Air Quality Index
A Tool to Communicate with the Public and Policymakers

Commission on Sustainable Development
United Nations
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Overview

- US AQI
  - How is it structured?
  - How is it used?
  - How effective is it?
  - Important target audiences
  - AIRNow International
- Mexico City, Mexico
- Sao Paulo, Brazil
- Canada

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

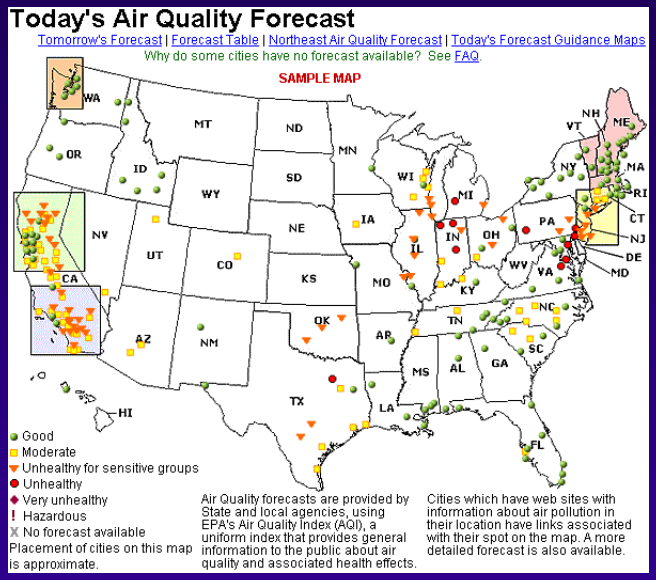
Descriptors	Cautionary Statement
Good 0 – 50	No message
Moderate 51 – 100	Unusually sensitive individuals
Unhealthy for Sensitive Groups 101 - 150	Identifiable groups at risk - different groups for different pollutants
Unhealthy 151 - 200	General public at risk; sensitive groups at greater risk
Very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

Use AQI to Reduce Risk

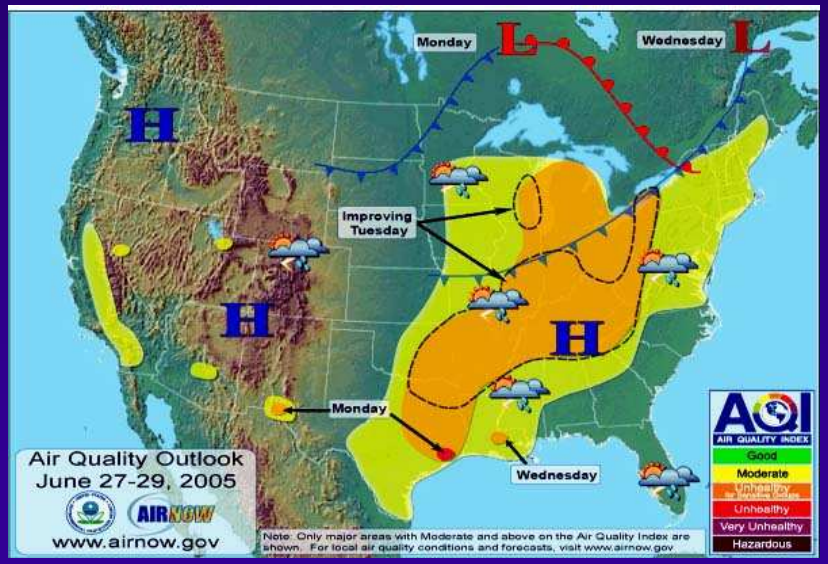
Dose = Concentration x Ventilation Rate x Time

- 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

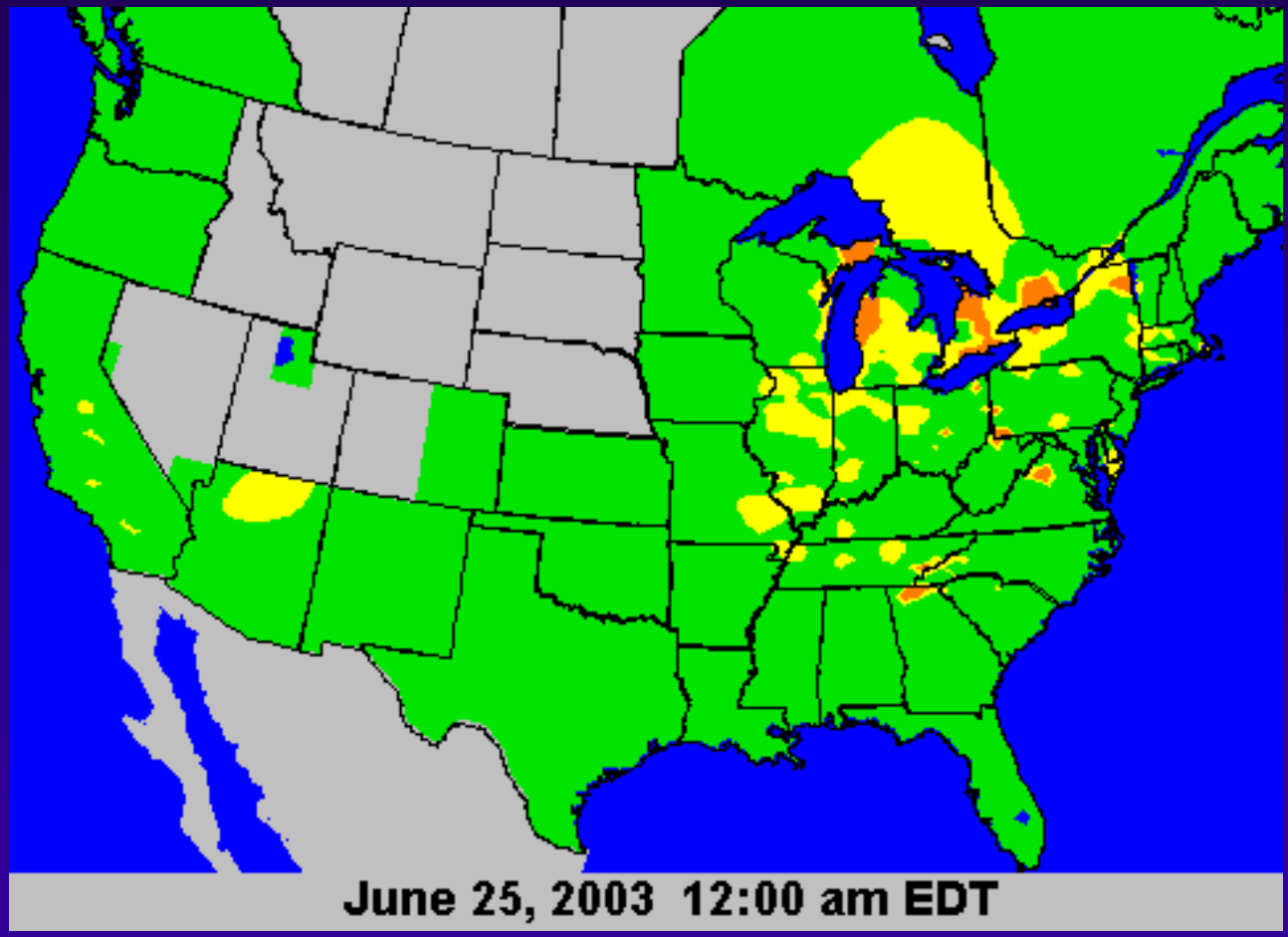


Daily

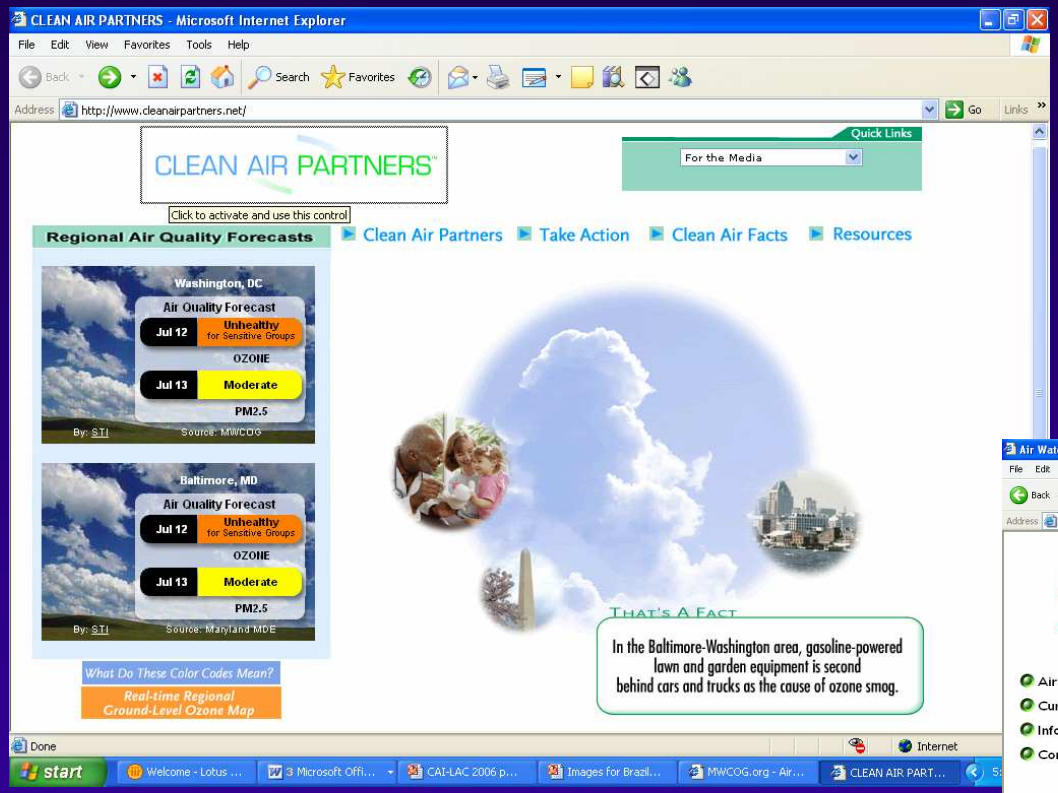


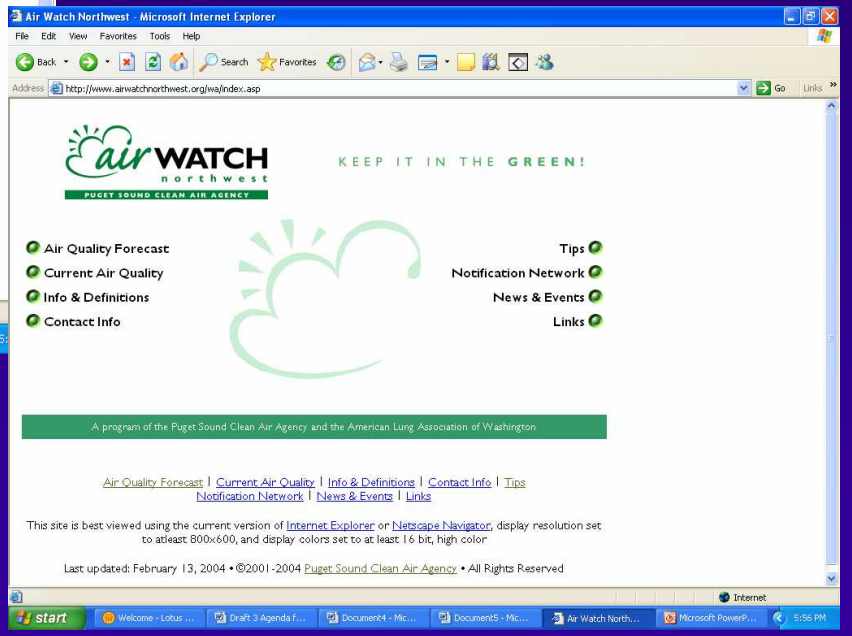
Two-Day Outlook

Real-Time Air Quality Mapping



Emission Reductions Programs





Clean Air 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:

GOOD	MODERATE	UNHEALTHY FOR SENSITIVE GROUPS	UNHEALTHY	VERY UNHEALTHY

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.

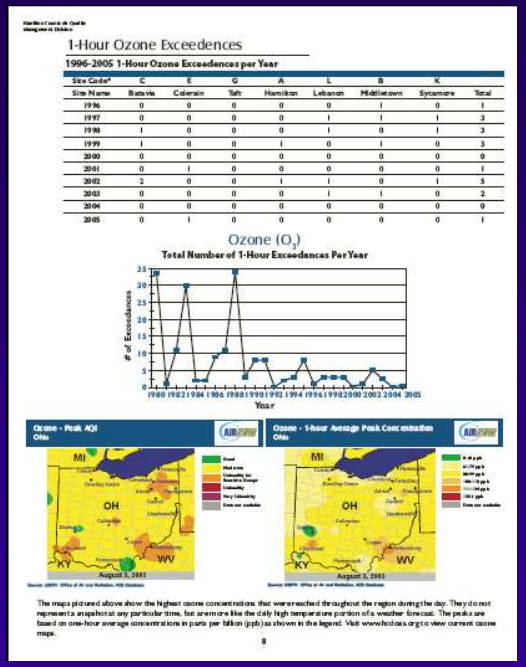
The Michigan EnviroFlash program is a partnership between Michigan DEQ and U.S. EPA.

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



1-Hour Ozone Exceedences

1996-2005 1-Hour Ozone Exceedances per Year

Site Code*	C	E	G	A	L	B	K	
Site Name	Batavia	Colerain	Taft	Hamilton	Lebanon	Middletown	Sycamore	Total
1996	0	0	0	0	0	1	0	1
1997	0	0	0	0	1	1	1	3
1998	1	0	0	0	1	0	1	3
1999	1	0	0	1	0	1	0	3
2000	0	0	0	0	0	0	0	0
2001	0	1	0	0	0	0	0	1
2002	2	0	0	1	1	0	1	5
2003	0	0	0	0	1	1	0	2
2004	0	0	0	0	0	0	0	0
2005	0	1	0	0	0	0	0	1

Ozone (O_3)

Total Number of 1-Hour Exceedances Per Year

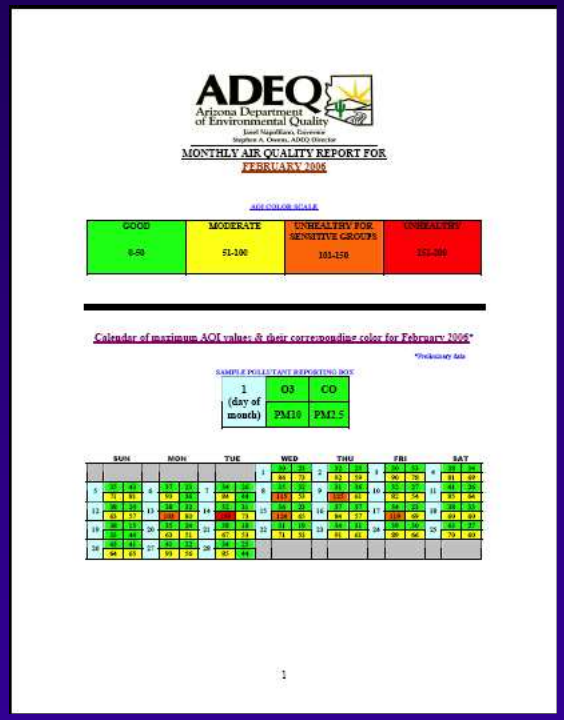
Ozone - Peak AQI

Ozone - 1-hour Average Peak Concentration

The maps pictured above show the highest ozone concentrations that were reached throughout the region during the day. They do not represent a snapshot at any particular time, but are more like the daily high temperature portion of a weather forecast. The peaks are based on one-hour average concentrations in parts per billion (ppb) as shown in the legend. Visit www.hcdoes.org to view current ozone maps.

8

Hamilton Co, Ohio



ADEQ Arizona Department of Environmental Quality

MONTHLY AIR QUALITY REPORT FOR FEBRUARY 2006

AQI COLOR SCALE

GOOD	MODERATE	UNHEALTHY FOR SENSITIVE GROUPS	UNHEALTHY
0-50	51-100	101-150	151-200

Calendar of maximum AQI values & their corresponding color for February 2006*

*Preliminary data

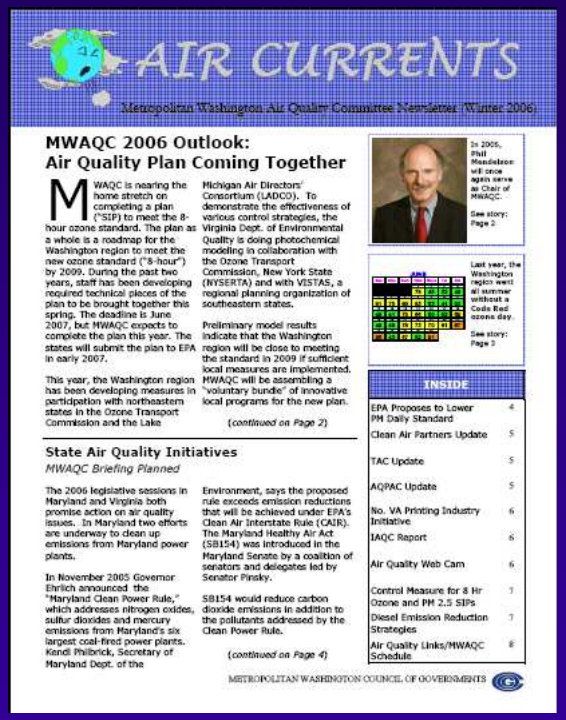
SAMPLE POLLUTANT REPORTING BOX

1 (day of month)	O3	CO
	PM10	PM2.5

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

1

Arizona



AIR CURRENTS

Metropolitan Washington Air Quality Committee Newsletter Winter 2006

MWAQC 2006 Outlook:
Air Quality Plan Coming Together

MWAQC is nearing the home stretch on completing a plan ("SIP) to meet the 8-hour ozone standard. The plan as a whole is a roadmap for the Washington region to meet the new ozone standard ("8-hour") by 2009. During the past two years, staff has been developing required technical pieces of the plan to be brought together this spring. The deadline is June 2007, but MWAQC expects to complete the plan this year. The states will submit the plan to EPA in early 2007.

This year, the Washington region has been developing measures in participation with northeastern states in the Ozone Transport Commission and the Lake Michigan Air Directors' Consortium (LADCO). To demonstrate the effectiveness of various control strategies, the Virginia Dept. of Environmental Quality is doing photochemical modeling in collaboration with the Ozone Transport Commission, New York State (NYSERTA) and with VISTAS, a regional planning organization of southeastern states.

Preliminary model results indicate that the Washington region will be close to meeting the standard in 2009 if sufficient local measures are implemented. MWAQC will be assembling a "voluntary bundle" of innovative local programs for the new plan.

(continued on Page 2)

In 2006, Phil Mendelson will once again serve as Chair of MWAQC.

See story: Page 2

Last year, the Washington region went all summer without a Code Red ozone day.

See story: Page 3

INSIDE

State Air Quality Initiatives

MWAQC Briefing Planned

The 2006 legislative sessions in Maryland and Virginia both promise action on air quality issues. In Maryland two efforts are underway to clean up emissions from Maryland power plants.

In November 2005 Governor Ehrlich announced the "Maryland Clean Power Rule," which addresses nitrogen oxides, sulfur dioxides and mercury emissions from Maryland's six largest coal-fired power plants. Kendl Philbrick, Secretary of the Maryland Dept. of the Environment, says the proposed rule exceeds emission reductions that will be achieved under EPA's Clean Air Interstate Rule (CAIR). The Maryland Healthy Air Act (SB154) was introduced in the Maryland Senate by a coalition of senators and delegates led by Senator Pinsky.

SB154 would reduce carbon dioxide emissions in addition to the pollutants addressed by the Clean Power Rule.

(continued on Page 4)

METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS

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	Unusually 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:

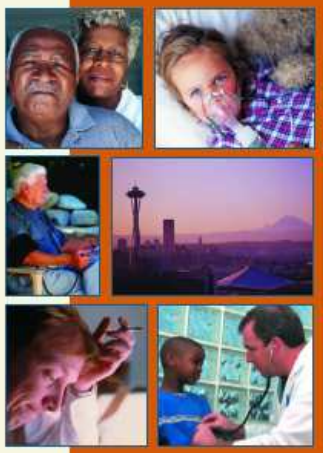
- Real-time particle levels for many locations.
- Air quality forecasts for many cities across the country.
- Kids' Web page and associated teacher curriculum.
- Smoke Web page.
- Links to state and local air quality programs.
- Ideas about what you can do to reduce particles. For example, you can keep 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

EPA United States Environmental Protection Agency

Particle Pollution and Your Health



What Is Particle Pollution?

Are You at Risk?

How Can You Protect Yourself?

United States Environmental Protection Agency
Air and Radiation
EPA-452/F-00-001
February 2000
Washington, DC 20460

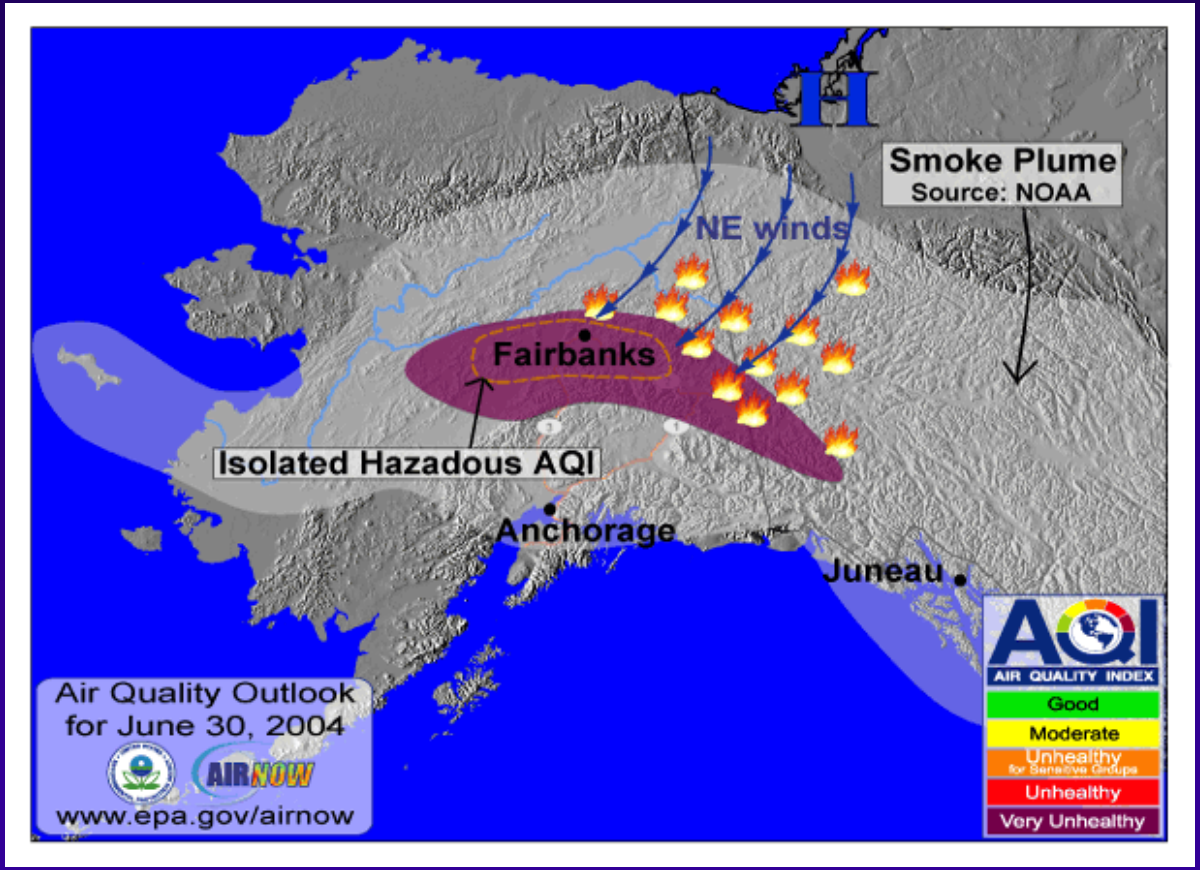
EPA **El Ozono y Su Salud**

¿Qué es el Ozono, o el Smog?

¿Corre Usted Riesgo?

¿Cómo Puede Protegerse?

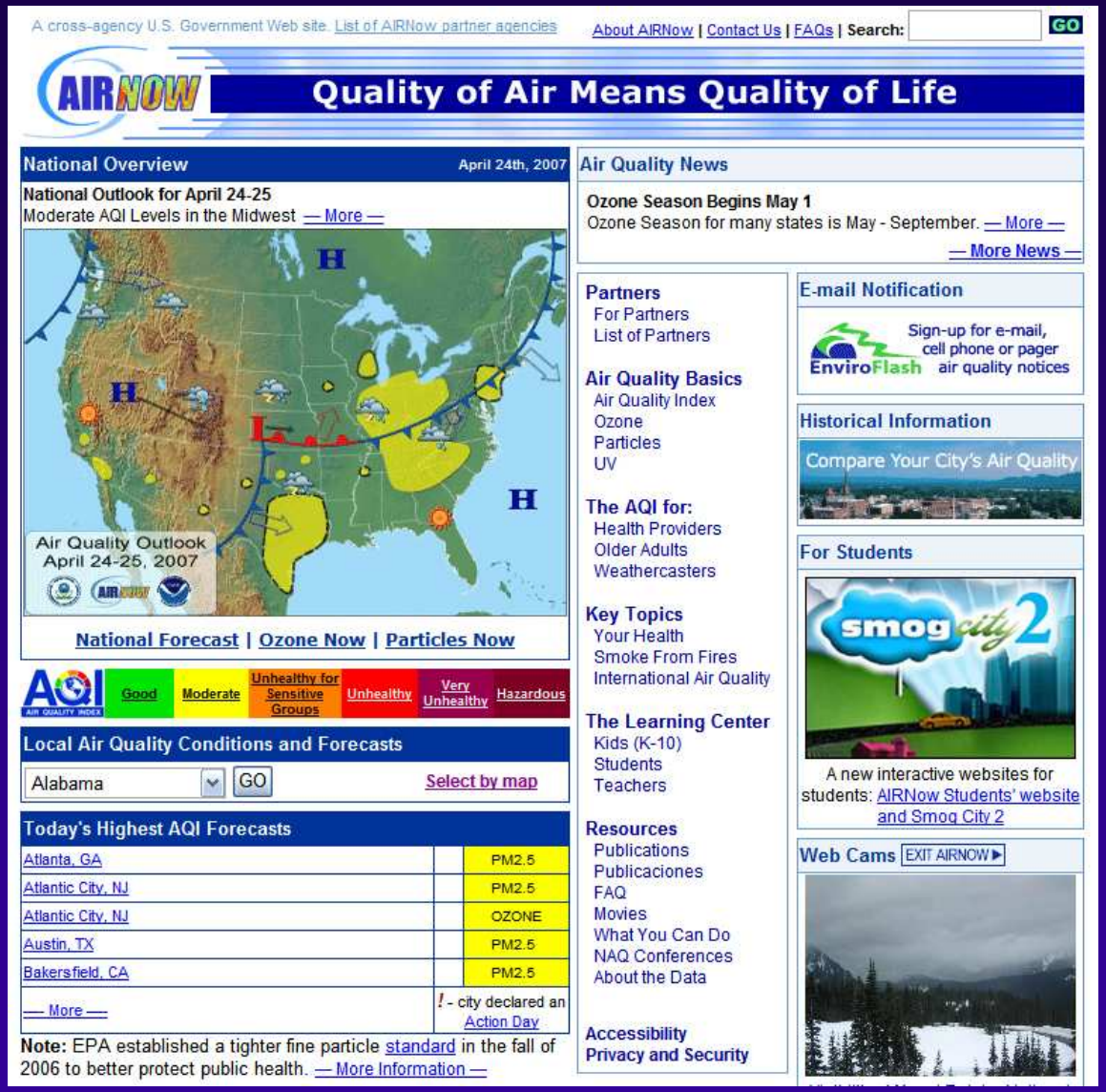
News Stories



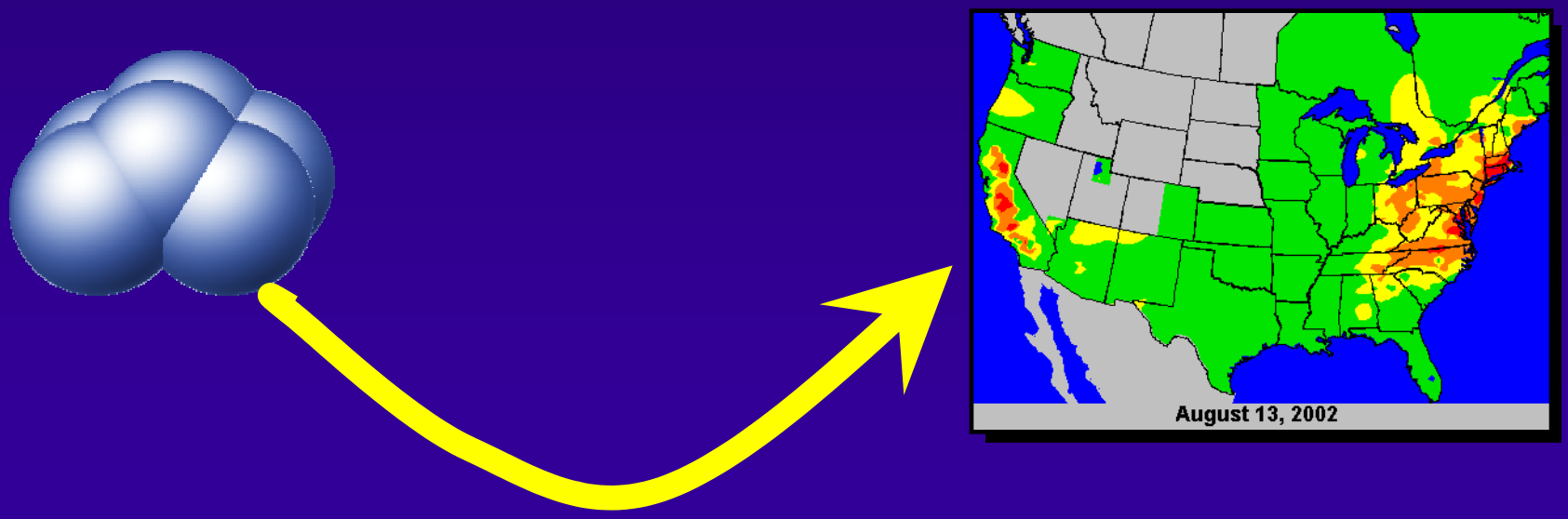
Web Cameras

Phoenix, Arizona

AIRNow Website
www.airnow.gov



An Hour in the Life of an AIRNow Ozone Molecule

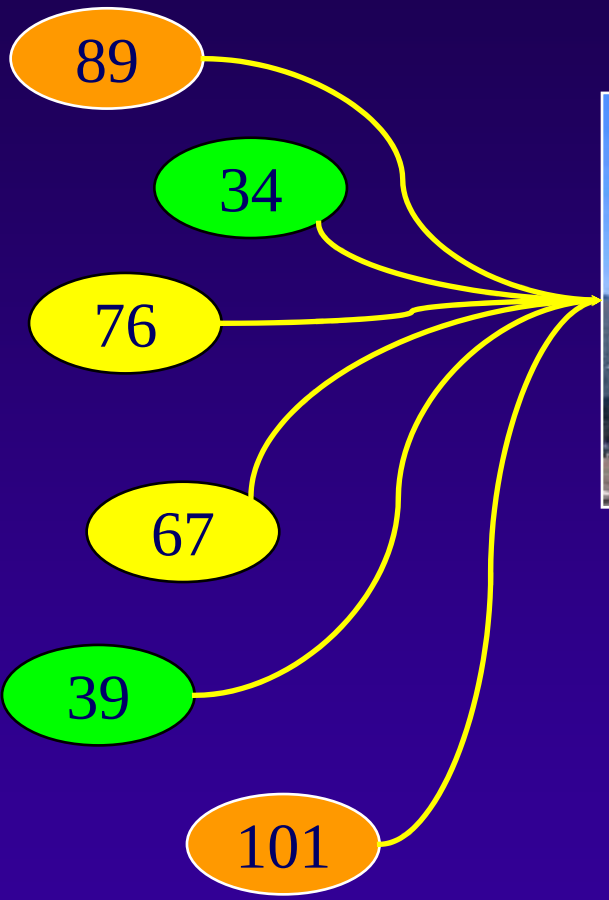


The journey begins…..

9:59:59

10:00:01

First stop: AQ Agency

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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
Corne             ,000010301,  13,  13,  10,  6,  5,  7,  14,  16,  18,  22
Corne             ,000010301,  G,  G,  G,  G,  G,  G,  G,  G,  G,
WELL1             ,000020301,-999,-999,-999,-999,-999,-999,-999,-999
```

OBS data file

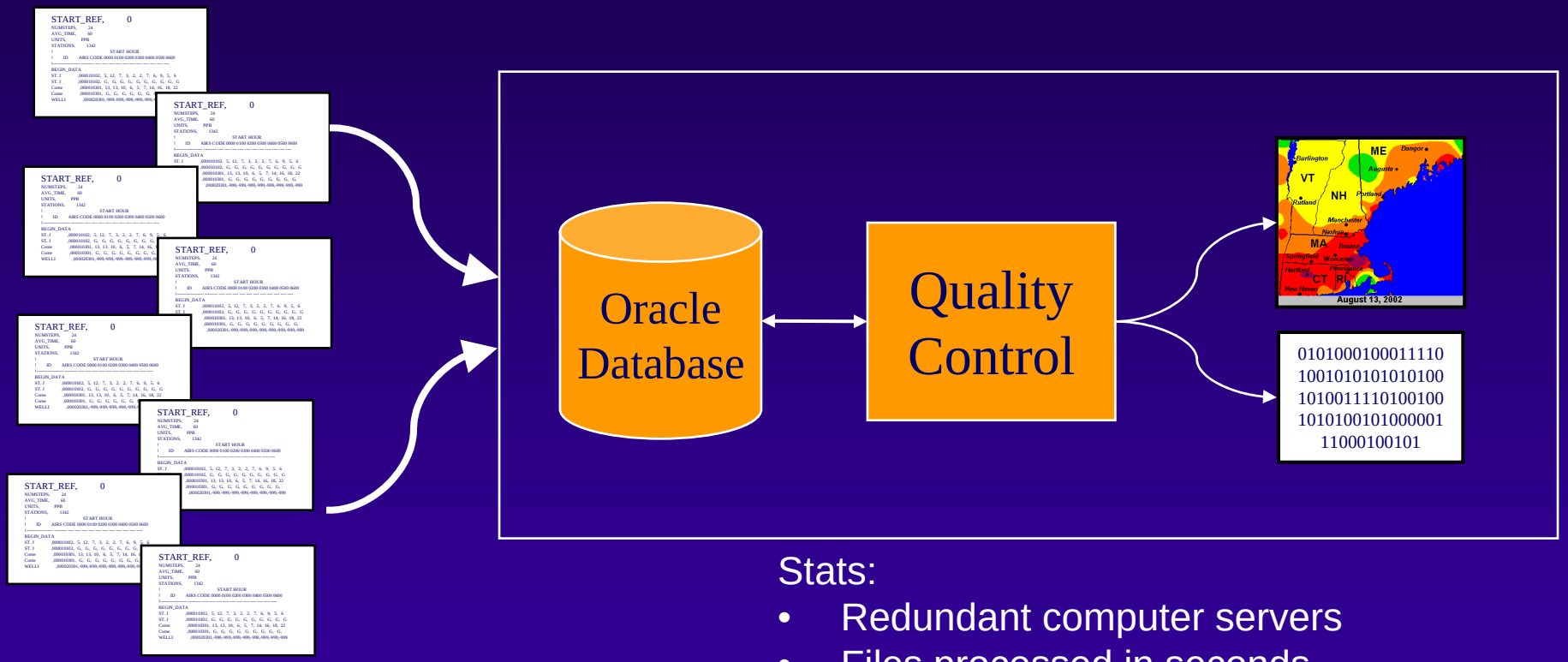
Stats:

- 1200 monitors
- 78 agencies nationwide
- Collected every hour

10:05:29

10:15:21

All roads lead to the DMC…



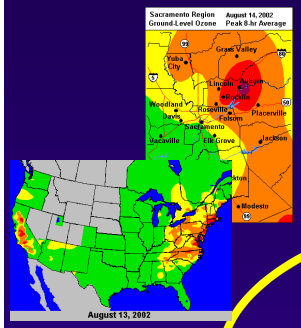
Stats:

- Redundant computer servers
- Files processed in seconds
- Over 30,000 data values per day
- 50 maps produced every hour

10:31:45

10:45:21

The last leg of the journey….



U.S. EPA AIRNOW
www.epa.gov/airnow

Weather/News Providers

THE WEATHER CHANNEL

meteorlogix

wsi

USA TODAY

The Weather Underground Inc.

ACCU WEATHER

0101000100011110
1001010101010100
1010011110100100
1010100101000001
11000100101

Public

10:45:55 10:55:21 11:00:00

Media Coverage

Do People Pay Attention?

- Polling results
  - Majority of people know about AQI
  - Of those about 50% take exposure reduction measures
  - Slightly fewer take emission reduction measures
  - People who report their health as fair or poor, more likely to reduce exposure
- UCLA study – Neidell et al.
  - 4 to 7% reduction in pediatric hospital admissions for asthma attributable to advisories

Focus Group Testing

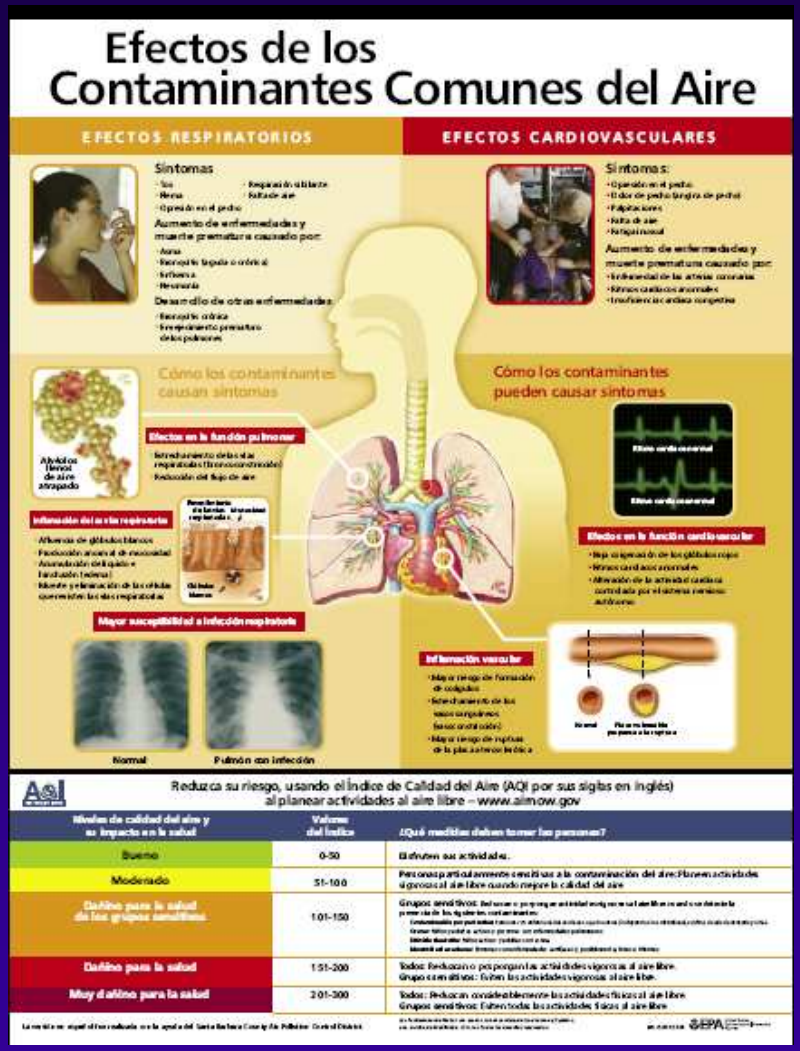
Participants

- 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

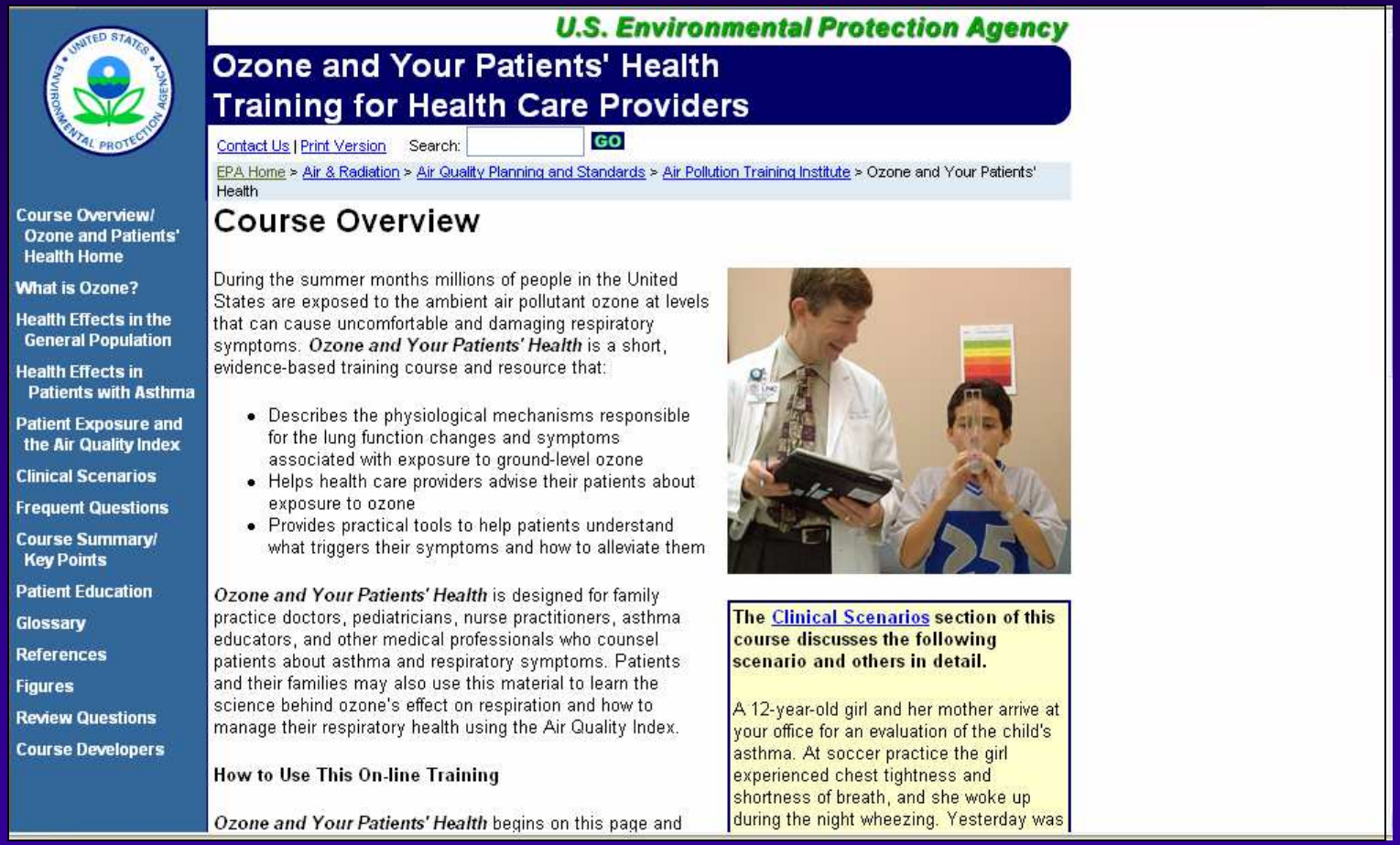
Important Target Audiences

- Healthcare providers
- Meteorologists
- Journalists
- Teachers

Medical Poster



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/ 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

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

Asthma Factsheet

EPA

ASTHMA AND OUTDOOR AIR POLLUTION

❶ 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.

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

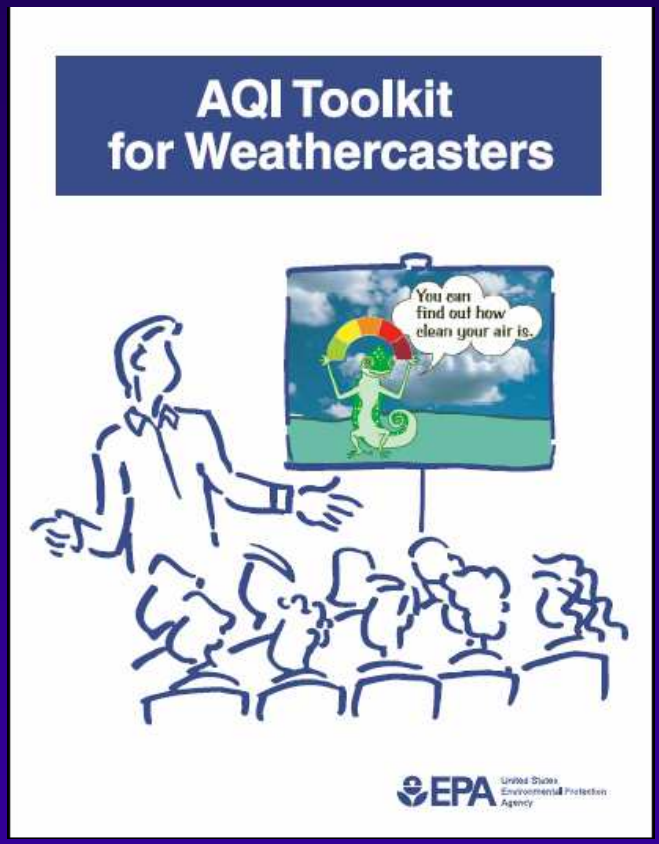
► Get to know how sensitive you are to air pollution.

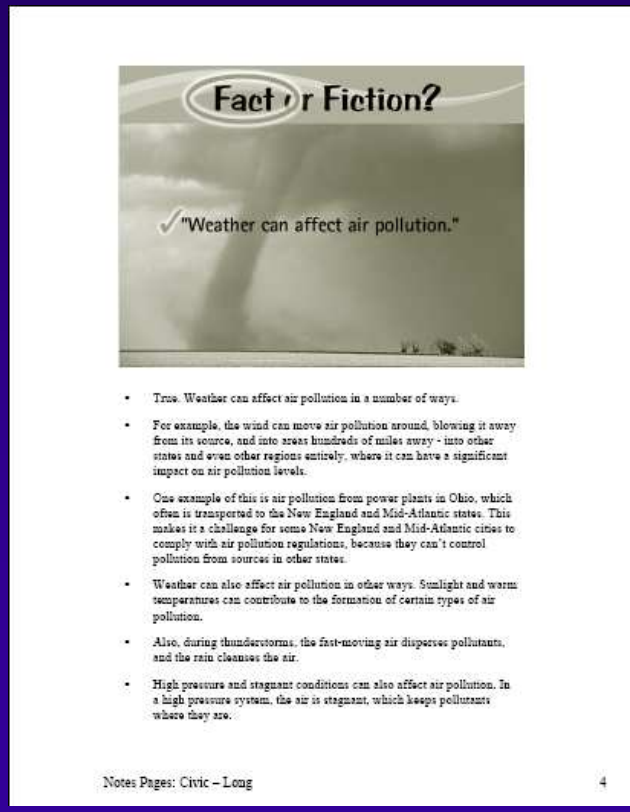
- Notice your asthma symptoms when you are physically active. Do they happen more often when the air is more polluted? If so, you may be sensitive to air pollution.
- Also notice any asthma symptoms that begin up to a day *after* you have been outdoors in polluted air. Air pollution can make you more 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.

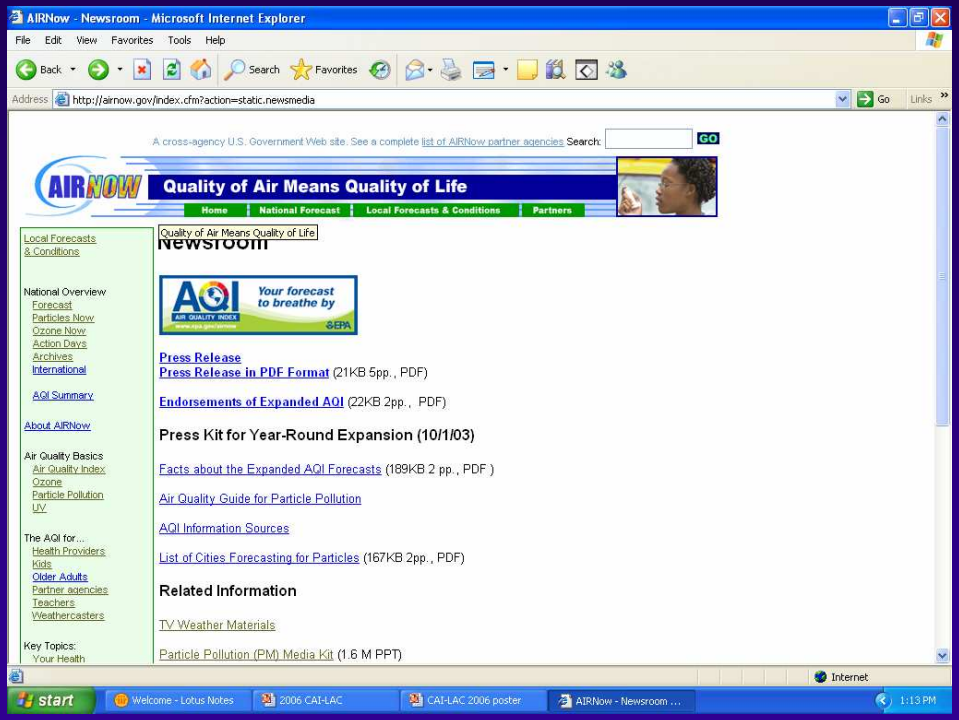
- *Ozone* is often worst on hot summer days, especially in the afternoons and early evenings.
- *Particle pollution* can be bad any time of year, even in winter. It can be especially bad when the weather is calm, allowing air pollution to build up. Particle levels can also be high:
  - Near busy roads,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

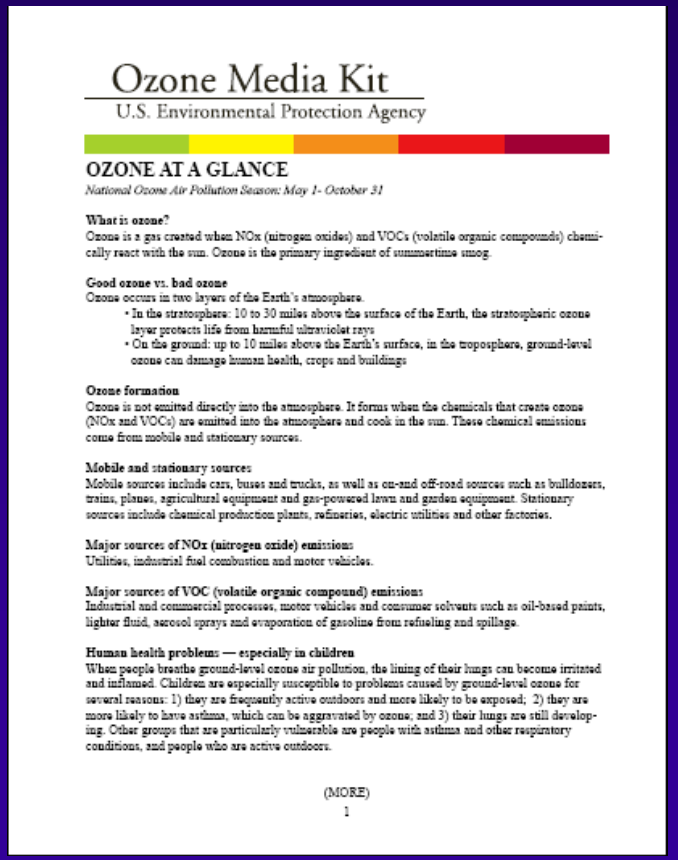
Meteorologist Toolkit





Journalists





Ozone Media Kit

U.S. Environmental Protection Agency

OZONE AT A GLANCE

National Ozone Air Pollution Season: May 1- October 31

What is ozone?
Ozone is a gas created when NOx (nitrogen oxides) and VOCs (volatile organic compounds) chemically react with the sun. Ozone is the primary ingredient of summertime smog.

Good ozone vs. bad ozone
Ozone occurs in two layers of the Earth's atmosphere.

- In the stratosphere: 10 to 30 miles above the surface of the Earth, the stratospheric ozone layer protects life from harmful ultraviolet rays
- On the ground: up to 10 miles above the Earth's surface, in the troposphere, ground-level ozone can damage human health, crops and buildings

Ozone formation
Ozone is not emitted directly into the atmosphere. It forms when the chemicals that create ozone (NOx and VOCs) are emitted into the atmosphere and cook in the sun. These chemical emissions come from mobile and stationary sources.

Mobile and stationary sources
Mobile sources include cars, buses and trucks, as well as on-and off-road sources such as bulldozers, trains, planes, agricultural equipment and gas-powered lawn and garden equipment. Stationary sources include chemical production plants, refineries, electric utilities and other factories.

Major sources of NOx (nitrogen oxide) emissions
Utilities, industrial fuel combustion and motor vehicles.

Major sources of VOC (volatile organic compound) emissions
Industrial and commercial processes, motor vehicles and consumer solvents such as oil-based paints, lighter fluid, aerosol sprays and evaporation of gasoline from refueling and spillage.

Human health problems — especially in children
When people breathe ground-level ozone air pollution, the lining of their lungs can become irritated and inflamed. Children are especially susceptible to problems caused by ground-level ozone for several reasons: 1) they are frequently active outdoors and more likely to be exposed; 2) they are more likely to have asthma, which can be aggravated by ozone; and 3) their lungs are still developing. Other groups that are particularly vulnerable are people with asthma and other respiratory conditions, and people who are active outdoors.

(MORE)

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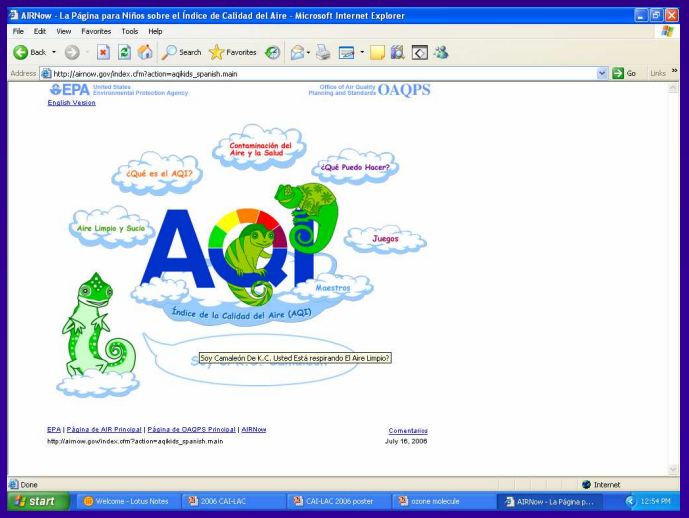
Teacher Curricula



Air Quality Index Kids Website
Teacher's Reference

Clean Air and Dirty Air

On a clear breezy day, the air smells fresh and clean. Clean air is air that has no pollutants (dirt and chemicals) in it. Clean air is good for people to breathe.

On a hot day with no wind, the air can feel heavy and have a bad smell. Once in a while, the air can even make your chest feel tight, or make you cough. Dirt and chemicals that get into the air make the air dirty or polluted. Dirty air is not good for people to breathe.

Dirty Air Can Make You Sick

When the air has some dust, soot or chemicals floating in it, people who are inside probably won't notice it. People who are outside might notice it.

Sometimes people with asthma, like me, feel bad when the air is very dirty.

People with asthma, a disease that can make it hard to breathe, and children who play outside a lot might feel a little strange. When you are active outdoors, for example, when you run and jump a lot, you breathe faster and take in more air. Any pollutants in the air go into your lungs.

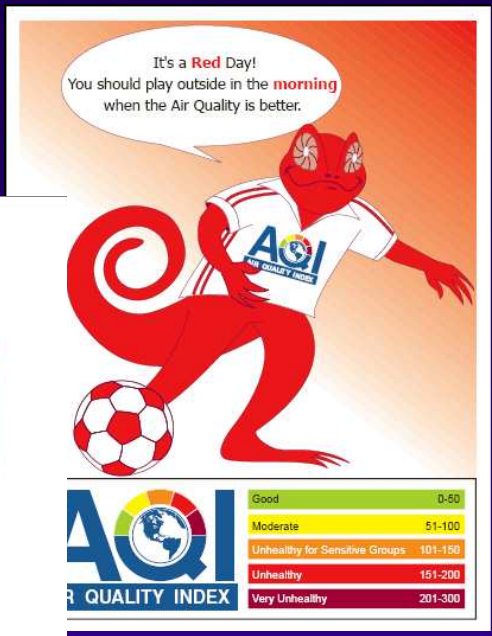
When the air is very dirty, almost everyone will notice it. It would be good if we could stop breathing on those days, but of course we can't!

How Can I Tell if the Air is Clean or Dirty?

For information about visibility: http://www.epa.gov/air/visibility/

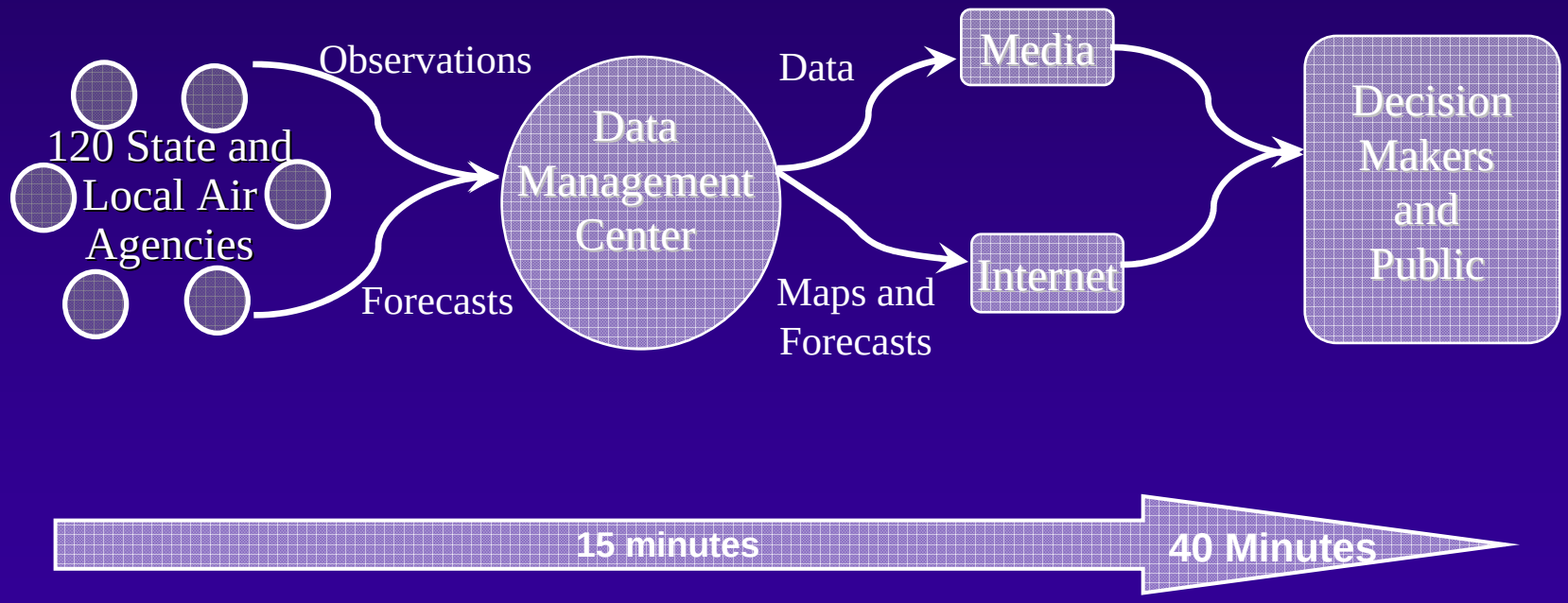
Have you ever been stopped behind a truck or a bus at a traffic light? When it starts up, sometimes a puff of dark smoke comes out of the exhaust pipe.

1



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