

GOOEY GARBAGE

Dear Presenter,

This is a 20 to 25 minute presentation and HANDS-ON activity for approximately 25 - 30 ten year-old children. You **MUST** do this activity at home **BEFORE** you attempt to lead the activity during the Water Festival.

As each new group of students arrive, find the classroom teacher, introduce yourself, and let the teacher know this is a hands-on activity and you will need assistance from him/her. If you do not ask for assistance, the teacher will assume that **YOU** are the **EXPERT** and they are the observer! Plan when you will ask the teacher for assistance! **DO NOT** hesitate to call the teacher by name and politely ask for their assistance with **ANY** of your needs.

As each session begins, introduce yourself to the students. “Good morning, my name is.... and I work for..., I am a or simply I am happy to be here today.” Then introduce the topic of this presentation. Each step of this presentation is explained in this packet. These are recommended guidelines and do not have to be followed exactly word for word. However, you may present this material just as written. Feel free to personalize the presentation to suit you, if necessary.

Thank you for volunteering to present “Gooley Garbage.” Have fun, enjoy yourself, and we hope you will consider volunteering again next year.

Big Sioux Water Festival

GOOEY GARBAGE

BACKGROUND

Background information is provided as a basic overview with both general and specific information. Share this information with the students throughout the presentation.

Humans have always produced waste. Prehistoric cliff dwellers in Colorado used the back rooms of their cliff homes to dump waste. Around 500 B.C., the first known regulations against throwing waste in the streets were issued in Greece. Archaeologists explore the waste of prehistoric people to better understand their society, culture, and the way they lived.

Ancient landfills were often places of continuous burning fires. People began covering their waste with soil because of smell, rodents, and flies. In 1916, “sanitary landfills” were developed. This is when soil was placed on top of the waste each day.

Growing populations and the great number of new products have increased the problems with landfills. When rain, snow, or runoff water soaks into and through a landfill, it can dissolve some of the landfill’s contents and carry it on down to the groundwater. This mixture is called leachate. As the amount of waste increases, the potential for leachate to enter the groundwater increases.

Groundwater supplies vary around the world. When groundwater is the only source of water, it is an especially valuable resource. Clean water is essential for the existence of life. Contamination of groundwater is difficult and expensive to reverse and may remain for a long time.

In various parts of the world, including the US, regulations are established to protect groundwater. Barriers such as plastic or clay layers must be installed in new landfills today. Double liners are presently installed in new landfills. Permits are required to open and close landfills. Research is continuing to determine even more efficient ways of preventing pollution of our groundwater.

Many people have the attitude that once they have taken their trash to the curb, dumpster, or landfill, they no longer need to be concerned about it. Naturally, most people don’t spend their time thinking or worrying about the garbage that they send to the landfill. But what people send to the landfill can have a profound effect on the quality of groundwater.

GOOEY GARBAGE

VOCABULARY WORDS

(When introducing these words, do not assume the students will already know the meaning of them. You will probably need to explain the meaning)

<i>Aquifer</i>	A land formation that stores water
<i>Barrier</i>	Blocks or stops further movement
<i>Chemicals</i>	Items like cleaning supplies
<i>Clay</i>	Natural earthy material that is plastic when wet
<i>Contamination</i>	An impurity
<i>Containment</i>	Holds something within a defined space
<i>Environment</i>	The total circumstances surrounding an organism or group of organisms
<i>Fertilizer</i>	A chemical used to make plants grow bigger
<i>Groundwater</i>	Water under the ground
<i>Landfill</i>	An area of land where public waste is disposed of
<i>Leachate</i>	The liquid formed when water soaks into and through a landfill, picking up a variety of suspended and dissolved materials from waste
<i>Liner</i>	Plastic or clay used to seal an area
<i>Percolation</i>	To filter or ooze
<i>Pesticide</i>	A chemical used to kill insects
<i>Precipitation</i>	Water in the form of rain, snow or ice
<i>Solvent</i>	Substance that dissolves another substance
<i>Toxic</i>	Caused by poison

GOOEY GARBAGE

MATERIAL LIST

(FOR 6 SESSIONS WITH 24-30 STUDENTS PER SESSION)

CONSUMABLES

- Plastic baggies (1 box of 1 gallon baggies - 36 minimum(NOT ZIPLOCKS))
- Ketsup (6 - 24 oz. bottles)
- Food coloring (6 boxes of 4 dropper bottles)
- Vegetable oil (at least ½ gallon)
- Syrup (6 - 24 oz. bottles)
- Spaghetti's (6 - family size cans)
- Cereal (36 - 8 oz. cups)
- Green hamster bedding (36 - 8 oz. cups)
- Paper towels (6 rolls)
- Bathroom tissue (6 rolls)
- Solo cups (36 - 3 oz. plastic cups)
- Large garbage bags (3)
- Water (6 - 20 oz. or larger bottled water)
- Potting soil (36 - 8 oz. cups)
- Newspapers (to cover supply tables and work stations)
- Box of plastic spoons

NON-CONSUMABLES

- Pitchers (2 - 2 gallon pitchers to refill bottled water)
- Milk jugs (8 - 1 gallon milk jugs with lids and bottoms)
- Wooden paint stirrers (6)
- Wooden skewers (2)
- Can opener
- 110 - 8 oz. re-usable plastic cups
- Modeling clay and/or manufacturer's sample of geo-membrane lining
- Poster-tac
- Rag
- Gooley Garbage Procedure Notebook
- Visuals (banner with a cross-section of a landfill)
- Storage tube (for banner)
- Handouts for class (1 per student)
- Teacher key for handout

GOOEY GARBAGE

AREA REQUIREMENT

Classroom with tables and chairs

PRE-PREPARATION

- Check supplies against supply list
- Prepare milk jugs by cutting 3" off the bottom of the milk jug. The top portion will be the landfill (you will have students invert the milk jug to fill during the activity). The bottom portion will be used for the aquifer
- Copy student handout
- PRACTICE ACTIVITY

PREPARATION : Approximately 1 ½ hours to set up

- Fill 36 cups with cereal
- Fill 36 cups with hamster bedding
- Fill 36 cups with potting soil
- Fill 36 Solo cups with vegetable oil
- Hang up banner of landfill
- Place handouts in a location accessible for teacher to pick up at end of the session
- Open 6 cans of Spaghettio's and dispose of lids
- Set up 6 work stations. Each station will accommodate 3 - 6 students

Each work station includes:

- 1 cup of cereal
- 1 cup of soil
- 1 cup hamster bedding
- 1 cup of oil
- 1 box of food coloring
- 1 can of Spaghettio's
- 1 plastic spoon
- 1 roll of bathroom tissue
- 1 bottled water
- 1 bottle of ketchup
- 1 bottle of syrup
- 1 milk jug with lid on and bottom tray
- 1 baggie
- 1 wooden paint stirrer
- several paper towels

GOOEY GARBAGE

SAMPLE ROOM SET UP

VISUAL DISPLAYED AT FRONT OR SIDE OF ROOM
WHERE STUDENTS CAN EASILY VIEW

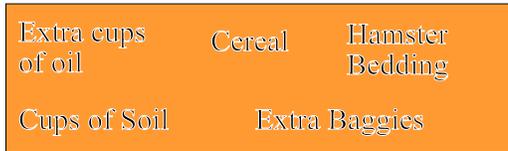
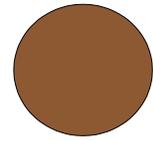


TABLE FOR REFILL SUPPLIES



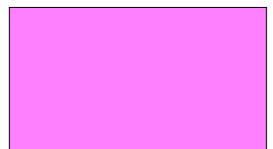
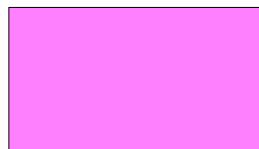
TABLE FOR EMPTY CONTAINERS AND PAPER TOWELS



LARGE LINED GARBAGE CAN



6 WORK STATIONS WITH 3-6 STUDENTS PER STATION



GOOEY GARBAGE

SAMPLE ROOM SET UP

SAMPLE WORK STATION

STUDENT

STUDENT



STUDENT

STUDENT

GOOEY GARBAGE

THIS IS A 20-25 MINUTE PRESENTATION
(Procedure note cards for this presentation are included)

To best explain and supervise this activity, ONE MUST DO THIS ACTIVITY BEFORE the actual presentation.

INTENDED STUDENT OUTCOMES

By completing this activity students should be able to:

- Explain the history of garbage and landfills
- Understand why people should be concerned about what happens to their garbage
- Know the meaning of leachate and how it is a possible source of groundwater pollution
- Be able to evaluate their own landfill contributions

PROCEDURE

1. Introduce yourself with enthusiasm to your students
2. Break the class into groups of 3-6 students. You may wish to ask the teacher to assist you with this step.
3. This activity works well with a discussion about aquifers and reservoirs. Ask students if they know the source of their local drinking water. After everyone has answered, put a small amount of water in one of the “aquifer” milk jug bottoms to demonstrate groundwater. Tell the students they will be learning about landfills and how contamination can occur.
4. Explain the history of garbage and landfills.
5. Ask the students to look at the materials at their work station. Tell them to try to remember where everything is located. Forewarn them that the work station will need to look like this when the session is completed. The room will be ready for the next group of students if you follow this procedure. Begin lab activity
6. Explain landfills (commonly referred to as a dump) are similar to the milk jug container in front of them. The earth has a hole dug into it (the milk jug), a liner (the baggie) is placed in the hole, with solid waste (the items to be put into their landfills). Finally, rain (water from the bottle) falls on the top soil of the area.
7. Explain liners from the background information and show samples of the clay and plastics (if available). Pour water into a bowl of modeling clay. Ask the students where the water went. Show that water sits on top of clay. Explain that clay is used as the liner in landfills north of Missouri and plastic is used in Missouri and south. In some instances, both are used. Have one student secure the lid on the milk jug.
8. Begin to fill the landfill. Ask students for types of waste disposed of in landfills. Use supplies provided to represent items that students suggest. Add each item to the

landfill, SOIL LAST. Not every student suggested waste may have an appropriate “supply item.” Each time a supply item is added to the landfill, ask students if there is a better way to dispose of that item. Other means of disposal may include: recycle center (plastics, newspaper or paper products), composting (plant and food waste) or reusing (paint, oil, etc.)

Use the following reference chart

STUDENT SUGGESTED WASTE	SUPPLY ITEM
PAINT	FOOD COLORING
OIL AND PETROLEUM PRODUCTS	VEGETABLE OIL
CLEANERS	KETSUP
ITEMS THAT DON'T DECOMPOSE (ELECTRONICS, DISPOSABLE DIAPERS, GLASS, ETC.)	SYRUP
PAPER PRODUCTS	BATHROOM TISSUE
PLANT WASTE (GRASS CLIPPINGS, LEAVES, STICKS, ETC.)	HAMSTER BEDDING
FOOD WASTE	CEREAL
SOLID WASTE	SPAGHETTIO'S

9. Soil is the last item to add to the landfill. Explain to students that “open” landfills are illegal and that soil is used to cover the garbage.
10. Students need to stir the landfill. The bulldozer that covers the garbage “stirs” the waste as it pushes it around. Caution the students not to touch the bottom of the landfill.
11. Ask the students how the landfill smells. Remind them that prehistoric landfills were continual fires and that “sanitary landfills” were introduced relatively lately. Next have the students “sanitize” their landfill by raining on it (carefully squirt water onto their stirred mixture). Discuss precipitation, percolation, and leachate and point out the leachate collection system on the banner.
12. Next ask the following question: “What will happen when the lid is taken off the milk jug?” You should get a variety of answers. *Nothing will happen if the students haven't ripped the bottom of the baggie when they stirred the landfill.*
13. Instruct the student to carefully remove the lid from the milk jug, holding the jug over their aquifer (the aquifer is the tray made from the bottom of the milk jug)
14. “Why did nothing happen to our aquifer?” *Because of the liner.* “What happens to the water if the liner breaks or the clay leaks?” *Leachate*

15. At this point, walk around the room and gently poke holes in each liner. Have student hold milk jug up over the aquifer and watch what happens!

SET UP FOR NEXT SESSION

- Ask teacher to go around the room with the large garbage can and collect from each station the landfill liner and garbage.
- Have one student from each station carefully clean out the milk jug with the paper towels and a little water from the bottle. Also have that student carefully wipe off the stir stick. Discard the paper towels in the garbage can.
- Have one student from each station bring up to the table for empty supplies, the empty cups from their station.
- Have another student from each work station come up to the front table where the extra supplies are kept and take one cup of each of the following back to their work station: soil, cereal, hamster bedding, and vegetable oil
- Instruct a student at each work station to replace paper towels on their work station from the roll you have. Only replace what was used in their session.
- Give each student the student handout. Give teacher the answer key
- Thank everyone for participating, compliment behavior and answer any questions the children may still have.

GOOEY GARBAGE

FINAL CLEAN UP AFTER LAST SESSION

Approximately 15 minutes

- Replace banner in storage
- Reassemble Procedure Manual
- Rinse and save 8 oz. plastic cups
- Discard Solo cups
- Empty and save bottled water bottles and lids
- Rinse and save plastic milk jugs, bottoms and lids
- Wipe off all work stations and discard all used paper products into the garbage
- Place all reusable and unused items in a large storage container for use in the future.