STUDENT RESOURCE

One Breath at a Time: The Play

A play about the six major air pollutants plus a few more.

Cast of Characters

The number of characters and some suggestions for props or costumes are in parentheses. It would be helpful if each character had a name tag. Pictures of atoms and molecules are available on the MEECS Air Quality CD.

Connie Lung, reporter (1; props: microphone, notebook; costume: breathing mask)

Harry Wheezer, reporter (1; props: microphone, notebook; costume: breathing mask)

The Particles (3; prop: dirt; costume: brown or black shirts, dirt on face)

Carbon Monoxide (1; prop: carbon monoxide detector; costume: sneakers, hat, trench coat, and sunglasses)

Radon (1; prop: radioactivity placard; costume: white sheet)

The Air Toxics (3; props: cans, household cleaners; costume: hats)

Sulfur Dioxide (1; props: water gun or spray bottle filled with water, umbrella; costume: yellow and white streamers attached to clothing)

Nitrogen Oxides (NO_X) (3; props: toy cars or trucks, umbrella; costume: each NO_X can wear one of the letters in "NO_X")

Bad Ozone (1; prop: sign saying "O_3"; costume: sunglasses, sophisticated hat or clothing for a "big city look")

Good Ozone (1; prop: sign saying "O_3"; costume: sunglasses and light-colored clothing)

Chlorofluorocarbons (CFCs) (2; prop: spray can; costume: heavy coats and jackets with the initials "CFC" on the back, gloves, and scarves)

EPA Scientists (2; prop: notebooks; costume: goggles and lab coats)

Carbon Dioxide (2; props: fire extinguisher or picture of a fire extinguisher, thermometer; costume: white streamers attached to clothing)

Methane (1; prop: picture of a cow; costume: red, orange, and yellow streamers attached to clothing for fire)

Lead (1; prop: gasoline can made from cardboard; costume: something gray)

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Tips for Putting on the Play

- Have those playing pollutants make picket signs by taping large pieces of poster board to yardsticks and writing slogans on the poster board. (See slogan suggestions in description of the play's setting.)
- If some students prefer non-speaking roles, you can let them carry picket signs or be camera people filming the report. They could also take on the responsibilities of stage manager, costume designer, or set designer.
- Go over these pronunciations with the students playing the air toxics: benzene (BEN-zeen), xylene (ZI-leen), toluene (TOL-you-een). Also, VOCs = V-O-Cs, CFCs = C-F-Cs, and NO_X = NOX.
- The stage directions are in parentheses.

Setting for the Play
In front of the Environmental Protection Agency (EPA) building in Washington, DC. The air pollutants are picketing the EPA. Some carry picket signs with phrases such as "Dirty Air! Let's Keep It That Way," "Down with the Clean Air Act," and so on. TV reporters ***Connie Lung*** *and* ***Harry Wheezer*** *are at center stage. In turn, each pollutant comes over to be interviewed, while the other pollutants continue to picket in the background.*

Connie: Hi, I am Connie Lung.

Harry: And I'm Harry Wheezer. We're here at the United States Environmental Protection Agency in Washington, DC, to cover a late-breaking story. The world's worst air pollutants are picketing the EPA to protest clean-air legislation. There is a whole cast of characters here today including both outdoor and indoor pollutants.

Connie: In our special report, we'll give you the scoop on who these pollutants are, where they come from, and the ways they can hurt people and other living things.

Harry: Our first interview is with the Particles. (**Particles** walk over, carrying signs and chanting.)

Particles 1, 2, and 3 (all together):
Droplets, soot, dirt.
Who do we hurt?
Pollution's not a crime
Particles are just fine.

Connie: (coughs) So—you are the Particles.

Particle 1 (Droplet): Yeah—I'm Droplet, this is Dirt, and this is Soot. We are particle pollution and proud of it.

Harry: So you are those tiny bits of pollution that make the air look really dirty and dusty?

Particle 2 (Dirt): Yeah! We can remember the good old days when there were few pollution controls and black smoke was everywhere, especially in the cities.

Particle 3 (Soot): Most of us get into the air when stuff is burned—like gasoline in cars and trucks or coal in a power plant and even wood in a wood-burning stove! Sometimes there is so much of us around that visibility is decreased—the sky is hazy and gray.

Particle 2 (Dirt): Some of us are stirred up during construction, mining, and farming (throws some dirt in air). EPA has a fancy name for us, fu-gi-tive emissions—we are hard to control!

Particle 1 (Droplet): And we just love to get into your eyes and make them itch and make your throat hurt and get into your lungs and irr-i-tate them (**Particle 1** coughs as he/she says "irritate").

Particle 3 (Soot): Yeah, I can't even count the number of people with asthma that I've sent to the hospital gasping for breath! And then there are all of those people with other lung and heart problems that I have made sick. I bet Particles kill thousands of people each year.

Particle 1 (Droplet): (interrupts) Come on, Soot, quit bragging! We better get back to the picket line. (**Particles** return to picket line. **Carbon Monoxide** sneaks up behind Harry.)

Harry: Let's introduce the folks at home to our next pollutant, Carbon Monoxide. Hey, where did it go? Oh, there you are! Pretty sneaky, Carbon Monoxide!

Carbon Monoxide: Yeah, sneaking up on people is what I do best. I get into the air when cars and trucks burn fuel inefficiently and when your furnaces need some attention-- but you can't see or smell me.

Connie: Then how can we tell when you're around?

Carbon Monoxide: You'll find out when you inhale! I am a silent killer—just look at the people who have died when too much carbon monoxide escaped their furnaces. I can give you a bad headache and make you really tired because I block the oxygen from getting into your blood. (**Carbon Monoxide** gives an evil laugh.)

Harry: (yawns) Oh—I see what you mean. Thanks for talking with us Monoxide. (Harry yawns again.) (**Carbon Monoxide** returns to picket line.)

Radon: (Dressed as a ghost, **Radon** runs across the stage.)

Connie: What was that?

Harry: I think that was Radon.

Radon: Yup, it is me, all right. I am a radioactive gas and you don't want to be around me for very long. I lurk in basements and come in from the soil through cracks. When I decay, I produce some pretty dangerous stuff. And did you know I am the number two cause of lung cancer?

Harry: Wow! Don't you have to go somewhere… quickly? (**Radon** disappears.)

Connie: (checking notes) Next, we'd like you to meet some of the most dangerous air pollutants—The Air Toxics. These guys weren't even on the radar screen when some of the first air pollution laws were made. (**Air Toxics** walk over, carrying signs and chanting.)

Air Toxics (all together):
Bubble, bubble, toil, and trouble
Our toxic brew turns you to rubble.

Harry: You Air Toxics are made up of all kinds of chemicals. How do you get into the air?

Toxics 1: We come from just about everywhere: chemical plants, dry cleaners, oil refineries, hazardous-waste sites, power plants, paint factories...even things in your home like carpets and building materials.

Toxics 2: Yeah, and cars and trucks send a lot of us into the air too. You probably don't know it, but gasoline is loaded with air toxics.

Toxics 3: Wow, that's for sure. There's benzene, toluene, xylene—all kinds of great stuff in gas.

Toxics 1: Hey, don't forget mercury. Mercury gets into fish and then into humans. I hear Michigan doesn't want people and schools to have any mercury thermometers any more and power plants are going to have controls on mercury. What a shame for us.

Toxics 2: Well, don't forget the volatile organic compounds—that is just a fancy name for a bunch of us who evaporate easily into the air. But then, all VOCs aren't necessarily air toxics. For instance, lemons and oranges give off VOCs.

Toxics 3: That's a good point.

Connie: Scientists say you cause cancer and other kinds of diseases. What do you think of that?

Toxics 1: Well, that isn't a topic we would like to discuss.

Toxics 2: Yeah, we are here to make sure you people don't pass any more laws that might keep us out of the air.

Toxics 3: By the way, someone needs to tell Michigan to lay off us; they are really making life tough for Air Toxics.

Toxics 1: C'mon, Toxics—we're out of here! (**Air Toxics** return to picket line. **Sulfur Dioxide** walks over.)

Connie: (wrinkles nose) Wow! Our next pollutant must be really rotten. It is sulfur dioxide! (Pinches her nose and turns to face **Sulfur Dioxide**.)

Sulfur Dioxide: Hey, I'm not THAT bad. It is my cousin hydrogen sulfide who smells like rotten eggs. (laughs) heh, heh, heh…

Connie: I understand you just blew in from the Midwest.

Sulfur Dioxide: Yeah, I wouldn't miss this for all the pollution in Los Angeles, California!

Harry: I'm sure the folks at home would like to know how you get into our air.

Sulfur Dioxide: Don't they read the newspapers? I shoot out of smokestacks when power plants burn coal to make electricity. The power plants try to catch me in scrubbers. But I can escape easily if a plant doesn't have enough of that expensive pollution control equipment.

Connie: And what kinds of nasty things do you do?

Sulfur Dioxide: Nasty—that's me! (snickers) Here's the most rotten thing I do: When I get way up into the air, I get together with water in the sky, and presto! You get acid rain! (sprays water at audience) I also like to form tiny particles that make the air hazy and make it harder for some people to breathe.

Harry: Acid rain has been a real problem. It can hurt or kill fish and other animals that live in lakes and rivers, and it can damage trees. Acid rain can even eat away at statues and buildings.

Sulfur Dioxide: (proudly) That's right. Hey, I can even travel a long way to do my dirty work. If I get pumped out of a smokestack in Ohio, I can ride the wind for hundreds of miles and turn up as acid rain in Vermont!

Connie: I sure hope we can continue to get rid of you, Sulfur Dioxide!

Sulfur Dioxide: Good luck, guys! I need to do some more picketing before I catch the next wind! (**Sulfur Dioxide** returns to picket line. The **NO_x** walk over.)

Harry: (to the audience) I could certainly use a breath of fresh air after that!

NO_x (all together): Not with us around!

Connie: You must be the Nitrogen Oxides.

NO_x 1: Just call us the NO_x for short. (turns to audience) Give me an "N"!

Audience and other NO_x respond: "N"!

NO_x 2: Give me an "O"!

Audience and other NO_x respond: "O"!

NO_x 3: Give me an "X"!

Audience and other NO_x respond: "X"!

NO_x 3: What's that spell?

Audience and other NO_x: NO_x

NO_x 2: What's that mean?

Other NO_x: DIRTY AIR!

Harry: Hey, I didn't know pollutants could spell.

NO_x 1: Very funny, Harry. We are compounds made of different combinations of nitrogen and oxygen. That is how we got our name.

Connie: So, how do you NO_x pollutants get into the air?

NO_x 3: We get airborne when cars, planes, trucks, and power plants burn fuel.

Harry: And what happens once you're in the air?

NO_x 2: We can make people's lungs hurt when they breathe—especially people who already have asthma. We make that brown color in smog.

NO_x 1: And, like Sulfur Dioxide, we react with water in the air and form acid rain.

NO_x 3: But we also help make another form of pollution. And here it is—BAD OZONE! (all the NO_x start clapping as **Bad Ozone** waves and walks over. **NO_x** return to picket line.)

Bad Ozone: Well, my friends, when the NO_x pour into the air from vehicles and power plants, they get together with some other chemicals such as evaporated gasoline and solvents—the V-O-Cs. As the sun shines on all these lovely gases, it heats them up and creates me, Bad Ozone, the big O-3. And where there's ozone near the ground, there is big trouble!

Harry: I heard that smog contains a lot of ozone, which can be a big problem at ground level in the troposphere.

Bad Ozone: That's right, Harry. I can really make life miserable, especially when there is lots of sunlight, NO_x, and VOCs around to make more of us. I can make your eyes burn and your head ache and I can damage your lungs. I make it really tough for people with asthma. And check out some of the damage I do to plants—it's awesome.

Harry: But what I want to know is, if ozone is so bad, why are people worried about holes in the ozone layer? (**Good Ozone** walks in from offstage.)

Good Ozone: That low-level ozone is my rotten twin—it's just a good gas turned bad! I'm the good ozone that is found in a layer high above the Earth. I help absorb the harmful ultraviolet rays from the sun.

Bad Ozone: (nastily to Good Ozone) So what are you doing here? You are usually up in the stratosphere and out of my way.

Good Ozone: I'm here to support the clean air laws. If certain chemicals keep getting pumped into the atmosphere, I'll disappear. And without me, the harmful rays of the sun will kill some kinds of plants and cause many more people to get skin cancer and eye injuries!

Harry: But what kinds of chemicals are making you disappear?

Good Ozone: It's those terrible ozone depleters the CFCs! (**CFCs** walk over from picket line.)

CFC 1: Hey, we're not so bad! We are just made of chlorine, fluorine, and carbon—the CFCs! People use us in coolants for refrigerators and air conditioners for their homes and cars.

CFC 2: So what if we destroy a little bit of ozone? There's enough ozone around to last for years!

CFC 1: Yeah, who needs ozone anyway?

Good Ozone: People do! Tell them what else you CFCs are doing!

CFC 2: What is Good Ozone complaining about now—could it be global climate change? (**Scientists** walk in from offstage. **Good Ozone** and **Bad Ozone** walk offstage.)

Scientist 1: Excuse me. Does someone need information about global climate change?

CFC 1: Yeah. What do you want?

Scientist 2: We just happen to be experts on global climate change.

Connie: Are CFCs really changing the world's climate?

Scientist 1: Well, here is the story. Over the past 100 years or so, people have been pouring gases, such as CFCs and carbon dioxide, into the air. Methane is another culprit.

Scientist 2: And as they build up in the atmosphere, these gases act like the glass in a greenhouse.

Scientist 1: That's right. They let the radiation from the sun in—but they keep the heat from getting out. And this is causing the Earth's climate to change.

Harry: I've read that as the temperature goes up, sea levels may rise. Wow, some cities on the coast might be flooded some day!

Scientist 2: That may be true for oceans, but in the Great Lakes, the levels of the lakes might go down! There is a lot to be done to figure out what will happen in the future.

Scientist 1: (Interrupts **Scientist 2**) Well, it has been nice talking with you all, but we need to get back to our research. And it looks like Carbon Dioxide is coming our way. (**Carbon Dioxide 1 and 2** walk in.)

Carbon Dioxide 1: Did we hear you mention our name? I am the official leader of the Greenhouse Gas Group. We aren't really a bad gas in the right amount. We are just a little out of control right now.

Carbon Dioxide 2: You know there used to be less of us in the air. But then people started burning more and more things—they built power plants that burn coal, and cars and trucks that burn gasoline.

Carbon Dioxide 1: And they started cutting down and burning forests! Every bit of that burning releases extra amounts of us into the air.

Carbon Dioxide 2: As more and more of us got into the air, people started saying that the Earth was warming up—because of us! (**Methane** walks in.) Oh, hi, Methane!

Methane: It looks like you could use a little support, Carbon Dioxide. Remember, I'm a member of the Green House Gas Group, too.

Harry: Welcome. What's your story?

Methane: Well, I help to trap heat in the atmosphere, just like you. Have you ever heard of swamp gas—that's me! How about all that methane produced in landfills? And do you know that cows produce lots of methane—ha, ha! And when I burn, like in people's furnaces, I produce carbon dioxide? Pretty hot, right?

Carbon Dioxide 2: Yeah—like this global climate change stuff is all our fault! (to audience) The reason that there is such a mess is because you use so much fuel and cut down so many trees!

Connie: You're right, Carbon Dioxide and Methane. Maybe we should be doing a special report on **people**—we're the ones who are really causing most air pollution.

Harry: But people can change! (turns to audience) How about you? Can you think of some ways that people can help fight air pollution? (**Audience** responds with ideas, such as driving cars less, using less electricity, conserving forests, planting trees, and so on.)

Lead: (Lead enters the stage walking very slowly.) Yeah, just look what happened to me. When they took the lead out of gasoline, it really decreased the lead pollution. If it weren't for metal refineries and a few other things, I probably wouldn't be in the air at all.

Connie: If I remember correctly, a compound of lead used to be added to gasoline to make cars run better. Lead was found in certain types of paint and plumbing pipes.

Lead: Those were the days…I was everywhere! I caused brain damage, kidney damage, and learning problems. I was in the news all the time there for a while. Now, the only way I get any attention is if a small child chews on something with really old paint. They've taken me out of gasoline, out of paint, and they don't use me in plumbing anymore. (**Lead** starts to sniff and cry and looks like he/she might be about to start sobbing.)

(Harry pulls a handkerchief from his pocket, hands it to **Lead** who is crying, and ushers **Lead** off stage as **Connie** reads her line. **Harry** then returns.)

Connie: Well, that's the end of our special report. The bottom line? These air pollutants seem to be a pretty tough bunch—but people helped create them, and people can reduce the amounts that are in our atmosphere. Once we make decisions that limit how much of them we allow into the air, these air pollutants don't seem so tough after all (**Connie** looks back at **Lead**, who has now stopped sobbing.) Thank you and good night.

Pollutant curtain call:
Harry introduces the pollutants again, and **Connie** reviews their effects from the Air Pollutants Chart.

The End.

Source: Adapted from *The Awful Eight: The Play* with permission of the Texas Commission on Environmental Quality.