

# Landfill Lounge

## Understanding Landfills

### Objectives

Students will be able to 1) accurately construct a model of a sanitary landfill; and 2) identify the parts of the landfill and explain their function.

### Web-Directed Research

These activities correlate with the Keep America Beautiful “Clean Sweep U.S.A.” web site targeted to grades 6-8, and are designed to expand on the objectives in this lesson. The web site can be found at [www.kab.org/cleansweepusa](http://www.kab.org/cleansweepusa).

1. Describe the difference between a “**landfill**” and an “**illegal dump**”. Define “**leachate**” and why it’s a concern. Have students cite the source for their answers.
2. Describe the steps for preparing a landfill. Why might people not want a landfill in their community? What does NIMBY (not in my back yard) mean? Have students complete the on-line quiz.
3. Where is the closest landfill to the community? Who regulates and monitors it? What things are not accepted or “banned” at the local landfill? What is the projected life of the landfill?
4. Identify two careers related to siting, planning, and managing a landfill (e.g., engineer, water quality, attorney/legal, landfill manager, etc.). What areas of study are needed to qualify?

### Web sites to consult:

- U.S. Environmental Protection Agency “Terms of Environment” (<http://www.epa.gov/OCEPAt/terms/>) and state municipal solid waste data (<http://www.epa.gov/epaoswer/non-hw/muncpl/states.htm>).
- How Stuff Works (<http://people.howstuffworks.com/landfill.htm>)
- The Solid Waste Association of North America (<http://swana.org/>)
- Environmental Career Organization ([www.eco.org](http://www.eco.org))
- Environmental Jobs and Careers ([www.ejobs.org](http://www.ejobs.org))
- Web site of the City or County government that handles solid waste.

### In-Class Activity

#### Method

After classroom instruction on the components of a sanitary landfill, students will diagram and construct a non-working model of a landfill.

#### Materials

For each group of 3 or 4 students: clear plastic shoe box or deli salad container, large sheet of clear plastic, enough modeling clay to cover the bottom and top of the container, enough potting soil to make three or four layers in each container, paper scraps and other refuse scraps (do not include food or organic waste), plastic straws of various sizes, grass seed (optional)

#### Vocabulary

groundwater, impermeable, leachate, methane gas, sanitary landfill, solid waste management

## Procedure

1. Begin by giving students background information on the difference between a garbage dump and a sanitary landfill. A garbage dump is a place where garbage is left in an open pit or pile, and is illegal. A sanitary landfill is a deep opening in the ground where refuse is buried under carefully monitored conditions. The bottom and sides are first lined with compacted clay and plastic liners to prevent ground water contamination. Daily, a layer of waste material is placed in a cell, or open area, and capped with soil. When a cell is filled, it is capped with another layer of clay and soil. When a landfill has been filled and is closed, grass and shrubs are planted on the top layer to keep the soil in place. Many closed landfills have been landscaped and developed into recreational facilities, such as a golf course.

All sanitary landfills must have systems for collecting and monitoring groundwater to ensure against contamination. They also have systems for collecting leachate, liquid that filters down through the landfill with rainwater and could contain harmful chemicals. Methane gas is also produced inside the landfill. In some cases this gas is simply burned off, in other cases it is collected and used as fuel. Systems for collecting ground water, leachate, and methane gas do not breach the lining systems of the landfill. As a landfill is air tight, the degradation processes which rely on the presence of light or air do not take place inside a landfill.

2. After students have taken notes on the proper construction of a sanitary landfill, have them work in groups to diagram a landfill. Make sure they have included all parts of the landfill and labeled them correctly.
3. Distribute to each group the materials to build the model landfills. Do not give students step by step instructions on how to construct the landfill. If their diagrams are correct, they should be able to accurately simulate the construction on their own:
  - Clay should line the bottom of the container.
  - Then, the plastic will line the bottom and sides.
  - The straws represent the leachate, groundwater, and methane collection equipment and should be placed so that they extend above the surface of the completed landfill.
  - Next, students should layer the waste material and potting soil.
  - The final layer of the landfill is covered with clay followed by top soil.
  - Students may wish to plant grass seed on this layer and decorate it to represent a golf course, etc.

## Assessment

Student models should contain all the elements of a sanitary landfill, and elements should be properly placed. Students should be able to explain the function of each part of the landfill.

## Standards of Learning

The North American Association for Environmental Education (NAAEE) Guidelines for Excellence in Environmental Education can be found at <http://naaee.org/npeee/learnerguidelines/8th.html>. The Guidelines for Learning which correlate to this lesson are: Strand 1 A, B, C, F; Strand 2.3 A, E; Strand 2.4 A, B; Strand 3, A, B, C, D; Strand 4 A, B, C, D.

# Diagram of a Sanitary Landfill

