Landfill

(Adapted from The Layered Look activity)

OBJECTIVE

To identify the parts of a landfill and explain their function.

MATERIALS

For each group of three or four: clear plastic 2 liter bottle with the top cut off or clear deli salad containers, or plastic box, large sheet of clear plastic wrap, enough modeling clay to cover the bottom and top of each container, enough potting soil to make three or four layers in each container, paper scraps and other refuse scraps (do not use food waste), plastic straws

WHAT IS A LANDFILL?

Modern landfills are well-engineered facilities that are located, designed, operated, and monitored to protect the environment from contaminants which may be present in the solid waste stream. Sites where solid waste was disposed have not always been regulated. At one point in US history, garbage was left in an open pit or pile on the ground in a place usually called the "dump." However, today "dumps" are illegal. A modern landfill is an opening in the ground with the bottom and sides lined with compacted clay, plastic liners and collection systems to prevent pollution from causing ground water contamination.

Garbage is placed into the opening and buried or covered under carefully monitored conditions. The landfill is divided into cells; smaller areas that are filled one at a time. Each day a layer of waste is added to the current or working cell. A layer of material called "daily cover" is then placed over the top. Covering the waste helps manage smell and vermin and depending on the material may be used to keep out rainwater to decrease leachate. Leachate is the liquid that percolates through the garbage and collects harmful substances. It needs to be treated before being discharged into the sanitary sewer system. When a cell is completely 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.

As the organic portion of waste (e.g., food and yard wastes) decomposes, large amounts of methane, a greenhouse gas, and carbon dioxide are produced. In some cases this gas is simply burned off, other cases it is collected and sold as fuel. This gas must be tracked via monitoring wells. Degradation processes that rely on the presence of light or air do not take place inside a landfill.

DEMONSTRATION

1. Distribute the materials to build the model landfills to each group. Do not give participants step-by-step instructions on how to construct the landfill. If their diagrams are correct, they should be able to simulate accurately the construction on their own.
2. The model should be formed by:
    - Lining the bottom of the container with half of the clay.
    - Then adding the plastic to further line the bottom and sides.
    - The straws represent the leachate and methane collection pipes; place them so that they run the length of the landfill and extend above the surface.
    - Layering the waste material and potting soil.
    - The final layer of the landfill is covered with clay followed by top soil.

DISCUSSION

How does your community dispose of its waste? Are there any materials that are NOT allowed in your local landfill? What are they? How should you dispose of them?