HU GK-12 Activity

TITLE: Tracking Air Pollution

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DCPS STANDARDS: E.8.1 and E.8.2

GOALS:

1. Scholars will be able to differentiate between natural and human-generated pollution and give at least three examples of each.
2. Scholars will be able to describe sources of air pollution.
3. Scholars will be able to discuss the impact of air quality on human health, wildlife, vegetation, buildings, and vehicles.

OBJECTIVES:

1. Given a particulate matter collector, scholars will identify five particulates that landed in the particulate collector and explain which of these would be classified as a pollutant.
2. Given a particulate matter collector, scholars will describe which location showed the greatest and the least number of air particulates.

PREREQUISITE KNOWLEDGE:
Background

Pollutants are classified as harmful substances that enter the environment. Pollutants may enter the environment in many different ways. A common point of entry for pollutions is through air travel. Air pollution is one of the greatest causes of pollution on earth. Pollutants in the air may be made of particulates or gases in the form of oxides. Air pollution can be present outdoors, such as photochemical smog, or indoors, such as cigarette smoke and radon.

Air pollution can adversely affect human health and the health of plants and animals. The human health problems that result from air pollution range from eye and respiratory tract irritations to emphysema and lung cancer. Air pollution may also damage crops and be passed from contaminated food and water to grazing animals.

The global and local effects of air pollution are tremendous. Natural processes such as precipitation and biological activity remove some air pollutants. Air pollution can be reduced in part by controlling automobile emissions. The control of air pollution is difficult because the type of legislation that can reduce air pollution can also potentially cause economic hardship for certain industries.

ESSENTIAL QUESTIONS:

1. What is a pollutant?
2. Is there any way to produce energy without producing carbon dioxide? Make a list of carbon dioxide-free energy sources.
3. What things can you do as an individual to help reduce air pollution?
4. Compared to the United States, Canada is less industrialized. Why do you think acid precipitation is more serious in Quebec than in most of the United States?

LABORATORY MATERIALS:

Masking tape, five microscopes slides, petroleum jelly, five Petri dishes with lids, binocular microscope or hand lens.

DIFFERENTIATING INSTRUCTION:

English language limited scholars will be grouped with other Spanish-speaking scholars to complete this activity.

RATIONALE:

This activity is designed to determine the sources of various types of pollution and its potential impact on wildlife, vegetation, and human health.

RESEARCH ACTIVITY:

Experimental set-up:

1. Separate the class into five groups
2. Each scholar will write a hypothesis that pertains to the problem.

Laboratory activity:

1. Make five separate airborne particle collectors by writing your group name on the edge of glass slides. Label one slide as your control.
2. Spread a thin layer of Vaseline® on the center of each slide with the edge of a Popsicle stick.
3. Place each particulate collector in the bottom half of a Petri dish. Immediately place lids on the dishes.
4. Remove the airborne particle collectors from their Petri dishes, and leave them exposed to the air at four locations around your school where particulate levels may differ.
5. Write the locations on each slide and on your data sheet.
6. Maintain the control slide in your classroom, and do not remove it from its covered Petri dish.

7. Retrieve the airborne particle collectors after 30 minutes and place the experimental slides back into covered Petri dishes.
8. Examine the slides, including your control, with a microscope or magnifying glass. Count the number of particles that fell on each one slide.
9. Record your data.

EVALUATION AND ASSESMENT:

1. Graph the number of particulates found for each collector.
2. What was the purpose of the control?
3. List the possible sources of error in your experiment.
4. Describe the locations you chose. Identify the areas that showed the greatest and least amount of particulate matter and explain what this data represents.