

U.S. Air Quality Index



Clean Air Initiative for Latin American Cities Conference
Training Course 1-02. Air Quality Indexes
CETESB, Sao Paulo Brazil
July 24, 2006

Susan Lyon Stone
US EPA Office of Air Quality Planning and Standards
stone.susan@epa.gov



U.S. AQI

- How is it structured?
- How is it used?
- How effective is it?
- Important target audiences
- AIRNow International

Structure

- Index for reporting daily air quality
- Revised 1999 through extensive stakeholder process
- Nationally uniform
- Intuitive colors - like weather map
- Health-based descriptors
- Pollutant-specific health messages

Air Quality Index

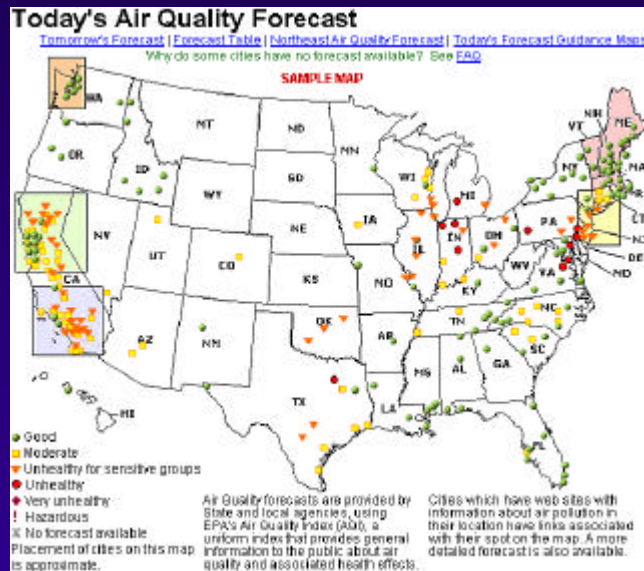
Descriptors	Cautionary Statement
Good 0 – 50	No message
Moderate 51 – 100	Unusually sensitive individuals
Unhealthy for Sensitive Groups 101 - 150	Identifiable groups at risk - different groups for different pollutants
Unhealthy 151 - 200	General public at risk; sensitive groups at greater risk
Very Unhealthy 201 - 300	General public at greater risk; sensitive groups at greatest risk

Use AQI to Reduce Risk

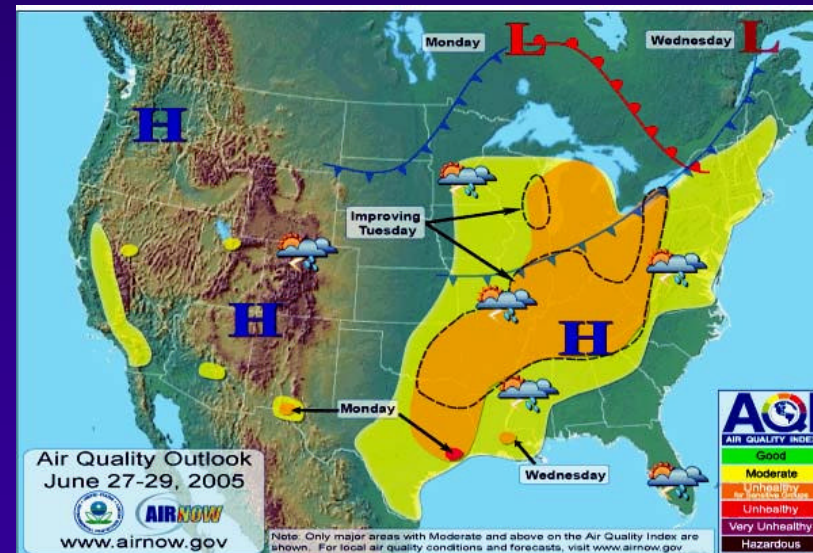
Dose = Concentration x Ventilation Rate x Time

- Reduce these factors to reduce dose
- Pay attention to symptoms
- People with asthma – follow asthma action plan
- Coaches – rotate players frequently
- People with heart disease
 - Check with your doctor
 - Don't exercise near busy roads

Air Quality Forecasting

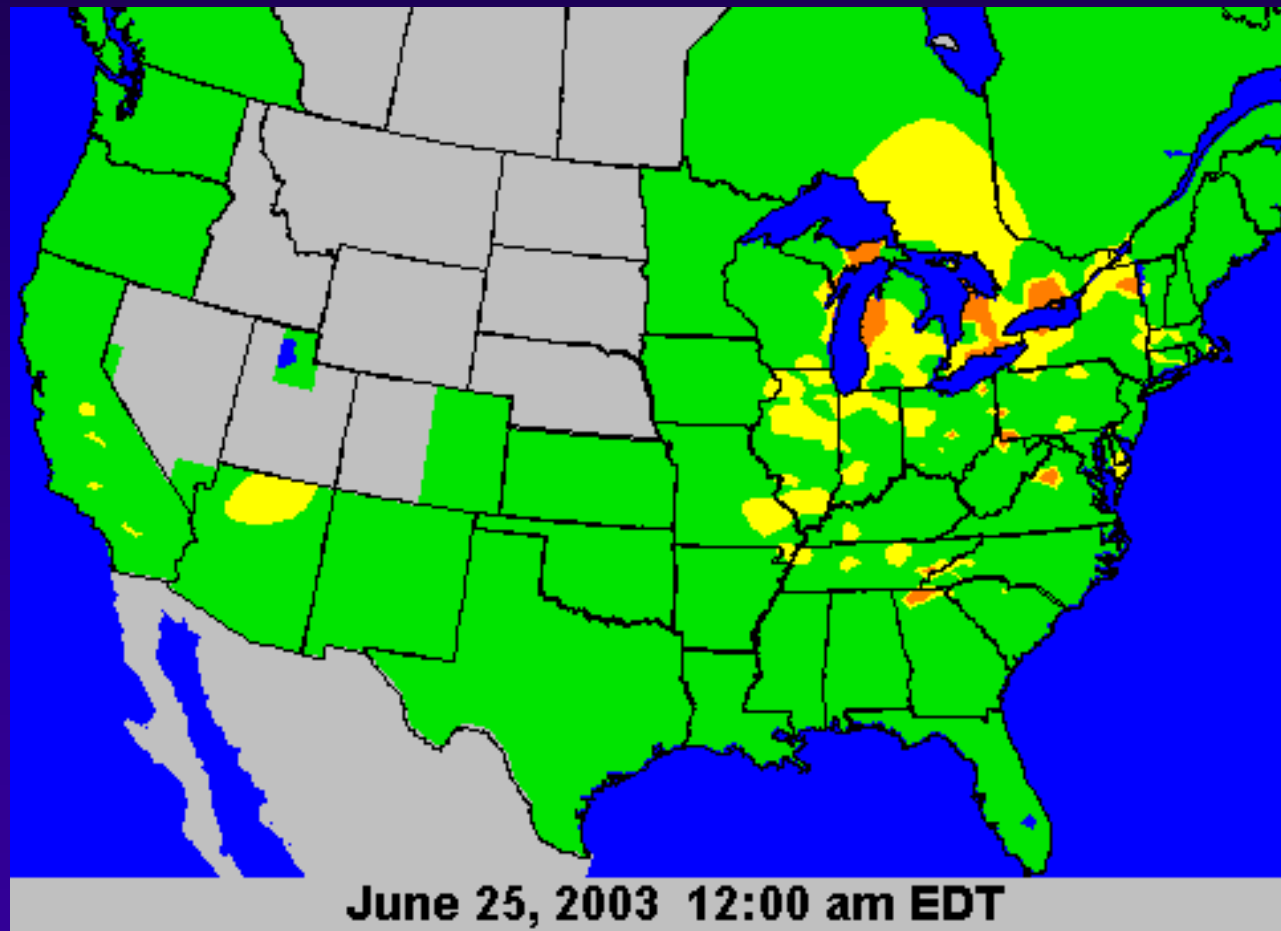


Daily



Two-Day Outlook

Real-Time Air Quality Mapping



Emission Reductions Programs

CLEAN AIR PARTNERS

For the Media

Click to activate and use this control

Regional Air Quality Forecasts

Washington, DC

Air Quality Forecast

Jul 12 Subhealthy for Sensitive Groups OZONE

Jul 13 Moderate PM2.5

Baltimore, MD

Air Quality Forecast

Jul 12 Subhealthy for Sensitive Groups OZONE

Jul 13 Moderate PM2.5

THAT'S A FACT

In the Baltimore-Washington area, gasoline-powered lawn and garden equipment is second behind cars and trucks as the cause of ozone smog.

Real-time Regional Ground-Level Ozone Map

airWATCH northwest

KEEP IT IN THE GREEN!

EVERY BREATH CLEAN AIR BEGINS!

Air Quality Forecast

Current Air Quality

Info & Definitions

Contact Info

Tips

Notification Network

News & Events

Links

A program of the Puget Sound Clean Air Agency and the American Lung Association of Washington

This site is best viewed using the current version of Internet Explorer or Netscape Navigator, display resolution set to at least 800x600, and display colors set to at least 16 bit, high color.

Last updated: February 13, 2004 • ©2001-2004 Puget Sound Clean Air Agency • All Rights Reserved

Clean Air Partnerships

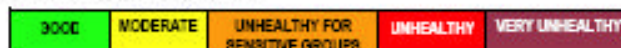


EnviroFlash in Michigan

EnviroFlash is a service that automatically delivers air quality forecasts directly to the public. It provides information so people can adjust their daily activities when poor air conditions are expected.

People enrolled in **EnviroFlash** get the information they choose to receive via computer e-mail or a cell phone with text messaging capability.

Michigan Department of Environmental Quality meteorologists determine what the air quality level for the next few days is likely to be:



Forecast pollutants include ground-level ozone and fine particulate. **EnviroFlash** automatically sends the forecast message at the air quality level you select as well as notice when an "Action" day (air quality advisory) is announced.

Those with small children and people with cardio-pulmonary health problems (such as asthma) may choose to be notified when the air is predicted to be unhealthy for sensitive groups. People who work or exercise strenuously are in this category due to increased deep respiration. People who do not have health risks and who aren't as concerned about outdoor air quality may opt to be notified when the forecast is unhealthy.

Current air quality information is already available via DEQ's website [www.michigan.gov/deqair] and AIRNow [www.airnow.gov]. **EnviroFlash** is an additional service that sends air information directly to your computer or cell phone.

SIGN UP NOW! HERE'S HOW:

Go to www.michigan.gov/deqair & click on the **EnviroFlash** icon. Click on "sign-up" and follow these five easy steps:

1. Type in your e-mail address
2. Select the city location.
3. Optional - type name and zip code information
4. Select either "regular" e-mail format -or- "short" for pagers & digital cell phones.
5. Choose a forecast level.



A confirmation message to initiate this service will be sent to you by e-mail.

The Michigan EnviroFlash program is a partnership between Michigan DEQ and U.S. EPA.



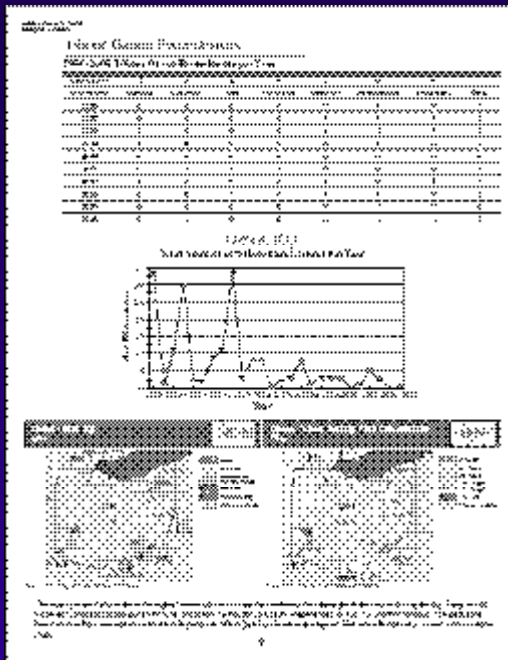
Air Quality Division
Michigan Department of Environmental Quality



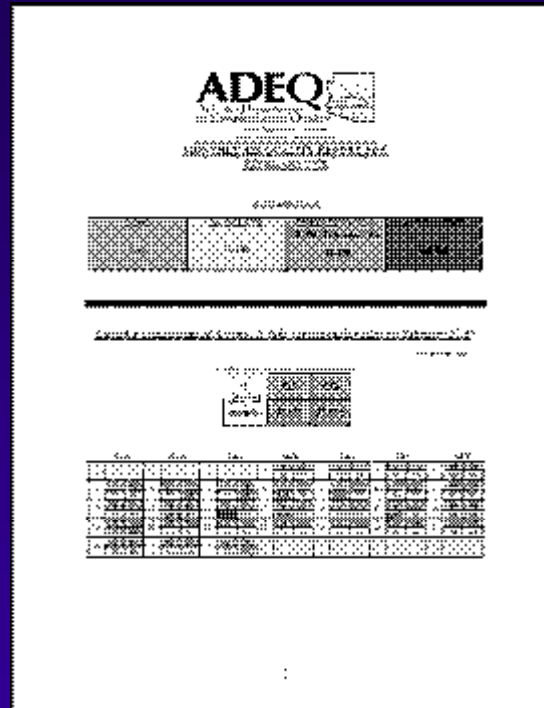
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency

April 2005

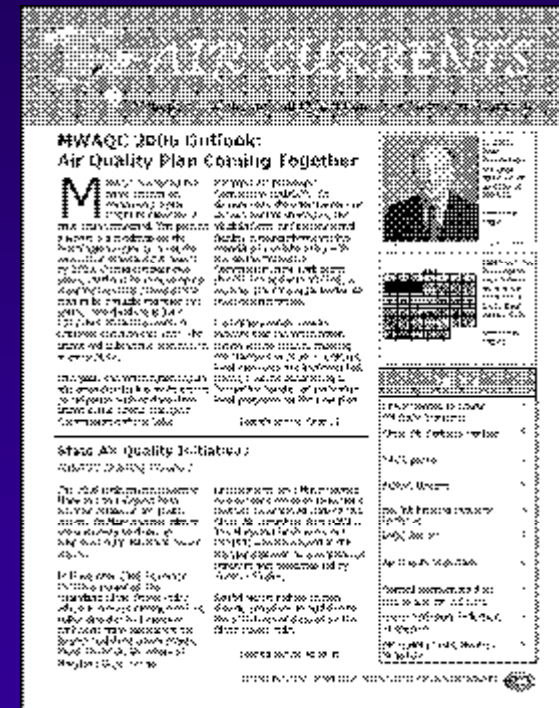
State and Local Agency Reports



Hamilton Co, Ohio



Arizona



Washington, DC

Clean Air Partners

Publications

Particle levels can be elevated indoors, especially when outdoor particle levels are high. Certain filters and room air cleaners can help reduce indoor particle levels. You also can reduce particle levels indoors by not smoking inside, and by reducing your use of other particle sources such as candles, wood-burning stoves, and fireplaces.

How can the Air Quality Index help?

In many areas, local media provide air quality forecasts telling you when particle levels are expected to be unhealthy. Forecasts use the same format as EPA's Air Quality Index, or AQI, a tool that state and local agencies use to issue public reports of actual levels of particles, ground-level ozone, and other common air pollutants.

Using the AQI's color-coded scale, these forecasts help you quickly learn when air pollution is expected to reach unhealthy levels in your area. In the newspaper forecast below, for example, the black arrow points to the "orange" range, indicating that particle levels are expected to be unhealthy for sensitive groups. On television, you might hear a meteorologist say something like this: *"Tomorrow will be a code orange air quality day, with particle pollution at levels that are unhealthy for sensitive groups. If you have heart or lung disease, or if you're an older adult or a child, you should plan strenuous activities for a time when air quality is better."*



AIR QUALITY INDEX FOR PARTICLE POLLUTION		
Air Quality Index	Air Quality	Health Advisory
0 to 50	Good	None.
51 to 100	Moderate	Usually sensitive people should consider reducing prolonged or heavy exertion.
101 to 150	Unhealthy for Sensitive Groups	People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.
151 to 200	Unhealthy	People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.
201 to 300	Very Unhealthy	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.



Daily air quality and health information are available on the AIRNOW Web site.

AIRNOW

AIRNOW (www.epa.gov/airnow) is a Web site that gives daily information about air quality, including ground-level ozone and particles, and how they may affect you. AIRNOW contains:

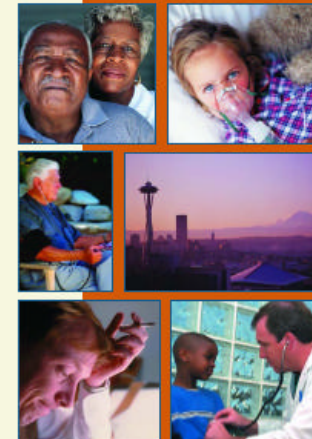
- Real-time particle levels for many locations.
- Air quality forecasts for many cities across the country.
- Kids' Web page and associated teacher curriculum.
- Smoke Web page.
- Links to state and local air quality programs.
- Ideas about what you can do to reduce particles. For example, you can keep your car, boat, and other engines well-tuned, and avoid using engines that smoke. You can also participate in local energy conservation programs.

*Photo courtesy of The Weather Channel.

Office of Air and Radiation
www.epa.gov/air
 September 2003
 EPA-452/F-03-001



Particle Pollution and Your Health



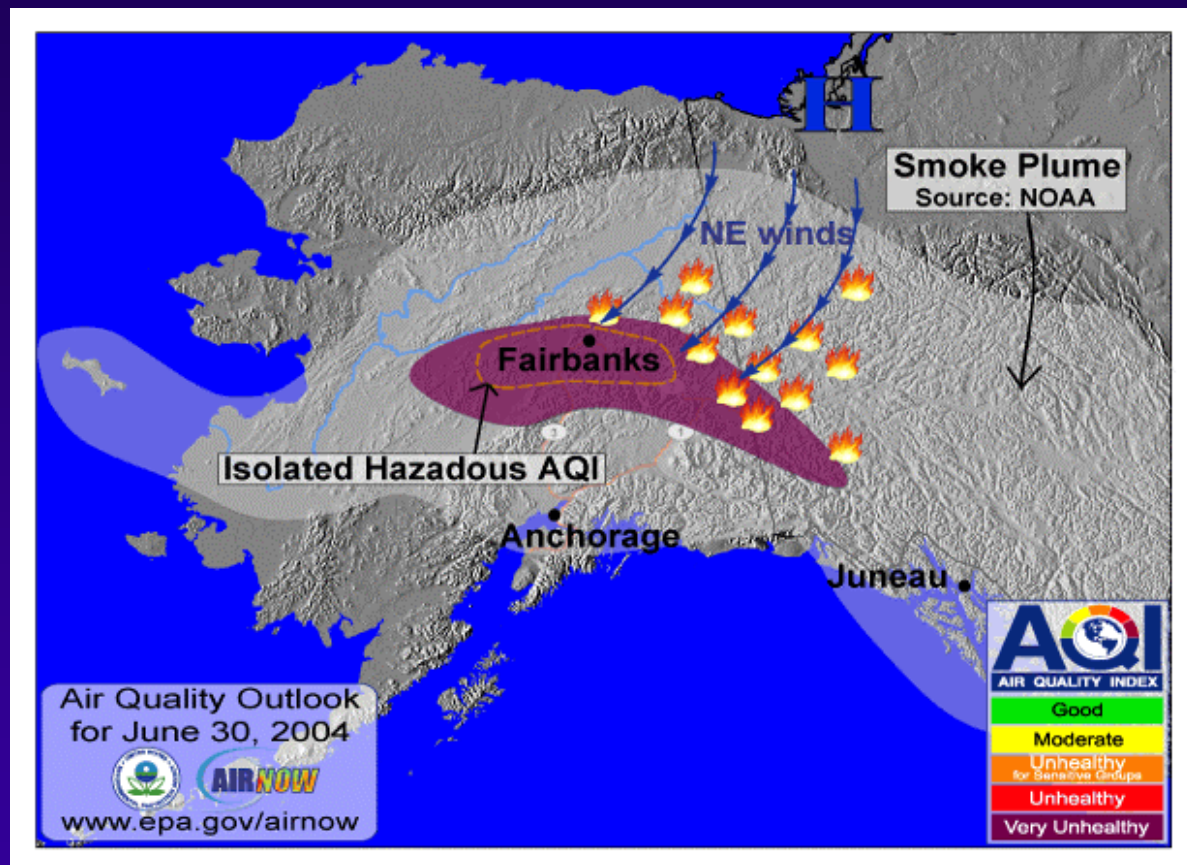
What Is Particle Pollution?

Are You at Risk?

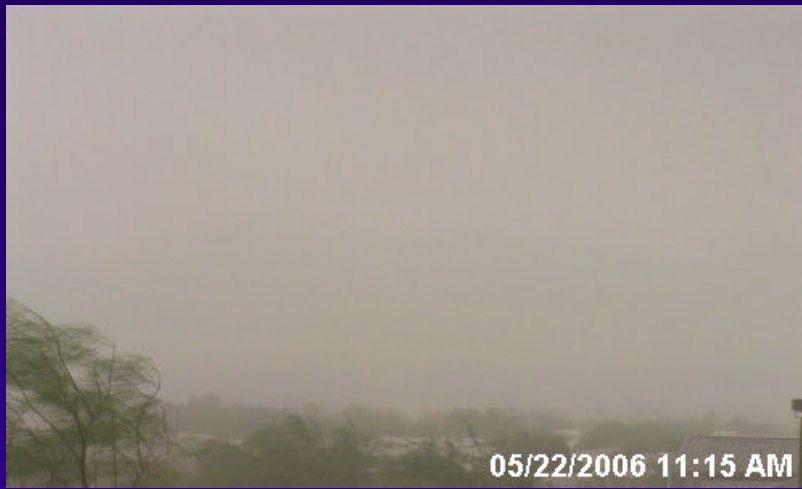
How Can You Protect Yourself?



News Stories



Web Cameras



Phoenix, Arizona



AIRNow Web site

<http://www.airnow.gov>

A cross-agency U.S. Government Web site. See a complete list of AIRNow partner agencies Search **GO**

AIRNOW Quality of Air Means Quality of Life

Home National Forecast Local Forecasts & Conditions Partners

About AIRNow

Air Quality Basics
[Air Quality Index](#)
[Ozone](#)
[Particle Pollution](#)
[AQI](#)

The AQI for...
[Health Providers](#)
[Kids](#)
[Older Adults](#)
[Partner agencies](#)
[Teachers](#)
[Weathercasters](#)

Key Topics:
[Your Health](#)
[Smoke from Fires](#)

Resources
[Publications](#)
[Publicaciones](#)
[FAQ](#)
[What You Can Do](#)
[Media](#)
[NAO Conferences](#)
[About the Data](#)

Contact Us

National Overview

July 13th, 2006

National Outlook for 7/13/06-7/14/06
Unhealthy for Sensitive Groups AQI levels in the West and the East

More —

National Outlook	Today's Forecast	Ozone Now	Particles Now	Today's Action Days
				Raleigh, NC OZONE
				Danish Area, LA OZONE
				Chattanooga, TN PM2.5
				El Paso, TX OZONE
				Great Smoky Mtn. Natl. Park - NC, TN PM2.5
				Knoxville, TN PM2.5
				More —

Air Quality Outlook Jul 13 - Jul 14, 2006

Today's National Forecast - click for larger map
[view flash version of maps](#)

Local Resources

EnviroFlash E-mail Notification
Sign-up for E-mail and Pager air quality notifications

[Local Forecast & Conditions](#)
[Current Ozone & Particle Maps](#)
[Compare Your City's Air Quality](#)
[Submit Environmental Complaint](#)

Web Cams [EXIT AIRNOW](#)

[Newark NJ/New York City, NY](#)

[View Other Visibility Cams](#)

Ozone: Good Up High, Bad Nearby

Ozone acts as a protective layer high above the earth, but it can be harmful to breathe. [More](#)

Ozone

Resources

[Publications](#)
[Publicaciones](#)
[FAQ](#)
[What You Can Do](#)
[Media](#)
[NAO Conferences](#)
[About the Data](#)

Contact Us

Today's: [Forecast](#) | [Action Days](#)

[Ozone Now](#) | [Particles Now](#) | [AQI Summary](#) | [Map Archives](#) | [International Air Quality](#)

Tomorrow's: [Forecast](#) | [Action Days](#)

Alaska DEC continues air quality advisory due to wildfire smoke

7/12 - 7/14: The Alaska Department of Environmental Conservation has issued an air quality advisory for Interior Alaska. [More](#) [EXIT AIRNOW](#)

U.S. EPA proposes PM-10 attainment for San Joaquin Valley air

[More](#) [EXIT AIRNOW](#)

Hybrid Technology Takes Giant Leap into Commercial Vehicles - EPA Unveils UPS Delivery Truck with 60 to 70 Percent Higher Fuel Economy

[More](#) [EXIT AIRNOW](#)

North Carolina expands EnviroFlash cities

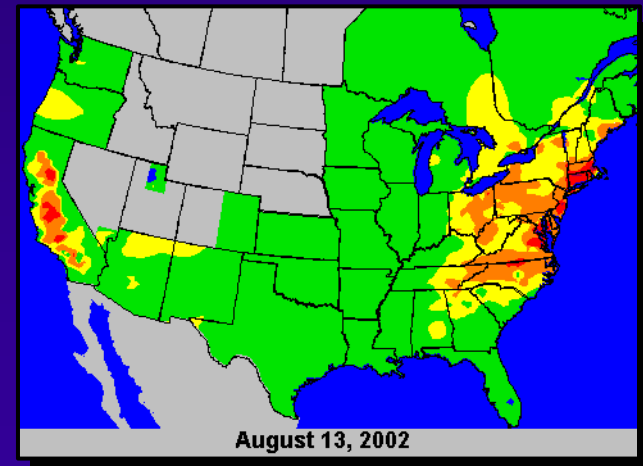
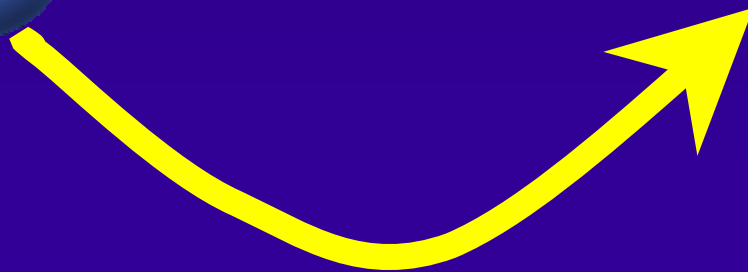
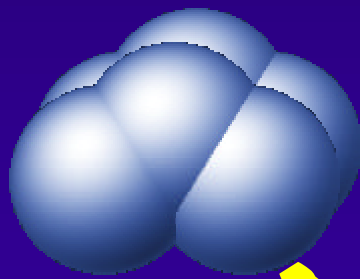
Air quality e-mail notifications are available for [eight North Carolina cities](#)

Sao Paulo, Brazil air quality data now available on-line

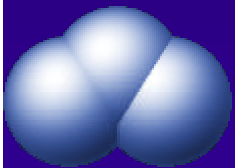
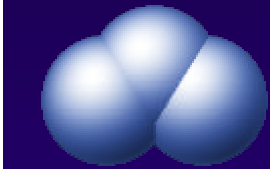
AQI AIR QUALITY INDEX

Good
Moderate
Unhealthy for Sensitive Groups
Unhealthy
Very Unhealthy
Hazardous
More

An Hour in the Life of an AIRNow Ozone Molecule



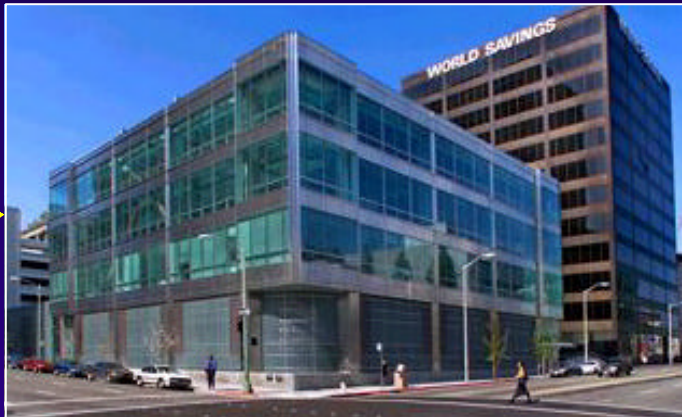
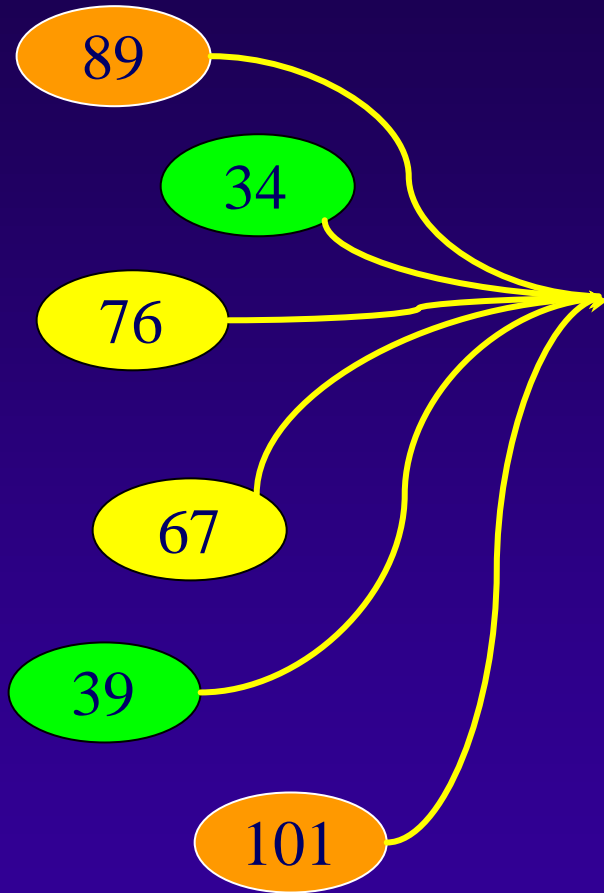
The journey begins.....



9:59:59

10:00:01

First stop: AQ Agency



```
START_REF. 0
NUMSTEPS. 24
AVG_TIME. 60
UNITS. PPB
STATIONS. 1342
      START HOUR
! ID AIRS CODE 0000 0100 0200 0300 0400 0500 0600
-----
BEGIN_DATA
ST.J .000010102. 5. 12. 7. 3. 2. 2. 7. 6. 9. 5. 6
ST.J .000010102. G. G. G. G. G. G. G. G. G. G. G. G
Corne .000010301. 13. 13. 10. 6. 5. 7. 14. 16. 18. 22
Corne .000010301. G. G. G. G. G. G. G. G. G. G. G. G.
WELLI .000020301.999.999.999.999.999.999.999.999
```

OBS data file

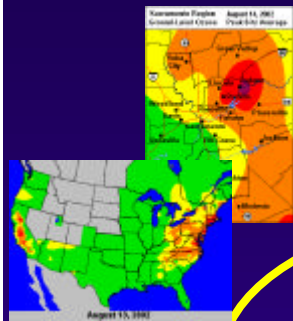
Stats:

- 1200 monitors
- 78 agencies nationwide
- Collected every hour

10:05:29

10:15:21

The last leg of the journey....



Public



Weather/News Providers



```
0101000100011110
1001010101010100
1010011110100100
1010100101000001
11000100101
```

10:45:55

10:55:21

11:00:00

Media Coverage



Weather

Pittsburgh
 More clouds than sun 90/71
Thursday: Isolated thunderstorms 85/68
Friday: Scattered thunderstorms 88/68
Saturday: Isolated thunderstorms 83/68
AQI: Unhealthy

City	Forecast	High/Low	Wind	Clouds	Chance of Precip
Pittsburgh	Partly cloudy	85/68	10-15	90%	10%
Indianapolis	Partly cloudy	85/68	10-15	90%	10%
Columbus	Partly cloudy	85/68	10-15	90%	10%
Cincinnati	Partly cloudy	85/68	10-15	90%	10%
Dayton	Partly cloudy	85/68	10-15	90%	10%
Cleveland	Partly cloudy	85/68	10-15	90%	10%
Richmond	Partly cloudy	85/68	10-15	90%	10%
Washington	Partly cloudy	85/68	10-15	90%	10%
Atlanta	Partly cloudy	85/68	10-15	90%	10%
Charlotte	Partly cloudy	85/68	10-15	90%	10%
Raleigh	Partly cloudy	85/68	10-15	90%	10%
Asheville	Partly cloudy	85/68	10-15	90%	10%
Nashville	Partly cloudy	85/68	10-15	90%	10%
Memphis	Partly cloudy	85/68	10-15	90%	10%
Birmingham	Partly cloudy	85/68	10-15	90%	10%
Atlanta	Partly cloudy	85/68	10-15	90%	10%
Jacksonville	Partly cloudy	85/68	10-15	90%	10%
Tampa	Partly cloudy	85/68	10-15	90%	10%
Orlando	Partly cloudy	85/68	10-15	90%	10%
Miami	Partly cloudy	85/68	10-15	90%	10%

Tour of AIRNow Website

<http://www.airnow.gov>

Do People Pay Attention?

- Roper 2002 “Green Gauge Poll”
 - Survey of 2000 people across the US
 - 52% have heard of “Code Orange” or “Code Red” air quality days
 - Of those, 46% have reduced exposure to air pollution
- UCLA study – Neidell et al.
 - 4 to 7% reduction in pediatric hospital admissions for asthma attributable to advisories

National Health and Aging Survey

- 33% respondents had heard of alert system
- 71% respondents lived in counties with at least one day of code orange or worse
- Of those who resided in county with at least one code orange day:
 - 37% were aware of system
 - 54% correctly reported that their counties had a ozone alert day
 - 57% reported spending less time outdoors on ozone alert days

Results

- Estimated awareness of ozone ranking system
 - More education, higher income, older age, and living in areas with red or purple ozone days (p-value = 0.05)
 - Good health, full-time employment, orange ozone days (p-value = 0.07)

Results

- Estimated behavioral change; whether respondent will take averting actions
 - Older age, being female, living area with purple day more likely to take averting actions (p-value = 0.05)
 - Being white, higher income less likely to take averting actions (p-value = 0.05)
 - Fair or poor health status more likely to take averting actions (p-value = 0.07)

Focus Group Testing

Participants

- Valued *actionable* health messages
 - **Who** will be affected
 - **When** will they be affected
 - **What** they should do to reduce exposure
- Wanted this information “pushed” out to them
 - TV, radio, newspapers
- Were willing to seek more detailed information
 - Newspaper reports, Internet
- Wanted more detailed information on bad air quality days


Conclusions

- Good general coverage, but
- Need to do a better job getting the message to members of sensitive groups
 - Use health care providers to deliver information
 - Provide range of information from simple to complex
 - Take advantage of unusual, or “teachable” events such as fire/smoke events

Important Target Audiences

- Healthcare providers
- Meteorologists
- Journalists
- Teachers

Ozone Web Course



U.S. Environmental Protection Agency

Ozone and Your Patients' Health Training for Health Care Providers

[Contact Us](#) | [Print Version](#) Search: [GO](#)

[EPA Home](#) > [Air & Radiation](#) > [Air Quality Planning and Standards](#) > [Air Pollution Training Institute](#) > Ozone and Your Patients' Health

Course Overview


During the summer months millions of people in the United States are exposed to the ambient air pollutant ozone at levels that can cause uncomfortable and damaging respiratory symptoms. *Ozone and Your Patients' Health* is a short, evidence-based training course and resource that:

- Describes the physiological mechanisms responsible for the lung function changes and symptoms associated with exposure to ground-level ozone
- Helps health care providers advise their patients about exposure to ozone
- Provides practical tools to help patients understand what triggers their symptoms and how to alleviate them

Ozone and Your Patients' Health is designed for family practice doctors, pediatricians, nurse practitioners, asthma educators, and other medical professionals who counsel patients about asthma and respiratory symptoms. Patients and their families may also use this material to learn the science behind ozone's effect on respiration and how to manage their respiratory health using the Air Quality Index.

How to Use This On-line Training

Ozone and Your Patients' Health begins on this page and



The [Clinical Scenarios](#) section of this course discusses the following scenario and others in detail.

A 12-year-old girl and her mother arrive at your office for an evaluation of the child's asthma. At soccer practice the girl experienced chest tightness and shortness of breath, and she woke up during the night wheezing. Yesterday was

**Course Overview/
Ozone and Patients'
Health Home**

What is Ozone?

**Health Effects in the
General Population**

**Health Effects in
Patients with Asthma**

**Patient Exposure and
the Air Quality Index**

Clinical Scenarios

Frequent Questions

**Course Summary/
Key Points**

Patient Education

Glossary



References

Figures

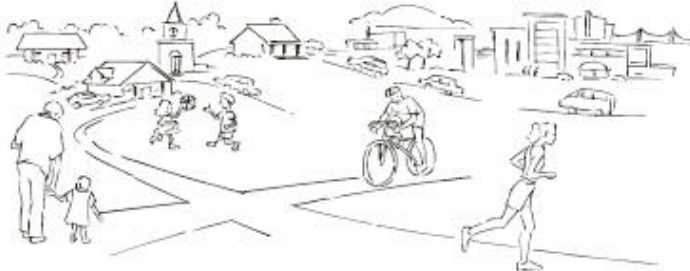
Review Questions

Course Developers

Asthma Factsheet

ASTHMA AND OUTDOOR AIR POLLUTION



1 Air pollution can make asthma symptoms worse and trigger attacks.

If you or your child has asthma, have you ever noticed symptoms get worse when the air is polluted? Air pollution can make it harder to breathe. It can also cause other symptoms, like coughing, wheezing, chest discomfort, and a burning feeling in the lungs.

Two key air pollutants can affect asthma. One is *ozone* (found in smog). The other is *particle pollution* (found in haze, smoke, and dust). When ozone and particle pollution are in the air, adults and children with asthma are more likely to have symptoms.

2 You can take steps to help protect your health from air pollution.

► **Get to know how sensitive you are to air pollution.**

- Notice your asthma symptoms when you are physically active. Do they happen more often when the air is more polluted? If so, you may be sensitive to air pollution.
- Also notice any asthma symptoms that begin up to a day *after* you have been outdoors in polluted air. Air pollution can make you more sensitive to asthma triggers, like mold and dust mites. If you are more sensitive than usual to indoor asthma triggers, it could be due to air pollution outdoors.

► **Know when and where air pollution may be bad.**

- *Ozone* is often worst on hot summer days, especially in the afternoons and early evenings.
- *Particle pollution* can be bad any time of year, even in winter. It can be especially bad when the weather is calm, allowing air pollution to build up. Particle levels can also be high:
 - Near busy roads, during rush hour, and around factories.
 - When there is smoke in the air from wood stoves, fireplaces, or burning vegetation.

Meteorologist Toolkit

AQI Toolkit for Weathercasters



 United States
Environmental Protection
Agency

Fact or Fiction?

"Weather can affect air pollution."

- True. Weather can affect pollution in several ways:
- For example, the wind can sweep pollutants around, blowing them away from the source and into new locations. Windy conditions can also help disperse pollutants, reducing their concentrations.
- Hot, sunny, and clear conditions can cause photochemical smog. This is why the ozone layer is thicker in Los Angeles and other cities with hot, sunny weather. Photochemical smog is a type of air pollution that is caused by the reaction of pollutants in the atmosphere.
- Wind can also affect air pollution in other ways. High winds can stir up dust and dirt from the ground, which can contribute to air pollution.
- Also, the temperature can affect the way that pollutants behave. For example, some pollutants are more likely to be in the air when it is warmer.
- High pressure and low humidity can also affect air pollution. High pressure and low humidity can cause the air to be drier, which can lead to more dust and dirt in the air.

Notes: Roger Leece - Long

Journalists

Ozone Media Kit

U.S. Environmental Protection Agency

OZONE AT A GLANCE

media information on ozone and ozone depletion

What's new?
 Ozone is a gas, common about 10% of the way up from the ground. It absorbs harmful ultraviolet radiation from the sun. Causes of the ozone layer's gradual destruction include:

Good news: "bad news"
 Causes concern in the U.S. are of the ozone layer's gradual destruction include:

- In the atmosphere, there is still a slow but steady decline in ozone levels.
- The ozone layer is still recovering from the damage caused by past emissions of ozone-depleting substances.
- The ozone layer is still recovering from the damage caused by past emissions of ozone-depleting substances.

Ozone formation
 Ozone is formed naturally in the atmosphere. It is also formed by lightning strikes, UV light, and other natural sources.

Major sources of ozone-depleting substances
 Ozone-depleting substances are used in a variety of products, including:

- Air conditioning and refrigeration systems
- Aerosol cans
- Foam blowing agents
- Solvents
- Medical anesthetics
- Fire extinguishers
- Certain types of electrical equipment
- Certain types of medical equipment
- Certain types of scientific equipment
- Certain types of industrial equipment
- Certain types of agricultural equipment
- Certain types of marine equipment
- Certain types of automotive equipment
- Certain types of construction equipment
- Certain types of mining equipment
- Certain types of power generation equipment
- Certain types of transportation equipment
- Certain types of communication equipment
- Certain types of defense equipment
- Certain types of space equipment
- Certain types of nuclear equipment
- Certain types of other equipment

Major source of VOCs to create smog and ozone pollution
 VOCs are emitted from a wide variety of sources, including:

- Gasoline and other petroleum products
- Solvents
- Paints and coatings
- Adhesives
- Aerosols
- Certain types of industrial processes
- Certain types of agricultural processes
- Certain types of marine processes
- Certain types of automotive processes
- Certain types of construction processes
- Certain types of mining processes
- Certain types of power generation processes
- Certain types of transportation processes
- Certain types of communication processes
- Certain types of defense processes
- Certain types of space processes
- Certain types of nuclear processes
- Certain types of other processes

Health risks: persistent — especially to children
 Ozone is a powerful oxidant that can irritate the respiratory system and cause lung damage. It can also cause headaches, chest pain, and other symptoms. Children are especially vulnerable to ozone pollution because their lungs are still developing and they spend more time outdoors.

OZONE

Teacher Curricula



Air Quality Index & How It Works
Teacher's Reference

Class Air and Daily Air

Each day every day the amount of air that we breathe is different. The amount of air that we breathe is different because of the amount of air that we breathe. The amount of air that we breathe is different because of the amount of air that we breathe.

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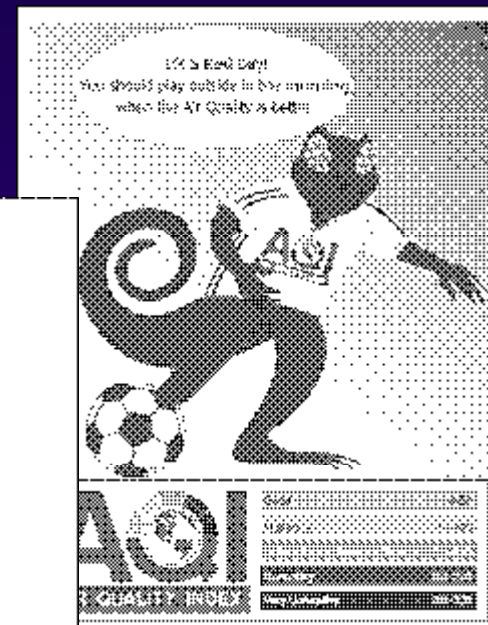
How Air Quality Works

When we breathe, we breathe in air. The air that we breathe in is different. The air that we breathe in is different because of the amount of air that we breathe. The amount of air that we breathe is different because of the amount of air that we breathe.

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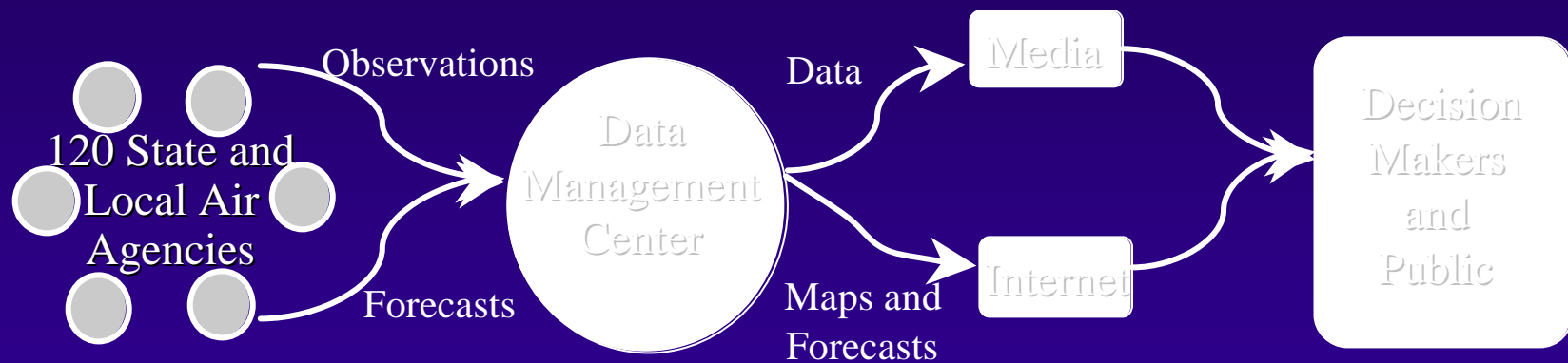
How Air Quality Works

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AIRNow Program

- Centralized, real-time air quality information system



Possible Future Activity

AIRNow-I (AIRNow international version)

- Key features:
 - Data processing
 - Automated quality control checks
 - Manual quality control checks
 - System monitoring and diagnostics
 - Mapping
 - Standardized data output
- Built from current AIRNow technology
- Runs on a Windows platform

Possible Future Activity

Database

- Relational
- Low cost
- Flexible/Scalable

Data Management System

- Data processing
- Quality control
- System monitoring
- Reporting

Mapping Software

- Map production
- Animations
- Customizable graphics
- GIS capability

Multilingual capability

