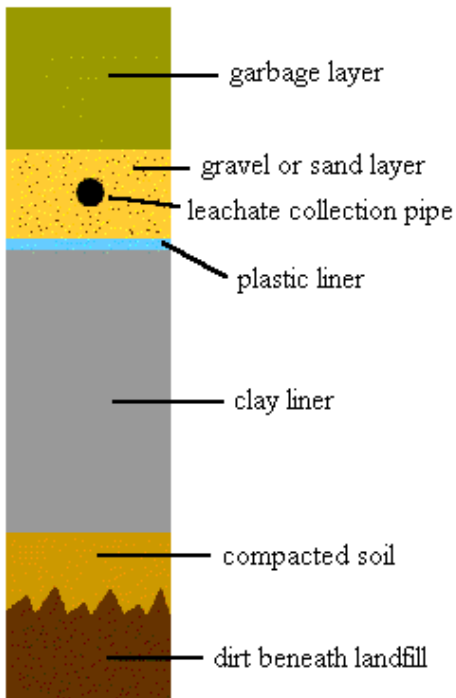


# Activity: A Landfill Is No Dump !

## Cross-Section of a Landfill



### Serves: Grades 1- 6

Landfills are the most common forms of waste disposal and are an important component of an integrated waste management system. A landfill is a large area of land that is specifically designed and built to receive municipal solid waste. "Where does your trash go?" Find out, if you don't know by visiting your local landfill. What would your family do if your trash weren't picked up every week? What would happen to your garbage (and the garbage of everyone else in your area) if the landfill closed? What happens to a landfill when it is full? What does it mean to recycle and why are recyclables separated? How long does it take for different items to decompose? Why is buying products made from recycled materials important?

### SOL's Addressed:

1.1,1.3,1.4,1.8,2.1,2.8,3.1,3.5,3.7,3.11,4.1,4.5,4.8,5.1,6.1,6.11

### Teacher Resources:

1. [www.epa.gov/epaoswer/education/quest/chapb-4.htm](#) Teacher Fact sheet

2. [www.epa.gov/epaoswer/education/quest/chapb-4.htm](#)

3. Garbage Timeline

4. Luscious Layered Landfill Activity- Grades 1-4

5. A Landfill Is No Dump! Activity- Grades 3-6

6. Simulated Landfill Project

If possible, take students on a tour of your local landfill or study about landfills before doing the simulated landfill activity.

- Discuss with students why it is important to reduce, reuse and recycle.
- Ask that what can be recycled in their locality (community)? Mixed paper, plastic, glass, steel, cardboard, aluminum, used motor oil, latex paint, batteries, tires, scrap metal, white goods, yard waste etc.
- Ask students the difference between a dump and a landfill?
- Be sure to include vocabulary words such as leachate, decomposition, groundwater, methane gas, etc.



## Virginia Office of Environmental Education

Adapted from *Keep Henrico Beautiful* and *Henrico County*

Department of Public Utilities/ Solid Waste Division

## Simulated Landfill Project

### Resource Materials:

4-qt. Plastic shoebox with lid (one per student)  
Box of Q- tips (one per student)  
Avery Address Labels (eight per student)  
Washer (one per student)  
Rubber bands (one per student)  
Toothpicks (one per student)  
Styrofoam peanuts (one per student)  
Paper clips, small (one per student)  
\*Kite string, must be really thin (8 pieces per student)  
Aluminum foil (one small square per student)  
Newspaper (one small square per student)  
Three (3) 40 lb. bags of topsoil  
Spray bottle

*Note: It has been suggested to use a thin nylon string versus cotton kite string because cotton will decompose so quickly.*

### **How To Instructions:**

Students will tie a string at one end around each item to be buried. They will put a label with the name of the item around the other end of the string. Fill the plastic cube half way with topsoil. Bury each item leaving the labeled end of the string out. Cover items with another layer of topsoil. Each student will write a hypothesis. See simulated landfill worksheet. (Note: You will need for the students to decide if their landfill will be covered the entire 10 day and 20 day observation period or if the “mini” simulated landfill will receive sun, air and water each day.) After 10 days have students uncover items and look at them under a microscope to see if they are decomposing. Rebury the items and make observations at the end of 20 days. After students record findings after 20 days incorporate the follow-up questions on the back of the worksheet.

Students will discover items that start to decompose and begin to understand why it is so important not to fill up valuable landfill space with items that could have been recycled into new products, the importance to reduce waste- to buy in bulk, or buy things without excessive packaging and to reuse items.

Name \_\_\_\_\_ Date \_\_\_\_\_

## **SIMULATED LANDFILL WORKSHEET**

*Adapted from Keep Chesterfield Clean*

**Hypothesis: (which items will decompose?)**

**Observations** (with microscope)

**After 10 days**

**After 20 days**

**Objects:**

1.

2.

3.

4.

5.

6.

7.

8.

**Conclusion:**

## Follow-up Questions:

- Which items in the shoebox have decomposed the most?
  
- Are the decomposing items manufactured or natural? Made from renewable or nonrenewable resources?
  
- Which items show no sign of decomposition? Can you tell why? Can these items be recycled instead of being put into landfills?
  
- What are the differences between a dump and a landfill? How did your simulated landfill differ from a true sanitary landfill?
  
- What would you build on your landfill once it is covered? Why wouldn't you want to build a house there?

## **Garbage Timeline - Decomposition Rates**

Toilet Paper	2 weeks
Paper Plate	1 week- 2 months
Orange peel	1 week- 6 months
Cotton Rag	6 months- 1 year
Rope	3- 14 months
Wool sock	6 months- 2 years
Cardboard	2 years
Cigarette butt	2- 13 years
Plastic bag	15-30 years
Leather shoe	25-50 years
Nylon	30-40 years
Plastic container	50-80 years
Aluminum can	250-500 years
Disposable diaper	300 years
Styrofoam egg carton	Undetermined
Glass jar/bottle	Undetermined

## **Activity: Waste Management Jeopardy**

### **(Clara Mills, Spotsylvania County Litter and Recycling Program)**

**Serves:** 4<sup>th</sup>-8<sup>th</sup> grade, 20-40 students (1 or 2 classrooms) Can be used for larger groups, but not everyone plays, and questions can be customized for any audience, even civic groups.

**Time Frame:** 50 minutes

#### **Resources needed:**

- ◆ Jeopardy-type game show wall hanging. (I use a 6x8 blue plastic tarpaulin, with clear 8.5 x 11" sleeve protectors applied in rows with colored duck tape. The categories and pollutants-eliminated columns are more permanent printed pages, in colored card stock. The questions (and answers on reverse) are white, then all covered by a consistent color of cardstock with a giant question mark printed on the top. Some of the questions also have "daily double", or extra bonus points as secondary frames, once the cardstock is pulled to reveal the question.  
The tarp can be hung from the ceiling on bungee cords with hooks, or duck taped to a block wall.
- ◆ Noisemaker signal for each team. (A rattle and a bell work fine, and a third noisemaker for the host to signal that it is OK to get help from team members.
- ◆ Costumes for Jeopardy host, Alex Treebark – an old sports coat and fish tie are fine. Watershed hosts, Vanna and Hanna or Hans (ideally the kids teachers) – I use different colored feather boas, or shiny fabric scarves, if a man, then a tux vest. All these characters need big nametags.
- ◆ Signs for the "Television Studio", announcing the show, a "Boo" and "Clap" sign, potentially signs for consolation prizes, like "the largest acorn found in the county this fall", or the first summer breeze, or winter snowflake"
- ◆ "Watery" Fabric to cover a small desk or table in the center

## **How-To Instructions:**

Set Up: Arrive early enough to have the room set up, host costume on and signs on the door before kids come in, if possible. Hang the tarp in the middle of the long wall, with easels and watershed boards on either side of it, and a small table with cloth in front for the host, the bell and the rattle.

Arrange the chairs in two teams with an aisle in the center to get to the table. Long rows are best, so that everyone is close enough to read the questions and answers.

Directions: As kids come in, be expansive and silly, greeting them like a television host. Inquire about their long travel, airsickness, good hotel food, etc., and direct them to their “studio seats”. Ask their teacher or others to be Vanna and Hanna, and, you’re ready to roll.

Tell the kids that you’re sure they know how to play, since they have ostensibly watched Jeopardy on TV. Introduce Vanna and Hanna.

Tell the students that each person in the studio will have a chance to play, starting with \_\_\_\_\_ (point or tap to the kids), and going this way down the row. (demonstrate). Show them the rattle and bell for their teams, which they can’t touch until they have read the question, and also the other noisemaker (I use a squeaky tomato toy) as the signal to get help from your team. Remind them that the contestant will have to go back into their team area to keep the other person from hearing the answers yelled out. (You will use this a lot...it’s the way they will all learn about the topics. You can even have another device as host, that Vanna or Hanna may be consulted. I still use some wait time before squeezing the tomato, though. Then they really want to know the answer!) Point out the categories.

Invite the first contestants up. Pretend to talk to them about their watershed, etc. in a microphone. (Ham it up, and they will usually play along. I used to have a dead microphone, and am looking for another!)

Let the team with the best team name choose the first. Try to remember which team is the category chooser, but the kids will help you if you forget.

Pull the card out and read the “answer” to the whole group, ready to recognize whoever rings or rattles first.

When they are really into it, say that there will be a commercial after the next question. Put on your other costume, and change the pace for a few minutes with some related conservation in a humorous form (like Cooking Up Trouble – non-point source pollution with a chef hat), then return to the game.

Notice the time...you will need to finish up in some way, with a big grant, Vanna and Hanna going for all that’s left, or something. Be sure to thank the helpers.

## WASTE MANAGEMENT JEOPARDY

	NATURAL RESOURCES	POLLUTION PREVENTION	COMPOST	LANDFILLS	SORTING
\$ 100	WHAT TYPE OF ROCK IS AN IMPORTANT PART OF THE GLASS MAKING PROCESS? (What is Quartz)	WHAT ARE THE 3 R's? (WHAT ARE REDUCE, REUSE, RECYCLE)	WHAT IS COMPOST USED FOR? (WHAT IS TO IMPROVE SOIL QUALITY)	ARE OPEN DUMPS THE SAME AS SANITARY LANDFILLS? (WHAT IS NO)	HOW ARE PLASTICS SORTED FOR RECYCLING? (WHAT IS BY THE NUMBER ON THE BOTTOM OF THE CONTAINER)
\$ 200	WHAT IS THE MAIN NATURAL RESOURCE USED TO MAKE PLASTICS? (What is Petroleum)	HOW CAN YOU PREVENT POLLUTION WHEN WALKING YOUR DOG? (WHAT IS SCOOP THE POOP)	NAME 1 THING THAT WILL SPEED UP THE RATE OF COMPOSTING. (WHAT IS SHRED THE MATERIALS, TURN OR WATER THE PILE)	WHAT IS AMERICANS #1 THROWAWAY THAT ENDS UP IN LANDFILLS? (WHAT IS PAPER)	HOW IS GLASS SORTED FOR RECYCLING? (WHAT IS BY COLOR)
\$ 300	WHAT IS THE MAIN NATURAL RESOURCE USED TO MAKE PLASTICS? (What is Petroleum)	BESIDES REDUCING WASTE, WHAT IS A GOOD REASON TO USE POLLUTION PREVENTION TECHNIQUES? (WHAT IS USUALLY SAVES MONEY)	NAME 1 ANIMAL THAT HELPS BREAK DOWN MATERIALS IN A COMPOST PILE. (WHAT IS EARTHWORM, VARIOUS INSECTS)	WHAT IS THE NAME OF THE GAS THAT ESCAPES FROM LANDFILLS? (WHAT IS METHANE GAS)	HOW DO YOU PREPARE ALUMINUM CANS FOR RECYCLING? (WHAT IS RINSE AND CRUSH)
\$ 400	WHAT % OF ENERGY IS SAVED BY RECYCLING INSTEAD OF PRODUCING NEW ALUMINUM FROM ORE? (What is 90 – 95%)	WHAT TOXIC ELEMENT IN THERMOMETERS CAN BE AVOIDED BY USING DIGITAL ONES? (WHAT IS MERCURY)	WHAT DOES BIODEGRADABLE MEAN? (WHAT IS DECOMPOSES READILY BACK INTO THE SOIL)	ABOUT HOW MUCH OF THE MATERIAL IN A LANDFILL COULD HAVE BEEN RECYCLED OR COMPOSED? (WHAT IS ACCEPT ANYTHING OVER 50%)	WHAT RECYCLABLE MATERIAL CAN BE MADE INTO CARPETING, CLOTHING, TENNIS BALLS, AND CONTAINERS? (WHAT IS PLASTIC)

**FINAL JEOPARDY QUESTION:** RECYCLING 1 GLASS BOTTLE SAVES ENOUGH ENERGY TO LIGHT A 100-WATT BULB FOR HOW MANY HOURS??

**FINAL JEOPARDY ANSWER:** 4 HOURS

## Activity: Litter-Less Lunch

Activity from Pollution Solutions, a curriculum supplement about litter and pollution prevention based on the Standards of Learning for grades K-12. Developed by the Virginia Resource Use Education Council and funded by the Litter Control and Recycling Fund. Full curriculum can be downloaded from <http://www.deq.virginia.gov/education/polsol.html>

**Serves:** Third Grade

**SOL's Addressed:** Science: 3.1

### Resource Materials:

1. A selection of lunch items (e.g., sandwich, crackers, cheese, fruits, cookies, drinks, etc.)

*Note:* include examples of both reusable and one-time-use wrappings and containers

2. A nutrition poster (optional)

3. Paper and pencils

### Goal:

Students will question and discuss packaging food items and design a litter-less lunch.

Investigate and understand how much packaging--trash—and possible litter could be in a lunch.

### Background

Millions of school-aged children across the country carry packed lunches to school. Depending on how the lunch is packed and what is packed in the lunch, there is almost always some trash produced. There are some ways to reduce the amount of trash (waste items that will be discarded) in a lunch. The first and easiest change to make to pack foods that the child will eat. If you know that your child will not eat the crust of the sandwich, you might want to pack a "crustless" sandwich and compost the bread crusts at home. Another thing is to look at the containers that you pack the lunch in-- will your child return containers or will they be lost at school or on the bus? If you can count on getting the containers back, it is worth the investment to purchase some plastic tubs and a lunch box. If the child has a tendency to lose things, then you may want to try to re-use some margarine tubs or other "recycled" containers. While all of our food needs some sort of packaging, we can reduce the amount of packaging needed by buying larger containers and dividing the product into smaller reusable containers. For example if a child eats raisins for lunch, instead of buying the smaller one serving boxes of raisins you can buy the larger box of raisins and divide them into serving sized portions. Not only will you be saving packaging, you will also save money. If "everyone" at school eats the new pre-packages lunches that can be bought in the grocery store deli, you may want to make some of your own using crackers, meats, cheeses and reusable containers. And finally, many food items can be composted; aluminum cans and some plastic containers can be recycled.

## How To Instructions:

1. Ask students what they will have (or have had) for lunch that day. Make a list of the items on the board or an overhead. Have students analyze the waste materials left after eating each of the items. Don't forget the "natural packaging" (e.g., banana peels) and the leftovers (e.g., apple cores and crusts of sandwiches).
2. Discuss packaging methods by asking for and including students' thoughts. Starter questions might include: Why might food need to be "packaged"? What are the advantages and disadvantages of the different kinds of packaging? Can the packaging or containers be reused? Ask students if they ever see any of these items on the floor, tables, or chairs. Establish an understanding about how and when these items become litter.
3. Divide the class into several small teams. Have each team "pack a lunch." (This might be accomplished by students listing, drawing, or collecting visuals of "lunch materials.") Explain that each team should also list all item that would be left and thrown away after their lunch is eaten.
4. Allow each group the opportunity to come forward and share their lunch and findings. Note the lack of trash being generated. Ask about and commend groups as they explain how they would prevent their trash from becoming litter! Determine which team had the least amount of trash! Then ask which teams left any litter? None!!

## Variation for older students:

Assign a differently focused lunch to each group. The lunches might include "the Tastiest," "the Healthiest," "the Most Packaging," and "the Least Packaging." Additional categories can be considered, or assign more than one group to each category. The groups should record their lunches as above and share with the rest of the class. Promote awareness of the lack of trash being generated and discuss how to keep any trash from becoming litter!

## Optional Teacher Follow-up:

The whole class can participate in a "Litter-Less Lunch Day." On the designated day each student should carry their lunches to school. As lunch time is finishing, each team should count and record one point for each item that will be thrown away after they are done eating (food scraps become trash). Each team's record should include the total sum of its members' trash. It should also be noted: "5 points will be added to any team's total if there is any trash remaining where it is not supposed to be (litter)!" The team with the least amount of points gets to take a bow!

## Activity: Luscious Layered Landfill

(Developed by Delaware Solid Waste Authority. Adapted for EPA Quest for Less Activity Guide.)

**Grades:** 1-4

**Goal:** To teach students how a modern landfill functions (that is, how its many layers contain garbage and prevent leakage into soil or ground water).).

Students will construct edible models of a landfill to learn about its different layers and their functions.

**Key Vocabulary Words:** Landfill, Clay Liner, Plastic Liner, Leachate, Leachate Collection Pipes, Methane, Decompose, Rodent

**Time:** 1 hour

**Skills Used:** Observation/Classification, Motor Skills

### Resource Materials:

- One 8-ounce pliable clear plastic cup per student
- Five chocolate sandwich cookies per student
- One 8-ounce box of raisins
- One fruit rollup per student
- Two graham crackers per student
- Two red licorice sticks per student
- One package of birthday candles
- One set of matches
- One scoop of chocolate ice cream (or pudding) per student
- Two tablespoons of whipped cream per student
- One plastic knife per student
- One plastic fork per student
- One handful (per student) of a variety of small chewable candies (e.g, chocolate, peanut butter, fruit)
- One copy of *Anatomy of a Landfill* handout per student

### How-To Instructions:

**Step 1:** Refer to the Teacher Fact Sheet titled *Landfills* on page 165 for background information. Explain the purpose of a landfill to students and explain that they will construct their own model landfills in class. Copy and distribute the *Anatomy of a Landfill* handout. Using the handout, go over each layer's name and function with students.

**Step 2:** Distribute a cup and five chocolate sandwich cookies to each student. Explain that the cup represents an excavated hole in the ground.

**Step 3:** Have students carefully “unscrew” two of their cookies so that one half has white cream and the other is bare. Students should have two cookie halves with white cream and two cookie halves without cream. Crush the bare cookie halves into small pieces and put them into the cup. Explain that the crushed cookies represent a layer of soil that is placed in the bottom of real landfills.

**Journal Activity:** Ask students to list some common items that they throw away. What do they think people threw away 100 years ago? Ask them to predict what we will throw away in the future. What would they expect to find in a landfill in another country (pick a country)? Ask students to compare these answers with the United States.

**Step 4:** Next, have the students take the cookie halves with white cream and break them up into two or three pieces. Direct students to place the pieces in the cup with the white cream face up. These pieces represent a layer of clay that is put on top of the soil in real landfills.

**Step 5:** Have students use the plastic knife to cut their fruit rollups to roughly fit the size of the top of cup and slide them into place (will push up on sides) on top of the cookies to represent a plastic liner. Plastic liners prevent leachate from escaping from a landfill into the ground. Leachate is liquid created when trash decomposes.

**Step 6:** Have students crush and add their graham crackers to represent a sand layer. This layer is used to prevent liquids in landfills from seeping out.

**Step 7:** Have students place raisins on top to represent a layer of pebbles. Like the sand layer, pebbles provide further protection against leachate leaks.

**Step 8:** Have students rip the licorice sticks in half and bite off both ends to represent leachate pipes. Stick pipes into pebble layer. These pipes collect any leachate that collects on top of the liners.

**Step 9:** Ask students to sprinkle the candies on top of the raisins. The candies represent pieces of garbage. Ask students to think about what happens when a landfill or “cup” is filled up with trash or “candies”? How can they reduce the amount of trash that they send to the landfill? (Refer to the Teacher Fact Sheet titled Recycling on page 101 for background information.)

**Step 10:** Give each student a scoop of ice cream on top of the candies. Then, have the students add one more layer of candies on top of the ice cream. The ice cream layer represents the seepage created from rain seeping through the garbage. Explain that in a real landfill, more layers of garbage or “candies” are placed on the landfill each day, so that liquid from the decomposition of the trash is continually created.

**Step 11:** Direct students to “unscrew” their two remaining cookies and crush another layer of the bare cookie halves, without the cream, on top of the candies and ice cream to represent soil again. (Students can eat the other cream-covered cookie halves.) This layer reduces the amount of rain water that reaches the garbage.

**Step 12:** Each student should use a layer of whipped cream to “cap” the landfill or cover it (as would a plastic cap) in order to prevent odor, insect, and rodent problems.

**Step 13:** In front of the class, stick a candle deep into your own edible “landfill” and light it. Explain that the candle represents the methane gas recovery system, which draws methane gas from the decomposing garbage. The flame represents energy that can be generated by burning the captured methane gas.

**Step 14:** Have students eat their landfills as a snack. When they get to the bottom of their cup, ask students to notice whether their cookie or “soil” layer is dry, or whether the ice cream or “leachate” leaked past the many layers and the fruit roll-up liner to soak the cookies. Remind students that if they built their landfill correctly, their cookies will be dry, just as in a real landfill the soil remains protected from leachate.

**ASSESSMENT**

After enjoying the luscious layered landfill as a snack, ask the students if they remember the purpose of all the different parts, such as the fruit roll-up, the licorice, the cookies, and your candle.

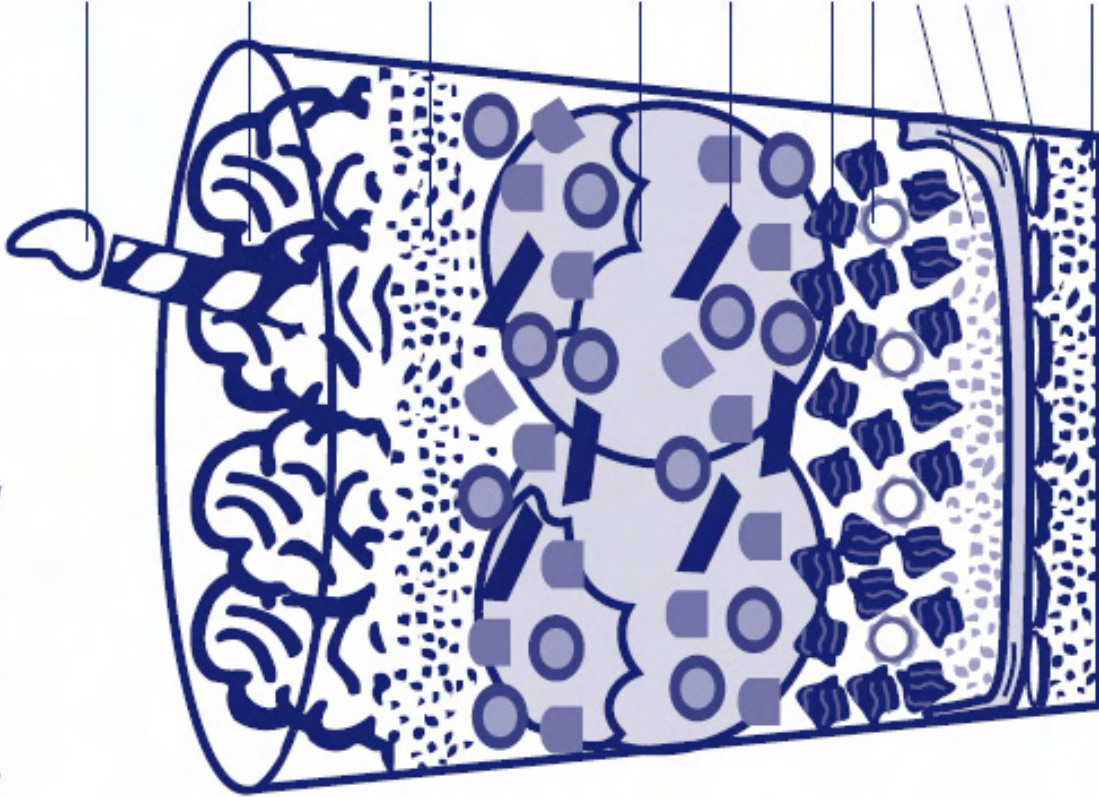
**ENRICHMENT**

Contact a landfill in your community and take a tour. Ask to hear about all the different parts of the landfill. If your landfill recovers methane for energy, ask for a tour of the plant.

Have students conduct a survey of friends and family asking them where their garbage goes. Have them record peoples' responses and determine whether they are well informed. In class, discuss the survey results.

# Student Handout

## Anatomy of a Landfill



Methane gas recovery system (candle): recovers gas for energy from decomposing garbage

Landfill cap (whipped cream): prevents odor, insect, and rodent problems

Soil layer (cookie pieces): used to cover daily garbage

Leachate (ice cream): natural byproduct of decomposing garbage

Garbage (candies): added daily from communities

Pebble layer (raisins): prevents liquid from seeping out

Leachate pipe (licorice stick): collects leachate

Sand layer (graham crackers): prevents liquid from seeping out

Plastic liner (fruit rollup): prevents leachate from escaping into the ground

Clay layer (cookie pieces): absorbs any leachate (or liquid) that escapes the plastic liner

Soil layer (crushed cookies): lines the bottom of the landfill

# **AGRICULTURAL AWARENESS & FIELD DAYS**

**Harvest Fair  
Agriculture Awareness Days  
Environmental Field School  
Down On The Farm Tour  
Tour Du Park**

