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Beginning this fall, HCDOES' public affairs division will partner with the Regional Ozone Coalition to present grade-wide and school-wide assemblies on air quality topics. Michelle White of Crystal Clear Science will present lessons similar to those previously offered on a classroom-by-classroom basis. We have switched to this broader approach in order to serve the schools in Butler, Clermont, Hamilton and Warren counties more effectively. All information adheres to Ohio education standards and can be modified for age and subject matter. Please contact Michelle at (513) 553-2252 to schedule a presentation.

Nan McKenna, public affairs specialist, will provide presentations on HCDOES and air quality issues that pertain to a community or group's interests. If you are interested in scheduling a presentation, please contact Nan at (513) 946-7754 or at nan.mckenna@hamilton-co.org.

HCDOES Receives \$100,000 From Cinergy To Help Clean Up School Buses



Cinergy recently awarded HCDOES a \$100,000 grant to retrofit 140 school buses with diesel oxidation catalysts. The oxidation catalysts will reduce approximately 11,000 pounds per year of diesel exhaust emissions in the Greater Cincinnati area.

The key goal of the project is to reduce school children's exposure to diesel exhaust emissions, whether riding on a school bus or waiting in areas where buses are idling. Recent studies have confirmed that children riding in school buses are exposed to six times more diesel exhaust emissions than outside the bus. Diesel particulate exhaust exacerbates existing respiratory conditions in children, including asthma.

Fourteen school districts who own their own buses in Southwest Ohio were selected to participate in the 2005-2006 Cinergy/HCDOES project, including:

- Bethel-Tate Local School District
- Finneytown Schools
- Forest Hills School District
- Indian Hill Exempted Village Schools
- Loveland Public Schools
- New Richmond Exempted Village Schools
- Northwest Local Schools
- Princeton City Schools
- Ross Local Schools
- Three Rivers Local Schools
- Winton Woods City Schools
- Deer Park Community City Schools
- Mariemont City Schools
- St. Bernard Elmwood Place City Schools

For more information about the Cinergy grant or about any of HCDOES' school bus retrofit projects, please call Ken Edgell at (513) 946-7751 or visit www.hcdoes.org.

Particulate Matter and Winter Weather

Winter may seem far off, but it will be here before you know it. Although the summer months are typically referred to as "smog season," smog can be a problem even during the winter. In early February of 2005, the Tri-State almost experienced its own wintertime smog alert.

If smog usually accumulates on hot, sunny days, how did Southwest Ohio have pollution problems in the middle of winter? The answer has a lot to do with weather. From January 31 to February 6, 2005, high pressure over the Midwest resulted in light winds and stagnant air conditions, which allowed for the build-up of pollutants. Particulate matter (PM) levels were already ranging from Moderate to High several days before the high pressure system moved into the area.

Without breezes or winds to blow the PM out of the region, the pollution hung in the air. These conditions, combined with increased pollution from day-to-day activities, such as driving and residential wood burning, caused some Midwest Air Quality Index (AQI) levels to reach as high as 155 (Unhealthy). During this time, Cincinnati's AQI rose to 88 (Moderate) and Middletown's AQI reached 117 (Unhealthy for Sensitive Groups).

PM (dust, soot, ash and other solids and aerosols) can come from a variety of sources, including wood burning, diesel engines, gasoline engines, factories and power plants. Colder temperatures can result in more people burning wood, which increases particulate levels. As evidenced during the winter of 2005, dry weather and lack of wind or precipitation can leave the PM suspended in the air for a longer period of time, potentially causing adverse health effects.

It is important to be aware of PM levels during the winter months due to their potential health effects, such as aggravating asthma, magnifying cardiovascular problems and irritating the eyes, nose and throat. Children are especially sensitive to high levels of PM because they breathe more quickly and take in more air than adults. Children spend more time outdoors than adults, which further increases their exposure to PM and all air pollution.

The Hamilton County Department of Environmental Services, Air Quality Management Division, measures the levels of PM in the air for Southwest Ohio. This information is reported in the AQI which is provided to the local media and can also be found at www.hcdoes.org or by calling the AQI Hotline at (513) 946-7753.

Health effects

- Many scientific studies have linked breathing PM to a series of significant health problems, including:
 - aggravated asthma
 - increases in respiratory symptoms like coughing and difficult or painful breathing
 - chronic bronchitis
 - decreased lung function
 - premature death
 - cardiovascular problems

Visibility impairment

- PM is the major cause of reduced visibility (haze) in parts of the United States, including many of our national parks.

Atmospheric deposition

- Particles can be carried over long distances by wind and then settle on the ground or in water. The effects of this settling include:
 - making lakes and streams acidic
 - changing the nutrient balance in coastal waters and large river basins
 - depleting the nutrients in soil
 - damaging sensitive forests and farm crops
 - affecting the diversity of ecosystems

Aesthetic damage

- Soot, a type of PM, stains and damages stone and other materials, including culturally important objects such as monuments and statues.

Reference: www.epa.gov

Need More Information?

If you would like to receive *The School Breeze* by email, please email nan.mckenna@hamilton-co.org, with the subject box stating "add to The School Breeze list." For free outreach or resources, contact Nan McKenna or visit our website: www.hcdoes.org.



Lesson Plan

4th grade

Particulate Matter: How Dirty is the Air We Breathe?

Purpose:

To make a simple device that can be used to collect and observe the pollution in the air.

Objective:

Students will collect and study pollution from the air.

Focus:

To make students aware of the harmful effects of invisible air pollutants.

Materials:

- white plastic squares measuring 5 centimeters by 5 centimeters – can be cut from white disposable plates or similar objects
- petroleum jelly
- masking tape or other adhesive
- block of wood
- white paper for each child or each group of children

Background:

The atmosphere is almost completely made up of invisible gaseous substances. Most major air pollutants are also invisible, although large amounts of them concentrated in areas such as cities can be seen as smog. One particularly harmful air pollutant is particulate matter (PM). PM is made up of tiny particles of solid matter and/or droplets of liquid. PM is visible when it is present in large amounts in the air or when it collects on the surfaces of buildings and other structures.

Natural sources of PM include volcanic ash, pollen and dust blown about by the wind. Coal and oil burned by power plants and industries and diesel fuel burned by vehicles are the chief sources of human-made particulate pollutants, although all significant sources are not large in scale. The use of wood in fireplaces and wood-burning stoves also produces considerable amounts of particulate matter in localized areas, although the total amounts are much smaller than those from vehicles, power plants and industries.

Vocabulary

- air
- pollution
- particle
- particulate matter

Procedure:

1. Label each square with the student's name or the student group's name.
2. Coat the plastic square with a thin, even coat of petroleum jelly. With masking tape, fasten the square, jelly side up, to the wooden block.
3. Place the block outdoors on a post, fence, wall or window sill. Leave it for 24 hours.
4. Bring the sample inside. Remove the plastic square from the block. Lay it on white paper.
5. Let the students examine the pollution which was collected on the petroleum jelly.
6. Let the students record the findings of their testers.
7. Have students share their findings with the other groups. Did your square collect any dirt particles? How does your square compare to those of the other groups? In what places does the air seem to be the dirtiest?
8. Point out that there is dirt now where we once saw nothing. People must have air to live. The students must do everything they can to clean the air now.

Review:

- Discuss results and encourage students to brainstorm the likely types of particles collected and the sources of those particles.
- Brainstorm the likely amounts and types of particles that would be collected if these devices were placed in different parts of the school and school grounds.

Extensions:

- Have students write a paper and explain the differences they observed among the plastic squares.
- Have students take new testers home to test the pollution for 24 hours. Students will then report to the class of their findings.
- Ask students to leave the tester outside for a week or a month (shelter from precipitation). Students will keep a journal of its progress each day and report to the class.

Reference:

Holt Science 6th. Holt, Rinehart, and Winston Publishers, New York. p. 257.

Free Stuff

For Students

K-2 Friends for Clean Air Coloring Book

3-6 Clean Air Kids Activity Book – includes 16 pages of fun games, activities and experiments.

3-6 Kids Cloud Express Activity Sheet

For Teachers

All About Air: a comprehensive book about air quality

The Breeze: a quarterly newsletter for businesses and the community

Clean School Bus USA

USEPA Booklets

2006 *Do Your Share for Cleaner Air Calendar*

Please visit www.hcdoes.org for more information and to order materials.

Classroom Programs

HCDOES will be happy to schedule air quality programs for your students. See the "New Education and Outreach Focus" section on the front page. Please call Nan McKenna at (513) 946-7754.

Web Stuff

AIRNow.gov

A cross-agency website sponsored by federal, state and local government departments. This site contains a wealth of information, both technical and practical, about air quality. Links to the teachers' website and kids' website are located on the left side of the homepage. <http://www.airnow.gov>

The American Lung Association

Official website for this national organization devoted to promoting lung health. Click on the air quality link located on the right side of the homepage to learn more about particulate matter and other pollutants. <http://www.lungusa.org>

How Stuff Works – Ozone Pollution

From the creators of the *How Stuff Works* book series, this website explains the mechanics of just about anything. The "How Ozone Pollution Works" page gives a clear description of ozone, another harmful pollutant like particulate matter. <http://science.howstuff-works.com/ozone-pollution.htm>