# LEAKY LANDFILL LAB

#### **Objectives**

- o To compare methods of landfill construction, past and present
- o To understand how a modern landfill is properly constructed
- o To understand why regulations regarding landfill construction are necessary and what potential environmental consequences are associated with poor landfill design

## Day 1

Build three landfill models according to the following directions.

## Model 1. Open Dumping

- 1. Pour two inches of clear water into a glass jar. (This represents groundwater.)
- 2. Add one cup of gravel or pebbles to the water.
- 3. Cover the pebbles with one inch of soil.
- 4. Place the red-colored sponge pieces on top of the gravel
- 5. Pour one cup of water over the sponge pieces. (This represents rainfall.)
- 6. Cover the jar with plastic wrap secured with a rubber band.

## Model 2. Improperly Designed Landfill

- 1. Pour two inches of water into a glass jar.
- 2. Suspend a piece of cheesecloth in the jar about two inches above the water line. Secure the cheesecloth with a rubber band.
- 3. Place one-half cup of gravel or pebbles in the cheesecloth liner.
- 4. Place the red-colored sponge pieces on top of the gravel.
- 5. Cover the sponge pieces with one inch of soil.
- 6. Pour one cup of water over the soil.
- 7. Cover the jar with plastic wrap secured with a rubber band.

## Model 3. Properly Designed Landfill

- 1. Pour two inches of water into a glass jar.
- 2. Suspend a plastic sandwich or freezer bag in the jar about two inches above the water line. Secure the bag with a rubber band.
- 3. Place one-half cup of gravel or pebbles in the plastic liner.
- 4. Place the red-colored sponge pieces on top of the gravel.
- 5. Cover the sponge pieces with one inch of soil.
- 6. Pour one cup of water over the soil.
- 7. Cover the jar with plastic wrap secured with a rubber band.



#### Day 2

1. Observe the groundwater in each model. What changes have occurred to color and clarity of the groundwater overnight?

Model 1: Open Dumping

Model 2: Improperly Designed Landfill

Model 3: Properly Designed Landfill

2. Draw a diagram of a modern (properly constructed) landfill or describe how a modern landfill is constructed.



#### Leaky Landfills Post-lab Questions

1. Based on changes in color and clarity, which model has the most groundwater contamination by leachate? Why?

2. Which model has the least evidence of groundwater contamination by leachate? Why?

3. In what ways is the Open Dump model different from the Improperly Designed Landfill model?

4. In what ways is the Improperly Designed Landfill different from the Properly Designed Landfill model?

5. In addition to concerns regarding groundwater contamination, what other problems could result from open dumping of waste on top of the ground?



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6. Why are new sanitary landfills required to have an impermeable rock, clay, or plastic liner?

7. Why do you think waste is compacted before it is placed in a landfill?

8. Can you think of any materials that should not be placed in a landfill? Why?

9. What effects can run-off from heavy rainfall (stormwater) have on landfills?



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