Landfill Logic Activity Kit

Core Activity:
Landfill Logic Model Build

Lesson Summary:
Student discuss one aspect of our waste disposal system; Landfills. Students will build a model landfill to demonstrate the complexity of landfill systems and identify potential problems. Student will also discuss issues during a game that demonstrates just how difficult it can be to have enough space for our trash.

UNIT: Generation Zero

GRADES: 3rd and up

MATERIALS:
- 6 landfill model boxes with:
  - 10 Landfill clue cards
  - Playdoh
  - Plastic wrap
  - 3 Straws
  - Gravel
  - Mixed debris "trash"
  - Brown felt
  - Green felt/grass
  - Black Felt
  - Black Netting
- "What's in a Landfill" Pie Chart
- Sample of Geotextile and HDPE plastic liner

TIME REQUIRED: 40 minutes

OBJECTIVES:
Students will be able to:
- Define what a landfill is and the role landfills play in our waste disposal systems
- Identify the parts of a landfill and accurately construct a model landfill
- Identify problems with landfills and propose solutions

TEKS CORE CONCEPTS:
- +++

For specific TEKS, see document in Activity Resources Tab

Introduction (*5 minutes*)

1. Ask students: *What is "trash"? Where does it go when we throw it away.*
2. Explain that a landfill is a giant hole dug into the ground into which we put our "trash".
   - Explain that landfills have a lot of layers in order to protect the water in the ground = Hole, clay, plastic liner, gravel, pipes, filter, filter #2, waste, dirt, trash, dirt, etc.
   - *Extension – Draw a basic landfill on the board or have students build an "arm" landfill by pretending to add the layers with their arms.*
   - *Extension – discuss difference between a dump and a landfill. A dump has no protecting layers*
3. Discuss Historical waste management methods. Ex: dumping in the ocean, dumping in rivers, dumping in holes in the ground, pig farms, burning,

Landfill Model Build (*20 minutes*)

1. Divide students into 6 groups. Give each group a landfill container with all the supplies inside along with the landfill clue cards.
2. Instruct students that they will be using the clue cards to build their own landfill. Each student will read a card aloud and determine where it fits into the order of building the landfill and organize the clue cards accordingly.
3. Once the order of the cards has been approved by the instructor, students may begin constructing their landfill. The "Anatomy of a Landfill Page" outlines the correct order.
   - Try to keep the model materials separate – other groups have to use them! Please keep in mind as you are building models
   - HINT – the gravel and trash layers should be separated by other materials in your model so they don't mix!
4. Review the lays of the Landfill. Discuss how complicated the process is. *Why is it so complicated?*
   - Layers to protect ground/surface water, collecting methane, mitigating leachate, space, noise.

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Core Activity:
Landfill Logic Model Build

Landfill Fill –Extension (*10 minutes*)

1. Spread plastic chips over a large area. Use the What's in a Landfill Chart to show some of the main landfill materials and that the color chips represent each one.
2. Designate two students to be the landfills and set them on the outskirts of the 'urban' area.
3. All other students are sanitation engineers. They will haul trash one chip at a time to the landfills. Each chip represents one load and this is all they can carry at a time.
4. The 'landfills' hold out their arms and hands together in front of them and collect the chips on their hands and arms (not their shirts). Once the landfills begin to overflow they can no longer accept plastic chips.
5. What are the options?
    a. More landfills - be sure to emphasize what is being destroyed (housing, parks, stores).
    b. Recycle – open one or two recycling centers for certain materials.
    c. Commercial Compost – Open a composting facility for compostable materials.
6. Continue with the trash being picked up and being taken to landfills and/or recycling/composting centers.
    a. Use these extension scenarios to begin conversations about what can be done, what we are currently doing, and why there is no easy solution.
7. End when there is trash left and there is nowhere else to place it. This will build the concept that there is still a problem to be tackled.

Closing (*5 minutes*)

1. *What are the pros and cons of landfills? What can be done so landfills last longer?*
2. *What can we do with this info?* Recycle and Compost more to be Zero Waste Champions! Review the Zero Waste goal (more info in Background Information Tab) and how students can make a difference in their own homes and classrooms.

Next Steps

See Extension Activities Tab

Landfill Logic Activity Kit

Background Information

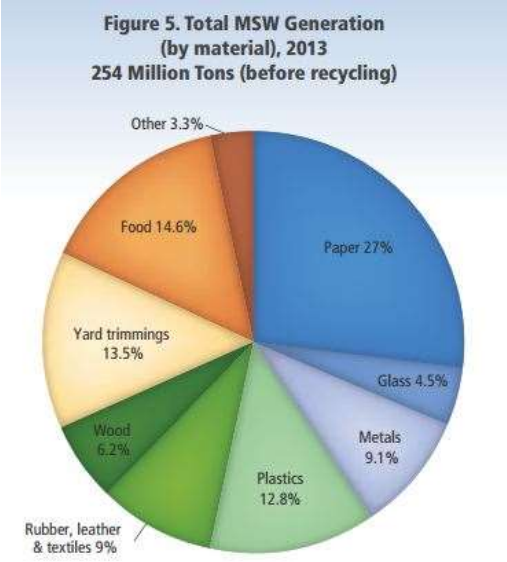
ADDITIONAL INFORMATION

- **City of Austin Resource Recovery –** www.austintexas.gov/department/austin-resource-recovery
- **Zero Waste International Alliance –** www.zwia.org
- **Environmental Protection Agency –** www.epa.gov/osw/nonhaz/municipal

Not many people think about their garbage or waste after it leaves their hands. The common concern for citizens when it comes to landfills is the Not in My Backyard saying. However, there are many more reasons to be concerned. With the population growing rapidly, it becomes more and more difficult to find room to dispose of our waste, especially in urban settings. Space that is dedicated to landfills results in a loss of habitat, odor, and the potential for environmental contamination. While some resources can be harvested from landfills, many more natural resources are taken from the environment to produce new materials. In addition, landfills are very expensive to build and maintain. Americans spend $7 billion a year on trash disposal. The cost of building a landfill depends on where you are, but it can range anywhere from 1 million to 20 million dollars or more.

Waste in America

On a daily basis, individuals in the United States generate approximately 4.45 pounds of waste. In 2013, this amounted to over 250 million tons! While such a high number, Americans composted and recycled close to 35% of what was collected. Slowly, through economic incentives and regulations, municipalities and private companies are finding ways to reduce production and landfilling of waste. Recycling synthetic materials like aluminum and plastic are offered in most towns across America. Bulk brush pickup once a week in Austin and composting at schools and backyards helps reduce organic waste. A newer form of recovery uses landfill trash as an energy source by harvesting methane fuel or combusting the trash. These practices not only save landfill space and resources but also reduce greenhouse gases and potential for environmental contamination over time.



Evolution of Municipal Waste Management

For centuries, people have produced waste. Municipal solid waste management (MSWM) in the United States is a system comprised of regulatory, administrative, market, technology, and social subcomponents, and can only be understood in the context of its historical evolution. American cities lacked organized public works for street cleaning, refuse collection, water treatment, and human waste removal until the early 1800s. Before the industrial revolution much of this waste was reused at home or separated and sold as scrap. Major cities such as New York began focusing on waste and sanitation due to trash rotting in streets and linkage to disease. In the early 1900s, large cities saw record growth of trash production in a short amount of time due to immigration and population growth. Without regulations from the government waste was haphazardly hauled off as scrap, fed to pigs, burned, or dumped in local waterways. Problems with these methods combined with cheap disposable materials led cities to form waste divisions and collection systems. Below is a timeline of events highlighting the major disposal methods and milestones:

Landfill Logic Activity Kit

Background Information

Timeline	Method	Description	Impact
1800's	Street Dumping and Scavenging	Rag Pickers collected, sold, and repaired waste items from the wealthy such as old clothing, bones, and scrap metal.	Seen as a job for the poor, children made up the majority of Pickers. Any unwanted refuse was left in the street causing odors and disease.
1890	Incineration	Chimneys with flue screens burn waste and reduce ash and smell around the city.	Created heavy air pollution and not well regulated. Resulted in too much waste to burn and no proper ash disposal method.
Early 1900's	Ocean and Waterway Dumping	Sending waste out on barges and ships to dump in the water.	Still struggling with heavy amounts of waste today. Toxic chemicals affect aquatic animal populations. Currents bring waste back to shore and pollute beaches.
1906	Street Cleaners	NYC employs street cleaners to remove ash, waste, and debris for the first taxpayer funded municipal solid waste collection.	Method still allowed citizens to dump trash in the street. People didn't want to pay taxes for the service.
1915	Open Dumping and Pig Food	Many small towns and rural areas designated small patches of land for open dumping from city waste and sorted organics to feed pigs.	Open dumping attracted vermin, and animals. Heavy odor and soil/groundwater contamination. Not practical for larger towns and cities because of the high waste volume.
1930's	Invention of the Landfill	Army Corps of Engineers pioneered American landfills for disposal of military waste during WWII.	No barrier between waste and the natural environment except soil.
1976	Federal control of MSW	The Resource Conservation and Recovery Act (RCRA) grants EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste.	
1991	Modern Sanitary Landfill	EPA established guidelines for the current standard of a sanitary landfill – groundwater monitoring, plastic liner, closure procedures, funding to maintain closed landfills.	Many landfill liners leak over the long term. Sanitary landfills require many resources and open land to build; and encounter slow anaerobic decomposition from being covered with soil.

Source: EPA, Waste and Want, Global Fuel Trading Co.,

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Background Information

Presently, Americans have access to many cheap and disposable goods which has dramatically increased the amount of trash produced. Subsequently, the government has evolved regulations and ways to efficiently and safely collect and dispose of trash. The most common method of waste disposal today is use of a sanitary landfill. Municipalities work with private waste and recycling companies to collect and properly dispose of garbage. Waste Management is currently the largest trash hauler in the world. How did they get there? Every time we fill up our garbage can, we pay money to the city we live in or directly to a waste company to have it removed and properly disposed of. Each garbage truck is weighed and assessed a tipping fee – price per ton. Although the upfront cost of a landfill can be incredibly high, garbage is becoming more expensive to dispose of which generates revenue for the waste company. As recycling becomes more efficient and widespread and land becomes scarcer, one day the hope is that diverting waste from landfills and reprocessing it into a new product will create bigger profits than charging to dispose of it in the ground.

Choosing a Site

Many factors must be taken into consideration before even beginning construction. Location of water sources, geologic stability, land value, and easy access are important to the decision of where to build. The Environmental Protection Agency has many regulations to ensure a site's safety and stability for many decades:

- **Location restrictions**—ensure that landfills are built in suitable geological areas away from faults, wetlands, flood plains, or other restricted areas.
- **Composite liners requirements**—a flexible geomembrane overlays two feet of compacted clay soil lining the bottom and sides of a landfill, and protecting groundwater and the underlying soil from leachate releases.
- **Leachate collection and removal systems**—sit on top of the composite liner and removes leachate from the landfill for treatment and disposal.
- **Operating practices**—include compacting and covering waste frequently with several inches of soil helping to reduce odor; control litter, insects, and rodents; and protect public health.
- **Groundwater monitoring requirements**—required testing of groundwater wells to determine whether waste materials have escaped from the landfill.
- **Closure and postclosure care requirements**—covering landfills and providing long-term care of closed landfills.
- **Corrective action provisions**—control and clean up landfill releases and efforts made to achieve groundwater protection standards.
- **Financial assurance**—provides funding for environmental protection during and after landfill closure.

**The above requirements are provided directly from the EPA website.*

Choosing the appropriate place for construction of a landfill can be very difficult. Landfill companies must consider a location in the community that is well away from complaining neighbors but close enough for trucks to access daily. New York is running out of room and now pays Pennsylvania to haul and dispose of their waste and some even ends up as far as South Carolina! Austin's landfills are located on the east and south sides of the city to avoid building over the aquifer and utilizing heavy clay soils with lower permeability.

Landfill Operations and Anatomy

Landfills are complex structures built underground. Before a landfill can begin accepting trash it must be properly sealed. Construction begins with clay and a very thick plastic liner that prevents leachate

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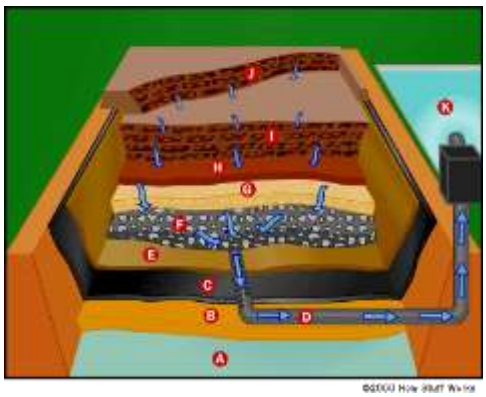
Background Information

(decomposing garbage mixed with rain water) from escaping the landfill into the surrounding environment. Perforated pipes (holes) are installed in the landfill to extract toxic leachate. The pipes are embedded in gravel to prevent trash from blocking the system and a layer of thick felt called a filter geotextile is placed between the sand and waste. After the liner, filters, and pipes are constructed the landfill can begin accepting waste. Each day trash is added to a section of the landfill called a working face, mowed over by tractors for compaction, and then covered with soil each night to prevent trash blowing off. Another pipe system is put in place to collect methane, a greenhouse gas produced by anaerobic (lacking oxygen) decomposition. The methane can be burned off by flares or used as a source of energy similar to natural gas. In Austin, methane is piped into the energy grid and used by Dell. The process and the landfills themselves are strictly regulated. It is expensive to properly contain the waste to prevent soil and water contamination, odors, and methane buildup in the landfill.



A. Surrounding environment
B. Clay Liner
C. Plastic Liner
D. Pipes (Methane Leachate Collection)
E. Sand
F. Gravel and pipes- Absorbs leachate
G. Sand
H. Filter geotextile- felt layer to filter
I. Cells – layers of trash and soil

Closed Landfill

Once a landfill is full, it is capped, closed and heavily monitored for many years to detect leaks. Due to the settling of decomposing waste, development on top of landfills is usually avoided. Closed landfills are often reclaimed for parks, wildlife habitats, or recreation. In Michigan, a closed landfill is used as a ski hill and in Buda Texas Disposal Systems uses closed landfills as an exotic game ranch. However, Gus Garcia Middle School in North Austin was built on top of an old landfill and parts of the buildings are experiencing problems due to sinking from decomposing trash. Gas monitoring wells and leachate collection systems are active and regulated. Many landfills are using methane gas similar to natural gas which can flow as long as waste is decomposing underground.

Austin's Zero Waste Initiative

By 2040, the City of Austin hopes to divert or "recover" 90% of all waste. Recovering waste can occur through recycling, reducing the amount of packaging a company produces, adding compost collection at the curb, and economic incentives for residents. This initiative has been adopted by one or more cities in California, New York, Colorado, Texas, Washington, North Carolina, and Hawaii. The goal of Zero Waste is to systematically eliminate waste in a landfill by changing the production, distribution, and processing of materials, providing comprehensive collection of refuse, and reclaiming waste into usable resources. Zero Waste implementation also eliminates environmental hazards of waste in natural environments such as groundwater, soil, and air pollution. Zero Waste initiatives began in the private sector. Honda, Hewlett Packard, Pillsbury, Toyota, and Xerox have already achieved or are in the process of reaching Zero Waste. Many other companies are following their example.

On the residential side of Zero Waste, Austin hopes to implement a 3 bin collection system: organics (compost such as food and yard waste), recyclables, and landfill trash. The City is also discussing plans to

build a complex drop off center for all waste products: household hazardous waste (paint, lawn chemicals), bulk material appliances, single stream recyclables, and organics. The facility will provide all residents and small businesses from any area of Austin a central location to dispose of materials. Above all, public education on resources and proper disposal methods will allow many more materials to be recovered.

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Pre-K – 5th grades

- Read poem – "Sara Cynthia Sylvia Stout Would Not Take the Garbage Out", by Shel Silverstein. *Where the Sidewalk Ends*
  - Found in Activity Resources Tab
- Read book – "Where Does the Garbage Go?" By Paul Showers
  - Found in Activity Resources Tab

6th - Adult

- The Great Waste Debate activity
  - Lesson plan in Extension Activities Tab
  - Community Group Cards in Activity Resources Tab

Tabling for a Fair/Festival

- This kit is not recommended for a tabling situation because of the complex pieces and involved nature of the activities

ADDITIONAL LESSONS

- **The Great Waste Debate**

Students role play as panel of community members that debate where to put a new landfill. They find that each community member has values important to them and there is no easy solution.

SERVICE ACTIVITIES

- **Litter Cleanup**
- **Trash Audit**
- **Recycling Drive**

Landfill Logic Activity Kit

Extension Activity:
The Great Waste Debate

Lesson Summary:

Students role play as panel of community groups that debate where to put a new landfill. They find that each community group has values important to them and there is no easy solution.

UNIT: Generation Zero

MATERIALS:
- Community Member Role cards

TIME REQUIRED: 25 minutes

OBJECTIVES:
Students will be able to:
- Identify with different community groups and their values
- Discuss various problems and compromises in selecting a Landfill site
- Identify reasons why landfills cannot be our only solution to trash

TEKS CORE CONCEPTS:
- +++

For specific TEKS, see document in Activity Resources Tab

Introduction (*5 minutes*)

1. Review what the students know about landfills. Look at pictures and get students thinking about what the environment of a landfill is like.
    a. Ex – Noisy, smelly, trashy, tracks driving in and out all the time, dusty.

The Great Waste Debate (*20 minutes*)

1. Announce that students will be hosting a mock debate to discuss where the new landfill in Austin will be built.
2. Divide Students into 4 groups and assign them each a community group. Have students read over their role and discuss what they value the most.
    - **Citizens from local neighborhood** – We live in Austin, and pay money to the city to give us garbage and recycle bins. Recycling is great, but we still create a lot of garbage. In fact, each person in Austin produces about 4.5 pounds of garbage per day! Since we pay so much to have it removed from our neighborhoods, once it gets picked up from our driveways, we don't want to see it, smell it, or think about it again!
    - **Texas Disposal Systems** – We are a waste collection company who takes care of the garbage at the landfill. At the end of every day we must cover the waste with soil and prevent people from getting hurt on our property. We are also responsible for making sure the garbage does not get out and harm the environment. Since the city is growing, we receive more and more waste each year. This means we must have enough land to expand the landfill if needed.
    - **City of Austin** – We are the middle men between the citizens and Texas Disposal Systems. This means we need to make sure we keep the citizens of Austin happy by having a quick and easy way to collect garbage. We pick up and take the garbage to the landfill owned by TDS. We must make sure the landfill is far away from the neighborhoods, but we don't want to have to travel too far away because we simply have too much trash to move!
    - **Keep Austin Beautiful** – Helps to make sure the city and creeks are pollution free, reaches out to citizens who care deeply about wildlife and the environment. KAB works to teach people about recycling and littering. The organization is concerned about landfills harming the nearby water sources and environment!

3. Based on which community group they are in, the students must decide where they think the new landfill in Austin should be built. Offer the following options and let groups know they can add to the list if they have a better idea.
    - **About 30 miles outside of Austin in a small town**. There is lots of room to expand and not many people living nearby, but a river runs right next to the property. It is also difficult to get to with a lot of traffic on the highway though Austin.
    - **Near an old neighborhood in Austin.** Most of the homes are being condemned and torn down and the property would be cheap for the city to purchase. It is also in town so it would be convenient for the trash trucks to drive to.
    - **In a new development area of Austin**. There is a lot of land between new neighborhoods being built and it is very easy to get to with a new highway that was just completed. The property is valued highly in the area and homes nearby are very expensive.
4. Have each group present their best option (from the above list or their own) and why the other options are not ideal.
5. If time allows, ask students to challenge other groups with relevant questions. Discuss how money, politics, and who you are can affect your standing.
6. The goals of the activity are for students to learn that there is no “best” place for a landfill to go. As the population grows there has to be an alternative solutions to waste such as reduction and recycling.

Landfill Logic Activity Kit

Activity Resources

INCLUDED TEACHER RESOURCES AND HANDOUTS

- "Sara Cynthia Sylvia Stout Would Not Take the Garbage Out", Poem by Shel Silverstein
  - English and Spanish versions
- "Where Does the Garbage Go?" Book by Paul Showers
- Landfill Anatomy Chart - Layers Answer sheet
- Landfill Clue Cards (extra)
- Community Group Cards for "The Great Waste Debate"
- "What's in a Landfill" Pie Chart
- Activity TEKS

Landfill Logic Activity Kit

Activity Resources
Anatomy of a Landfill

Clay Layer (Play-Doh) - Compacted Clay is the first (bottom) layer of a landfill and lines the landfill with a barrier to prevent leachate leaks to protect the soil and hold the trash in place. Clay is used due to its moldable and impermeability qualities. Note: The model landfill only shows clay on the bottom of the landfill. In a real landfill, the sides would be covered with clay and plastic as well.

Geomembrane (Plastic Layer) - A thick plastic layer lines the landfills and prevents leachate from leaving the landfill and entering the outside environment/ground. The plastic is made from high-density polyethylene which is tough and impermeable.

Leachate Pipe System (Straws) – Pipes, surrounded by a gravel layer, collect leachate and pump it out of the landfill and to a water treatment plant, retention pond, or another proper method of disposal.

Sand/Gravel Layer (Gravel) - Collects leachate (liquid produced from waste) and funnels it to a leachate pipe system via gravity.

Geotextile (black felt and black screen) **–** The geonet and geotextile prevent clogging of the leachate pipes by filtering out the solid particles.

Waste (Bag of Trash) -Waste is compacted in layers to reduce its volume but also prevents decomposition.

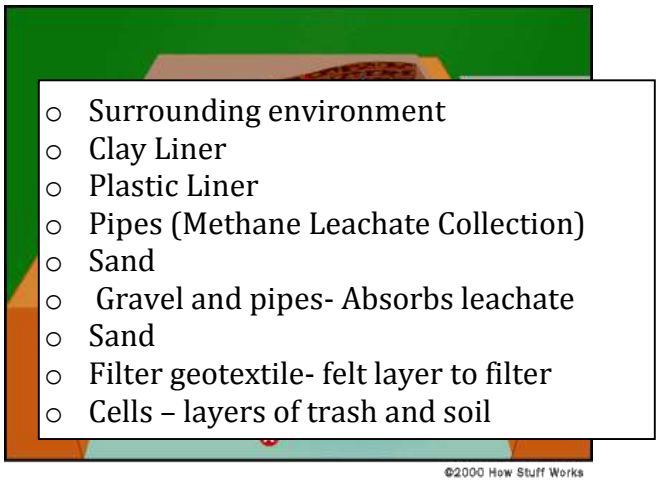
Daily Cover Top Soil & Cover Soil (Brown felt) – Each day landfill operators cover the waste to deter rodents and other pests, reduce odor, and keep litter from blowing away. Many landfills use 6 inches of topsoil or a plastic “lid” for their daily cover. This layer also s supports and maintains the growth of vegetation and protects the landfill cap.

Protective Cover, Geomembrane and Clay (container lid) – Compacted clay and a thick plastic layer forms a ‘cap’ that prevents excess precipitation from entering landfill and prevent the escape of landfill gas.

Protective Cover, Cover Vegetation (Grass-green felt) – when landfills are full they are covered with native grasses and shrubs and used as recreation areas. Pipes will continue to remove leachate and methane gas, but old landfills can be used as ski hills, park and recreation areas, etc.

Landfill Logic Activity Kit

Activity Resources
Anatomy of a Landfill



- Surrounding environment
- Clay Liner
- Plastic Liner
- Pipes (Methane Leachate Collection)
- Sand
- Gravel and pipes- Absorbs leachate
- Sand
- Filter geotextile- felt layer to filter
- Cells – layers of trash and soil

Clay Layer Compacted clay is put in the freshly dug landfill space to form a last resort barrier to stop leachate and methane gas from entering the outside environment contaminating soil and groundwater. Clay is used because it is flexible yet waterproof.		**Clay Layer** A heavy layer of clay placed inside a freshly dug landfill pit. The clay is the very last layer to stop leachate from mixing with soil and groundwater in the outside environment. Clay is used because it is flexible and waterproof.
Geomembrane Layer A thick plastic liner surrounds the *entire landfill* system to prevent any escaped leachate from the pipes from mixing with the clay and surrounding environment. Once the landfill is full, the top is capped with the same plastic, creating what is called a closed system.		**Geomembrane Layer** Like your garbage can at home, a thick plastic liner covers the whole landfill pit to seal the garbage from the environment. Once the landfill is full, the top is covered with the same plastic. This method is called a closed system.
Leachate Pipe System Perforated pipes (contain holes) laid between the gravel direct leachate to sumps that pump the liquid out of the landfill and to a water treatment plant, retention pond (where water evaporates leaving toxic chemicals behind), or another method of disposal.		**Leachate Pipe System** Pipes with holes in them are placed in gravel where they draw the leachate into a collection system. The leachate then moves to "sumps" where it is pumped out of the landfill and to a retention pond where toxic chemicals are separated from the rainwater.
Gravel Layer A thick layer of gravel is laid to allow leachate to filter down from felt layer and get sucked into the collection pipes. If the collection system is laid properly, not a drop of leachate should ever touch the plastic layer.		**Gravel Layer** A thick layer of gravel is laid to allow leachate to filter down from felt layer and get sucked into the collection pipes. If the collection system is laid properly, not a drop of leachate should ever touch the plastic layer.

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Geotextile A thick felt liner is used as a strainer to separate small pieces of waste that made it through the geonet. This is the last major filter of leachate before the gravel and collection pipes.		**Geotextile** A thick felt liner is used as a strainer to separate small pieces of waste that made it through the geonet. This is the last major filter of leachate before the gravel and collection pipes.
Leachate Collection Layer A plastic mesh screen called a geonet is the first barrier to separate large solid waste particles from leachate by acting as a porous filter. The filtered leachate continues on down to the collection system. Gravel or sand can also be used in place of geonets.		**Leachate Collection Layer** A plastic mesh screen called a geonet is the first layer to stop solid pieces of waste but allow leachate to trickle down to the collection pipes. Some landfill companies use sand instead of geonets.
Waste Each day waste is delivered to the landfill, dumped in the working face, and then compacted with trucks to make more room. Unfortunately, the compaction removes oxygen therefore severely slowing the rate of waste decomposition.		**Waste** Each day waste from the town is brought to the landfill and dumped in the working face. Large trucks press down the waste to make more room. This means the waste breaks down much slower because no oxygen or bacteria can get in.
Daily Cover At the end of each day, the working face is covered with 6-12 inches of soil. The next day, waste will be added to another section or cell and covered again. The reasons to cover waste are that it: -reduces odors -keeps litter from blowing away -deters scavengers		**Daily Cover** At the end of each day, the working face is covered with 6-12 inches of soil. The next day, waste will be added to another section or cell and covered again. The reasons to cover waste are that it: - reduces odors -keeps litter from blowing away -deters scavengers

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Protective Cover Once a landfill is full, a compacted layer of clay and a thick plastic layer forms a 'cap' that prevents excess precipitation from entering the landfill and prevents the escape of landfill gas.		**Protective Cover** Once a landfill is full, a compacted layer of clay and a thick plastic layer forms a 'cap' that prevents excess precipitation from entering the landfill and prevents the escape of landfill gas.
Vegetation Cover When landfills are full and closed the 'caps' are covered with native grasses and shrubs and used as recreation areas. Pipes will continue to remove leachate and methane gas. Old landfills can be used as ski hills, golf courses, parks and recreation areas.		**Vegetation Cover** When landfills are full and closed the 'caps' are covered with native grasses and shrubs and used as recreation areas. Pipes will continue to remove leachate and methane gas. Old landfills can be used as ski hills, golf courses, parks and recreation areas.

Landfill Logic Activity Kit

Sarah Cynthia Sylvia Stout

by Shel Silverstein

Sarah Cynthia Sylvia Stout
Would not take the garbage out.
She'd wash the dishes and scrub the pans
Cook the yams and spice the hams,
And though her parents would scream and shout,
She simply would not take the garbage out.
And so it piled up to the ceiling:
Coffee grounds, potato peelings,
Brown bananas and rotten peas,
Chunks of sour cottage cheese.
It filled the can, it covered the floor,
It cracked the windows and blocked the door,
With bacon rinds and chicken bones,
Drippy ends of ice cream cones,
Prune pits, peach pits, orange peels,
Gloppy glumps of cold oatmeal,
Pizza crusts and withered greens,
Soggy beans, and tangerines,
Crusts of black-burned buttered toast,
Grisly bits of beefy roast.
The garbage rolled on down the halls,
It raised the roof, it broke the walls,
I mean, greasy napkins, cookie crumbs,
Blobs of gooey bubble gum,
Cellophane from old bologna,
Rubbery, blubbery macaroni,
Peanut butter, caked and dry,
Curdled milk, and crusts of pie,
Rotting melons, dried-up mustard,
Eggshells mixed with lemon custard,
Cold French fries and rancid meat,
Yellow lumps of Cream of Wheat.
At last the garbage reached so high
That finally it touched the sky,
And none of her friends would come to play,
And all of her neighbors moved away;
And finally, Sarah Cynthia Stout
Said, "Okay, I'll take the garbage out!"
But then, of course it was too late,
The garbage reached across the state,
From New York to the Golden Gate;
And there in the garbage she did hate
Poor Sarah met an awful fate
That I cannot right now relate
Because the hour is much too late
But children, remember Sarah Stout,
And always take the garbage out.

Landfill Logic Activity Kit

Sarah Cynthia Sylvia Stout

por Shel Silverstein

Sarah Cynthia Sylvia Stout
No llevar la basura!
Ella había fregado los potes y raspar las ollas,
Caramelo de los ñames y especias los jamones,
Y aunque su papá gritaba y gritaba,
Ella simplemente no sacar la basura.
Y así apilados hasta el techo:
Los granos de café, cáscaras de papa,
Bananas marrones, guisantes podridos,
Trozos de queso agrio.
Se llena la lata, que cubría el suelo,
Se rompió la ventana y bloquea la puerta
Con las cortezas de tocino y
Los huesos de pollo,
Gotas de helado,
Semillas de Pasas,
Huesos de melocotónes, piel de naranja,
Masas de avena fría,
Cortezas de pizza y verduras marchitas,
Frijoles empapados y mandarinas,
Cortezas de pan tostado con mantequilla negro quemado,
Pedacitos cartilaginoso de asados fornidos ...

La basura rodó por el pasillo,
Se levantó el techo, que se rompió la pared…
Servilletas grasientas, migas de galleta,
Globos de chicle pegajoso,
Celofán de mortadela verde,
Macarrones gomoso y seboso,
Mantequilla de maní, endurecida y seca,
Leche cuajada y cortezas de la empanada,
Melones mohos, mostaza seca,
Cáscaras de huevo mezclada con crema de limón,
Papas frías y carne rancia,
Protuberancias amarillas de crema de trigo.
Por fin llegó a la basura tan alto
Que finalmente tocó el cielo.
Y todos los vecinos se alejaron,
Y ninguno de sus amigos habría llegado a jugar.
Y, por último, dijo Sarah Cynthia Stout,
"OK, voy a sacar la basura!"

Community Landfill Card

Citizens from local neighborhood – We live in Austin, and pay money to the city to give us garbage and recycle bins. Recycling is great, but we still create a lot of garbage. In fact, each person in Austin produces about 4.5 pounds of garbage per day! Since we pay so much to have it removed from our neighborhoods, once it gets picked up from our driveways, we don't want to see it, smell it, or think about it again!

Community Landfill Card

Texas Disposal Systems – We are a waste collection company who takes care of the garbage at the landfill. At the end of every day we must cover the waste with soil and prevent people from getting hurt on our property. We are also responsible for making sure the garbage does not get out and harm the environment. Since the city is growing, we receive more and more waste each year. This means we must have enough land to expand the landfill if needed.

Community Landfill Cards

GENERATION ZERO

Leaders of a WASTE-FREE AUSTIN

KEEP AUSTIN BEAUTIFUL

AUSTIN RESOURCE RECOVERY

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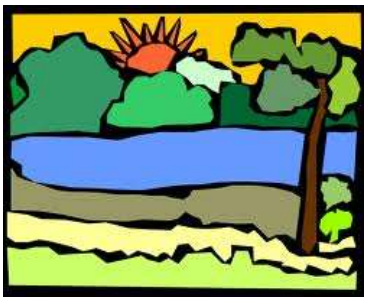
Community Landfill Card

City of Austin – We are the middle men between the citizens and Texas Disposal Systems. This means we need to make sure we keep the citizens of Austin happy by having a quick and easy way to collect garbage. We pick up and take the garbage to the landfill owned by TDS. We must make sure the landfill is far away from the neighborhoods, but we don't want to have to travel too far away because we simply have too much trash to move!

Community Landfill Card

Keep Austin Beautiful – Helps to make sure the city and creeks are pollution free, reaches out to citizens who care deeply about wildlife and the environment. KAB works to teach people about recycling and littering. The organization is concerned about landfills harming the nearby water sources and environment!



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