Activity 8

Hazardous Waste Cleanup Methods

Duration	1 class period
Grade Level	9-12
Key Terms/ Concepts	Cleanup method Treatment technologies
Suggested Subjects	Biology Chemistry Civics/Government Life Science Physical Science Physics

Purpose

This activity helps students understand some of the reasoning and science involved in choosing technologies for cleaning up hazardous waste sites. The students analyze the pros and cons of using various technologies for cleaning up specific hazardous waste problems, weighing factors such as contaminant-specific requirements, technological limitations, reliability, cleanup time, and cost.

Background

The Superfund Program was established by Congress in 1980 in response to growing public concern over the health and environmental risks posed by hazardous waste sites and other uncontrolled toxic hazards. The law is formally called the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The U.S. Environmental Protection Agency (EPA) administers the Superfund Program in cooperation with individual states and Tribal governments. EPA is responsible for responding to chemical emergencies and investigating and cleaning up uncontrolled or abandoned hazardous waste sites throughout the United States.

In the Superfund Program, EPA uses a variety of processes and technologies, alone or in combination with each other, to clean up hazardous waste sites. Some processes are designed to physically remove the contaminated material from the site or confine contaminated materials to a specific area. Other processes and technologies are designed to treat the contaminated material—to destroy or permanently change their chemical structure; to extract or separate them from the soil, sludge, sediments, or the water they are contaminating; or to immobilize them and keep them from moving or spreading beyond the site.

The responsibility for selecting the most appropriate **cleanup method** for a specific site rests with the EPA Remedial Project Manager (RPM) or On-Scene Coordinator (OSC), with input from the affected community. An important step in this selection process is narrowing the field of alternatives and developing a list of options that make sense for dealing with the contamination at the site.

The RPM or OSC has to examine the range of available technologies and processes and find the ones that offer the best potential for reaching the cleanup goals that have been set for the site. This involves weighing several factors—whether a technology is capable of effectively treating the contaminants present at the site, how long it will take to clean up the contamination using the technology or process, how much it will cost, how complicated or difficult it is to use, and if it is safe for both the workers at the site and the surrounding community.

Many processes and **treatment technologies** are available for use at hazardous waste sites, and new technologies are constantly being developed. The state-of-the-art is changing continuously. For convenience, this activity is based on current information about the most commonly used technologies at Superfund sites.

For additional information on the topics covered in this activity, see the Suggested Reading list found at the end of the Haz-Ed materials.

Preparation

1. Gather the following materials:

    - Copies for each student of
      Fact Flash 3: Flowing Railroad Hazardous Waste Site
      Fact Flash 4: Flowing Railroad Site Investigation Results
      Fact Flash 8: Common Cleanup Methods
      Fact Flash 9: Common Contaminants.

2. Read the 4 Fact Flashes to prepare your lecture.

3. Distribute Fact Flashes 3, 4 and 9. Have students read Fact Flashes 3 and 4 for homework. They can get more information about the contaminants at the site in Fact Flash 9.

Procedure

1. Review the information in Fact Flashes 3 and 4 with the class.

2. Ask students to identify the contamination problems at the site. (Answers should include TCE, metals, PCBs, asbestos in the soil, and lead and TCE in groundwater.)

3. Divide the class into teams. Have each team discuss the options below and decide how the site should be used in the future:

   A. Should the site become a park, residential area, school, or playground?

   B. Should the site remain a restricted area for limited industrial use only?

   C. Should the site be zoned for a landfill or for hazardous waste storage since it already has been polluted?

4. Have each team record their decision on a sheet of paper.

5. Distribute copies of *Fact Flash 8: Common Cleanup Methods.* Have teams choose the one or two **cleanup methods** (from those listed in the Fact Flash) that would be most effective in protecting human health and the environment now and that make sense in light of their decision about the site's future use.

6. Instruct teams to discuss and record on a sheet of paper the reasons for their selections.

7. Reassemble the class and have students discuss and compare the various teams' selections.