

SECTION

5

READING WARM-UP

Objectives

- List three effects of air pollution on the human body.
- Describe how air quality is monitored and measured.
- Describe how air quality is communicated to the public.
- Identify ways to reduce air pollution.

READING STRATEGY

Reading Organizer As you read this section, create an outline of the section. Use the headings from the section in your outline.

Maintaining Air Quality

Have you ever seen or heard a weather forecaster report the day's air quality? Have you ever had to stay indoors because the air outside was unhealthy?

The air quality in your area affects your health and your everyday life. It's important to learn about the air quality in your area and to know the short-term and long-term effects of air pollution on your health.

Air Pollution and Human Health

Daily exposure to small amounts of air pollution can cause serious health problems. Children, elderly people, and people who have asthma, allergies, lung problems, and heart problems are especially vulnerable to the effects of air pollution.

Short-Term and Long-Term Effects

Many of the effects of air pollution on the human body are short-term effects and are immediately noticeable. Coughing, headaches, irritation to the eyes, nose, and throat, and an increase in asthma-related problems are only a few short-term effects. One good way to avoid experiencing any short-term effects of air pollution is staying indoors on days when the air quality is poor in your area. People who cannot stay indoors because of their jobs, such as the police officer in **Figure 1**, can wear masks and other gear to protect themselves from air pollution.

Long-term effects of air pollution, such as lung cancer and heart disease, may not be noticed until many years after an individual has been exposed to pollutants.

✓ Reading Check List three short-term effects of air pollution on human health. (See the Appendix for answers to Reading Checks.)

Figure 1 This police officer wears a mask to protect him from harmful pollutants as he directs traffic in Bangkok, Thailand.



Monitoring Air Quality

In 1970, the United States Congress passed the Clean Air Act. The Clean Air Act is a law that gives the Environmental Protection Agency (EPA) the authority to regulate the amount of air pollutants that can be released from any source, such as cars and factories.

Air Quality Standards

The EPA sets air quality standards for each state to follow. There are specific standards regarding levels of pollutants, such as carbon monoxide, lead, and ozone. These standards restrict how much of each pollutant can be released. The EPA works to improve air quality in areas where the air quality is poor and to prevent air pollution in areas where the air quality is healthy. There are two types of standards—primary and secondary. Primary standards protect against the effects of air pollution on human health and secondary standards protect against the effects of air pollution on crops, vegetation, and buildings. If air quality worsens, the EPA can set stricter standards. The Clean Air Act was strengthened in 1990.

Air Quality Index

The EPA and local governments are responsible for setting and enforcing air quality standards, as well as for reporting the air quality to the public. The Air Quality Index (AQI), shown in **Table 1**, is used to provide the public with daily air quality information. The AQI measures the air quality of an area with a value from 0 to 500. The AQI is determined after air pollution monitors record the concentrations of the major pollutants in an area. The higher the AQI, the higher the level of air pollution, and the higher the health risk. Once the AQI value is determined for a certain area, a level of health concern and color is also given.

Table 1 Air Quality Index

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for sensitive groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

CONNECTION TO Environmental Science

WRITING SKILL

The Ozone Hole

In 1985, scientists reported an alarming discovery about the Earth's protective ozone layer. Over the Antarctic regions, the ozone layer was thinning. Chemicals called CFCs were causing ozone to break down into oxygen, which does not block the sun's harmful ultraviolet (UV) rays. The thinning of the ozone layer creates an ozone hole, which allows more UV radiation to reach the Earth's surface. UV radiation is dangerous to organisms because it damages genes and can cause skin cancer. Using the Internet or library resources research the current state of the ozone layer. Also, find out if CFCs are still being used today.

Figure 2 This power plant is leading the way in clean-coal technology. The plant turns coal into a gas before it is burned, so fewer pollutants are released.



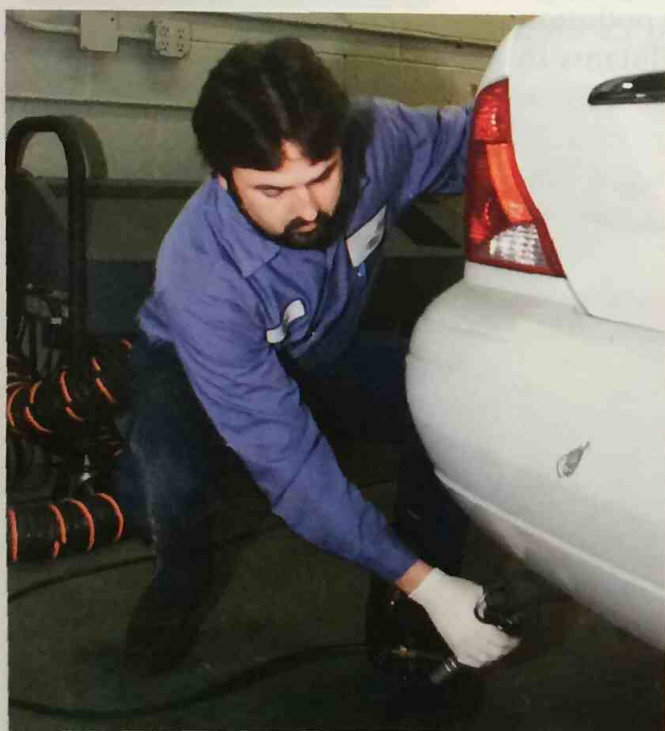
Reducing Air Pollution

Much progress has been made in reducing air pollution. The Clean Air Act, stricter air quality standards, advancements in technology, and lifestyle changes all help reduce air pollution.

Controlling Air Pollution from Industry

The Clean Air Act requires many industries to use pollution-control devices such as scrubbers. A *scrubber* is a device that is used to remove some pollutants before they are released by smokestacks. Scrubbers in coal-burning power plants remove particles such as ash from the smoke. Other industrial plants, such as the power plant shown in **Figure 2**, focus on burning fuel more efficiently so that fewer pollutants are released.

Figure 3 Many states require cars to get emissions tests. Regulating the amount of emissions that vehicles release helps reduce air pollution.



Reducing Motor Vehicle Emissions

A large percentage of air pollution in the United States comes from the vehicles we drive. To reduce air pollution from vehicles, the EPA requires car makers to meet a certain standard for vehicle exhaust. Devices such as catalytic converters remove many pollutants from exhaust and help cars meet this standard. To make sure that cars continue to meet this standard, some states require vehicles to pass an emissions inspection, as shown in **Figure 3**.

Cleaner fuels and more-efficient engines have also helped reduce air pollution from vehicles. Car makers are also designing cars that run on fuels other than gasoline. Some of these cars run on hydrogen or natural gas. Hybrid cars, which are becoming more common, use gasoline and electric power to reduce emissions.

Ways To Reduce Air Pollution

People can make choices that can help reduce air pollution. For example, you can reduce air pollution by carpooling, using public transportation, walking, or biking to your destination, as shown in **Figure 4**. Planning ahead to combine trips or errands instead of making multiple trips also helps reduce pollution. Keeping cars and other gas-powered machines in good condition helps reduce the amount of fuel the engine consumes, and therefore reduces the amount of emissions the engine releases.

Conserving electricity also helps reduce air pollution. Turning off lights and other electrical appliances when they are not in use can reduce the amount of air pollution that is created when electricity is generated. You can also learn more about reducing air pollution by talking to your state environmental agency or by joining a group that is working to reduce air pollution in your area.

✓ Reading Check Describe one way that you can help reduce air pollution.



Figure 4 In Copenhagen, Denmark, companies loan free bicycles in exchange for publicity. The program helps reduce air pollution and auto traffic.

SECTION Review

Summary

- Coughing, headaches, and an increase in asthma-related problems are three effects of air pollution on the human body.
- The EPA and local governments set and enforce air quality standards, and inform the public about air quality.
- Air pollution can be reduced by legislation, such as the Clean Air Act; by technology, such as scrubbers; and by changes in lifestyle.

Understanding Key Ideas

1. Which of the following is a long-term effect of air pollution on the human body?
 - a. irritation to the eyes
 - b. lung cancer
 - c. headaches
 - d. coughing
2. Describe the Clean Air Act. When was the Clean Air Act passed by Congress?
3. Explain how the EPA ensures that areas maintain healthy air quality.
4. What do the EPA's primary and secondary air quality standards protect?
5. Describe three effects of air pollution on human health.
6. How can industries help reduce the air pollution they release?
7. What is the Air Quality Index?

Critical Thinking

8. **Identifying Relationships** How can advancements in technology help reduce motor vehicle emissions?
9. **Applying Concepts** List three ways that your community can reduce air pollution. How can you raise awareness in your community about how to reduce air pollution?

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