- Stationary source emissions
- Mobile source emissions
- Criteria pollutants
- Air toxics

Acronyms

- CAA – Clean Air Act
- NAAQS – National Ambient Air Quality Standards
- AQI – Air Quality Index
- SIP – State Implementation Plan
- PM – Particulate Matter

Why does air quality matter?

- Air pollution affects:
  - Human health
  - Our well-being and enjoyment of the outdoors
  - Plants and wildlife
  - Water, land, ecosystems, habitats
- DEQ's Mission
- DEQ's Vision

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What affects ambient air quality*?

- Natural origin substances

- Human origin substances (manmade)

- Weather: temperature, humidity, wind

- Geography

- Example: Summer 2023 wildfires

June 5, 19:30 UTC
Black Carbon (mg/m²)
0   5   10   15   ≥20

*outdoor air quality

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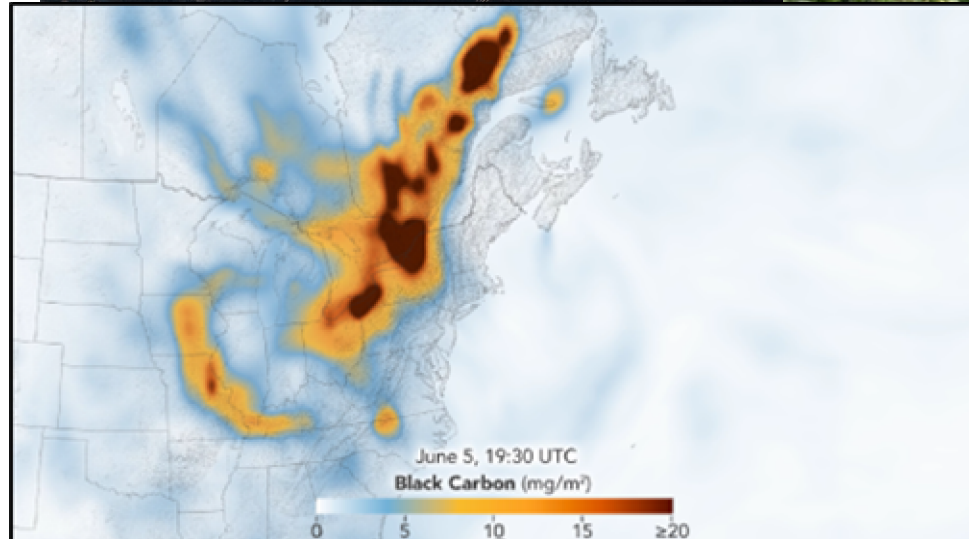
The Legal Framework for Protecting Our Air

- 1970 Federal law
- Amended in 1990
- Regulates sources of air emissions

Clean Air Act

- Federal regulatory authority
- Clean Air Standards
- Air Toxics list

EPA

- State regulatory authority
- Monitor, report, track progress
- Provide data for actions and decisions

VA DEQ

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Why does DEQ monitor air pollution?

- You can't manage what you don't measure

- Air pollution affects human health, and can also impact plants, wildlife and visibility

- DEQ is the official record of air pollution levels

- Air monitoring helps us track progress

- Real-time air monitoring helps people plan around days with poor air quality

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# Which pollutants do we monitor and why? 1 – Criteria (Primary) Pollutants

- Identified in the Clean Air Act

- Each have different protocols for measurement and analysis.
  - Some are measured hourly, some daily, and they are averaged over different periods of time to assess the ambient levels in the air.

- Six primary pollutants (criteria pollutants)
  - Nitrogen oxides
  - Sulfur oxides
  - Lead (Pb)
  - Ground-level Ozone (O_3)
  - Carbon Monoxide (CO)
  - Particulate Matter (PM2.5 and PM10)

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Which pollutants do we monitor and why? 2 – Hazardous Air Pollutants

• Hazardous air pollutants (air toxics)
  o Identified in Clean Air Act
  o Two sites in Virginia (Henrico and Hopewell), part of nationwide network
  o Metals, volatile organic compounds (VOCs), carbonyls, and more

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Questions?

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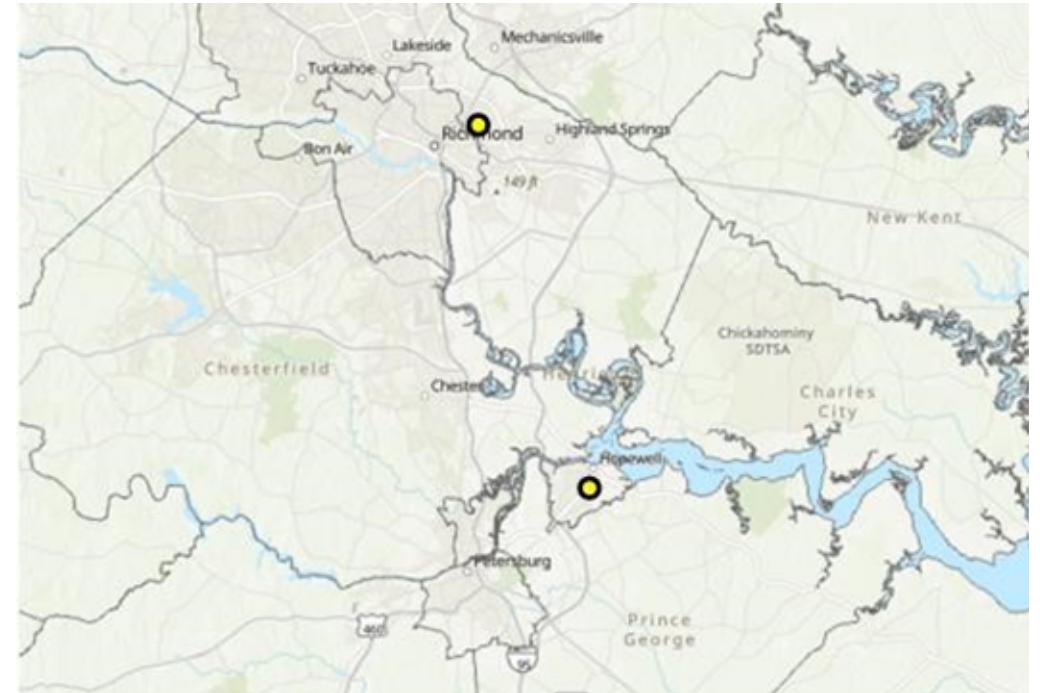
What if the monitored pollutants don't meet the standards (NAAQS)?

- An area that does not meet the standards is designated as a "Nonattainment Area"
  - (link to EPA list of nonattainment in Virginia)
- DEQ addresses issues through our State Implementation Plan
- When an area's air quality improves, it will be redesignated as a "Maintenance Area"
- Virginia currently has two Nonattainment Areas:
  - Northern Virginia counties for Ozone
  - Giles County for Sulfur Dioxide

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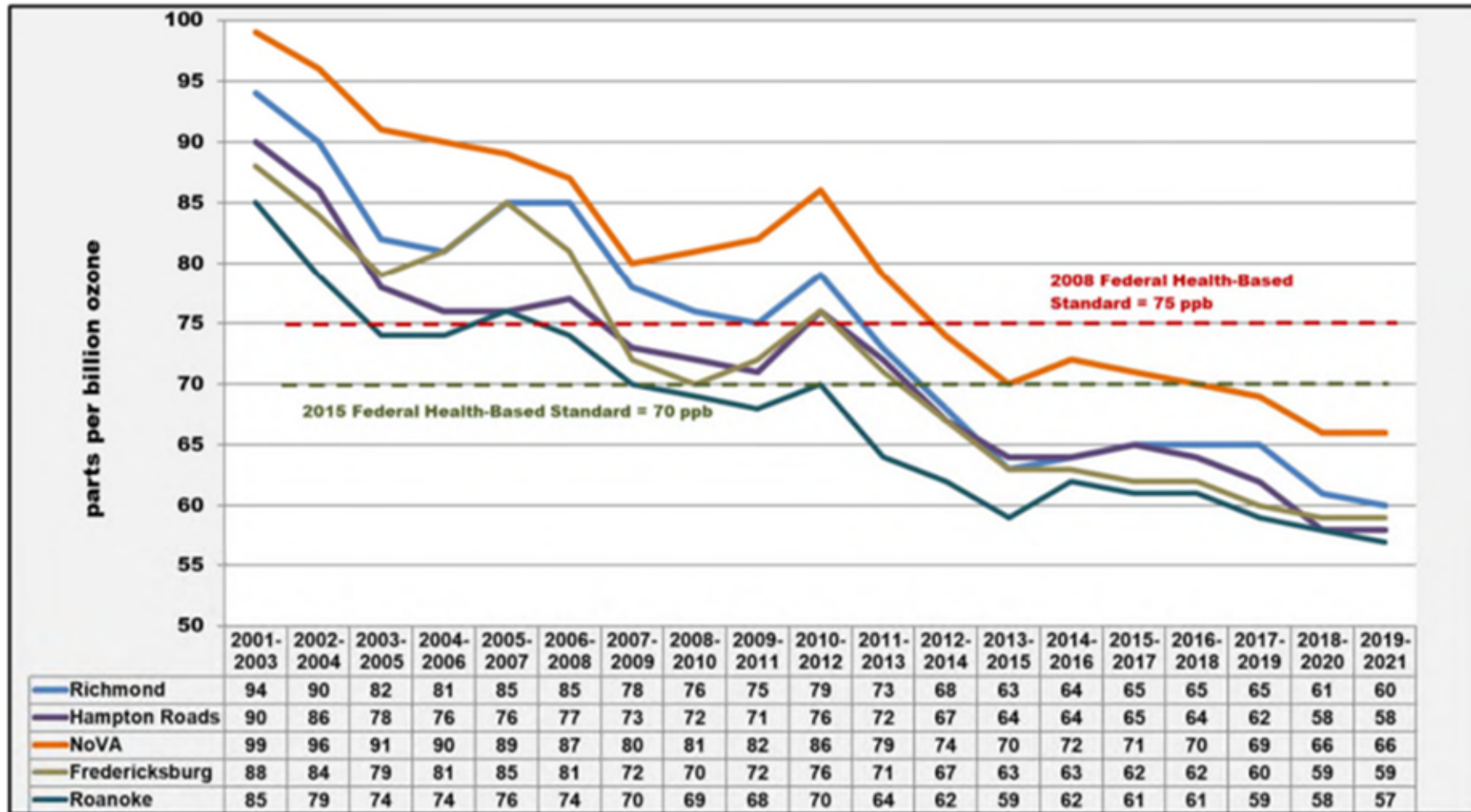# What if the monitored pollutants don't meet the standards (NAAQS)? 2

Figure 2-2: Ozone Concentrations, Three Year Average

	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Richmond	94	90	82	81	85	85	78	76	75	79	73	68	63	64	65	65	65	61	60
Hampton Roads	90	86	78	76	76	77	73	72	71	76	72	67	64	64	65	64	62	58	58
NoVA	99	96	91	90	89	87	80	81	82	86	79	74	70	72	71	70	69	66	66
Fredericksburg	88	84	79	81	85	81	72	70	72	76	71	67	63	63	62	62	60	59	59
Roanoke	85	79	74	74	76	74	70	69	68	70	64	62	59	62	61	61	59	58	57

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How do we monitor pollutants and assess ambient air quality?

- Network of monitors, each of which monitors different pollutants
- The data from these monitors contributes to nationwide data analysis ([link to interactive map of air quality monitors](#))
- Regulatory monitors require specific siting characteristics, for example, distance from:
  - Stationary sources of pollution
  - Ground level (2-10 m)
 - Roadways, trees, and other obstructions

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Air quality monitors

- Monitors may capture pollutants on filters or use sensors to detect pollutants
- DEQ staff from the Office of Air Quality Monitoring and the regional offices visit the monitors regularly to
  - Collect data
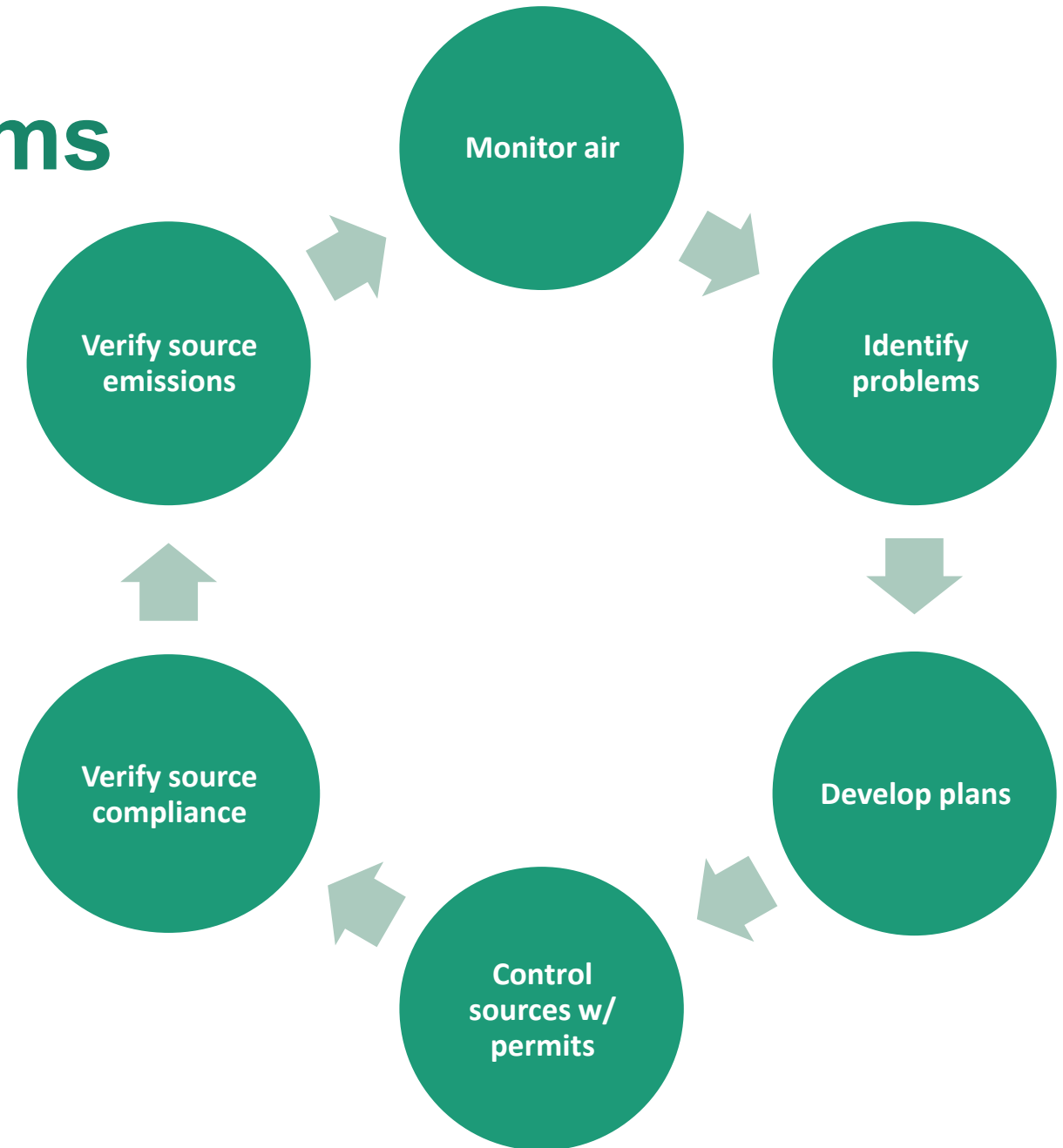 - Perform quality assurance
  - Perform maintenance

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Where are the monitors in Virginia?

Legend:
- Ozone
- NO2
- PM2.5
- PM10
- CO
- SO2
- Lead

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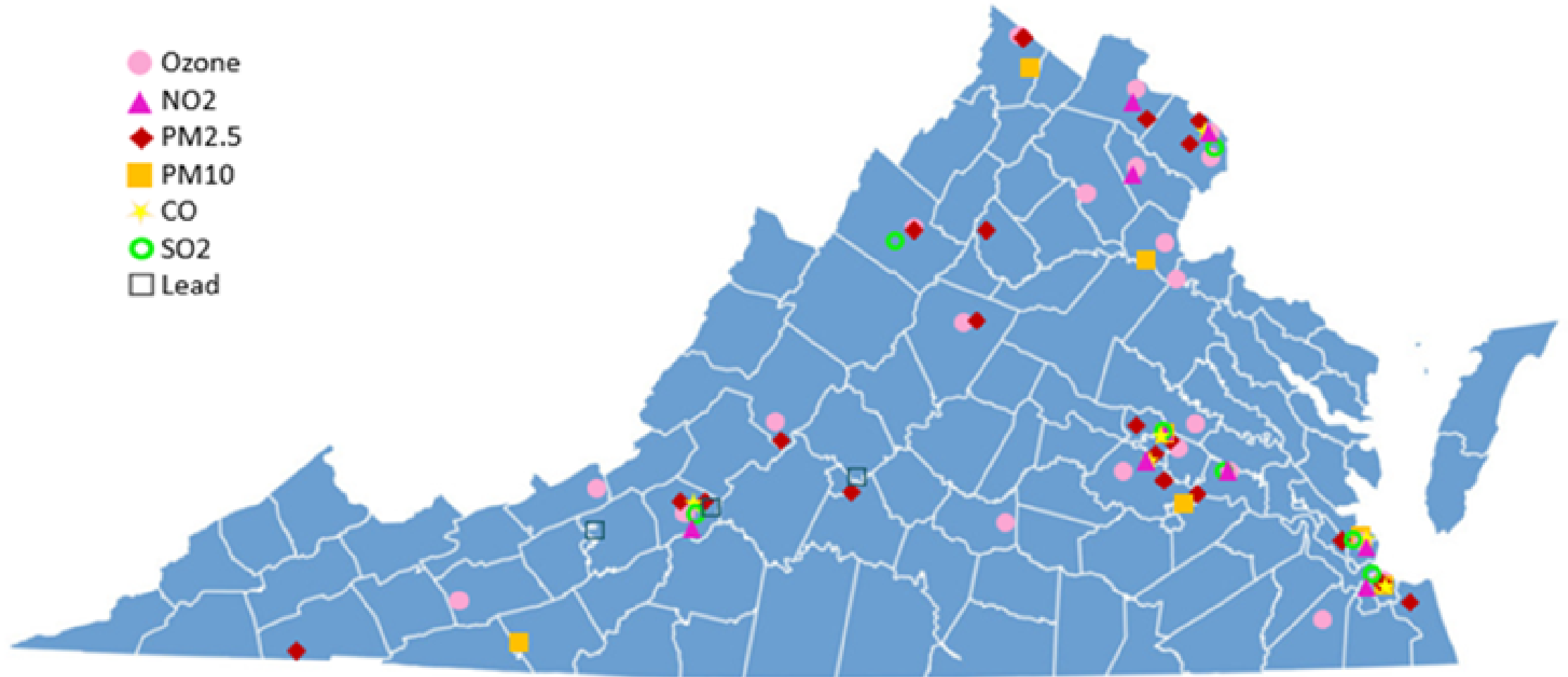
Air Quality Programs

- Air Quality Monitoring
- Air Quality Assessment
- Air Quality Planning
- Air Permitting
- Air Compliance

Monitor air

Identify problems

Develop plans

Control sources w/ permits

Verify source compliance
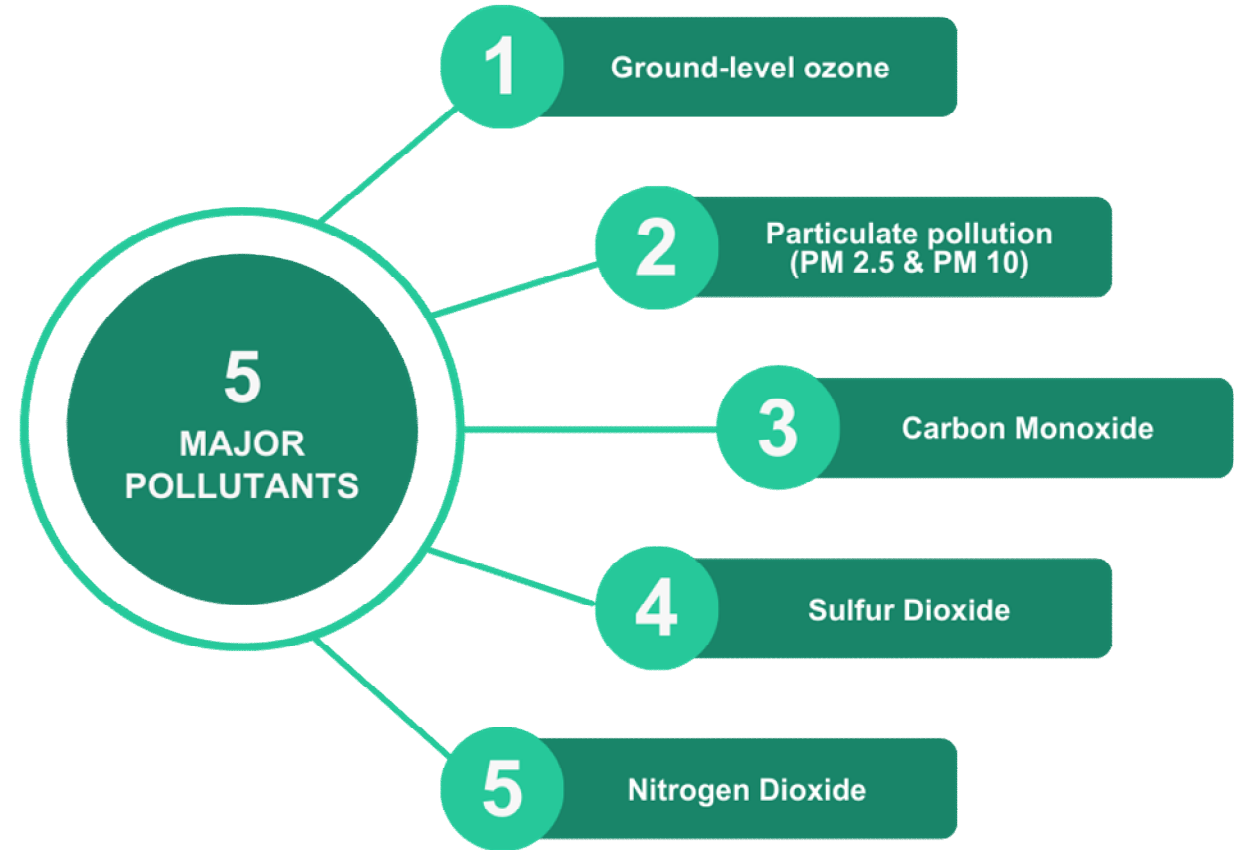
Verify source emissions

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Questions

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What is the Air Quality Index (AQI)?

- It is like a yardstick
- The higher the AQI value, the greater the level of air pollution
- Based on EPA standards and human health risk
- Some limitations:
  - Temperature
  - Pollen and other pollutants
  - Localized conditions
  - Ground level measurements

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

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Five Major Pollutants

- EPA established an AQI for five major pollutants regulated by the Clean Air Act

- Each pollutant has a **national air quality standard** also set by the EPA

- These regulations and standards are designed to protect human health

5 MAJOR POLLUTANTS

1. Ground-level ozone
2. Particulate pollution (PM 2.5 & PM 10)
3. Carbon Monoxide
4. Sulfur Dioxide
5. Nitrogen Dioxide

To learn more about the air quality standards for each pollutant, visit this technical assistance guide.

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DEQ Air Quality and Forecast

- DEQ monitors air pollution at many locations throughout the state
- Daily Air Quality Forecasts by region
- Interactive map of air monitoring sites and current AQI information

Forecast										
Today's Forecast						**Tomorrow's Forecast**				
Region	**AQI**	**Class**	**Pollutant**	**Activity Caution**	**Risk Groups**	**AQI**	**Class**	**Pollutant**	**Activity Caution**	**Risk Groups**
HAMPTON ROADS	25	Good	PM25LC	None	People with respiratory or heart disease, the elderly and children are the groups most at risk.		No Forecast			
NORTHERN VIRGINIA	25	Good	PM25LC	None	People with respiratory or heart disease, the elderly and children are the groups most at risk.		No Forecast			
RICHMOND	25	Good	PM25LC	None	People with respiratory or heart disease, the elderly and children are the groups most at risk.		No Forecast			
ROANOKE	33	Good	PM25LC	None	People with respiratory or heart disease, the elderly and children are the groups most at risk.		No Forecast			
WINCHESTER	33	Good	PM25LC	None	People with respiratory or heart disease, the elderly and children are the groups most at risk.		No Forecast			

Region [All ∨]　**Layers:** [AQI ∨]　**Sites:** [∨]　See tabular version of this AQI map data

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How can I find out about AQI where I live?

- Sign up for:
  - Air Quality Forecasts from DEQ – for Hampton Roads, Richmond, Roanoke, and Winchester
  - Health Alerts from DEQ
  - Air Quality Forecasts for the DC Metro Area
- Airnow.gov for AQI information in all 50 states and Puerto Rico
  - Includes "NowCasts" for ozone and particle pollution based on hourly readings
- Apps: Clime (NOAA), AIRNow (EPA), and many other weather apps include AQI


DEQ | DEQ.Virginia.gov

AIR QUALITY FORECASTS FOR OCTOBER 4, 2023

The Virginia Department of Environmental Quality (DEQ) uses a color-coded air quality forecast system:

Hampton Roads
Color Code: Yellow - Moderate air quality
Primary Pollutant: Particle pollution

Richmond
Color Code: Green - Good air quality
Primary Pollutant: Particle pollution

Roanoke
Color Code: Green - Good air quality
Primary Pollutant: Particle pollution

Winchester
Color Code: Green - Good air quality
Primary Pollutant: Particle pollution

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What can I do when AQI is unhealthy?

- Limit the amount of time you spend outside
- Consider changing the types of activities you do outside
- Wear a well-fitted N95 or KN95 mask outside, if the risk is high
- Use indoor air filters and vacuums with HEPA filters
- If possible, avoid using candles, incense, or fireplaces
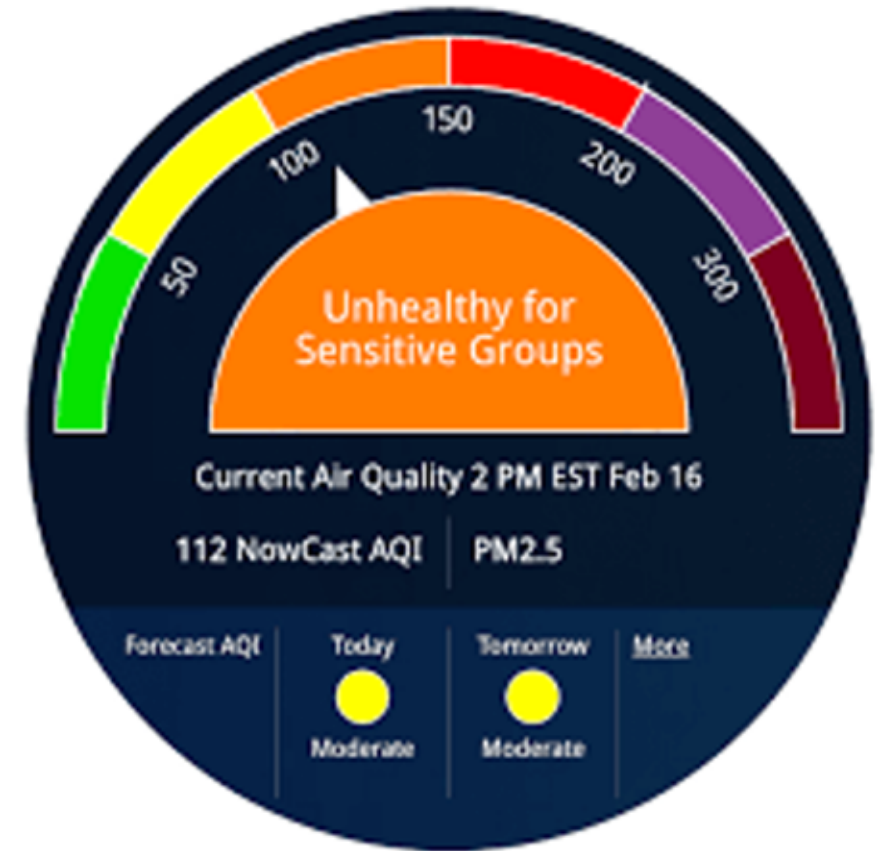
PurpleAir Sensors vs. Regulatory Air Monitors

Designed for citizen science

Designed for regulatory data

Data is not regulatory grade

Data drives regulatory decisions

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Other resources

- Sensors to measure particulate pollution (stationary sensors, mobile/hand-held sensors)
- EPA's Region 3 air sensor loan program
- EPA and NOAA air quality information
- NASA Data Explorer

Objectives

- Polls – what did you learn?

- Will you be signing up for alerts or downloading an app?

- Would you be interested in attending a webinar with more detailed information about air quality monitoring?

Final Questions?

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Upcoming Webinars

- **Tuesday, August 27** – DEQ 101

- **Tuesday, October 22** – DEQ Tools and Resources

- **Tuesday, December 10** – Pollution Prevention

Survey – What are you interested in learning from DEQ?

  - Link posted in Chat
  - QR code on the right

DEQ Education Series Survey

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Thank you!