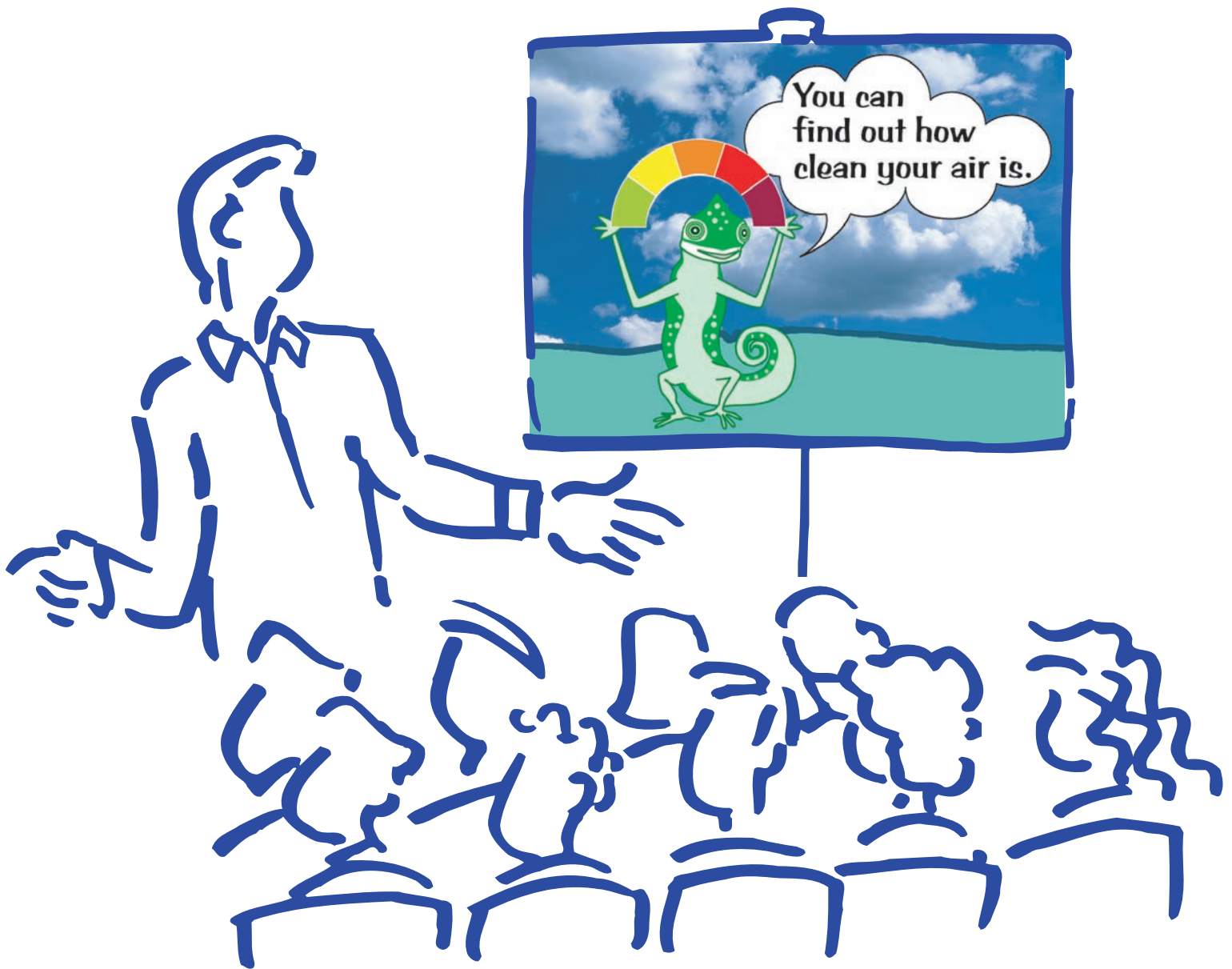
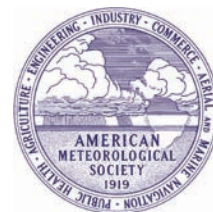


AQI Toolkit for Weathercasters



Endorsed by:



AQI Toolkit For Weathercasters

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

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CDs

CD#1

Electronic Copies of Presentations and Handouts

CD#2

Forecast Earth: Air Aware Video (About Air Pollution and Health)

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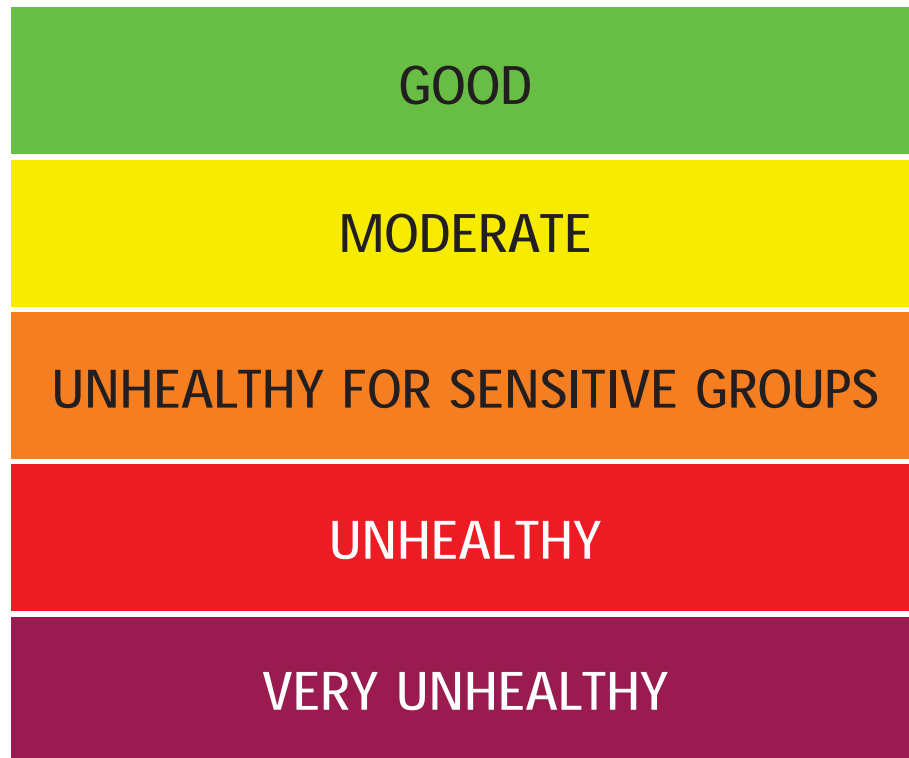
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Notice

This document has been reviewed in accordance with U.S. Environmental Protection Agency policy and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Toolkit Overview



Toolkit Overview



Welcome to the Air Quality Index (AQI) educational toolkit for weathercasters. This toolkit was designed by the U.S. Environmental Protection Agency (EPA) for weathercasters who make educational presentations to schools and civic groups. The toolkit contains key materials to help audiences understand how they can use the AQI to find out about local air quality and how they can protect their health when the air is polluted.

Your Role in Air Quality Awareness

Air pollution is a serious public health issue. Because of the linkage between weather and air pollution, weathercasters play an important role in raising air quality awareness. Like many weathercasters, you may be incorporating air pollution alerts and associated health messages into your weathercasts. Presentations by weathercasters offer another powerful venue for educating school children, families, teachers, and civic groups about air quality and health.

Two pollutants in particular, ozone and particle pollution, are often found at unhealthy levels in many parts of the United States. Real-time data and forecasts for ozone and particle levels, as well as messages about how to protect health, are now available to the public through many channels, including EPA's AIRNow web site (www.airnow.gov). EPA and others are working to help educate the public about the resources they can use to protect their health from air pollution.

What's In the Toolkit?

Presentations

- **Key Messages** — Bullet point lists of key air quality messages for each presentation (for Grades 3-5, Grades 6-8, and Civic groups).
- **Notes Pages** — Printed black-and-white copies of slides and talking points for each slide. Long and short versions for civic groups are provided to accommodate available presentation time.
- **Handouts** - Simple one- or two-page, age-appropriate handouts for students and adults.
- **Transparencies** - A set of overheads (in both transparency and PowerPoint formats) for each presentation. Long and short versions for civic groups are provided to accommodate available presentation time.

Additional Resources for Weathercasters

- **Fact Sheets** - Basic information on the AQI, air quality mapping and forecasting, the health effects of air pollution, and relevant publications and web sites for further information.
- **Optional Additional Activity** — For Civic groups.

Materials to Leave with Teachers

- A set of **Classroom Activities**.
- **Background Information** on air pollution, health, and the AQI.
- **Other Resources** - Descriptions of additional curricula, classroom activities, publications, and web sites.

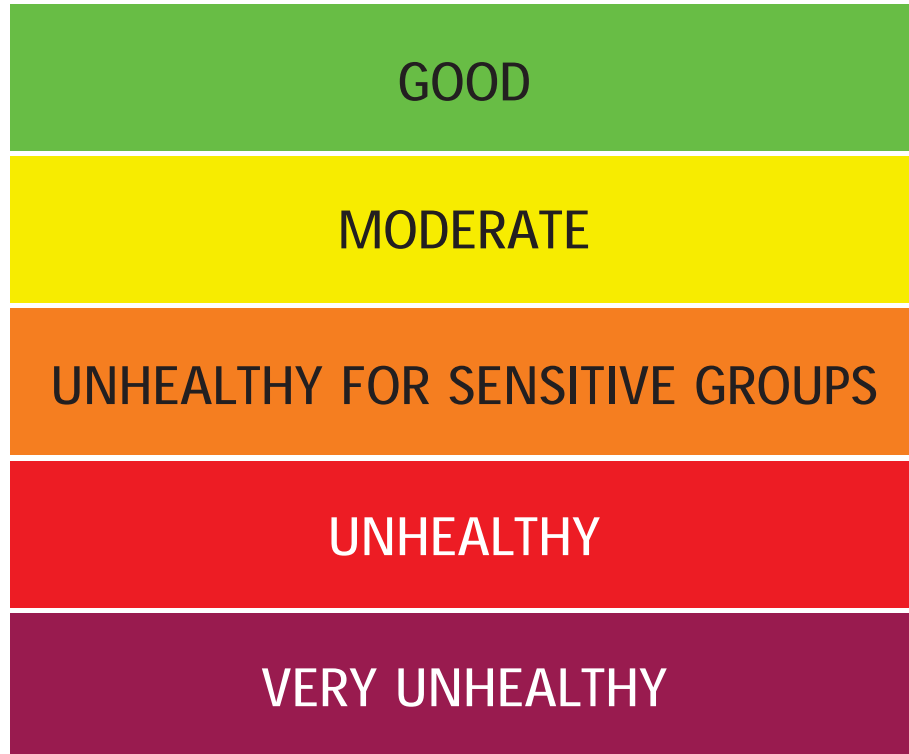
CDs

- Electronic copies of the presentations and handouts in this toolkit.
- A copy of *Forecast Earth: Air Aware* video — Produced in 2004 by The Weather Channel and EPA.

Quick Prep

- Read the fact sheets in this toolkit to familiarize yourself with the AQI, the health effects of air pollution, and air quality mapping and forecasting.
- Visit EPA's AIRNow web site at www.airnow.gov for further information about the AQI and to obtain local air quality information.
- Use the Key Messages and Notes Pages in this toolkit to prepare for the presentation.
- *Checklist:*
 - ✓ Your presentation notes or script
 - ✓ CD or overhead transparencies
 - ✓ One copy of the appropriate handout for each participant
 - ✓ For schools, a set of the *Materials to Leave with Teachers*

Presentations



Grades 3-5

Key Messages: Grades 3-5 Presentation



- Breathing dirty air is not good for people. For example: You might feel like it's harder to breathe, you might cough, or your chest might feel tight.
- You can help protect your health when the air is dirty. Here are three things you can do.
 1. Find out how clean your air is each day.
 - You can do this by checking the AQI, just like checking the weather report. The AQI (or the Air Quality Index) uses colors to tell you how clean or dirty the air is. For example, green means the air is clean. Red means the air is unhealthy.
 - You can always find the AQI on the Internet at a site called AIRNow at: www.airnow.gov . You also might hear about the AQI on TV during the weather forecast or on the radio, or you might see it on the weather page in the local newspaper.
 - Tell your parents about the AQI so they can check how clean or dirty the air is.
 2. If you play outside when you *know* the air is polluted, you can protect your health by taking it easier. For example, walk instead of run, take breaks often, or play outside at another time or on another day when the air is cleaner.
 3. If you notice any signs when you are playing outside like coughing, pain when you take a deep breath, chest tightness, or wheezing, stop playing and tell an adult.
 - If you have asthma, pay special attention on polluted days. If you think you or a friend may be having an asthma attack, tell an adult.

Notes Pages: Grades 3-5



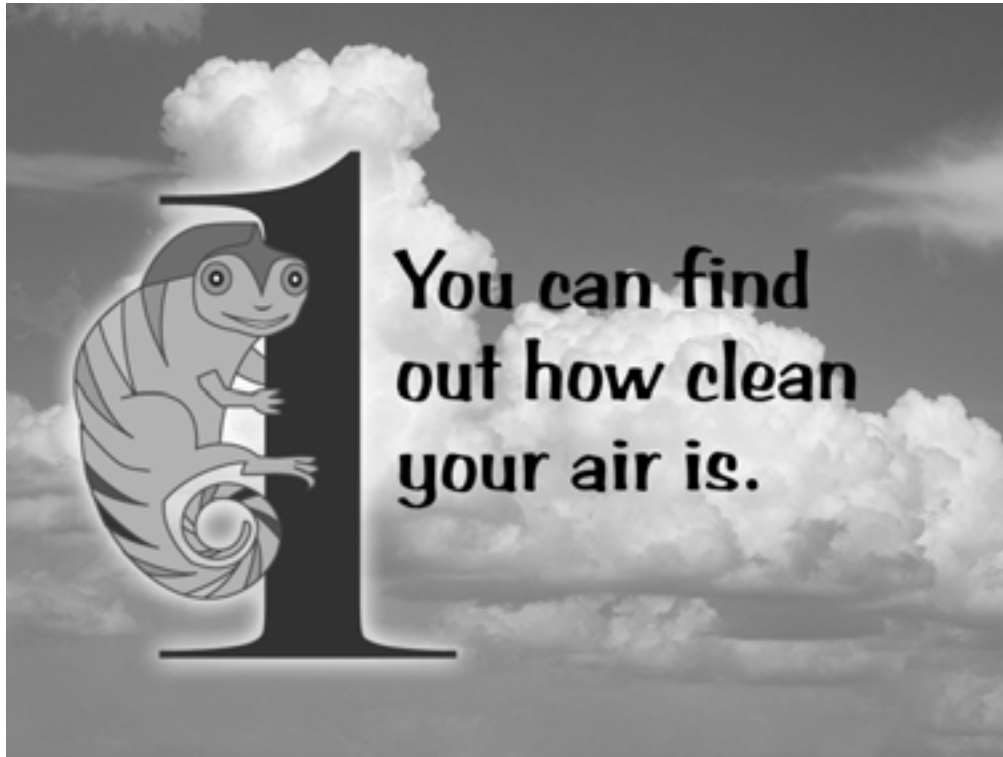
- Now I'd like to talk about air, which is a big part of weather. K.C. Chameleon and his friends will help me do this.
- We're all breathing all the time. With every breath, what do we take in? (Response: "Air")
- You can feel the air right now on your hand if you just swing it gently back and forth.
- Most of the time, the air looks clear. But have any of you ever seen air when it wasn't clear? Sometimes the air can look a little dirty, or smoky, or hazy, like this. (*show next slide*)



- These pictures show the same place with clean air and dirty air.
- Sometimes when air looks dirty, that can be a sign that pollution is in the air.
- Does anyone know what pollution is?
- That's right. Pollution means that the air is dirty from things like dust, chemicals, or soot (soot is a black substance, like that in chimneys, that is formed from burning things like wood or oil).



- Here K.C. is showing us some of the biggest pollution sources: cars and trucks, factories that make things like desks and chairs, power plants that make electricity, some ordinary products like house paints, and many other things. Also, things in nature, like forest fires and volcanoes, can pollute the air.
- What do you think happens when people breathe air that is dirty?
- Breathing dirty air is not good for people. For example: You might feel like it's harder to breathe, you might cough, or your chest might feel tight.
- How can you protect yourself from dirty air?



- Sometimes you can see when the air is dirty, but sometimes you can't. So we need another way to tell if our air is dirty.
- To do that, we can use something called the Air Quality Index, or AQI for short. Let's take a look at what that is.



- The AQI uses colors to tell us how clean or dirty the air is.
- Which color do you think means the air is clean? Green,
the same color that traffic lights use to tell you it's OK
to go, means the air is clean.
- Which color do you think means the air is really dirty? It's the
darkest color: Purple.
- Maybe you're wondering: How can I find the AQI? Checking the
AQI is like checking the weather report.



- You can always find the AQI on the Internet at a site called AirNow at: www.airnow.gov



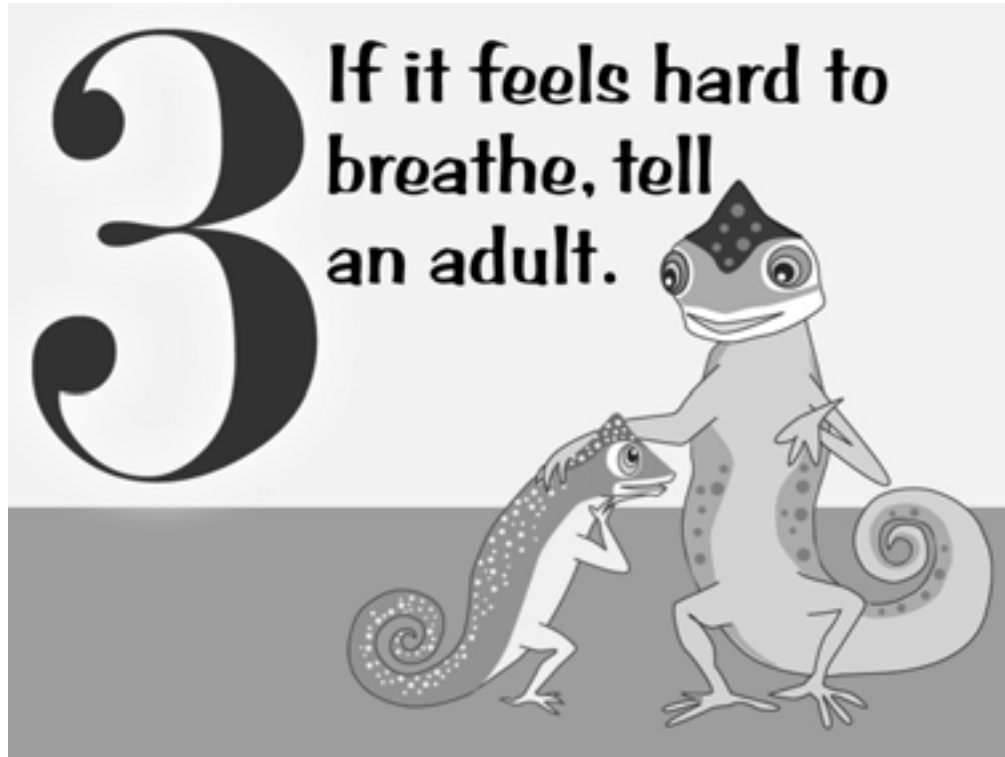
- When the air is polluted, sometimes you'll hear about it on TV during the weather forecast.



- Sometimes you, or your parents, can find it on the weather page in the newspaper.
- So finding out how clean or dirty the air is each day is one thing you can do to protect your health. Here's another thing you can do.



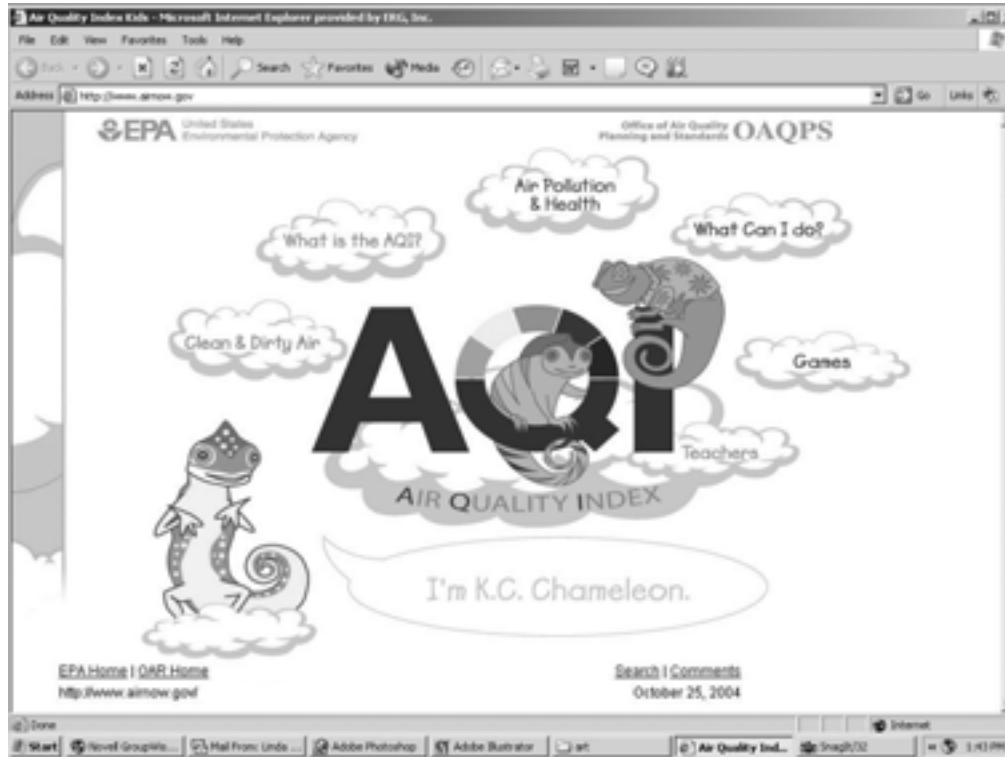
- Exercise and playing outside are good for you. But when the air is dirty, you should take some simple steps to protect your health.
- If you play outside when you *know* the air is polluted, you can take it easier. That could mean, for example, walking instead of running, taking frequent breaks, or planning to play outside at another time or on another day when the air is cleaner.
- Let's think why this makes sense. Do you breathe more when you're very active or when you're taking it easier?
- We don't breathe as hard when we're taking it easier, which is a good thing if the air is polluted.
- Here's another thing you can do.



- If you notice any signs when you are playing outside—like unusual coughing, pain when you take a deep breath, chest tightness, or wheezing—stop playing and tell an adult.
- If you have asthma, a lung condition that can sometimes make it difficult to breathe, pay special attention on polluted days. If you think you or a friend may be having an asthma attack, tell an adult.
- Let's review the three things you can do.



- If you can, find out what the air quality color is each day. You might want to tell your parents about the AQI colors so they can help you check how clean or dirty the air is.
- If the air is dirty, take it easier when you play outside, or change your play time to when the air is better.
- If you have a hard time breathing when the air is dirty, tell an adult.



- Here's a cool website where you can learn more about the air quality colors and what they mean.
- Here you can learn more about air pollution and the AQI and play some games.

Pass out handout

- This handout reminds you about what you can do. It also shows you where this kids' website is and where you or your parents can go to get AQI information.

Student Handout: Grades 3-5

Breathe Smart!

Three Things KIDS Can Do



1

Find out what color day it is for air quality.

- Visit the AIRNow web site at www.airnow.gov
- Tell your parents about the AQI so they can help you.

2

Protect your health when the air is dirty.

- Take it easier when you play outside.
- If it feels harder to breathe, tell an adult.



3

Visit the AQI kids' site at: www.airnow.gov
(click on "Kids" on the left side of the web page)



Transparencies: Grades 3-5

A cartoon illustration of a green lizard with white spots and a curled tail, holding a rainbow. The lizard is standing on a green hill under a blue sky with white clouds. A speech bubble contains the text:

**Hi.
What color is
your air today?**







**You can find
out how clean
your air is.**

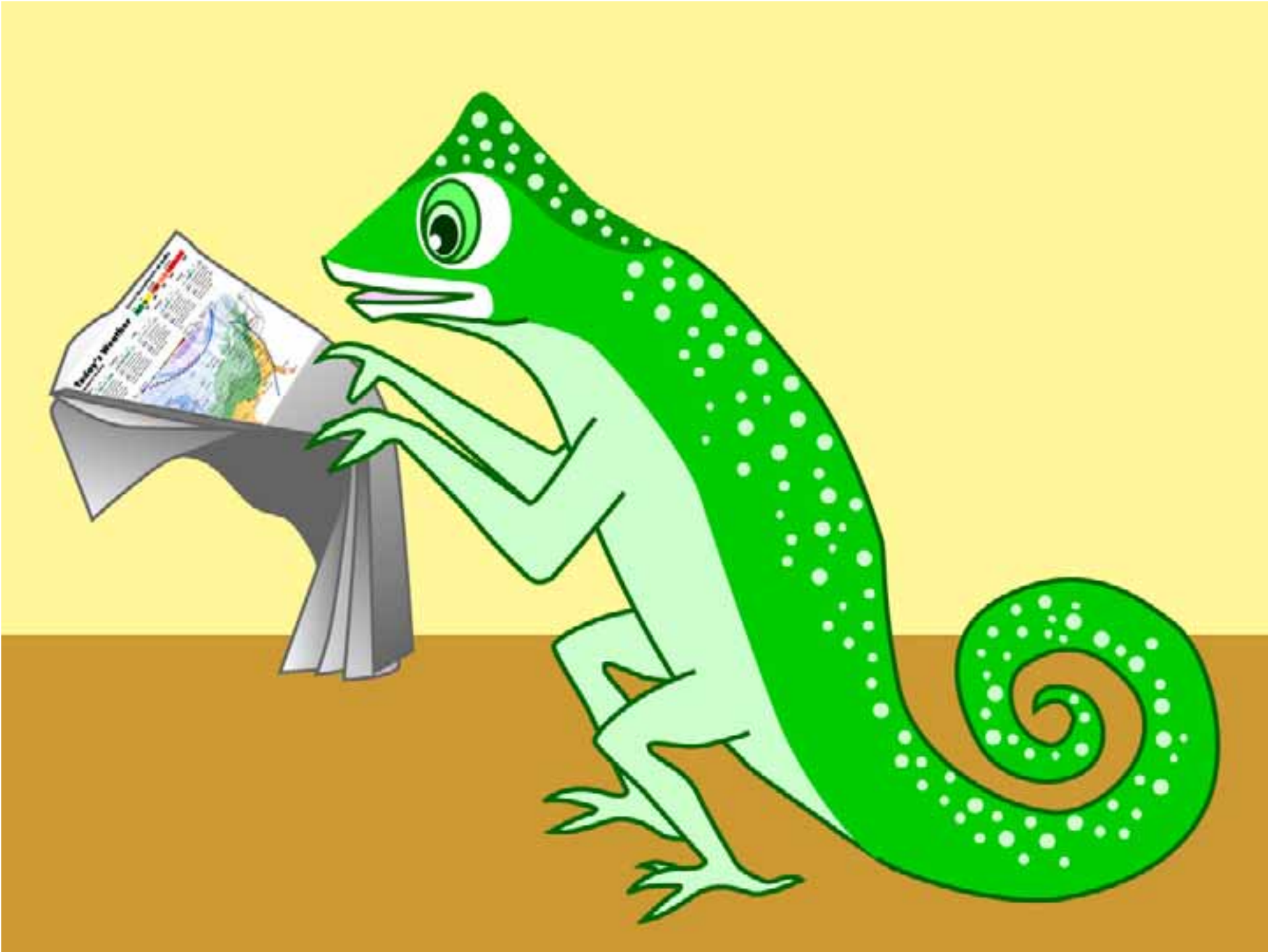


AIR QUALITY INDEX

www.airnow.gov







2

Take it easier when
you play outside.



3

If it feels hard to breathe, tell an adult.





What is the AQI?

Air Pollution & Health

What Can I do?

Clean & Dirty Air



Games



Teachers

I'm K.C. Chameleon.

Grades 6-8

Key Messages: Grades 6-8 Presentation

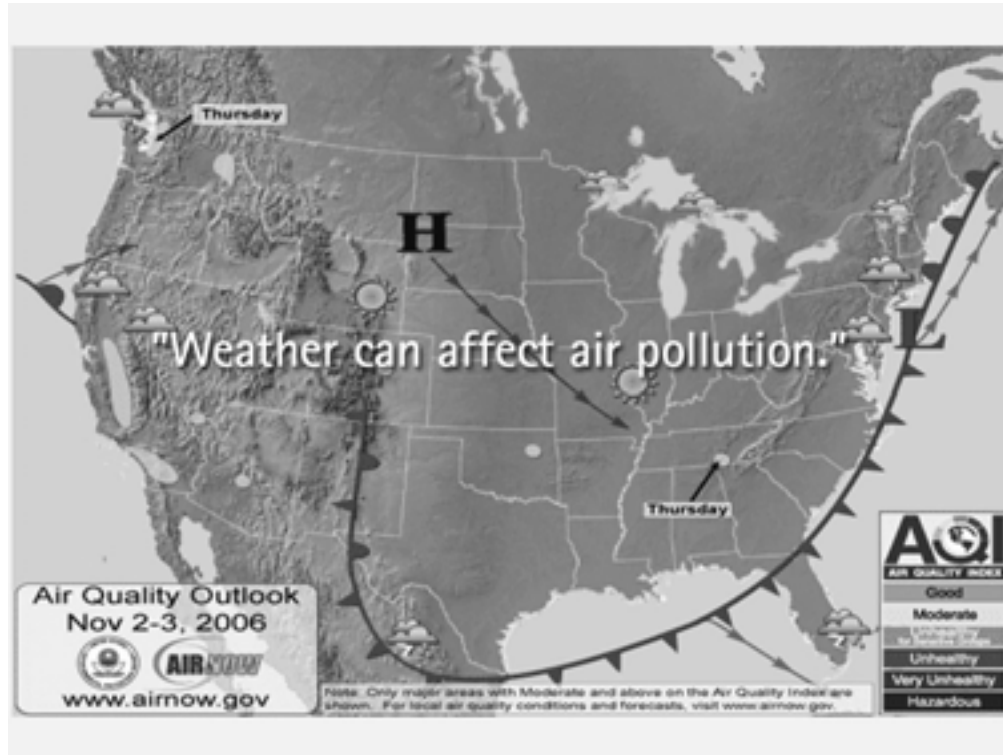


- Breathing polluted air is unhealthy. For example, you might find it more difficult to breathe, you might cough or wheeze, or your chest might feel tight.
- You can't always tell if the air is polluted by how it looks. The Air Quality Index, or AQI, can help.
- Two main types of air pollution are ozone pollution and particle pollution.
- The ozone we breathe at ground level is bad. But very high in the atmosphere is a natural layer of ozone that is good because it protects us from the sun's harmful ultraviolet rays. A rhyme that can help you remember this is: "Ozone: Good up high, bad nearby."
- You can protect your health in three ways when the air is polluted:
 1. Find out the air quality each day.
 - You can do this by checking the AQI (the Air Quality Index), just like checking the weather report. The AQI uses color-coded maps and health messages to tell you how clean or polluted the air is. For example, green means the air is clean. Red means the air is unhealthy for everyone.
 - You can always find the AQI on the Internet at a site called AIRNow at: www.airnow.gov . You also might hear about the AQI on TV during the weather forecast or on the radio, or you might see it on the weather page in the local newspaper.
 2. If you're outside when you *know* the air is polluted, you can protect your health by taking it easier. It's important to exercise and be active to maintain good health. But when the air is polluted, you can reduce the time you spend exercising, walk instead of run, take frequent breaks, or go outside at another time or on another day when the air is cleaner.
 3. If you notice any symptoms when you're outside like coughing, pain when you take a deep breath, chest tightness, or wheezing, stop your activity and tell an adult. This is especially important if you have asthma.
- Both people's activities (such as transportation, energy use, and materials production) and nature (such as forest fires and volcanic eruptions) can cause air pollution.
- You can help reduce pollution. For example, turn off lights and equipment that use energy when you don't need them. Walk, bike, carpool, or use public transportation when possible instead of having someone drive you.

Notes Pages: Grades 6-8



- Now I'd like to talk about how weather relates to air pollution, and how air pollution can affect your health.
- To do this, I'm going to begin by asking you some true or false questions.
- True or false: Rain can have an effect on air pollution. [*Correct response: true*]
- True. Rain can help to remove pollutants from the atmosphere. The intensity of the rain determines how much it actually cleans the air. The harder it pours, the more pollutants get removed from the air. But the rain deposits pollutants from the air onto the surface of the ground, which can contribute to water pollution.



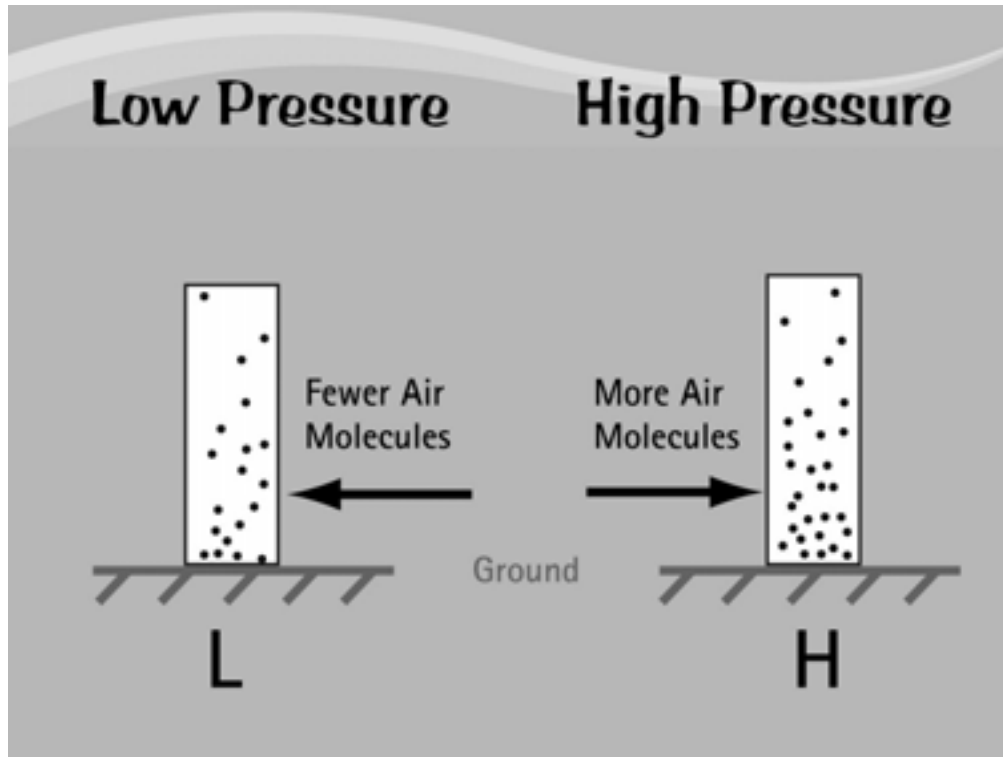
- True or false: Other types of weather can also have an effect on air pollution. *[Correct response: true]*
- True. Wind can affect air pollution. Wind can move air pollution to different places, sometimes hundreds of miles away.
- What other kinds of weather conditions do you think can affect air pollution? *[You may want to wait for a few responses]*

Weather and Air Quality Basics

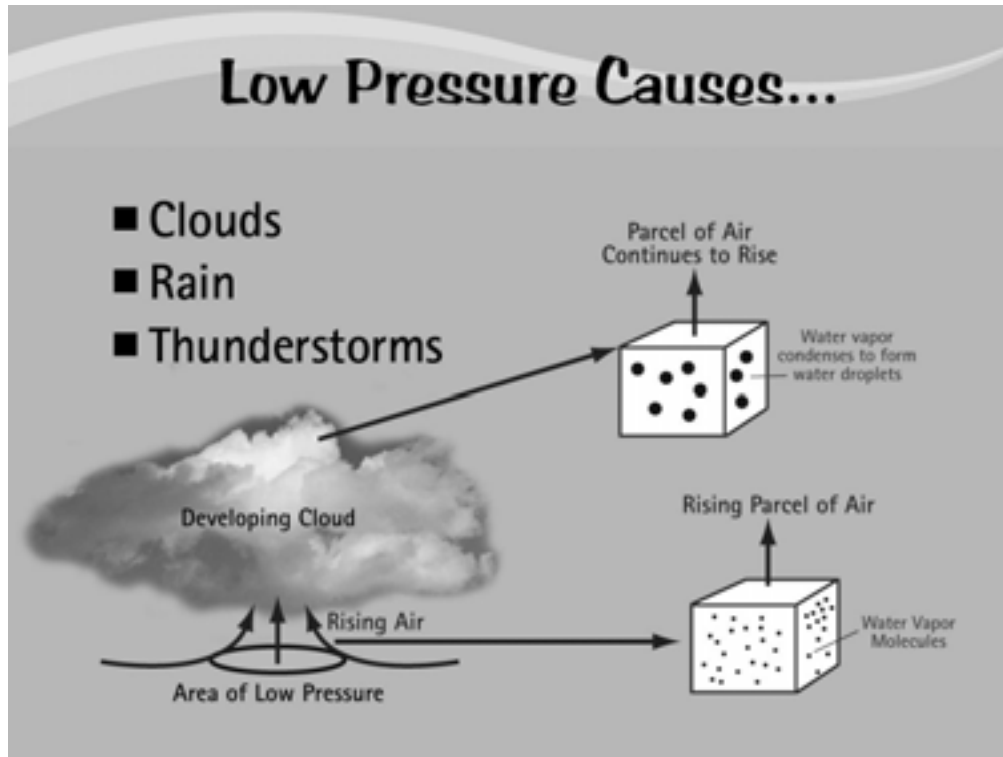
■ High Pressure vs. Low Pressure



- High and low pressure have a lot to do with the levels of pollution in the air.



- High pressure compresses more molecules of air into a smaller space.
- Low pressure allows molecules of air to occupy a larger area.



- In low pressure systems, rising parcels of air create motion and mixing in the atmosphere.
- This mixing generally keeps pollutants from building up.
- The rising air also often causes clouds, rain, and thunderstorms to form.

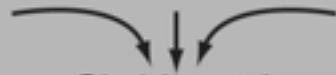
High Pressure Causes...

- Sunshine
- Hot Temperatures
- Light Winds



- High pressure systems do not allow air – or pollutants – to rise, so pollutants stay where they are and build up.
- Sunshine, high temperatures, and light winds often occur in high pressure systems.
- On clear days, sunlight and high temperatures can “bake” certain chemicals, causing them to react and form ozone, one type of air pollutant.

What about air quality?



- Sinking air + Hot temperatures + light winds + clear skies = stagnation and poor air quality



- Rising air+Clouds+Rain = moving air and good air quality

- These are the basic formulas for poor and good air quality.

**If the air can't move,
pollutants are trapped.**

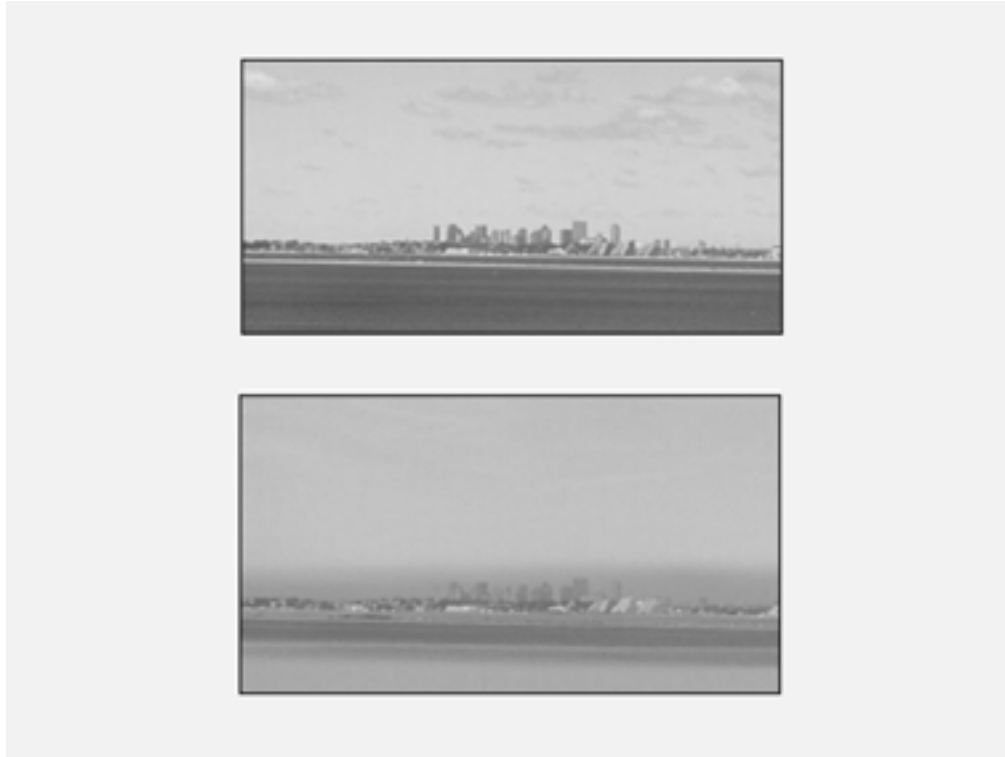


Image courtesy of: Queensland EPA

- This photo demonstrates pollutants being trapped in lower levels of the atmosphere. Why? Because if the air can't move, pollutants are trapped, stay where they are, and build up.

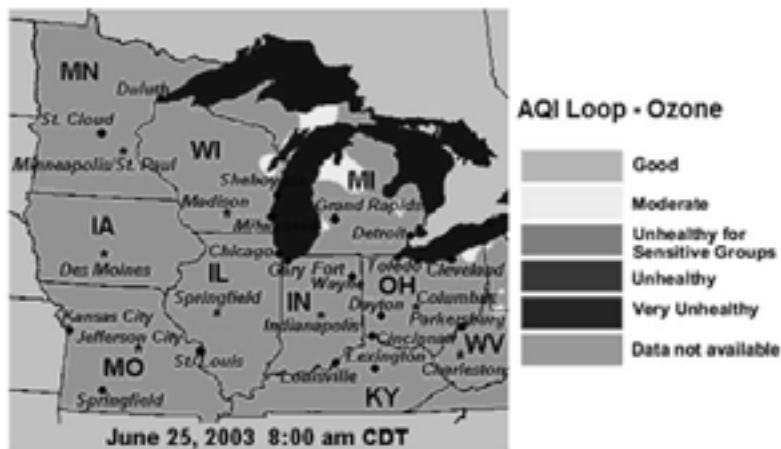


- There are many sources of air pollution, such as cars, factories, power plants that produce electricity, some ordinary products like house paints, and many other things.
- Sometimes nature can pollute the air. The bottom two photos show a forest fire and a volcano, both of which can pollute the air.
- If you lived near a forest fire, what do you think it would feel like to breathe the air that day? *[Wait for an answer or two.]*
- The air would be very smoky, and it might make you cough, or irritate your eyes, or you might find it harder to breathe.
- Forest fires and volcanoes put small particles into the air. Particle pollution is one type of air pollution that can come from both natural sources like these and from people's activities.



- Here's another type of pollution. The top picture shows Boston when the air is clean. The bottom picture shows Boston when the air is polluted with something called "smog."
- Smog is a combination of pollutants, two of which we've mentioned: ozone and particles. Both of these pollutants can affect our health.
- Here's another true or false question: Sometimes ozone in the air is a good thing. *[Correct response: true]*
- True. Ozone in the air we breathe here at ground level is bad. But very high up in the atmosphere (in the stratosphere, which extends up from about 6 to 30 miles), there's a natural layer of ozone that protects us from getting too much radiation from the sun.
- Here's another question—true or false: You can always tell when the air is polluted by how it looks. *[Correct response: false]*
- False. Polluted air often does look dirty. But sometimes air that looks clean might in fact be polluted.
- You can check the air quality each day by looking at color-coded maps and health messages, like the map on the next slide.

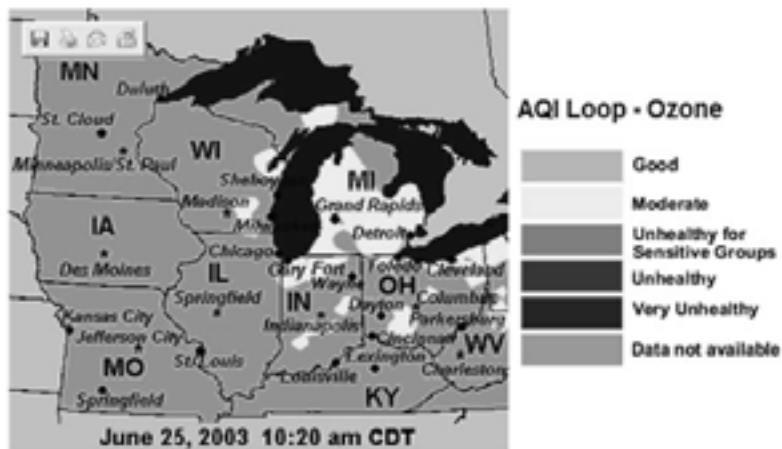
Midwest Ozone Maps for June 25, 2003



www.airnow.gov

- This ozone map comes from an Internet website called AIRNow where you can check daily air quality for many different locations. This particular map shows the air quality and related health messages for several Midwestern states at 8:00 a.m. on June 25, 2003.
- The color scale to the right of the map is called the Air Quality Index, or AQI, which is a way to report daily air quality. The AQI colors tell us how clean or polluted the air is.
- What is this map telling us about the air quality in the Midwest on this day at 8:00 a.m.? *[Wait for a response]*
- The map is mostly green, so the air quality is mostly “good” for ozone pollution at this location at this time.
- Let’s go forward in time on that same day and see whether the air quality has changed.

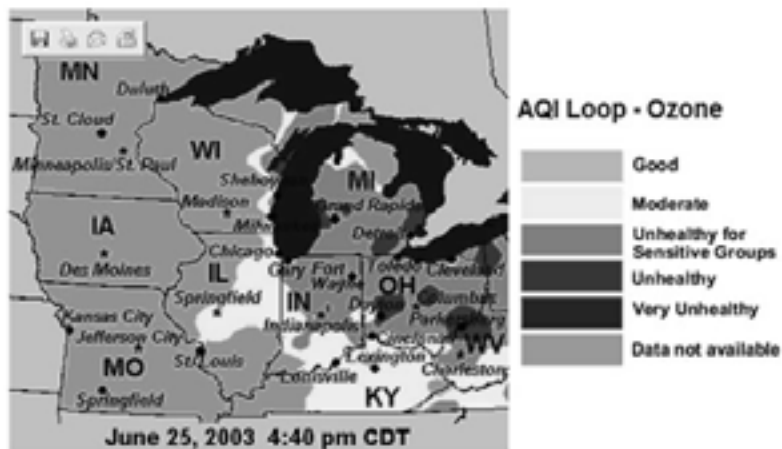
Midwest Ozone Maps for June 25, 2003



www.airnow.gov

- Now it's 10:20 a.m. on the same day. What's happening to the air quality in this area? [Point to yellow area] [Correct response: It's getting worse.]
- The color is yellow, so the AQI is telling us that the air quality is "moderate," which means just a little polluted.
- The health message that goes along with the yellow AQI color is: "Unusually sensitive people should consider reducing prolonged or heavy exertion outdoors."

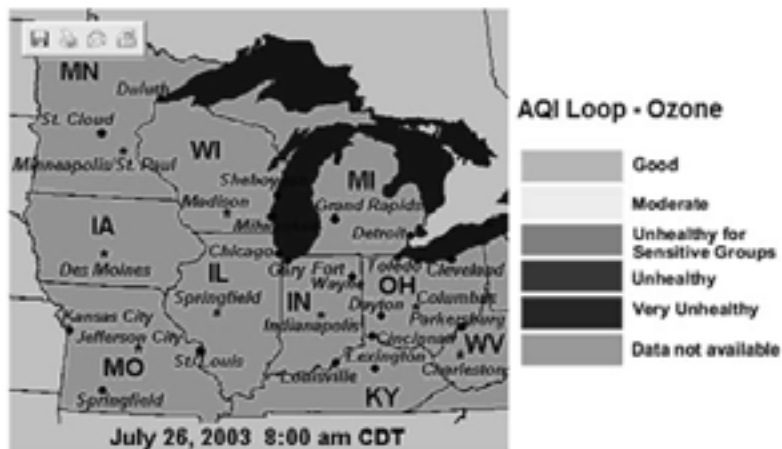
Midwest Ozone Maps for June 25, 2003



www.airnow.gov

- Now it's 4:40 p.m. on the same day. What is the air quality in these parts of the Midwest? *[Point to an orange area, then a red area.]*
[Correct response: "Unhealthy for sensitive groups" (orange), and "Unhealthy" for everyone (red)]
- It's "unhealthy for sensitive groups" (for orange) and generally "unhealthy" for everyone (for red).
- "Sensitive groups" are people who are more likely to be affected by air pollution, which includes children, because you are still growing and your lungs are still developing.
- For ozone, sensitive groups include people with lung diseases (including asthma), and active adults and children.
- For particle pollution, sensitive groups include people with heart or lung disease (including asthma), older adults, and children.
- When the AQI is orange, the health message is that sensitive groups should reduce prolonged or heavy exertion outdoors. When the AQI is red, the air is unhealthy for everyone; all people should reduce such activities.

Midwest Ozone Maps for July 26, 2003



www.airnow.gov

- Now it's 8:00 a.m. the next day. The map is again green, showing us that the air quality is much better.
- The pattern we saw in the Midwest maps is very typical for ozone pollution: Ozone is often worse in the summer, and worse in the mid-afternoon to early evening, because sunlight and higher temperatures “bake” the pollution from sources such as car exhaust, gasoline vapors, factory emissions, and chemical solvents, and form ozone.



- There are several things you can do to protect your health.
- First, you can check whether the air is polluted each day. You can check out the AQI daily on the Internet at the AIRNow website. Also many newspapers and TV and radio weather forecasts include air quality reports.
- If you find out that the air is polluted, here are some things you can do.

Things You Can Do

1. Check the air quality.
2. Take it easier if you're outside when the air is polluted.

- Exercise is important to staying healthy, so it's good to be outside. But when the air is polluted, take it easier when you're outside. That might mean not running around as much as you normally would, or for as long a time. Or take frequent breaks, or plan to be outside at another time or on another day when the air is cleaner.
- Let's think about why this makes sense. Do you breathe more when you're active, or when you're taking it easier?
[Correct response: when active]
- We breathe harder when we're active, which means we can breathe in more dirty air if the air is polluted.
- Here's another thing you can do.

Things You Can Do

1. Check the air quality.
2. Take it easier if you're outside when the air is polluted.
3. If breathing feels different when the air is polluted, tell an adult.

- If the air is polluted and you notice any symptoms like unusual coughing, or pain when you take a deep breath, or chest tightness, or wheezing, stop your activity and tell an adult.
- This is especially important if you have asthma, because air pollution can aggravate asthma.

Things You Can Do

1. Check the air quality.
2. Take it easier if you're outside when the air is polluted.
3. If breathing feels different when the air is polluted, tell an adult.
4. Help reduce pollution.

- There are also things you can do to reduce air pollution, such as turning off lights and equipment that use energy when you don't need them. Cutting back on electricity helps power plants cut back their pollution.
- Also, instead of having your parents drive you all over the place - walk, bike, carpool, or take the bus, train, or subway if you can when the air quality is good. But remember, your safety always comes first!



- Here's a cool website called Smog City where you can learn more about how people and weather affect air pollution.

Pass out handout

- This handout tells you how you can visit Smog City on the Internet and how you can get to the AIRNow website to check air quality.
- It also reminds you about what you can do to protect your health when the air is polluted.
- In 2007, "Smog City 2" will be available, which will include particle pollution in addition to ozone.

Student Handout: Grades 6-8

Be Air Quality Smart!

Four Things You Can Do



1 Check the Air Quality Index.

- Visit the AIRNow website at www.airnow.gov.
- Listen for air quality information on the radio or TV.

2

Protect your health when the air is polluted.

- Take it easier when you're outside.
- If it feels harder to breathe, tell an adult.



3

Help reduce pollution.

- Turn off lights and equipment.
- Walk, bike, carpool, or take the bus when the air quality is good. But remember, your safety always comes first!

4

Have fun at the Smog City website:
www.smogcity.com



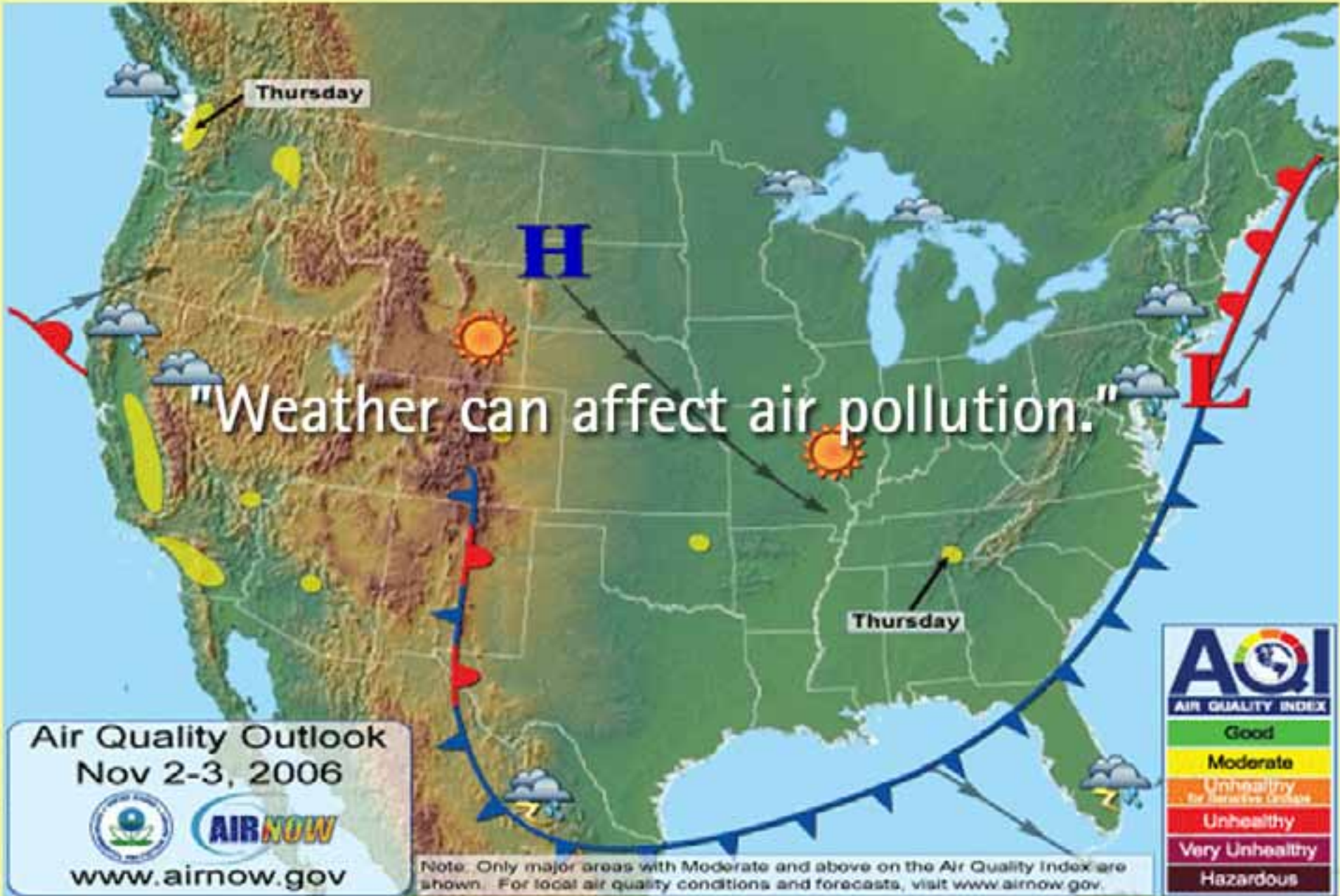
Coming in 2007—**Smog City 2**, which will include particle pollution in addition to ozone, at: www.smogcity2.org



Transparencies: Grades 6-8

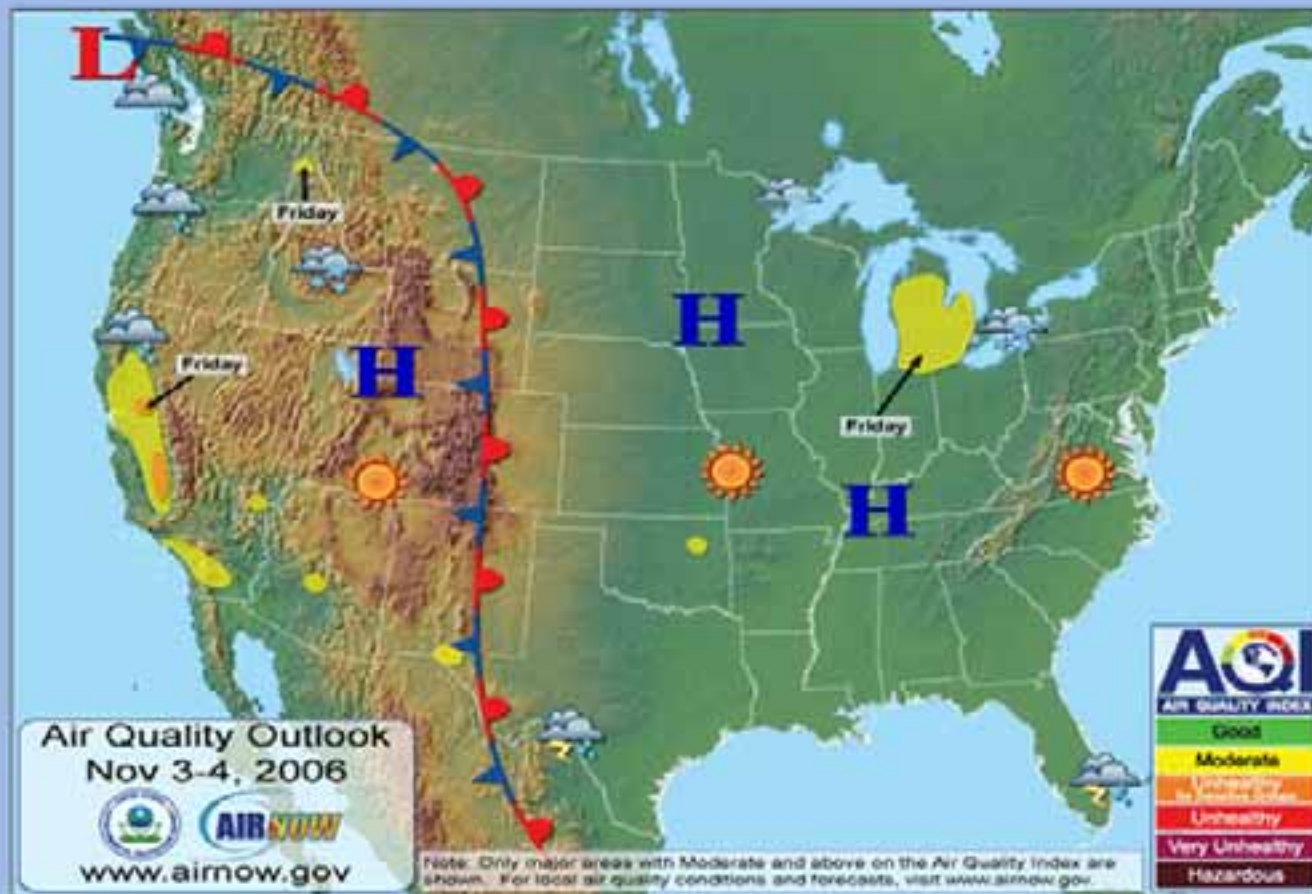


**What
Color Is
Your Air
Today?**



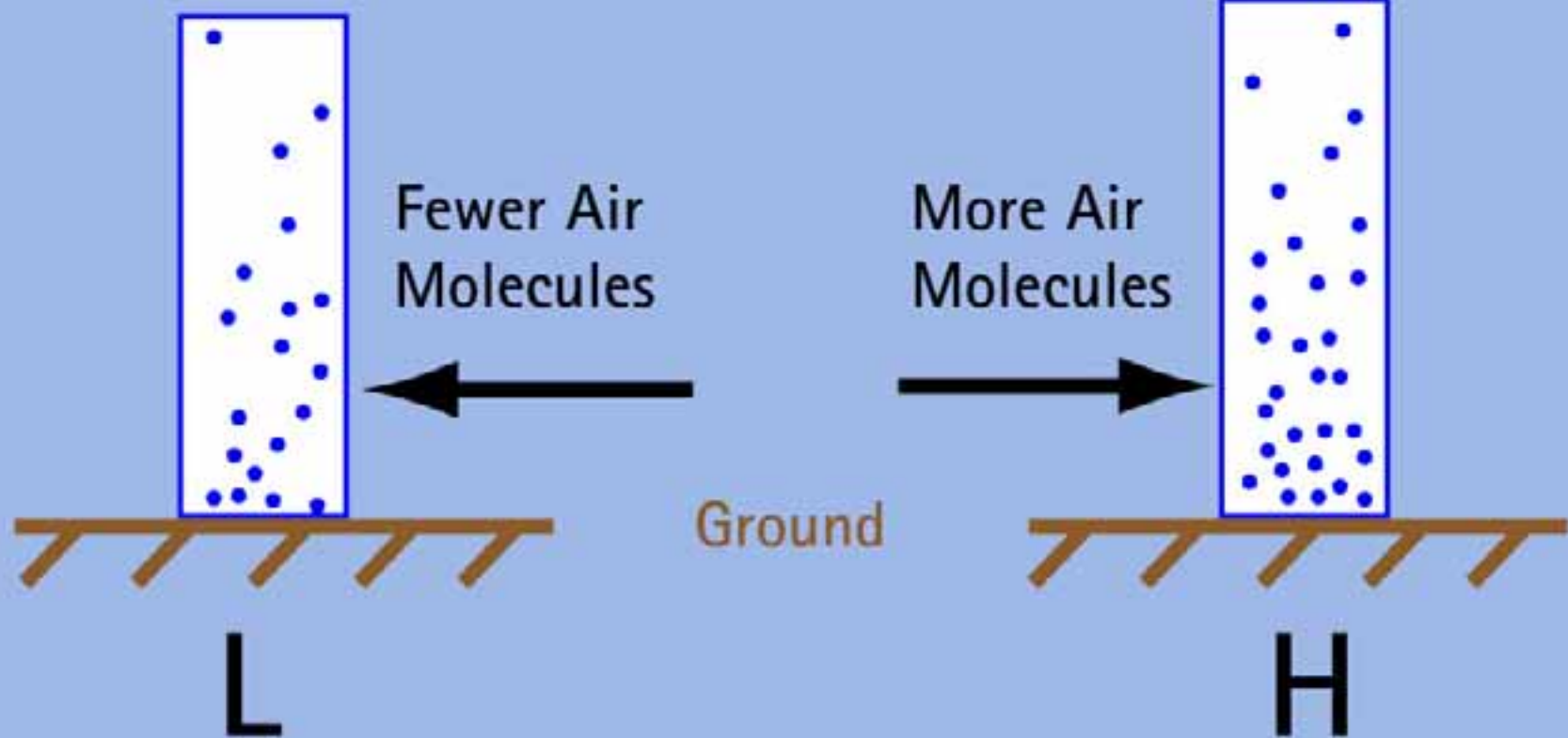
Weather and Air Quality Basics

■ High Pressure vs. Low Pressure



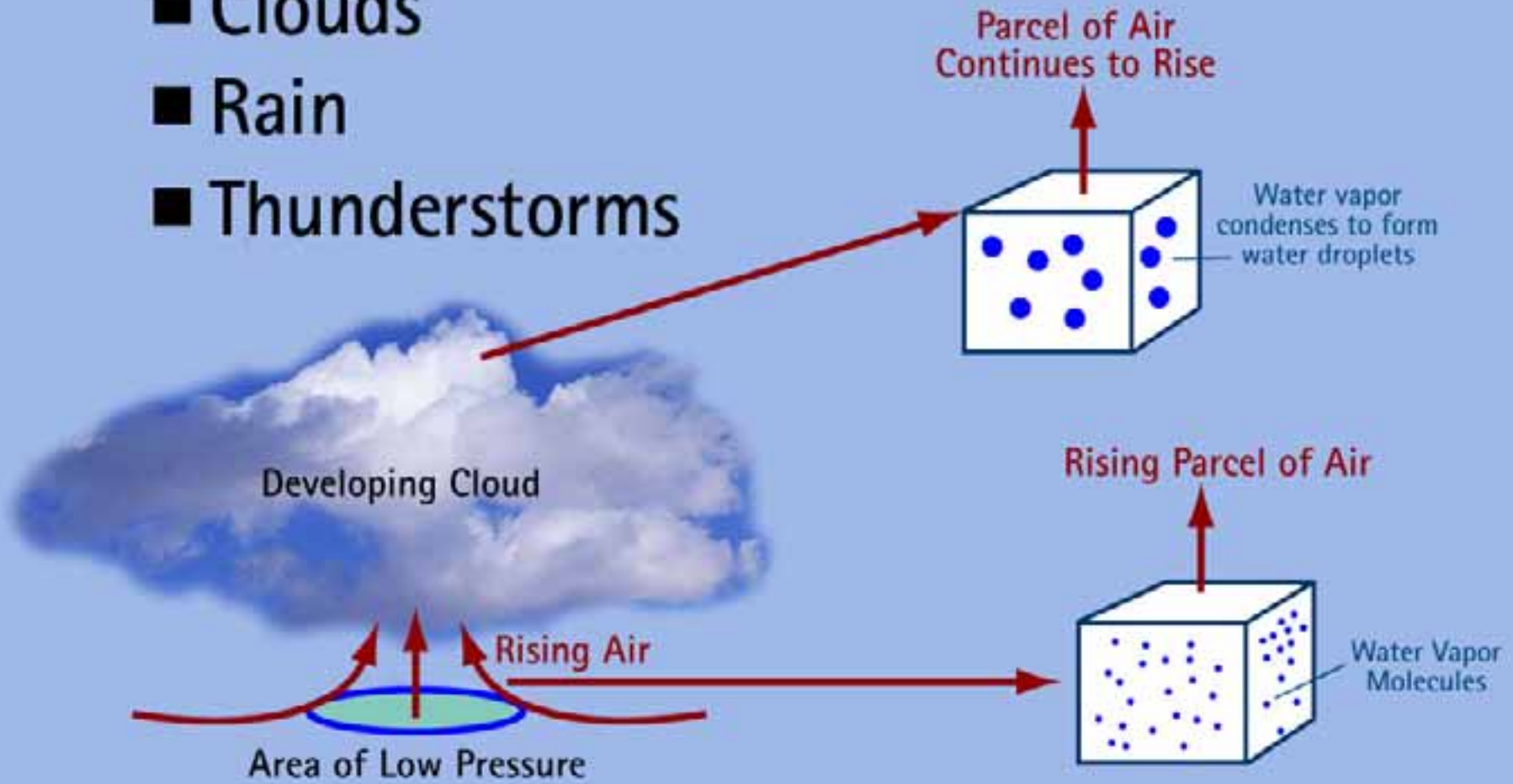
Low Pressure

High Pressure



Low Pressure Causes...

- Clouds
- Rain
- Thunderstorms



High Pressure Causes...

- Sunshine
- Hot Temperatures
- Light Winds



What about air quality?

- 
- Sinking air + Hot temperatures + light winds + clear skies = stagnation and poor air quality
- The diagram shows three red arrows pointing downwards from the top of the frame towards the text, indicating the direction of sinking air.

- 
- Rising air + Clouds + Rain = moving air and good air quality
- The diagram shows three red arrows pointing upwards from the bottom of the frame towards a cloud, indicating the direction of rising air. To the right of the cloud are three water droplets representing rain.

**If the air can't move,
pollutants are trapped.**

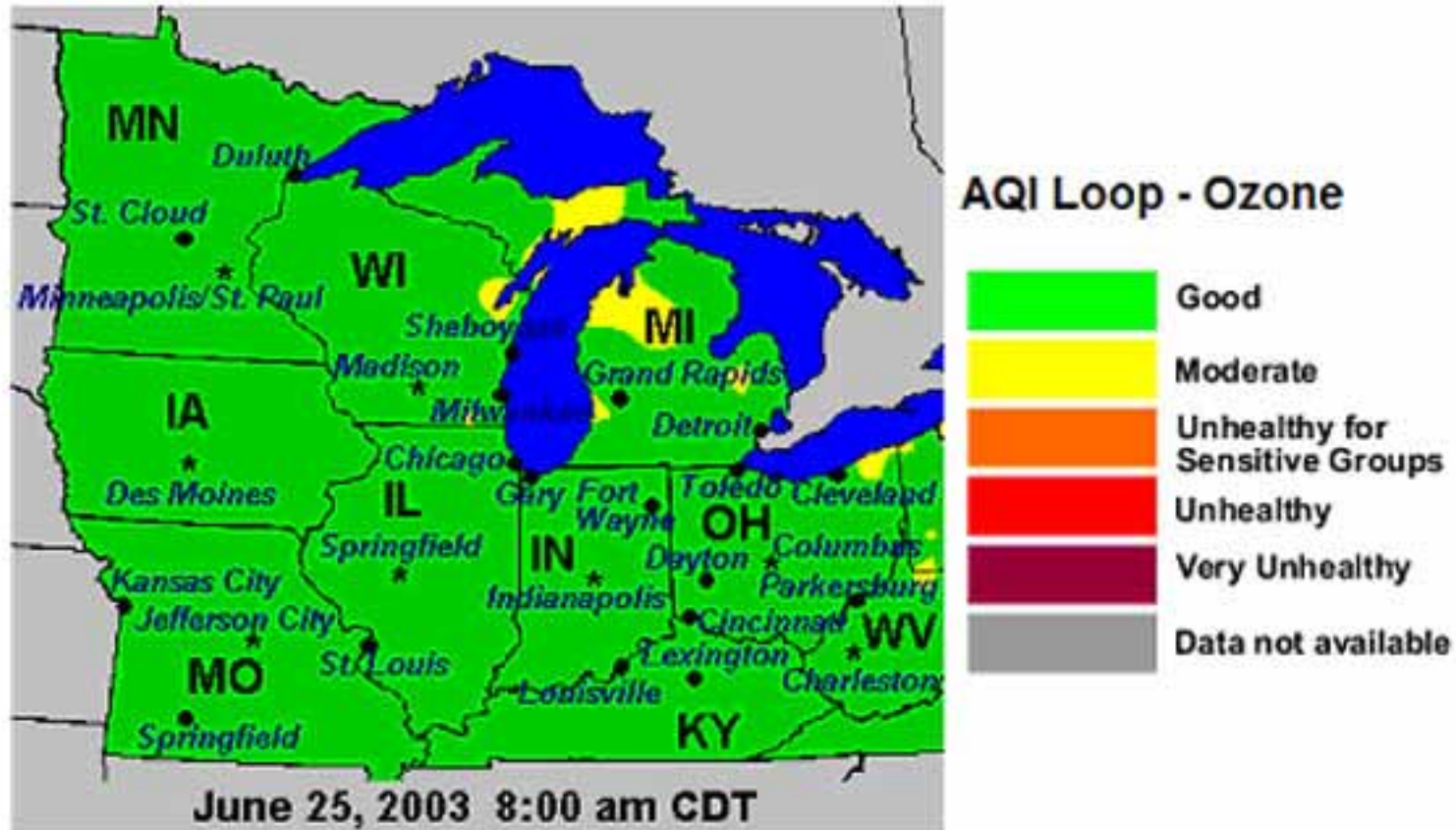


Image courtesy of: Queensland EPA



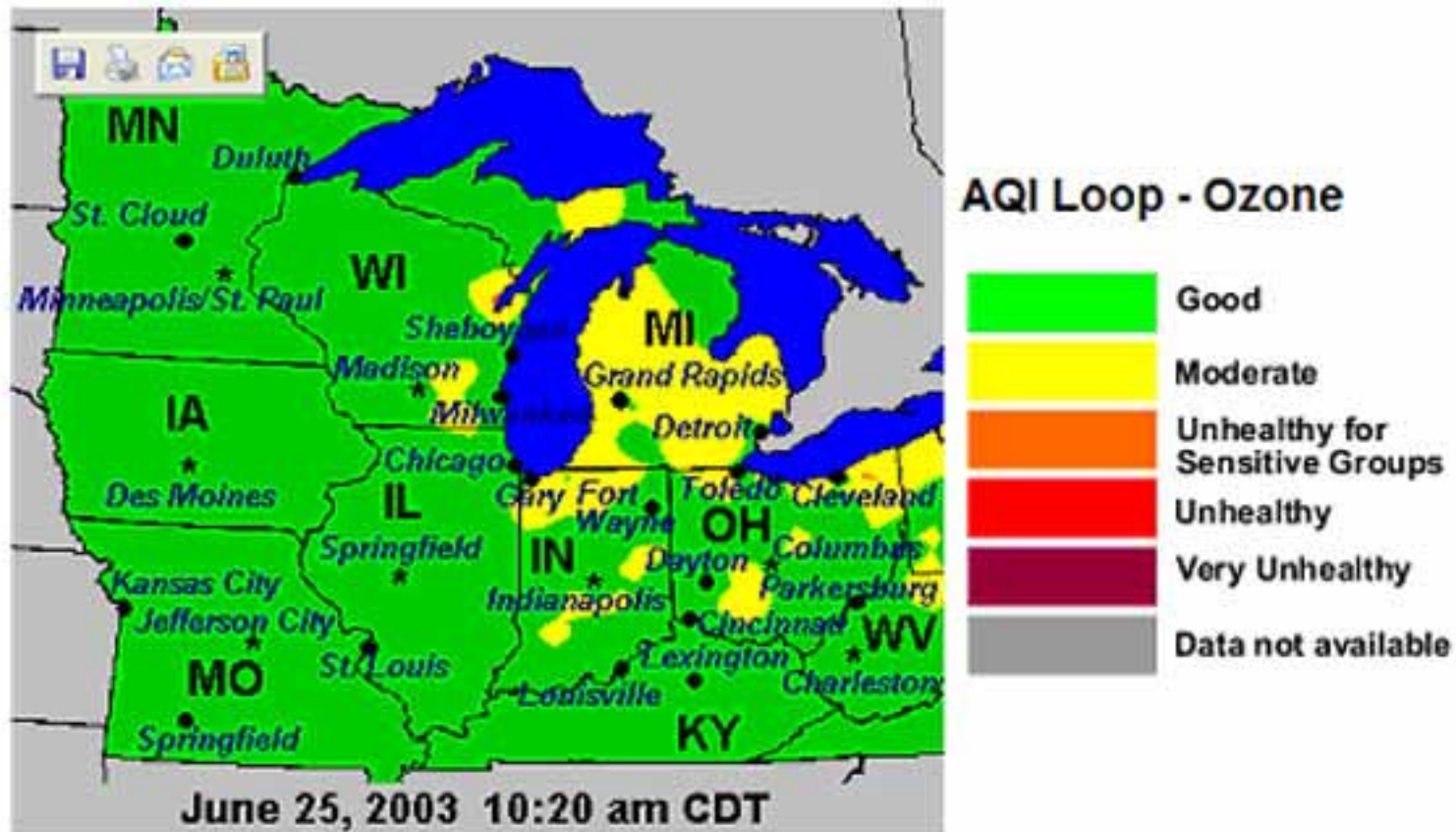


Midwest Ozone Maps for June 25, 2003



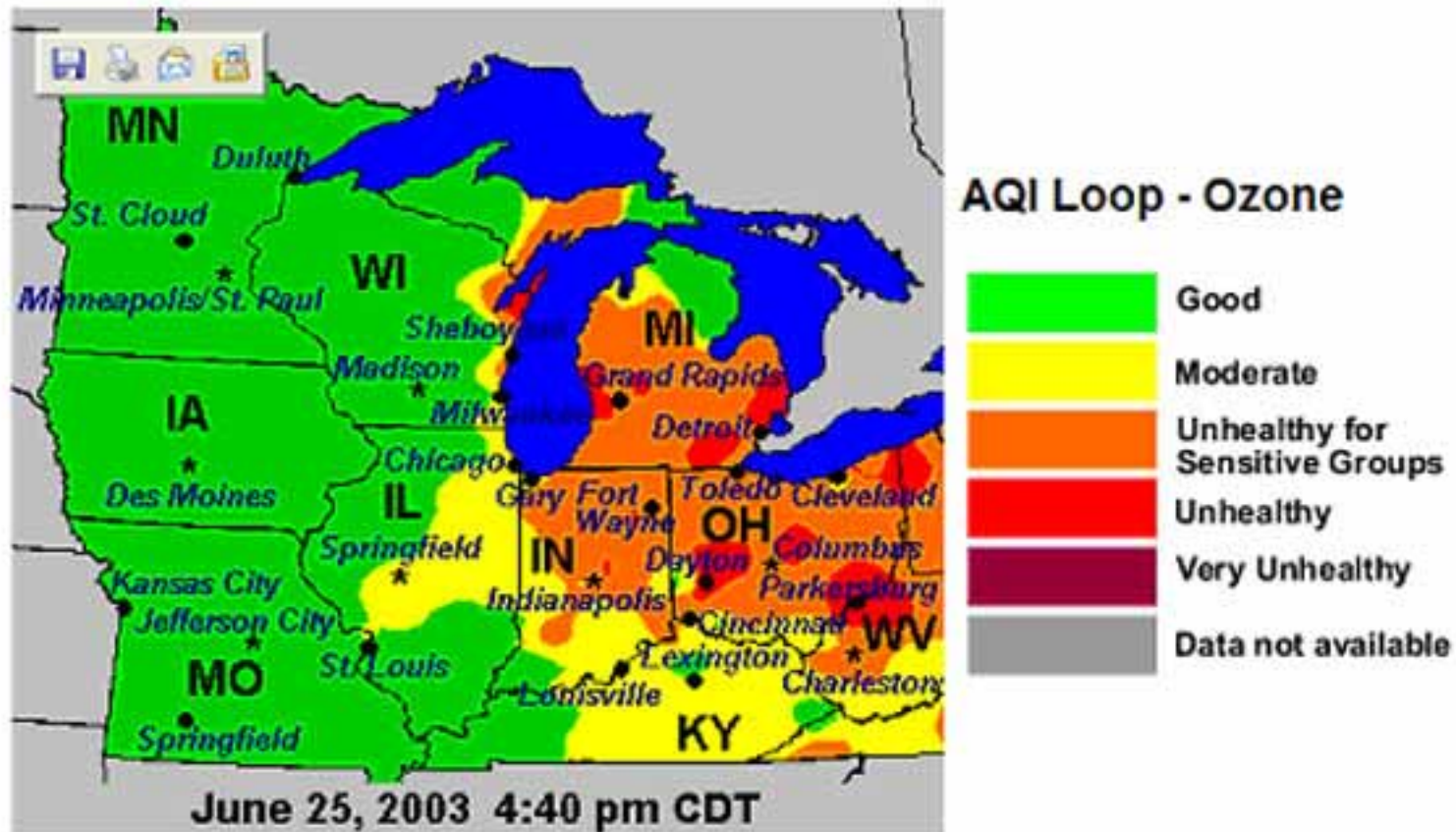
www.airnow.gov

Midwest Ozone Maps for June 25, 2003



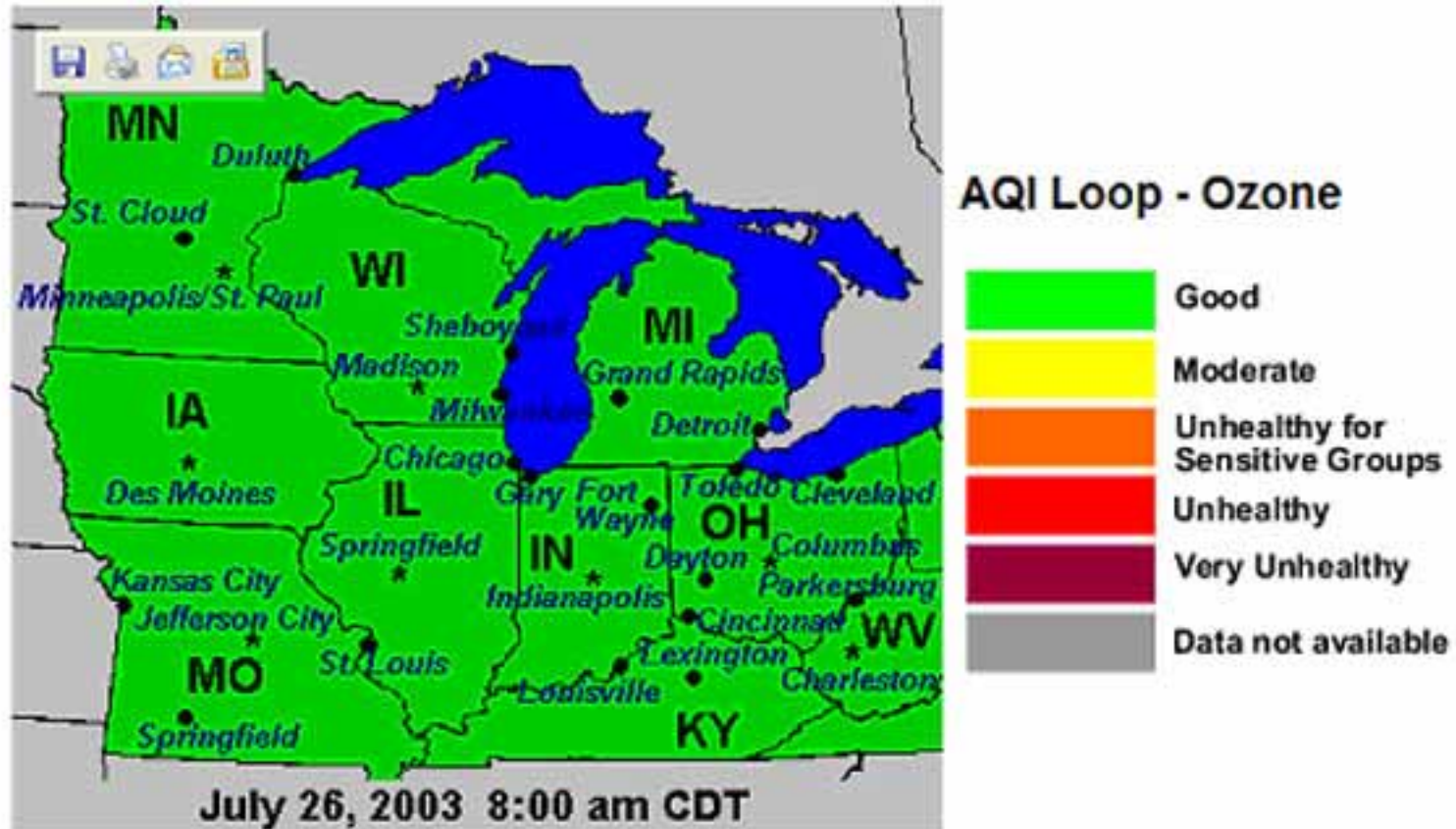
www.airnow.gov

Midwest Ozone Maps for June 25, 2003



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Midwest Ozone Maps for July 26, 2003



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Things You Can Do

1. Check the air quality.

Things You Can Do

1. Check the air quality.
2. Take it easier if you're outside when the air is polluted.

Things You Can Do

1. Check the air quality.
2. Take it easier if you're outside when the air is polluted.
3. If breathing feels different when the air is polluted, tell an adult.

Things You Can Do

1. Check the air quality.
2. Take it easier if you're outside when the air is polluted.
3. If breathing feels different when the air is polluted, tell an adult.
4. Help reduce pollution.



- Home
- Run Smog City
- Visitors Tour Guide
- What You'll Learn
- What's Ozone
- What's the AQI
- What You Can Do
- Smog City Science
- Educational Links
- Acknowledgments
- Download
- Help
- Send Comments

Welcome!

- SEE**
how your actions affect ozone levels
- FIND**
out how weather controls ozone
- LEARN**
how ozone affects your health



Smog City is an interactive air pollution simulator that shows how your choices, environmental factors, and land use contribute to air pollution. In Smog City you're in control so your visit can be a healthy or unhealthy experience depending on the decisions you make. You'll see how ground-level ozone, the biggest part of summertime smog, increases or decreases when you spend a day in Smog City. And since ozone can irritate respiratory systems, cause breathing difficulty, coughing, and chest pain, knowing how and why ozone forms and what you can do about it is important to the residents of Smog City and everyone else on the planet.

Minimum Requirements
IE 3.0 or Netscape 3.0
800 x 600 pixels

Cautionary Note:
Relationships between ozone, emissions, and weather conditions are very complex. Because Smog City's relationships are based on a simplified model of complex atmospheric processes in Sacramento, California, there is no guarantee that they are scientifically accurate for this or other regions. Results only illustrate general behavior of air pollution processes, and cannot be used for any quantitative purpose or in detailed planning of future control strategies.

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www.smogcity.com