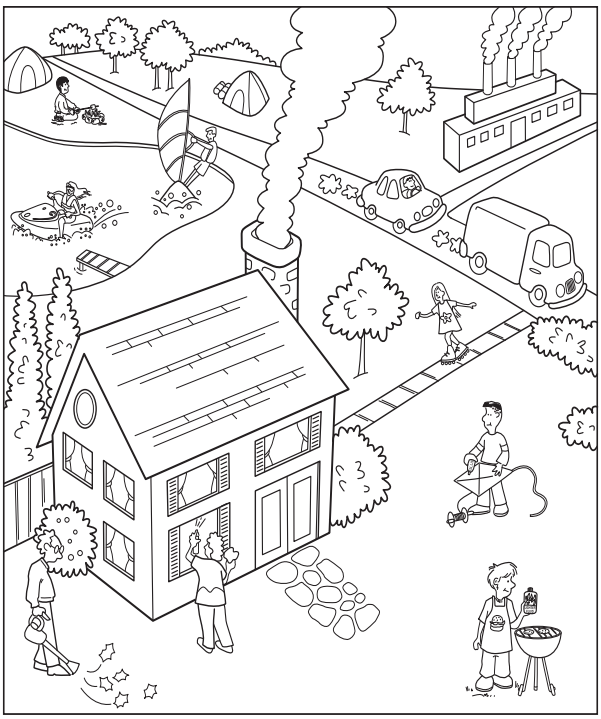
Activity 1: Causes of Air Pollution



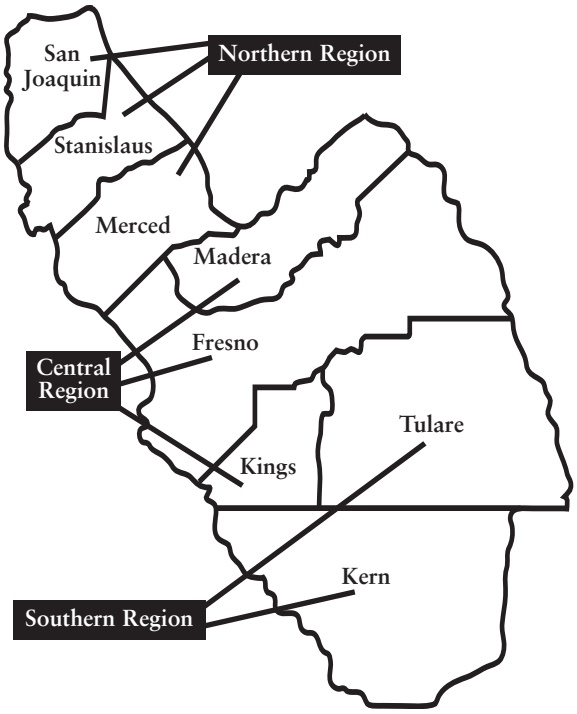
What is Air Pollution?

Imagine more than 7,000 big empty soda bottles lined up. The amount of air in those bottles is about how much air each of us breathes every day. Now imagine that the bottles contain not just air but also unhealthy gases and dirt particles. Unfortunately, that is the air that we breathe most every day—polluted air.

Air is polluted when it contains enough gases and particles to harm living things—people, plants, animals. This pollution comes from many familiar sources:

- cars and trucks and other vehicles
- gas-powered equipment, such as lawn mowers and leaf blowers
- power plants and factories that burn fossil fuels
- fires, such as in wood stoves, fireplaces, campfires, and barbeques
- dust and dirt from construction sites, roads, and fields
- household products, such as lighter fluid, paint, cleaners, and bug sprays

In the San Joaquin Valley, the largest source of air pollution is the exhaust from cars and other vehicles.



The San Joaquin Valley Air District

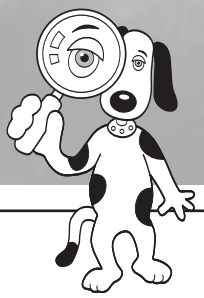
In the San Joaquin Valley, we have a serious air pollution problem. The San Joaquin Valley Air District covers eight counties, which are divided into three regions:

Northern Region: San Joaquin, Stanislaus, Merced counties
Central Region: Madera, Fresno, Kings counties
Southern Region: Kern, Tulare counties

The entire area is 270 miles from north to south. In terms of the area it covers, the Valley Air District is the largest air pollution control district in the nation.

The Valley has high levels of air pollution for three reasons:

- **Geography.** The Valley is shaped like a big pot or bathtub with mountains forming the sides. The air pollution settles on the Valley floor and gets trapped.
- **Climate.** In the summer, hot temperatures cause pollutants to combine to form smog. In the winter, very little rainfall and very little wind keep particulate matter in the air.
- **Growing Population.** More people in the Valley means more cars on the road and more equipment, products, and activities that cause air pollution.



Activity 2: Air Pollution Log

In your community, what **SIGNS** of air pollution do you see and smell?
What **SOURCES** of that air pollution can you find?
What are some **EFFECTS** of air pollution that you notice?

SIGNS of Air Pollution

Example: *Smoke in the air*

SOURCES of Air Pollution

Example: *Exhaust from car's tailpipe*

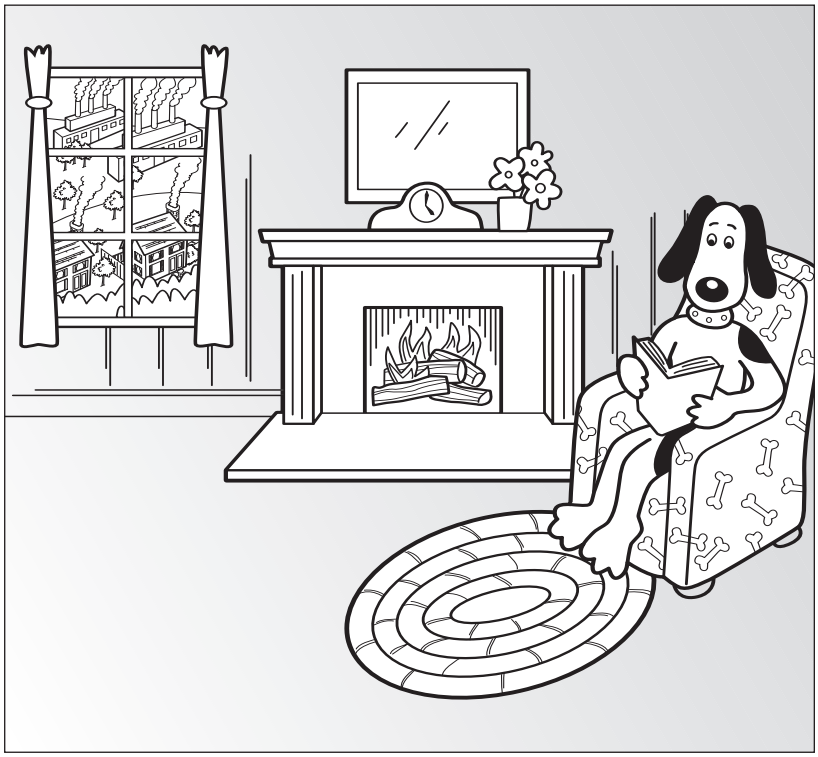
EFFECTS of Air Pollution

Example: *People's eyes watering*

Activity 3: Major Pollutants

In the San Joaquin Valley, our air quality does not meet standards set by both the federal or state governments for two pollutants:

- particulate matter (PM)
- ozone (O_3)



Particulate Matter

Many small particles of solid or liquid matter are carried in our air. Some we can see; others are so tiny that we can't easily see them. Some occur naturally; others are created by people. Particulate matter comes from:

- soot and smoke from chimneys and smokestacks
- ash and gases from burning wood
- exhaust from vehicles, especially diesel engines
- dust from construction and mining
- dust from roads and fields
- rubber from tires
- emissions from factories and power plants

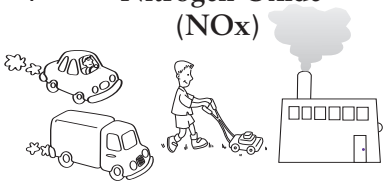
Particulate matter is more of a problem during the winter months when people like to use their fireplaces and wood stoves. And when there is fog, the unhealthy particles can stay in the air at ground level long after the fires go out.

Ozone

Ozone is an odorless, colorless gas. It doesn't come out of a smokestack or tailpipe, but ozone is created by the pollutants that do come out of tailpipes and smokestacks, as well as other sources.

Here's how it works. In the air, combine...

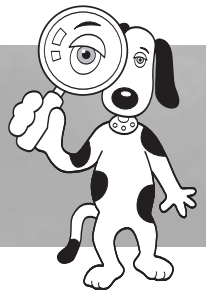
Hot Sunshine + **Nitrogen Oxide (NOx)** + **Volatile Organic Compounds (VOCs)** = **OZONE (O_3)**



(emitted from vehicles, equipment, and buildings that burn fossil fuels)

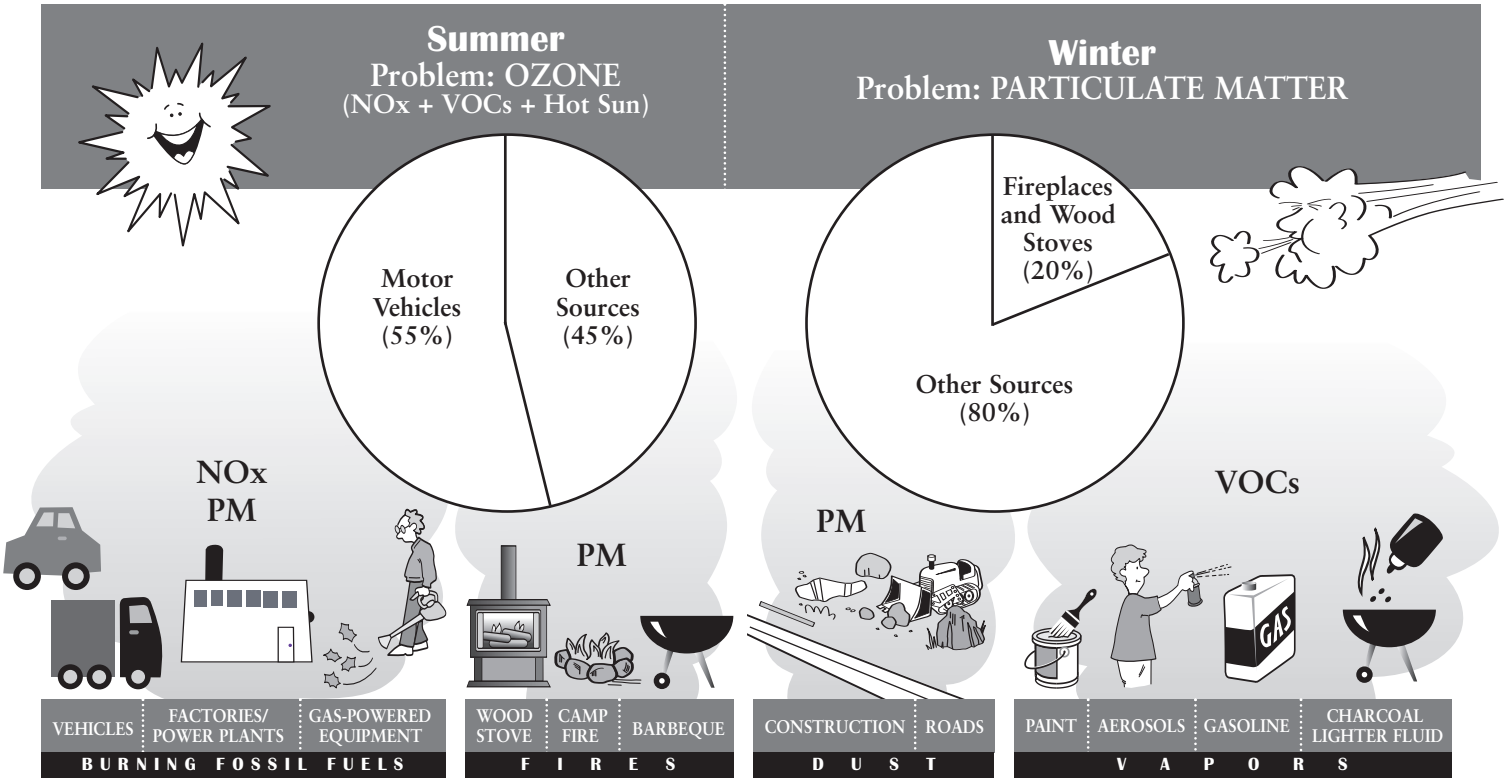
(from the vapors of gasoline, lighter fluid, paint, cleaners, and other chemicals)

When the sun is bright and hot, the pollutants combine to form ozone. The main ingredient in smog, ozone, can become dangerous during the summer.



Activity 4: Pie in the Sky

The illustration below shows the major sources of air pollution in the San Joaquin Valley in the summer and in the winter. Color each portion in the air pollution pies a different color and then answer the questions below.



1. What is the biggest air pollution problem in the summer?_____

2. What is the biggest air pollution problem in the winter?_____

3. How is ozone formed?_____

4. What is responsible for most of the emissions that create ozone?_____

5. Besides cars and trucks, what else burns gasoline?_____

6. Where do VOCs come from?_____

7. Why is particulate matter such a problem in the winter?_____

8. Besides burning wood, where else does particulate matter come from?_____

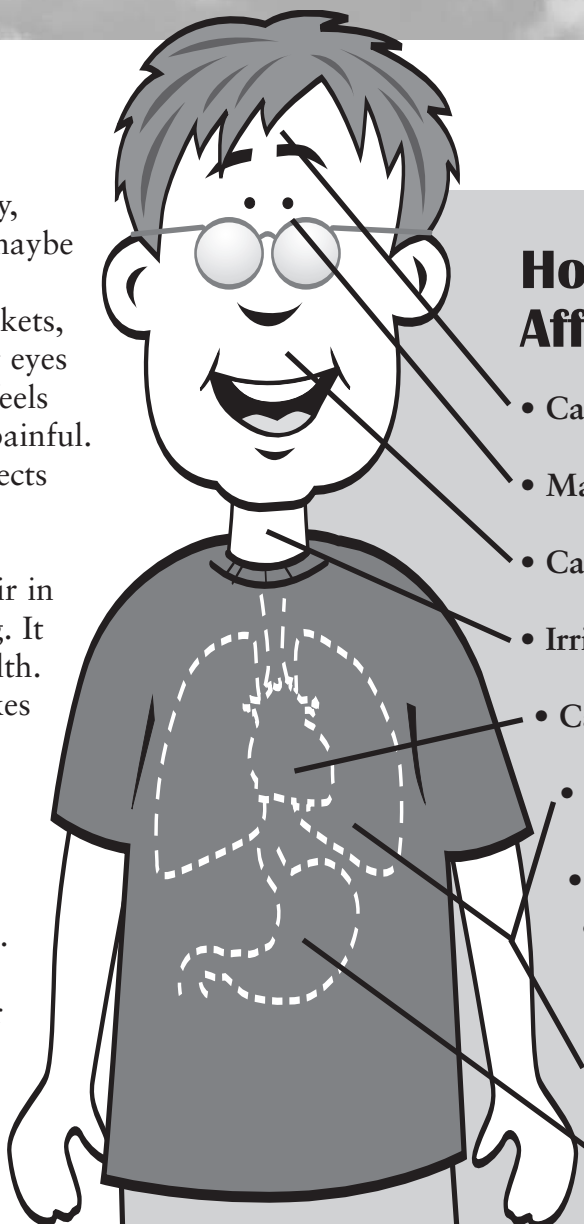
_____

Activity 5: Effects of Air Pollution

It's a bright sunny summer day, and you're outside playing—maybe rollerblading, skate boarding, riding your bike, shooting baskets, or chasing your dog. But your eyes are watering, and your chest feels tight. Taking deep breaths is painful. You are suffering from the effects of air pollution.

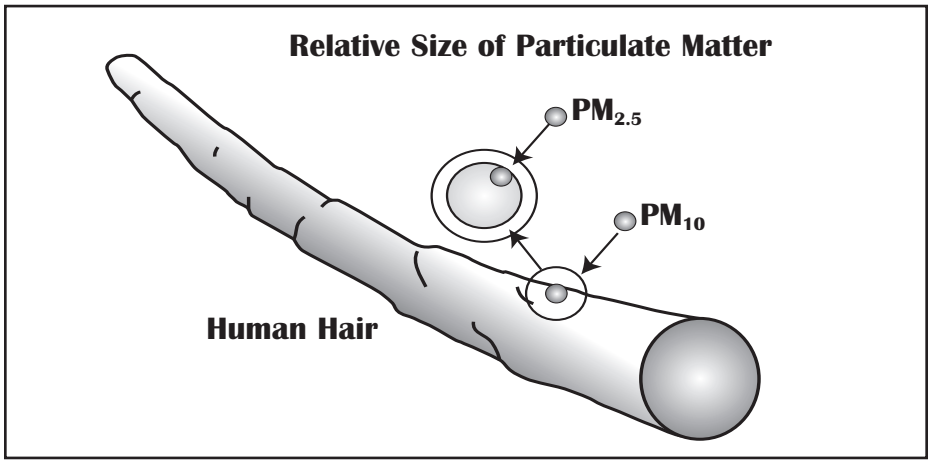
The ozone that forms in the air in the summer isn't just irritating. It is actually harmful to our health. It damages our lungs and makes diseases such as asthma and bronchitis worse.

Particulate matter also causes health problems, especially during fall and winter months. Large particles get trapped in the mucous membranes in our noses or throats or bronchial tubes. We often sneeze or cough them out. But tiny particles get past our bodies' filtering system. Particles less than 10 microns—which is about one-seventh the width of a strand of human hair—are called PM10. PM10 includes a harmful mix of soot, chemicals, dust, salts, dirt, metals, smoke, and toxins. These particles, as well as even smaller particles known as PM2.5, enter our lungs, where they can do permanent damage.

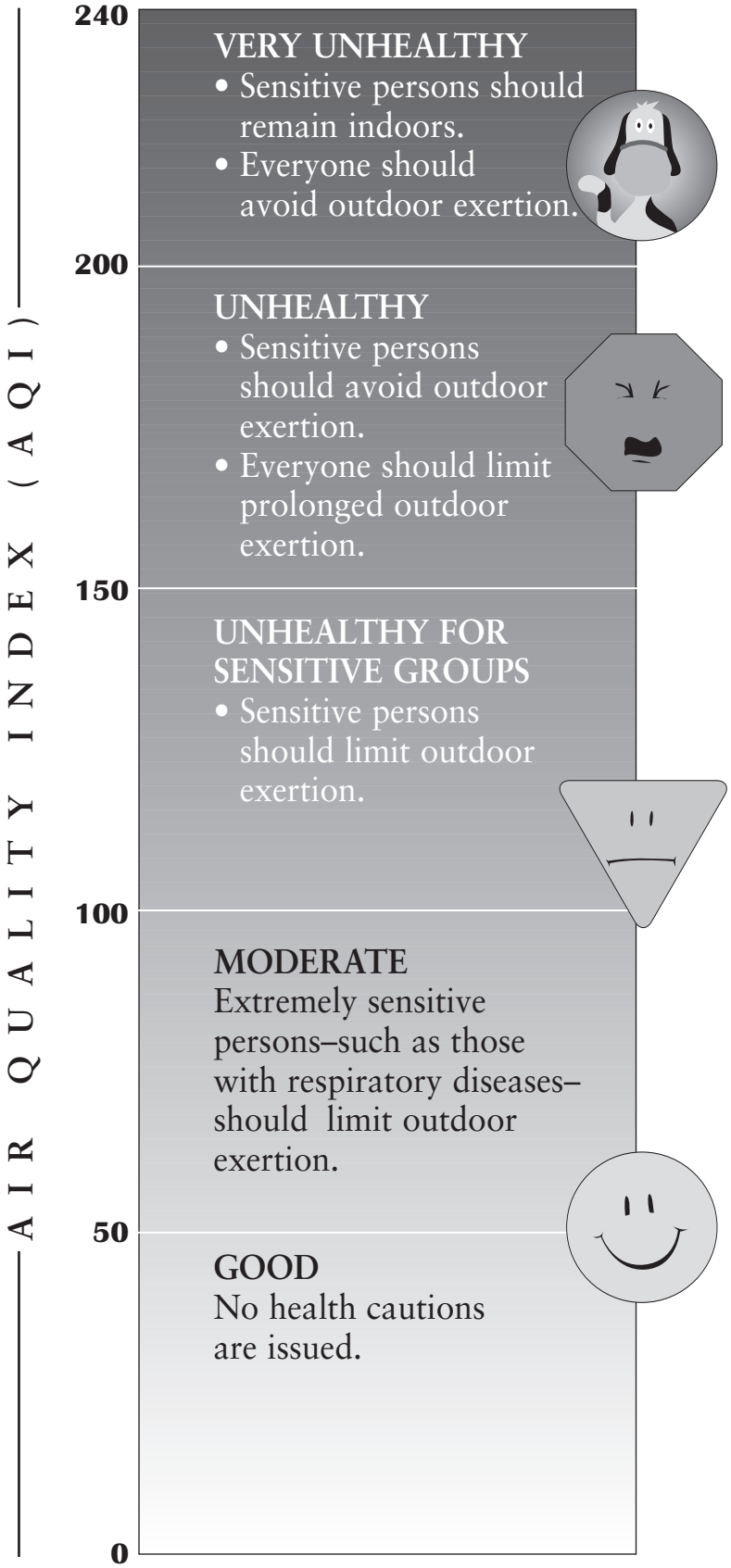


How Air Pollution Affects the Body

- Causes headaches and dizziness
- Makes eyes sting and water
- Causes coughing and sneezing
- Irritates and dries throat
- Can trigger heart attacks
- Causes chest tightness and pain
- Causes shortness of breath
- Increases asthma, bronchitis, and other respiratory diseases
- Decreases lung function
- Causes nausea



Activity 5: Effects of Air Pollution

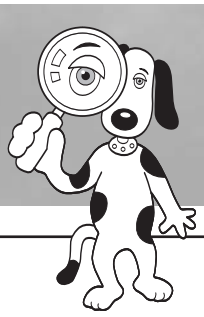


Air pollution isn't just harmful to people. It also affects the health of our pets and farm animals.

Air pollution creates other problems. Too much particulate matter in the air reduces visibility. And both ozone and particulate matter affect non-living things by:

- fading and peeling paint
- corroding plaster
- damaging fabrics
- cracking rubber
- rusting iron or steel

The quality of our air is monitored every day. When the amount of pollutants in the air is forecast to reach a certain level, health notices are issued. On these days, people are advised to stay inside and to cut back on exercise and activities, especially outdoors.



Activity 6: Pollution Problems

Describe the pollutants below and list their causes and effects.

Ozone

What does it look like and smell like?

What causes it?

What problems does it cause?

Particulate Matter

What does it look like and smell like?

What causes it?

What problems does it cause?

Activity 7: Levels of Air Pollution

Tracking the AQI

COUNTY_____MONTH_____

AIR QUALITY INDEX (AQI)

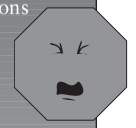
240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

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 29 30

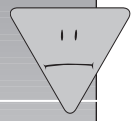
DAYS OF THE MONTH

VERY UNHEALTHY
Sensitive persons should remain indoors. Everyone should avoid outdoor exertion.

UNHEALTHY
Sensitive persons should avoid outdoor exertion. Everyone should limit prolonged outdoor exertion.



UNHEALTHY FOR SENSITIVE GROUPS
Sensitive persons should limit outdoor exertion.



MODERATE
Extremely sensitive persons–such as those with respiratory diseases–should limit outdoor exertion.

GOOD
No health cautions are issued.

Activity 7: Levels of Air Pollution

COUNTY__________________MONTH__________

Date	AQI Level	Tempera-ture	Weather Conditions	Health Notice?	Other (Spare the Air day? Check Before You Burn issued?)
Sample	175	102	No clouds	No	Spare the Air day