Understanding Air Pollution in Oklahoma

DENISE HARKINS 95/96

The Oklahoma Department of Environmental Quality is dedicated to providing quality service to the people of Oklahoma through comprehensive environmental protection and management programs. These programs are designed to assist the people of the state in sustaining a clean, sound environment and in preserving and enhancing our natural surroundings where Oklahomans, today and tomorrow, may prosper and enjoy life.

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OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY

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Steve Thompson • Executive Director

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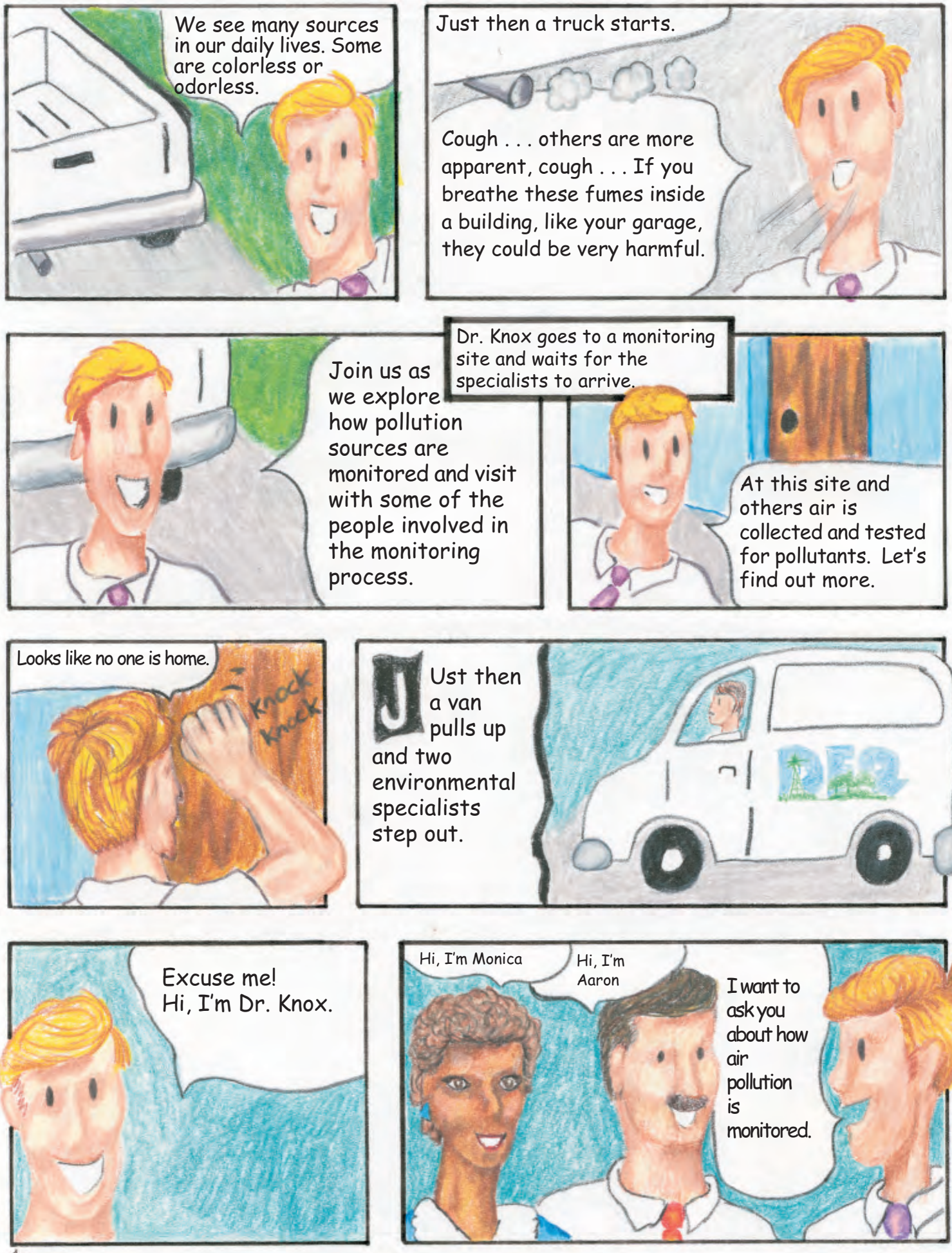
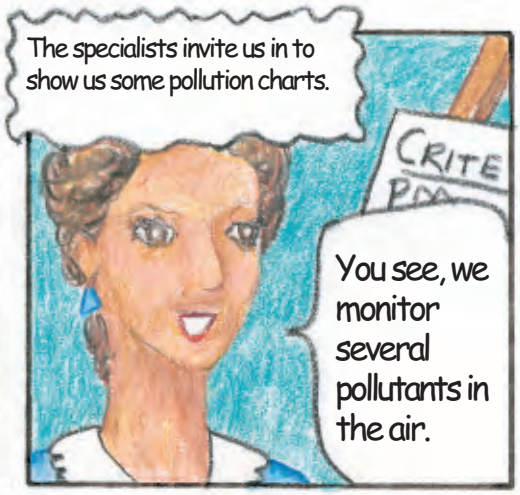
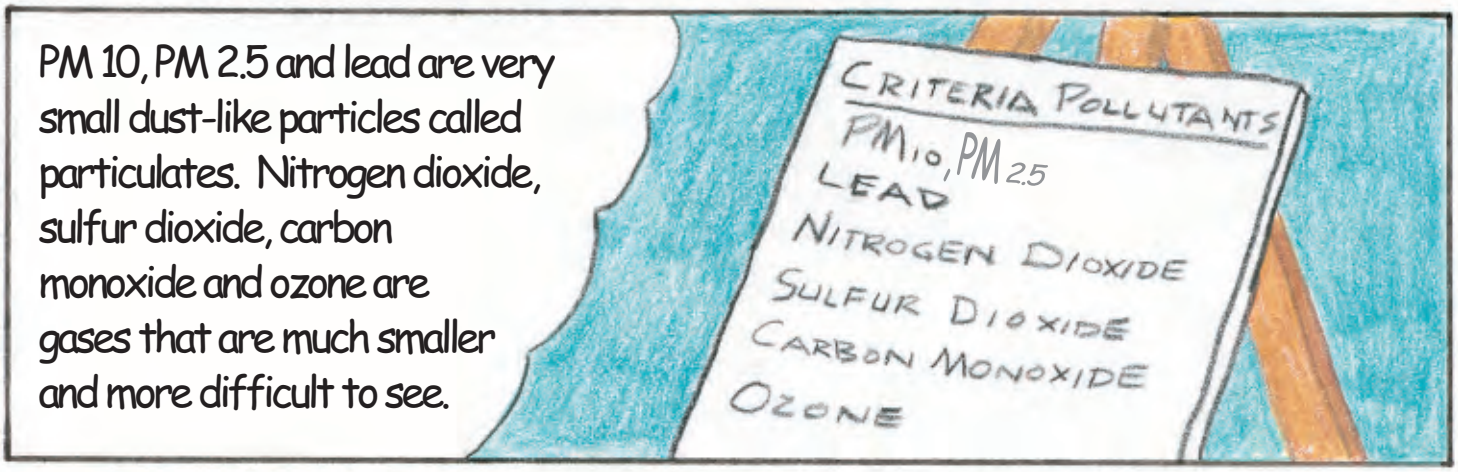
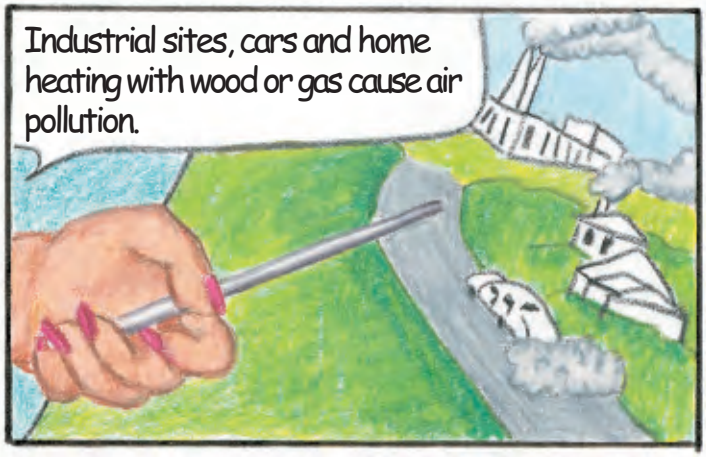

We see many sources in our daily lives. Some are colorless or odorless.
Just then a truck starts.
Cough . . . others are more apparent, cough . . . If you breathe these fumes inside a building, like your garage, they could be very harmful.
Join us as we explore how pollution sources are monitored and visit with some of the people involved in the monitoring process.
Dr. Knox goes to a monitoring site and waits for the specialists to arrive.
At this site and others air is collected and tested for pollutants. Let's find out more.
Looks like no one is home.
Knock Knock
Just then a van pulls up and two environmental specialists step out.
Excuse me! Hi, I'm Dr. Knox.
Hi, I'm Monica
Hi, I'm Aaron
I want to ask you about how air pollution is monitored.

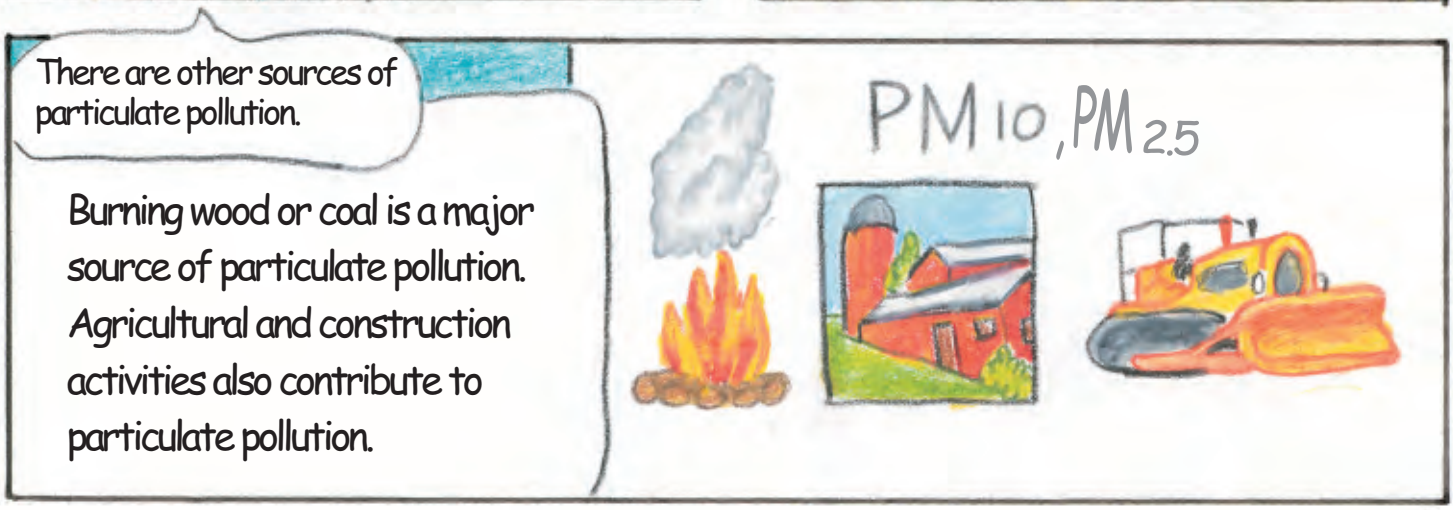
You've come to the right place. We would be glad to discuss it.

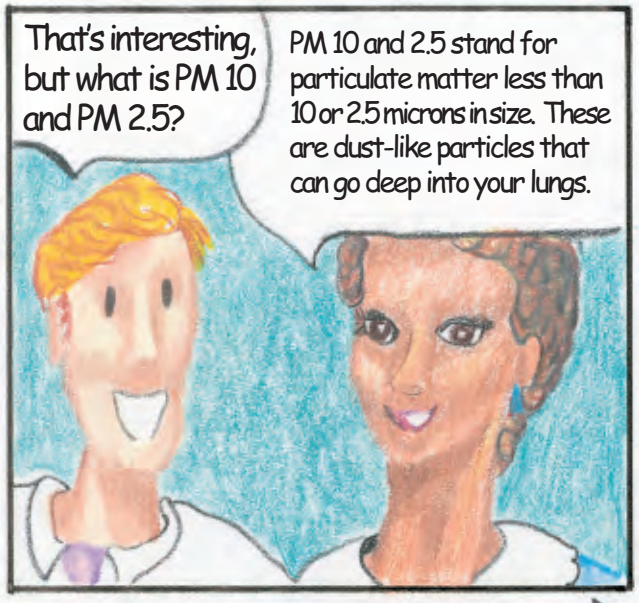

The specialists invite us in to show us some pollution charts.
You see, we monitor several pollutants in the air.

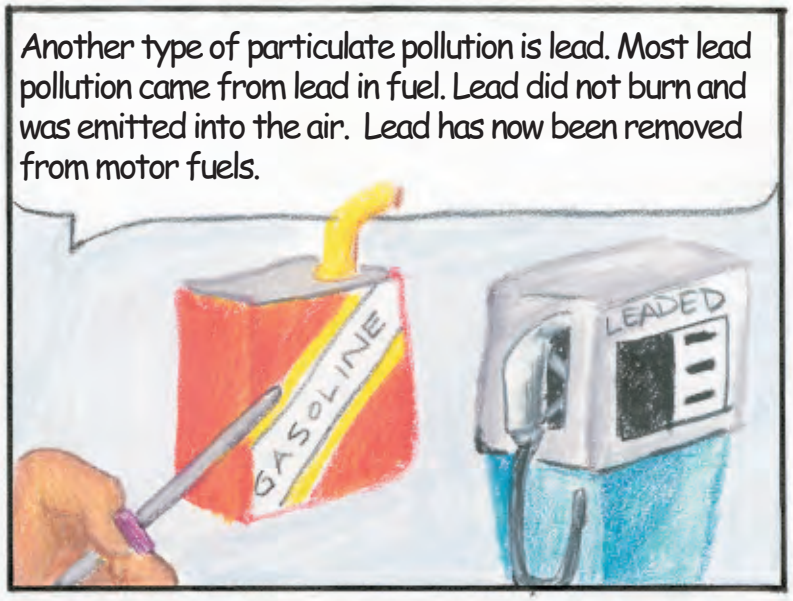

PM 10, PM 2.5 and lead are very small dust-like particles called particulates. Nitrogen dioxide, sulfur dioxide, carbon monoxide and ozone are gases that are much smaller and more difficult to see.
CRITERIA POLLUTANTS
PM10, PM2.5
LEAD
NITROGEN DIOXIDE
SULFUR DIOXIDE
CARBON MONOXIDE
OZONE

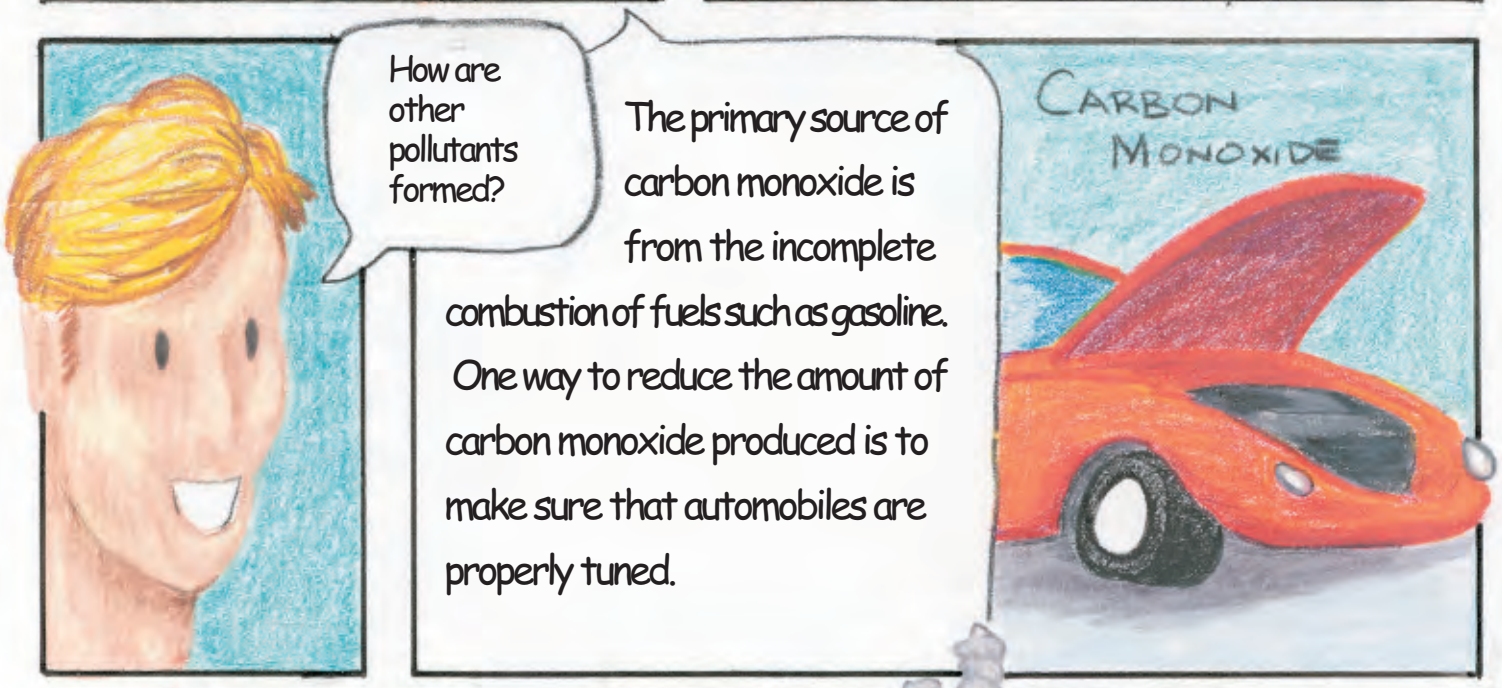
We have many instruments that analyze pollutants. Most air pollutants come from burning fuel.

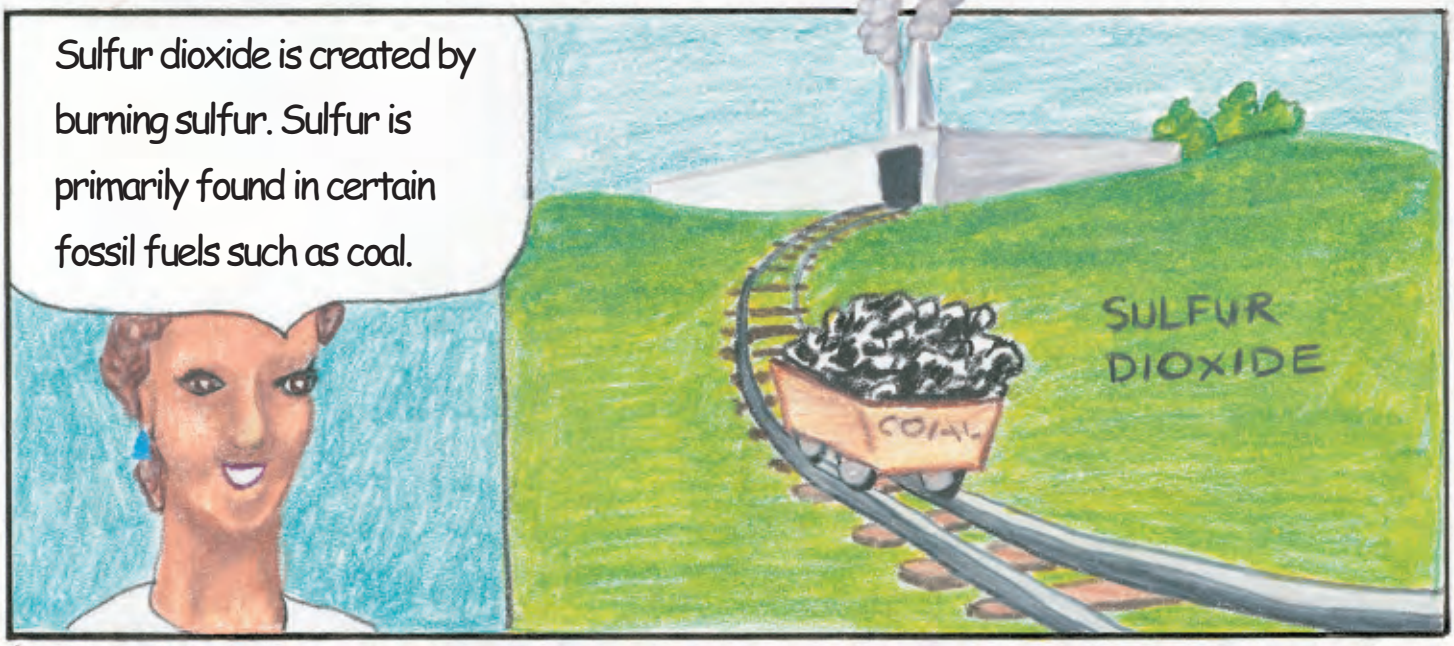

Industrial sites, cars and home heating with wood or gas cause air pollution.

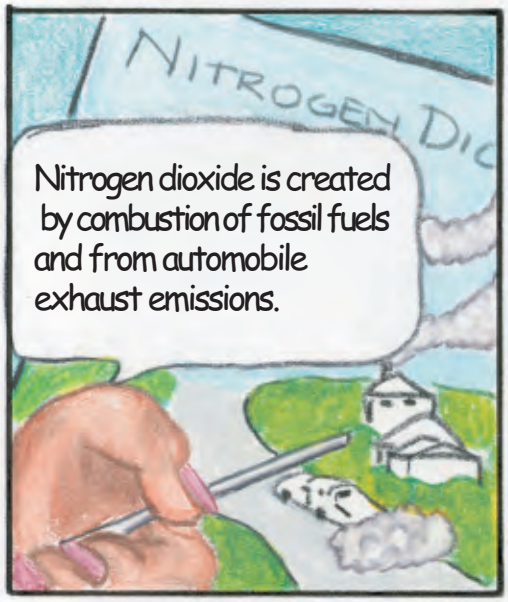

There are other sources of particulate pollution.
Burning wood or coal is a major source of particulate pollution. Agricultural and construction activities also contribute to particulate pollution.
PM10, PM2.5

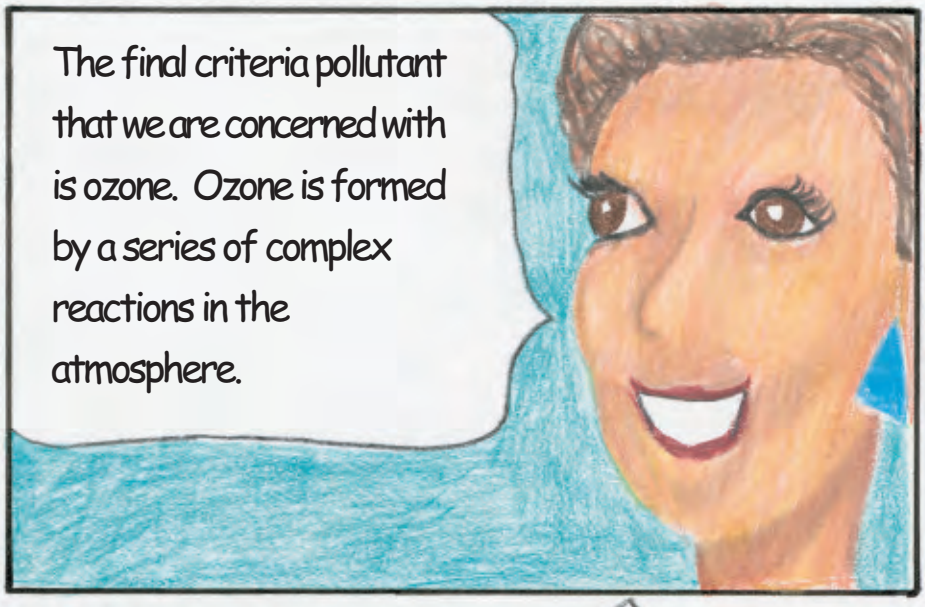

That's interesting, but what is PM 10 and PM 2.5?
PM 10 and 2.5 stand for particulate matter less than 10 or 2.5 microns in size. These are dust-like particles that can go deep into your lungs.

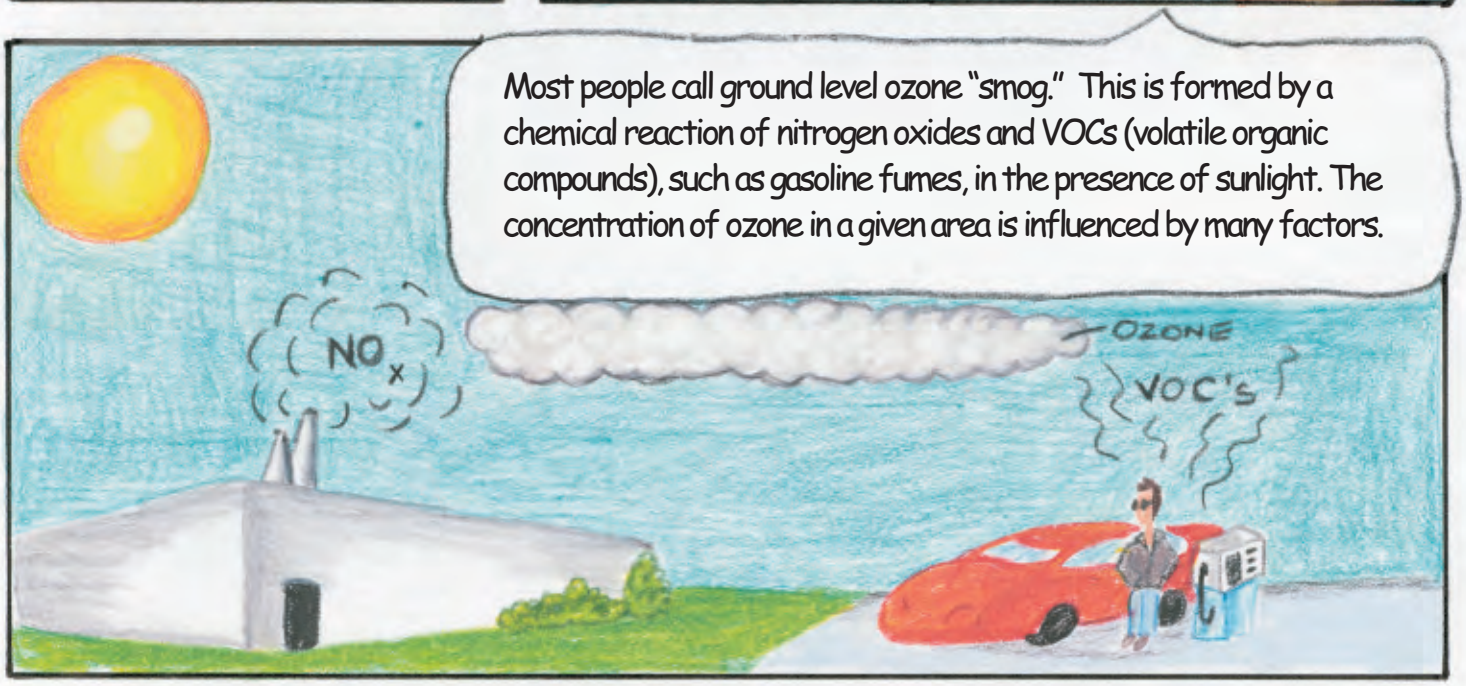

Another type of particulate pollution is lead. Most lead pollution came from lead in fuel. Lead did not burn and was emitted into the air. Lead has now been removed from motor fuels.
GASOLINE
LEADED

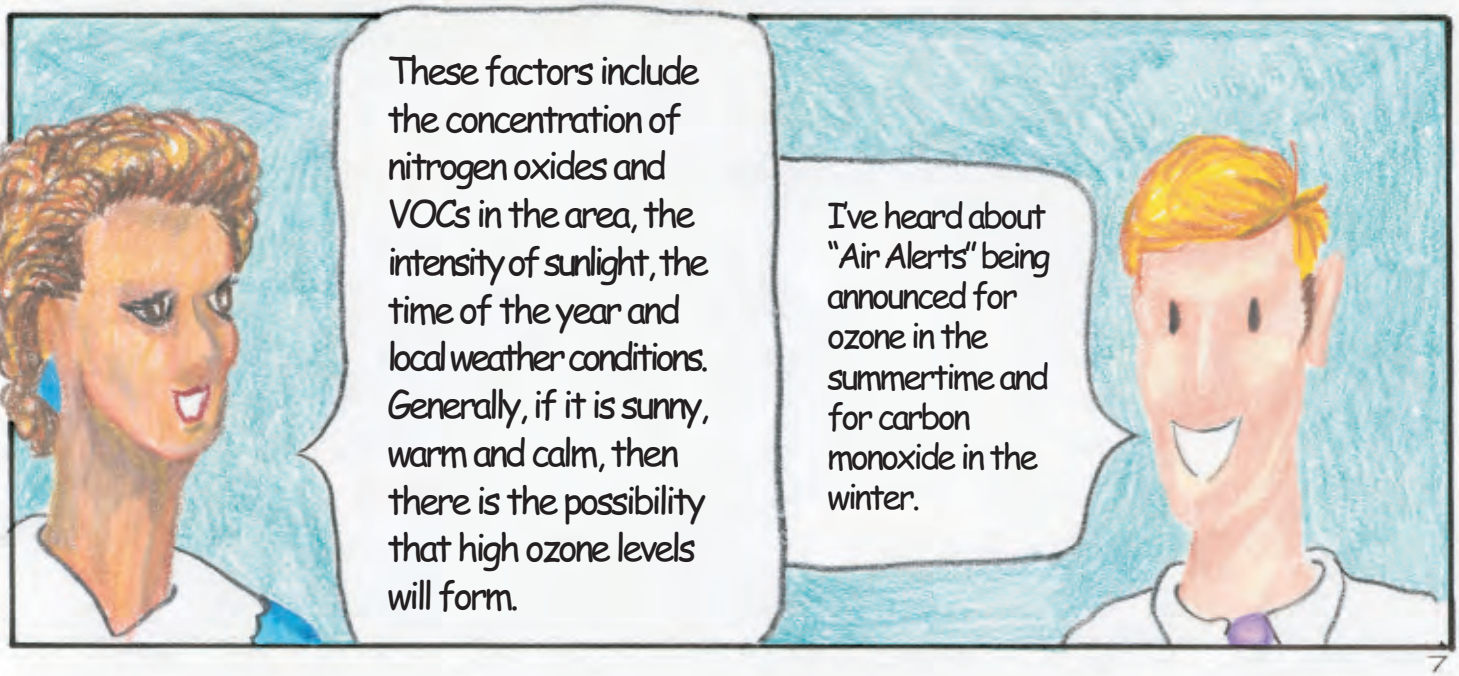

How are other pollutants formed?
The primary source of carbon monoxide is from the incomplete combustion of fuels such as gasoline. One way to reduce the amount of carbon monoxide produced is to make sure that automobiles are properly tuned.
CARBON MONOXIDE


Sulfur dioxide is created by burning sulfur. Sulfur is primarily found in certain fossil fuels such as coal.
COAL
SULFUR DIOXIDE


NITROGEN DIO
Nitrogen dioxide is created by combustion of fossil fuels and from automobile exhaust emissions.


The final criteria pollutant that we are concerned with is ozone. Ozone is formed by a series of complex reactions in the atmosphere.


Most people call ground level ozone "smog." This is formed by a chemical reaction of nitrogen oxides and VOCs (volatile organic compounds), such as gasoline fumes, in the presence of sunlight. The concentration of ozone in a given area is influenced by many factors.
NOx
OZONE
VOC's


These factors include the concentration of nitrogen oxides and VOCs in the area, the intensity of sunlight, the time of the year and local weather conditions. Generally, if it is sunny, warm and calm, then there is the possibility that high ozone levels will form.
I've heard about "Air Alerts" being announced for ozone in the summertime and for carbon monoxide in the winter.

How do these "alerts" relate to high pollution levels?
Air pollution alerts are announced on days when the formation of increased ozone is predicted. Air alerts are also announced when high levels of carbon monoxide are predicted.
The metropolitan areas of Oklahoma City and Tulsa experience ozone problems each summer, and carbon monoxide is a potential problem for each metro area in the winter.
Let's clear the air.
OZONE ALERT
LET'S CLEAR THE AIR
What can we do to help on "Alert" days?
We can Avoid activities that cause air pollution.

This can be done by carpooling to work, riding the bus and avoiding unnecessary trips in your car.

ATTENTION!

TOMORROW IS AN

AIR ALERT DAY

YOU CAN HELP

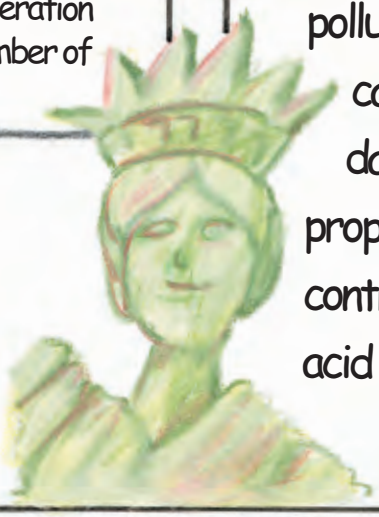
- CARPOOL TO WORK
- ELIMINATE UNNECESSARY TRIPS
- AVOID FUELING YOUR VEHICLE OR USING PRODUCTS CONTAINING HYDROCARBONS
- SKIP MOWING YOUR LAWN
- RIDE THE BUS WHEN POSSIBLE

Small gasoline engines are even worse at emitting pollutants, so avoid mowing your lawn. You should also wait until evening to fill up your car because of the fumes emitted while pumping gas.

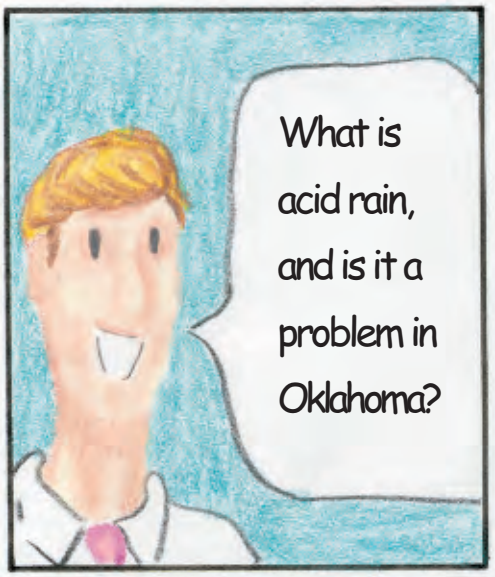
These activities are okay on non-alert days, but you shouldn't do them on alert days when pollution levels are more likely to rise.

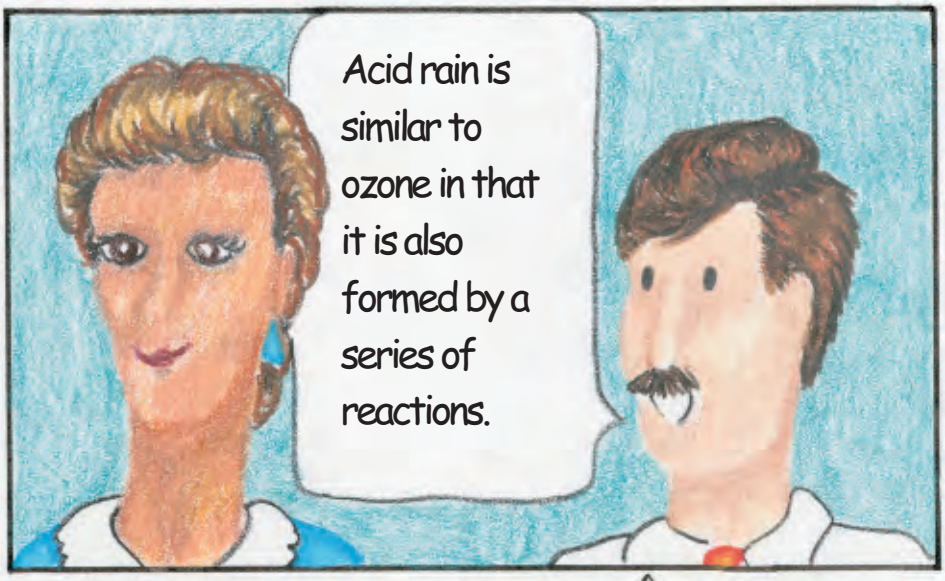
How do ozone and other pollutants affect us? Why should we be concerned?

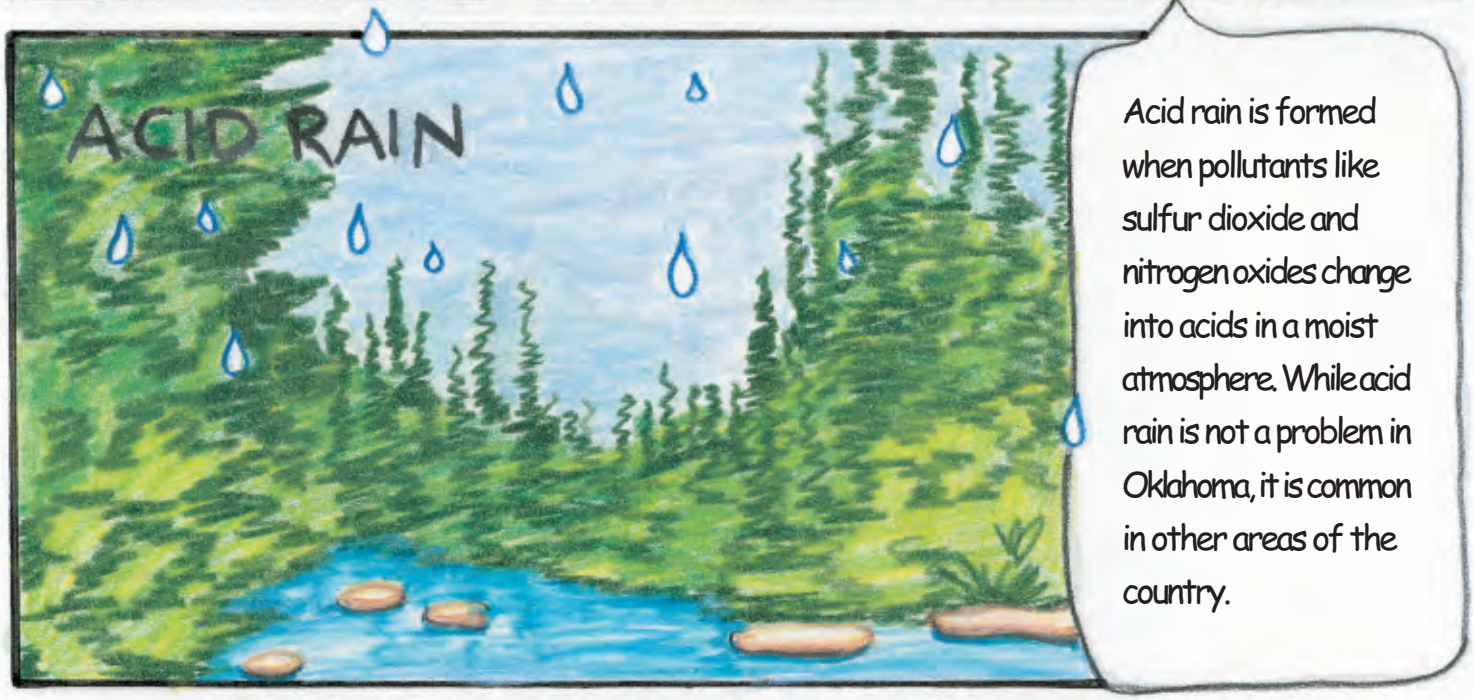
The air pollution we breathe into our lungs has a direct affect on our health. Extremely small particles and gases can affect the operation of our lungs. Ozone can affect the number of days you feel sick.

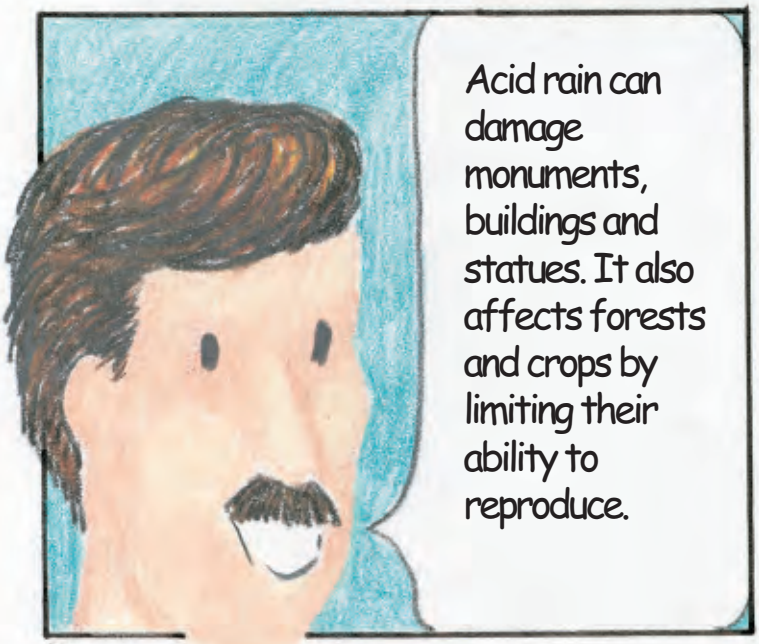


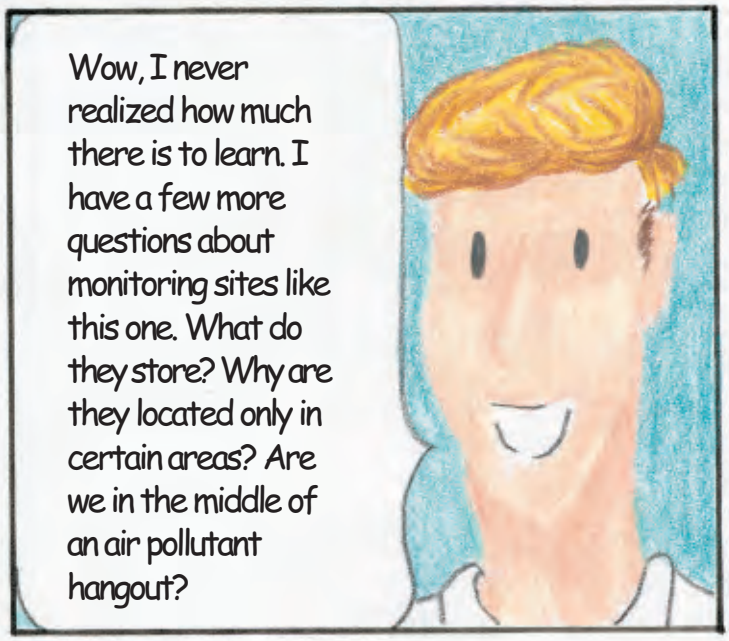
Also, air pollution can cause damage to property by contributing to acid rain.

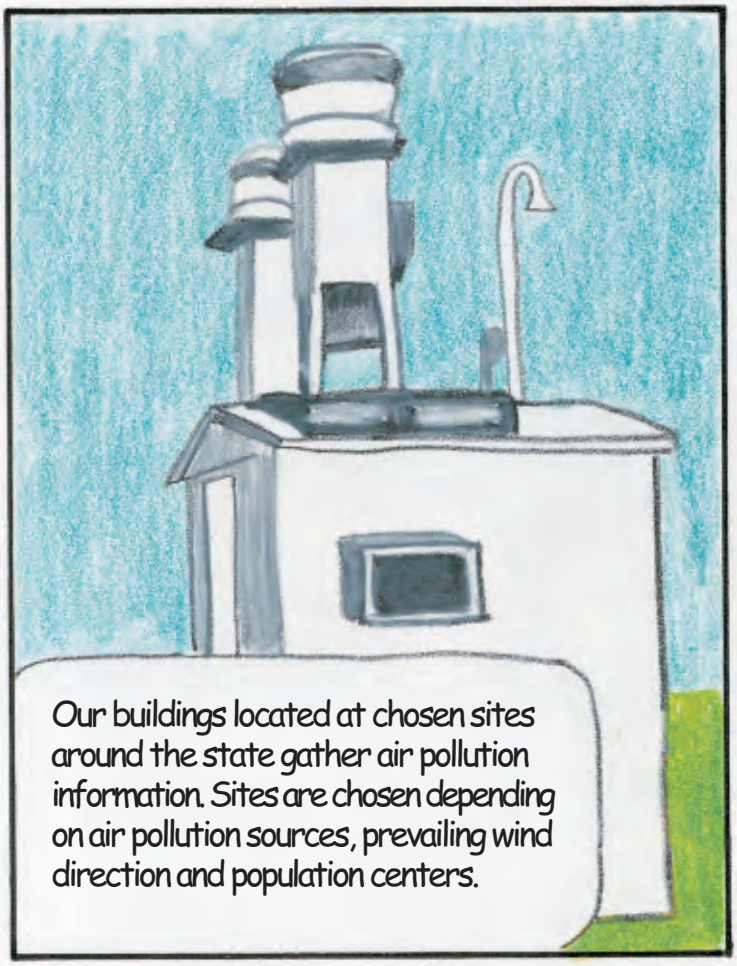

What is acid rain, and is it a problem in Oklahoma?

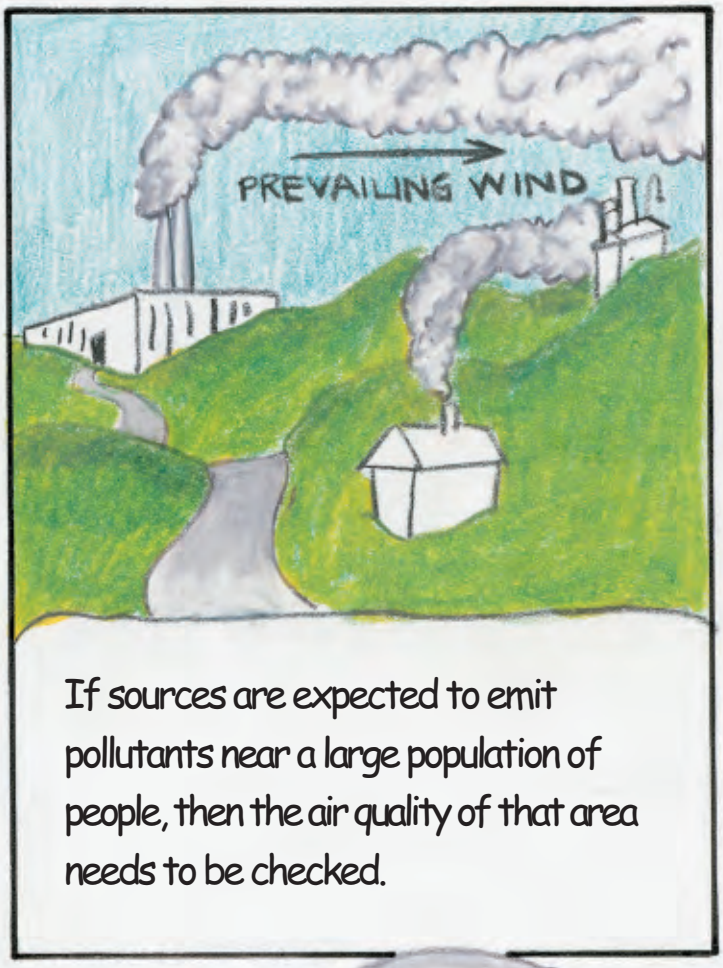

Acid rain is similar to ozone in that it is also formed by a series of reactions.

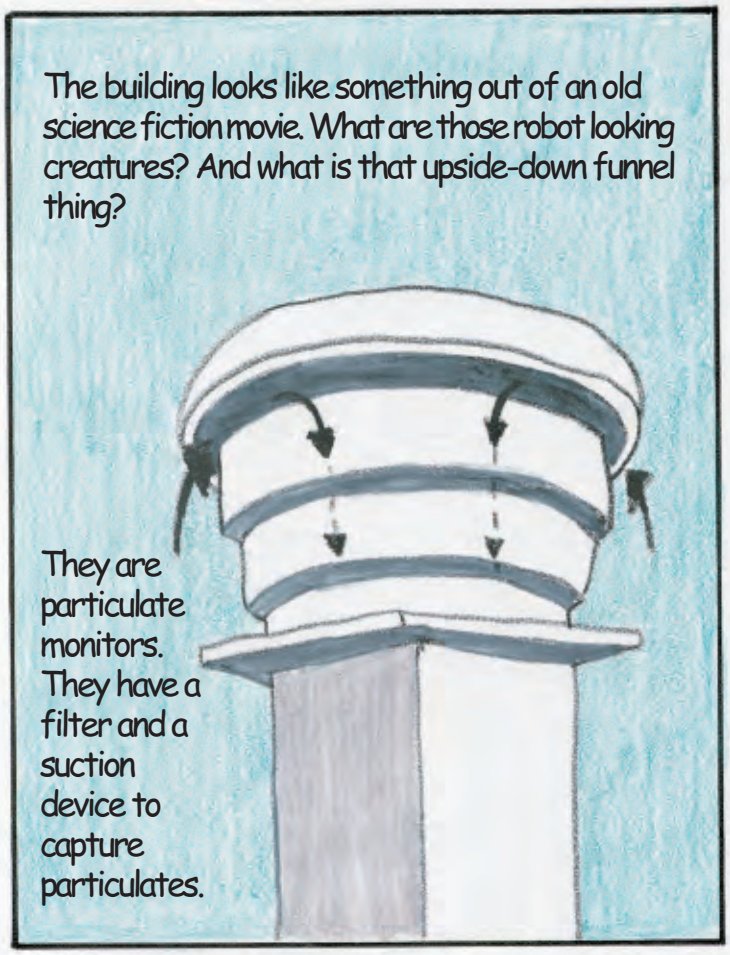

ACID RAIN
Acid rain is formed when pollutants like sulfur dioxide and nitrogen oxides change into acids in a moist atmosphere. While acid rain is not a problem in Oklahoma, it is common in other areas of the country.


Acid rain can damage monuments, buildings and statues. It also affects forests and crops by limiting their ability to reproduce.

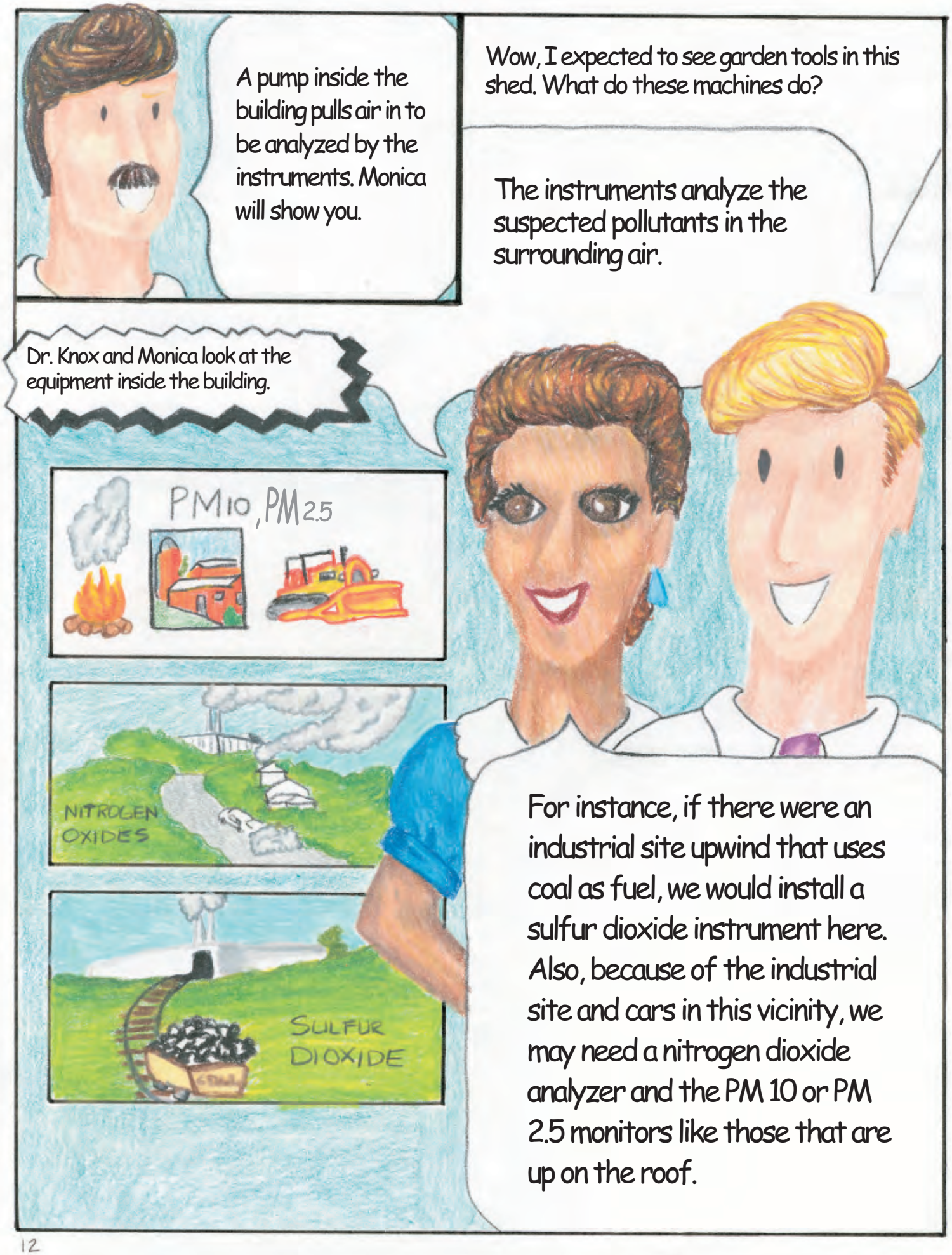

Wow, I never realized how much there is to learn. I have a few more questions about monitoring sites like this one. What do they store? Why are they located only in certain areas? Are we in the middle of an air pollutant hangout?


Our buildings located at chosen sites around the state gather air pollution information. Sites are chosen depending on air pollution sources, prevailing wind direction and population centers.


PREVAILING WIND
If sources are expected to emit pollutants near a large population of people, then the air quality of that area needs to be checked.

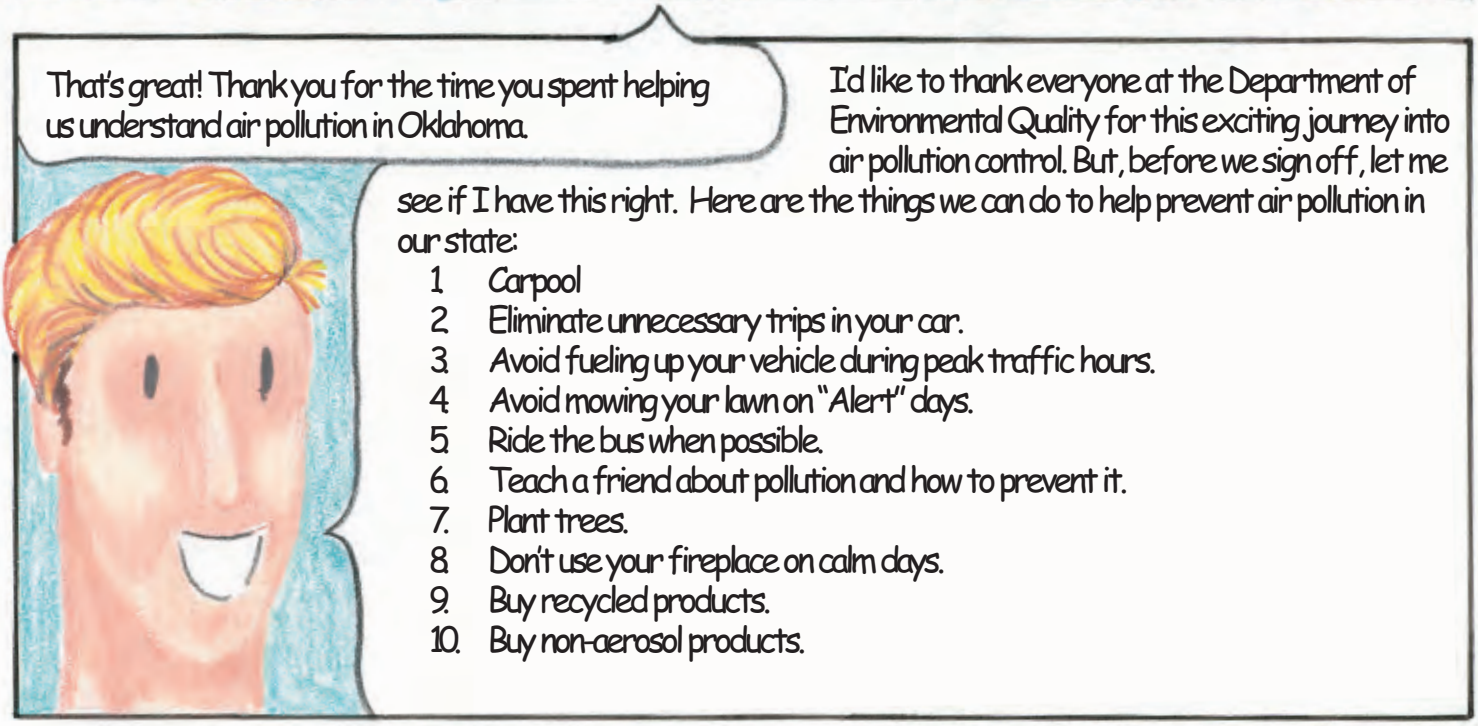

The building looks like something out of an old science fiction movie. What are those robot looking creatures? And what is that upside-down funnel thing?
They are particulate monitors. They have a filter and a suction device to capture particulates.

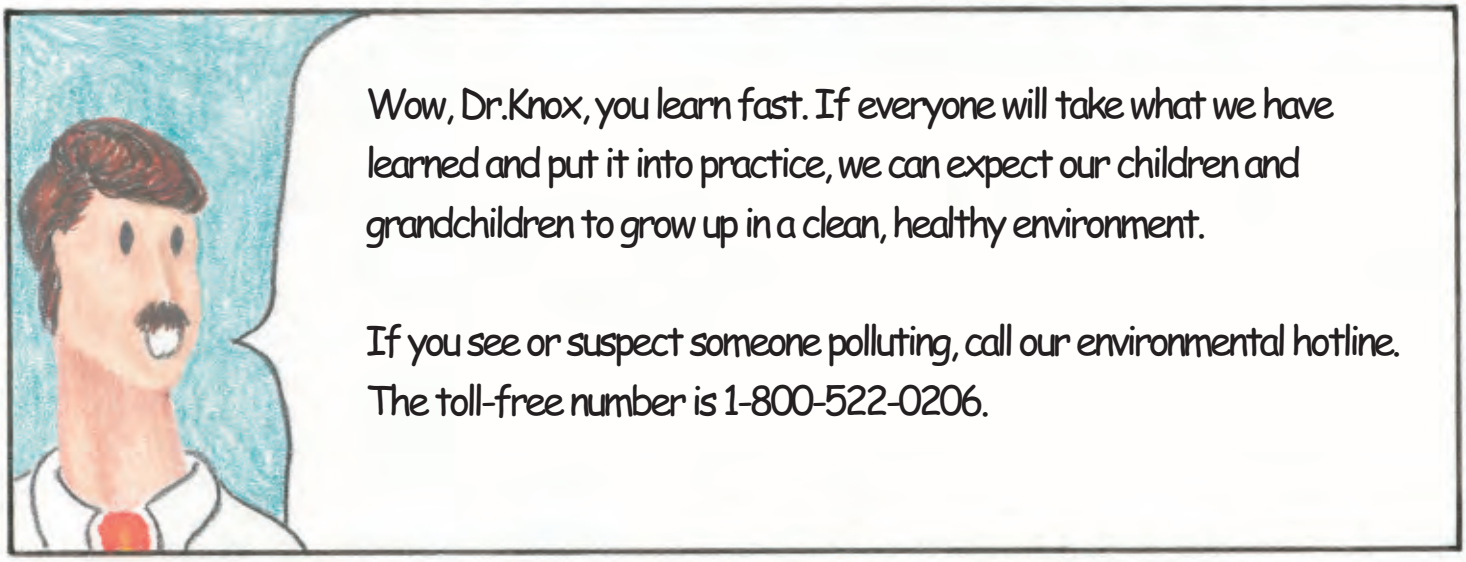
The upside-down funnel is an intake manifold that captures gaseous pollutants.


A pump inside the building pulls air in to be analyzed by the instruments. Monica will show you.
Wow, I expected to see garden tools in this shed. What do these machines do?
The instruments analyze the suspected pollutants in the surrounding air.
Dr. Knox and Monica look at the equipment inside the building.
PM10, PM2.5
NITROGEN OXIDES
SULFUR DIOXIDE
For instance, if there were an industrial site upwind that uses coal as fuel, we would install a sulfur dioxide instrument here. Also, because of the industrial site and cars in this vicinity, we may need a nitrogen dioxide analyzer and the PM 10 or PM 2.5 monitors like those that are up on the roof.

Different sites have different instruments depending upon their needs.

We visit the site routinely to collect the sample filters and see if the instruments are working properly.
That's fascinating!
So, are you like an environmental guardian?
Yes, we like to be sure that the air quality in Oklahoma is safe for everyone to breathe.

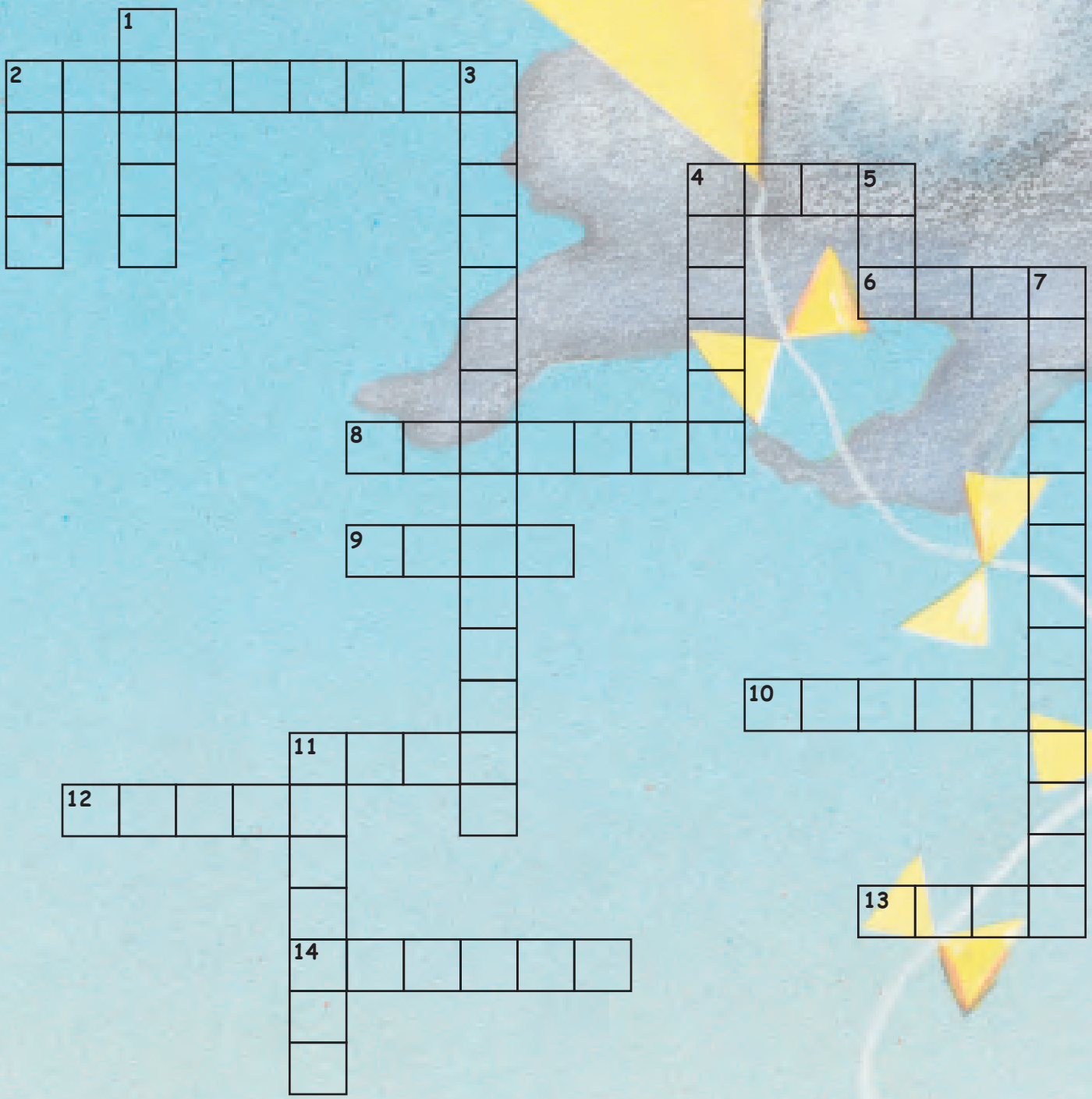

That's great! Thank you for the time you spent helping us understand air pollution in Oklahoma.
I'd like to thank everyone at the Department of Environmental Quality for this exciting journey into air pollution control. But, before we sign off, let me see if I have this right. Here are the things we can do to help prevent air pollution in our state:
1 Carpool
2 Eliminate unnecessary trips in your car.
3 Avoid fueling up your vehicle during peak traffic hours.
4 Avoid mowing your lawn on "Alert" days.
5 Ride the bus when possible.
6 Teach a friend about pollution and how to prevent it.
7 Plant trees.
8 Don't use your fireplace on calm days.
9 Buy recycled products.
10 Buy non-aerosol products.



Wow, Dr.Knox, you learn fast. If everyone will take what we have learned and put it into practice, we can expect our children and grandchildren to grow up in a clean, healthy environment.

If you see or suspect someone polluting, call our environmental hotline. The toll-free number is 1-800-522-0206.

Pollution Puzzle



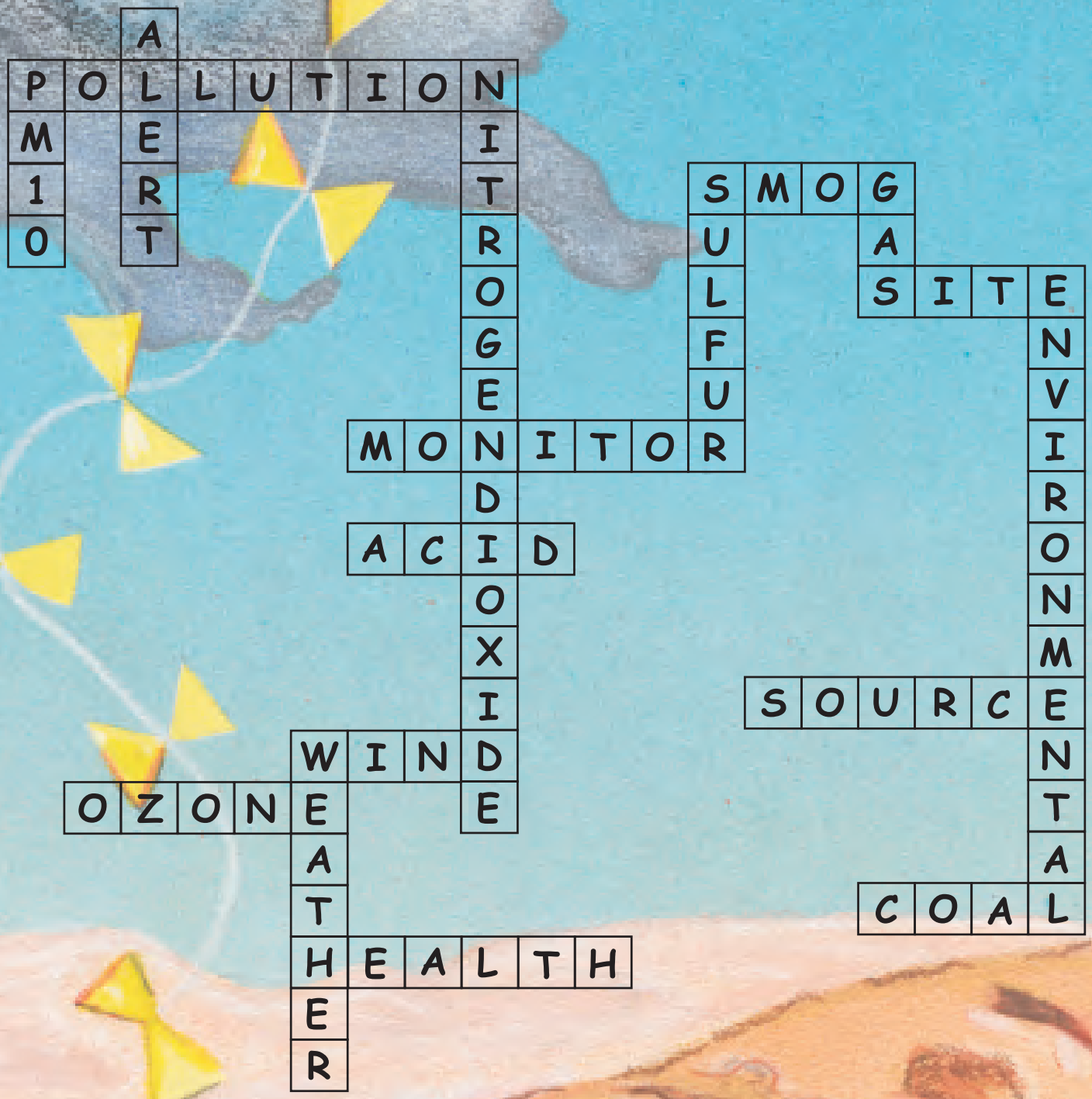
ACROSS

2. Air _____
4. Ground level ozone
6. Location of air pollution instruments
8. This instrument uses a suction device to capture particulates on a filter (Hint: a particulate _____)
9. _____ rain
10. Cars are a _____ of air pollution
11. Disperses air pollutants
11. Disperses air pollutants
13. A fossil fuel
14. Air pollution affects our _____

DOWN

1. Ozone _____
2. Dangerous particulate matter
3. Created by combustion of fossil fuel and motor vehicle emissions
4. Burning _____ creates sulfur dioxide
5. Air pollutants are solid particles or _____
7. Department of _____ Quality
11. _____ conditions affect ozone levels

Answers



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