



EPA POLLUTION PREVENTION IN SCHOOLS

POLLUTION PREVENTION (P2) EDUCATION TOOLBOX

Tools for Helping Teachers Integrate P2 Concepts in the Classroom

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Why P2 in your School?

In the other five fact sheets in this series, you learned pollution prevention (P2) concepts and how they apply to energy conservation, water pollution prevention and water conservation, pesticides use reduction, and household hazardous wastes reduction. These fact sheets describe how household activities can generate pollutants and waste. At school, the combination of more people and more activities generates a greater quantity and variety of pollutants and waste. Students, administrative staff, teachers, and janitors all consume energy and water and possibly use hazardous materials and pesticides. Therefore, schools are a good place to implement P2 concepts to reduce or eliminate the generation of pollutants and wastes that, if mismanaged, can be potentially harmful to human health and the environment.

Where is waste in schools generated?

Activities and areas throughout the school that generate pollutants and wastes are described below.

- ✓ Energy is consumed through lighting, office machine use, heating and cooling, and transportation to and from school.
- ✓ Hazardous materials that can become waste include caustic or acidic cleaners (such as drain and toilet bowl cleaners), aerosol cans, paints, and other chemicals present in science laboratories and classes, science storerooms, art classrooms, and custodial closets.
- ✓ Pesticides are used on school grounds and in kitchens, locker rooms, and classrooms.
- ✓ Water is used in bathrooms, kitchens, locker rooms, and classroom sinks. Water pollution can be generated from many materials used at school; for example, salt used on the sidewalks to melt ice or pesticides used on school grounds.

How Can Your School Prevent Pollution?

In order for your school to reduce or eliminate the amount of pollutants and wastes it generates, an attitude of "less is better" should be adopted. All students, teachers, administrative staff, and janitors must ask themselves, "Is there a different way to do this that generates less waste or uses safer materials?"

The following is a combination of P2 concepts that can help your school prevent health hazards, create less environmental pollution, and save money. P2 opportunities presented in the other fact sheets may also be appropriate for your school.

Some of the P2 concepts presented below can be completed individually or in groups, but some of the P2 tips will require working with the janitor, principal, or other faculty members to make sure they are implemented.

Energy Conservation

Implementing energy conservation in schools can be inexpensive or free. An energy-efficient school saves money and generates less pollution because less fossil fuels are burned to provide the energy.

- ✓ Use energy-efficient lights (fluorescent instead of incandescent bulbs). Call Commonwealth Edison at 1-800-334-7661 to find out where you can buy energy-efficient lights.
- ✓ Bike, walk, or share rides to and from school.
- ✓ Turn off lights during non-use hours.
- ✓ Recycle items such as paper, aluminum cans, and plastic bottles; recycling these items requires less energy than producing them from brand new, raw materials.
- ✓ Use recycled products such as paper and other environment-friendly products such as water - based paints, and non-toxic floor and desk cleaners.
- ✓ Plug holes and caulk windows to stop heat loss.
- ✓ Replace damaged doors and windows to reduce the need for heating and cooling in the building.
- ✓ Set the thermostat at 55 °F in winter during non-use hours.
- ✓ Turn off all machines when not in use.

Water Pollution Prevention and Conservation

Some wastes improperly disposed of at schools can pollute water. By taking steps to reduce water pollution, your school can help reduce the pollution in our drinking water sources and protect aquatic ecosystems. By conserving water, your school can save money.

- ✓ Fix leaks in faucets and pipes.
- ✓ Rinse all dishes at once by using a dishrack placed in the sink.
- ✓ Only run the dishwasher when it is full.
- ✓ Practice water-efficient landscaping. If school grounds must be watered, do so in the morning or evening so water will soak into root systems and not be lost to evaporation. Also, school grounds should not be watered more than every third day and not on windy days.
- ✓ Use a minimal amount of fertilizers on school grounds or try finding natural alternatives to fertilizing. Fertilizers can migrate into water bodies and harm aquatic ecosystems.
- ✓ Use sand on icy walks instead of salt, which pollutes water and can harm plants. Do not pour hazardous materials, such as science class chemicals down the drain because they can eventually be released into drinking water sources.
- ✓ Dispose of all litter in trash cans so that the litter does not get washed into nearby storm sewers.

Hazardous Material Reduction

Reducing or eliminating the generation of hazardous waste creates a more healthy atmosphere for school occupants and the surrounding environment.

- ✓ Use safer alternatives to hazardous materials. For example, use detergent-based cleaners instead of caustics, which are corrosive, and water-based cleaners instead of toxic solvents. More alternatives are presented in the "Household Hazardous Waste Reduction" fact sheet.

- ✓ Store chemicals and hazardous wastes properly in science storerooms, art classrooms, and custodial closets to avoid unauthorized use or spills.
- ✓ Properly dispose of chemicals that are no longer useful or needed, or that are unknown.
- ✓ Purchase only the needed amounts of chemical supplies to avoid disposing of extra, unused materials.
- ✓ Try alternatives to products labeled with the words "Danger," "Warning," or "Caution." For example, buy a safe bleach product that does not have a label that reads "Danger."
- ✓ Use the least amount of product needed to complete the job.
- ✓ Do not mix chemicals and hazardous wastes with everyday trash, or dump them on the ground.

Pesticides Reduction

Pesticides are used on school grounds to protect students and employees and the school's appearance from pests. However, pesticides can cause possible health hazards for school occupants and contribute to environmental pollution.

The best P2 option is to prevent a pest problem from occurring. If the school already has a pest problem, the best P2 option is to control pests without using pesticides.

- ✓ Use non-chemical pest control methods such as swatters for insects and mechanical traps for mice.
- ✓ Keep lockers and the building clean and dry so that the school building is unattractive to pests.
- ✓ Plant native flora which do not require chemical upkeep. Ask a local nursery if they will work with you to provide native plants on school grounds.
- ✓ Encourage employees or contractors to use integrated pest management. Guidelines are discussed in the "Pesticides Use" fact sheet.

If you must use pesticides:

- ✓ Only spray pesticides when children are out of school.
- ✓ Follow pesticide label instructions and wear protective equipment such as gloves and a face mask. The person applying pesticides should be a registered technician or certified applicator.
- ✓ Do not purchase excess pesticides.
- ✓ Store pesticides in a secure place.
- ✓ Do not (1) mix pesticides with everyday trash, (2) wash them down sewers or drains, or (3) dump them on the ground.

LESSON PLAN

This lesson plan provides guidance and activities that will help teachers meet the following goals:

- ✓ Explain where waste and pollutants are generated in your school
- ✓ Conduct a P2 survey of the school
- ✓ Develop a list of alternative products and conservation measures that can be used at your school
- ✓ Apply P2 principles in your school

The preceding pages and the five other P2 fact sheets in this series contain background information and definitions necessary to implement this lesson plan, which meets the requirements for the following Chicago Academic Standards Frameworks: 6th Grade - state goal 11 CASB. CFS4, state goal 13 CASB CFS1; 7th grade - state goal 11 CASC. CFS2, state goal 13 CASB. CFS1; 8th grade - state goal 11 CASC. CFS2, 5, state goal 13 CASB. CFS1.

This lesson plan contains three comprehensive activities divided into pre-survey, survey, and post-Survey stages. These activities allow a class to (1) research the waste and pollutants generated by a school, (2) conduct a P2 survey of the school, and (3) evaluate survey results and implement P2 at the school.

The instructor should conduct the activities using an adequate amount of time to obtain information and to attain the necessary goals. The outcome of this lesson plan requires individual and group efforts by the students. However, to implement some of the P2 concepts in the school, administrative actions may be required.

Why is P2 important at school?

- ✓ Begin the lesson by talking with the students about the wastes and pollutants generated at home that are identified in the other fact sheets.
- ✓ Explain to the students that many sources of wastes and pollutants in homes are also present in schools.
- ✓ Explain to the students that teachers, staff members, administrators, and students all contribute to the consumption of resources and use of products that generate waste at the school every day. For example, when a student leaves the light on in an unused classroom, the energy used by the light bulb could have been produced from the burning of fossil fuels (natural resources that cannot be replenished, such as oil and gas), thereby contributing to air pollution.

Activity No. 1 - Pre-Survey: School P2 Surveyors

Objective: Students should understand how to prepare a survey to find where wastes and pollutants are generated at your school

Time Length: 60 minutes; some survey groups may need to make a 30 minute appointment with the principal or janitor before the survey

Materials Needed: A student journal, pencil, copy of the fact sheet, and the "School P2 Surveyors" attachment for each student

Activity:

- ✓ Divide the class into four teams: the Energy Survey Team, Pesticides Survey Team, Water Survey Team, and Hazardous Materials Survey Team.
- ✓ Explain to the students that each team is going to prepare a list to help the team conduct a school survey in the area of its assigned topic. The "School P2 Surveyors" attachment can help guide each team through the next steps in the activities.
- ✓ Ask the teams to make two columns in their student journal headed "What and Where?," and "P2 Questions."
- ✓ In the first column, have the teams write down what or how the team's focus topic is used or generated and where it can be found in the school.
- ✓ In the second column, have each student write questions in their journals formulated from the P2 concepts given in this fact sheet and the other fact sheet addressing the team's focus topic. These questions should guide the students in identifying P2 already occurring in school and new P2 opportunities during their survey. The questions can also be used to interview other students, teachers, staff, and administrators. A few examples are provided below.

STUDENT JOURNAL ENERGY SURVEY LIST

"What and Where"

Lighting in the classroom
Heating throughout building
Computers in library

P2 Questions:

1. Are there recycling bins for aluminum, plastic, and paper in all classrooms?
2. Are the light bulbs used in the classrooms incandescent or fluorescent?

Activity No. 2 - Survey: P2 Inspection

Objective: Students should understand how to conduct a walking P2 survey at your school.

Time Length: 90 minutes

Materials Needed: A student journal, pencil, and copy of the "School P2 Surveyors" attachment for each student

Activity:

- ✓ Under adult supervision, have the teams use the survey list developed in Activity No.1 and conduct a walking survey of the school in areas where their assigned topic is found.
- ✓ While the team is inspecting the area where their resource or waste is found, have the students check it off in their journals. Also write down new things found that the teams did not write down in Activity No.1.
- ✓ During the survey, have the students try to answer the questions they developed during Activity No.1 and have them write down any additional observations. A few examples are provided below.

STUDENT JOURNAL;
HAZARDOUS WASTE SURVEY LIST

“What and Where”

Floor and bathroom cleaner in custodian closet ✓
Lead paint in art classroom ✓
Formaldehyde in science lab ✓

P2 Questions:

1. What type of cleaners are used on the floors?
The janitor said detergent-based cleaners are used on the floors instead of caustics.

Additional Observation

1. An open bag of fertilizer was found in the custodian closet and had spilled on the floor.

How Can Pollution Prevention Help You?

- ✓ Explain to the students that implementing P2 concepts in the school can prevent health hazards to all occupants, reduce environmental pollution, and save money.
- ✓ For example, if alternatives to pesticides are used to control pests the school would be reducing the potential of health hazards to people and the environment.
- ✓ Explain to the students that implementing P2 concepts in school is an individual and group effort but also may require administrative action. For example, some actions cost money; therefore, the principal or other administrative staff must get involved.

Activity No. 3 - Post-Survey: P2 Action!

Objectives: Students should identify P2 options and ideas that can be implemented in your school.

Time Length: 90 minutes

Materials Needed: A student journal, piece of paper, and pencil for each student

Activity:

- ✓ Have each survey team discuss P2 principles for their assigned topic that are already implemented in the school. For example, the Pesticides Survey Team may have discovered that mechanical traps are used instead of pesticides to trap mice.
- ✓ Have each team analyze the rest of its surveys and select one area that needs the most improvement. For example, the Energy Survey Team may decide that the school is wasting a large amount of energy heating and cooling the building because of air leaks.
- ✓ Once a focus has been decided upon, have each team brainstorm to come up with appropriate P2 ideas for the school according to their assigned topic. For example, the Energy Survey Team may suggest that the school should replace some damaged doors and windows to stop leaks.
- ✓ Have each team present its ideas to the rest of the class.
- ✓ Have each team write down the final environmental problem it has decided to focus on for their topic and the P2 idea/solution it recommends in a letter to the principal.
- ✓ A few days after the class has sent the letters, make an appointment for the principal to visit the class to discuss the possibilities of implementing the different P2 concepts proposed by each group.

Method of Evaluation/Assignment

Have the students write down the following questions in their journals:

- ✓ At school, what P2 concepts presented in this fact sheet and the other five fact sheets in the series are you practicing?
- ✓ If you have persuaded your principal to consider the P2 ideas you presented, have they been implemented at the school? Why or Why not?
- ✓ Do you notice a change in "attitude" about the generation of pollutants and wastes among the occupants of your school?

To evaluate the impact of the P2 activities, students should ask these questions again 3 to 6 months after the lesson plan has been completed.

ATTACHMENT SCHOOL P2 SURVEYORS

ENERGY SURVEY TEAM

Goal: To evaluate the habits and practices of energy use in the school so that the team can identify problem areas and opportunities for energy conservation

Areas to conduct survey: All rooms

Guidelines:

- ✓ Make an appointment with the school custodian to ask questions developed in class. For example, you could ask if the light bulbs used in the building are fluorescent, energy-efficient light bulbs.
- ✓ Observe the energy consumption patterns of all school occupants. For example, ask students if they turn off the lights in an unused room.
- ✓ To check for heat loss in the building, feel for leaks at the rims of windows and doors.
- ✓ To investigate recycling at your school, find out what types of recycling bins are available and where they are located. Also, ask teachers and janitors what types of recycled products they use.

WATER SURVEY TEAM

Goal: To evaluate the habits and practices of water use in the school so that the team can identify problem areas and opportunities for water conservation and P2

Areas to conduct survey: Cafeteria kitchen, bathrooms, locker rooms, and classes with sinks

Guidelines:

- ✓ Make an appointment with the school custodian and kitchen crew to ask some of the questions developed in class.
- ✓ Observe the water consumption patterns of all school occupants. For example, observe how long the bathroom sink is left on while someone is washing his or her hands.
- ✓ Observe what people pour down water fountain drains, sinks, and storm sewers outside your school.

HAZARDOUS MATERIALS SURVEY TEAM

Goal: To inventory hazardous material use in your school so that the team can identify safer alternatives

Areas to conduct survey: Science laboratories and storerooms, classrooms, custodial closets, and art classrooms

Guidelines:

- ✓ Make an appointment with the custodian to ask questions developed in class and to look in the custodial closet. Also make an appointment to interview the science and art teachers. Look for products that are flammable, corrosive, toxic, or reactive.

- ✓ Try to identify typical hazardous wastes generated when hazardous materials are used, such as bathroom cleaners, pesticides, and formaldehyde used to preserve specimens in biology rooms.
- ✓ In art classrooms, look for solvents such as those in rubber cement and permanent markers, and look on labels to find lead in paints (lead paint can also be found on playground equipment), clays, and glazes.

PESTICIDES SURVEY TEAM

Goal: To evaluate pesticides use at the school so that the team can identify ways to minimize pesticides use and protect school occupants from unnecessary exposure

Areas to conduct survey: Kitchen, locker rooms, custodial closets, and lawns or other outdoor areas

Guidelines:

- ✓ Make an appointment with the principal to find out what type of pesticides management plan the school currently implements. For example, the school may have a pesticides contractor or the school custodian may be responsible for the school grounds.
- ✓ Make an appointment with the person that controls the pesticides used on school grounds to ask questions developed in class. For example, you could ask if chemical pesticides are used at school and if so, how they are stored.
- ✓ While inspecting the school, write down the types of pests. There may be alternatives to pesticides used to control these pests.