

Recycling

Landfills



Level 3 (Grades 9-12)

LANDFILLS

Landfills are basically just holes in the ground, however they are dug specifically for garbage and must follow federal, state, and local regulations. They are often subject to inspections by those agencies along with Soil and Water Conservation districts, Solid Waste Districts, Zoning Control units and Health departments.

The construction of a landfill begins with the acquisition of permits, both locally and with the state and federal government. Landfills constructed today are called sanitary landfills. These landfills are constructed in a suitable geological location and are environmentally sound. That is why they are called “sanitary”. Sanitary landfills are replacing “dumps” because dumps allow leachate (liquid that filters through the decomposing garbage) to enter the groundwater, attract rodents, insects and other disease-carrying vermin, emit odors, and create a fire hazard. Sanitary landfills contain a specially designed liner, or multiple liners, buried deep in the ground under the entire site. This liner consists of layers of clay and man-made plastics that protect the environment around the landfill by preventing harmful fluids from leaking into the groundwater. Pipes are installed on top of the trash to move the liquid to a specially designed pool called a leachate pond. This pond is a lined storage area where the leachate stays until it is moved to an approved waste water treatment plant. There the water is tested and treated for any contaminants. When the water is free of any dangerous particles, it is released into a water source such as a river or stream. Landfill operators sample groundwater at the landfill regularly and send it to laboratories for analysis.

Garbage is hauled from households and industries to the landfill site. A fee is paid to the landfill operator based on how much trash the truck carries. This fee is called a “tipping fee” because trucks lift their load to ‘tip’ them on the face of the landfill. Waste materials are unloaded, spread out, and compacted by heavy equipment. To guard against animals, odors, and blowing litter in the landfill, heavy machinery covers incoming waste with a layer of soil or other approved material every day. As trash decomposes, gases can be created. Decomposition creates methane, carbon dioxide, and small amounts of hydrogen sulphide. These gases can build up and move around under the ground and eventually escape into the environment. To prevent this from happening the gas is vented in a controlled manner or tapped to use as fuel. Several layers of waste comprise a cell. Cells are built side by side until the landfill is completely filled. When the landfill is full, it is “closed” by covering the layers of dirt and waste with a gas layer (piping, gravel, etc. that helps in the collection of methane from the decomposing garbage), a synthetic layer, a geotextile layer which looks like felt, and a layer of densely packed soil. Grasses are planted on the top of the landfill. Trees are not planted on the landfill because the roots would grow into the covering on top of the trash. Completed landfills are monitored for leachate and gas control for 30 years after the close. Landfills can remain useful

even after they are closed. They can be turned into golf courses, parks, recreation areas, or wildlife areas.

At one time, it was believed that all waste decomposed in a landfill. We know now that is not true. Because of the current requirement to compact trash and to cover “raw” trash the components needed for decomposition have been reduced. For decomposition to occur, three components must be available: trash, water and air. One experiment shows waste buried for 15 years contained newspapers that could still be read and chicken bones that still had meat on them. Aluminum cans and plastics bottles take up to 500 years to decompose, steel cans take about 100 years and glass bottles can take up to 1,000,000 years to decompose. This shows the real need for recycling.

INCINERATION

Another method to dispose of trash is to burn or “incinerate” it. Incinerate means to burn to ashes. The burning takes place in a combustion chamber called an incinerator. When waste is burned, the remaining ashes take up less space in our landfills. If we continue to use landfills at our present rate without replacing them, we’ll run out of space very soon. We need to find new disposal methods. Incineration is one way to curb the problem. Incineration has another benefit. Burning waste creates heat, which may be used to produce steam. The steam can generate electricity for homes and businesses. Burning waste to produce energy is known as resource recovery; incinerators are often referred to as energy from waste plants. Resource recovery saves valuable landfill space and protects groundwater and drinking water. The process takes place inside a building, which traps odors. Vermin and insects are not attracted by the ash by-product.

Two problems still exist; air pollution and ash disposal. Ash from the incinerator must be tested and disposed in a landfill. Sometimes special landfills are made just for ash disposal. They are called ashfills or monofills. Ash takes up much less space than the same materials in their original form. Gases may be emitted by the incineration plant, but can be controlled through complex filter systems and careful monitoring.

Not all materials are combustible, which makes other waste disposal alternatives necessary.

NONRENEWABLE VS. RENEWABLE RESOURCES

Many items we buy are made from natural resources that replenish themselves. Some of these are plants which we use to make paper, furniture, and textile products. We get meat, dairy products, wool, and leather from animals. However, some items are made from natural

resources that cannot be replenished. Included in this group are fossil fuels that are used for making gasoline and plastics and minerals that are used to make glass and metal containers. Modern technology is giving us options to using fossil fuels. For example, we now see some plastics made from corn oil. Corn and soybeans are being used to create synthetic fuels that reduce our dependency on fossil fuels. More products can be found in plastic containers that we once packaged in glass jars or metal cans.

DURABLE VS. DISPOSABLE

As Americans, we have become dependent on the convenience of many disposable items. Disposable items like diapers, plastic flatware, napkins, cups, and plates have made our life easier, but it has created a huge waste problem when those items need to be disposed. These disposable items are a contributing reason why landfills are becoming full. Changing our buying habits is the solution to the overuse of disposable items. Using reusable plates instead of paper plates, cloth napkins instead of disposable napkins, rags or sponges instead of paper towels, and reusable canvas shopping bags instead of plastic disposable ones or paper bags are all examples of combating the use of disposable items.

SPECIAL WASTES

In this series we have discussed the recycling of paper, plastic, metal, aluminum, and glass when we talk about recycling. However, there are other consumables that need proper disposal. Among them are tires, motor oil, spent solvents, mercury, batteries, appliances, and agricultural pesticide containers.

TIRES - Tires are especially difficult to dispose of properly because they are banned from most landfills. They cannot be compacted and frequently rise to the surface. Compounding the problem are the dangers abandoned tires pose to health and their potential for contaminating ground and surface water. Because they catch water and provide shade, old tires provide an ideal habitat for mosquitos. Should a stockpile of tires ignite, the fire is particularly difficult to extinguish, pollutes the air with thick, arid smoke, and the rubber changes into an oil-like liquid that can contaminate surface and groundwater. Both conventional and steel-belted tires can be recycled, although the latter requires special processing. Conventional tires can be recycled through the following means:

- **Retreading** – This process bonds a new tread onto a worn tire. If the bead is straight and sidewall is free of punctures or obvious physical damage, the tire can be retreaded. The process is frequently done on truck, off-road vehicles and farm tires, usually because the cost of the replacements is so high.

- Reclaimed Rubber – Millions of tires are ground, shredded, and pulverized each year, then formed into sheet rubber. This material is sold in bales to producers of molded materials and semi-pneumatic tires.
- Crumb Rubber - Ground or shredded rubber can be added to other materials to manufacture new products. One particular result of this process – asphalt rubber – offers the greatest potential for using scrap tires in an economical, energy-efficient manner. Adding rubber to asphalt greatly enhances the material's cold-temperature characteristics. In road construction, this material serves as stress-absorbing membrane, surface treatment or inner layer. Non-highway applications include water retention liners for ponds and landfills, and as a cover for landfills. Crumb rubber is also used as mulch and a surface for playgrounds while asphalt rubber is also being tested as a roofing material.
- Artificial Reefs – To reduce coastal erosion, scrap tires are being strung together with non-corrosive cable and sunk off ocean shorelines.

SPENT SOLVENTS – Such solvents as turpentine and paint thinner have a negative impact on the environment. Carelessly discarded flammable solvents have caused sewers to explode and garbage trucks to burn. Municipal wastewater treatment plants can be damaged by these materials. These materials are often incinerated in special hazardous waste incinerators. Whenever possible, these items should be reused. Solvents can be recycled in much the same way as motor oils. To dispose of them properly, contact your local solvent distributor and arrange for a pick up or a drop off.

BATTERIES – According to a report by the EPA, two-thirds of all lead in municipal solid waste comes from automobile batteries. This figure is relatively surprising, since lead-acid batteries have one of the highest recycling rates of all recyclable materials. An average battery available for recovery weighs 36 pounds, half of which is recoverable lead. It contains about one gallon of sulfuric acid, three pounds of polypropylene casing, about three pounds of polyvinyl chloride (PVC) separators, and another three pounds of sulfates and oxides that bind the lead. In 1990, the Indiana General Assembly adopted a law making it mandatory for a retailer to accept a used battery for every new one sold. These returned batteries must be sent to a reclamation center and disposed of in accordance to the law.

MERCURY – Mercury is a naturally occurring element. It is a metal and conducts electricity. Liquid at room temperature, it combines easily with other metals and expands and contracts evenly with temperature changes. Because of these properties, mercury has been used in many household, medical, and industrial products. Although mercury performs many useful functions in our workplaces and homes, it is toxic and can impair the way we see, hear, and function. Mercury evaporates very slowly. If spilled or improperly stored, this evaporation will

cause continuous contamination of the air you breathe. Mercury poisoning attacks the central nervous system in all humans. Children, especially those under the age of six, are more susceptible to mercury poisoning. Most exposure comes from broken mercury-containing thermometers. Less than a third of the mercury in the environment is naturally occurring. The majority is released through preventable human pollution. It enters the environment from industrial sources and by improper disposal of household products that contain mercury. Improper mercury disposal includes: pouring it down the drains, putting it in the trash and burning it in barrels and incinerators. These improper disposal methods can elevate mercury contamination to harmful levels. When mercury seeps into lakes and waterways, it undergoes a natural chemical process and is converted to a more deadly form – methyl mercury. It then contaminates the food chain by building up in the tissue of fish and animals including those we eat. Because of high mercury concentrations in fish, the State of Indiana issues annual fish consumption advisories, which are available from your local health department. Mercury can be found in vintage toy drawing screens, batteries in some books and watches, pre- 1997 tennis shoes with light-up soles, switches for clothes irons, and some appliances, thermostats, and thermometers. Mercury was also used in the manufacture of latex paints before 1990 and some antibacterial products. Mercury is toxic in small quantities, so toxic that even a very small amount can contaminate an entire lake. A typical mercury thermometer contains about 2 grams of mercury. A mercury switch contains about 3.5 grams of mercury. A mercury thermostat contains about 3 grams of mercury. However, it only takes 3 grams (about 1/25 of a teaspoon) of mercury to contaminate a 60-acre lake.

For help in disposing of your mercury-containing products call your local Solid Waste Management office. When dealing with mercury-containing items, never intentionally break an item containing mercury, never pour mercury down the drain, never burn mercury, and never put mercury in the trash.

HAZARDOUS WASTES

The hazardous waste rule establishes specific standards for a generator of hazardous waste based on the amount generated. Subject to limited exceptions, generators that generate less than 220 pounds of waste per month that may meet the definition of hazardous waste are conditionally exempt from the rules. The solid waste they generate is, by definition, not hazardous waste. The waste may be legally disposed of as municipal solid waste, despite being hazardous. Residential hazardous waste generators are similarly exempt. This exempt waste is referred to as “household hazardous waste”. Recyclers must be careful not to accept any hazardous waste and must be aware of the definition of hazardous waste. They must get advice immediately when confronted with the prospects of generating hazardous waste or obtain a permit to manage it. Hazardous waste is defined by an intricate two-step process.

First, the material must be solid waste: solid, liquids, or contained gases. Second, the waste must be considered “hazardous”. Hazardous wastes are identified through specific listing in the regulations, or if they meet any of the following criteria:

- Ignitability - generally addresses liquids that can burn at temperature of 140 degrees Fahrenheit or less
- Corrosivity – generally refers to aqueous acids with a pH of 12.5 or greater
- Reactivity – addresses wastes that react violently with water, are unstable or explosive, or contain cyanide or sulfide under certain conditions.
- Extractive Procedure (EP) toxicity – a test that evaluated the potential of a waste to release specific contaminants into the leachate typically found in a municipal landfill.

Every day, American families produce an estimated 4 million pounds of household hazardous waste.

RECYCLING IN JACKSON COUNTY

Humans depend on the environment for their survival and can affect the environment negatively or positively. Humans consume products and affect how many resources are available for their use. The result of those products is waste. Those waste products can be handled in one of only a few ways; it can be sent to a landfill, burned in an incinerator, or recycled. While each one of these solutions has its own advantages and disadvantages, we will focus on recycling in this project.

The easiest way to reduce the amount of trash sent to landfills is not to create it in the first place. Attention to what we buy and how much trash we generate is the easiest way to save natural resources and preserve landfill space. The next step is to recycle any items that are accepted in local recycling programs.

What can be recycled varies from community to community because of facilities or lack of facilities nearby that can process various types of recyclable materials.

Most people think of plastics, metal, and paper when they recycle, however there are other items that can be recycled through special programs. Eye glasses, cell phones, batteries, hazardous household wastes, oil, mercury-containing items, ink jet cartridges, toner, pharmaceuticals, tires, appliances and even clothes can be recycled through special programs.

Some communities have curbside recycling programs sponsored by their local town and cities. These programs provide recycling pick up at the front of their homes on specific days. Other residents can deliver their recycling to collection centers.

Contact the Jackson County Solid Waste Management District (358-4277) to find the recycling opportunities in your neighborhood.

Preparing recyclable items:

- **Cardboard** and paperboard (light cardboard like cereal boxes) should be folded flat. Pizza boxes or other containers that contain food residue should not be included in recycling. Wax covered boxes such as juice cartons can not be recycled.
- **Office paper**, newspaper, magazines, file folders, unsolicited (junk) mail and construction paper can be recycled. Laminated or plastic coated paper can not be recycled.

- **Plastic** bottles should be rinsed. Lids are not recyclable and should be discarded. Labels do not have to be removed. Containers that held motor oil, meat packaging, food wrap, and most product packaging can not be recycled.
- **Metal food cans** should be rinsed. Labels do not have to be removed. Lids from food cans are recyclable.
- **Aluminum** cans and bottles should be rinsed.
- **Glass** jars should be rinsed and lids removed. Labels do not have to be removed. Window glass and ceramic glass are not recyclable. Not all programs in Jackson County accept glass. Check the requirements for your program.

Please do not add trash or any container with food residue to your recycling. These types of containers contaminate the recycling stream and ruin everyone's effort to recycle.

WHAT WE CAN DO

Recycling is not the answer to all our environmental problems, but it is a start. Recycling can become a part of everyday life, at work, school, and home. As time goes by, we will be able to recycle more and throw away less. Each individual contribution will make a difference to saving our natural resources and preserving landfill space.

RECYCLING

Note: All Levels - Choose one. Exhibit topics cannot be repeated. Posters should follow requirements for posters as defined in this requirement book under the miscellaneous section. Reports should be a maximum of two pages.

Reports can be either hand written in ink or typed, however, the work must be that of the 4-H'er. For information about action demonstrations, please see your adult leader or a Junior Leader. Complete a record sheet.

Grades 9-12 (Choose one. With the exception of #1 exhibit topics cannot be repeated.)

1. Make a useful or decorative object from items normally thrown away. Exhibit should not exceed 2' X 2' X 2' and must include a written explanation of the article, what was used to make it and how it will be used. It should also include a list of involved costs. The project should be age appropriate.

2. Make and label a model of a landfill. Exhibit should not exceed 2'x2'x2'.

3. 4. A poster, report or power point on one of the following topics:

A. Water usage and conservation

B. Household Hazardous Wastes

C. Disposal of industrial waste, oil, junk cars, old appliances, farm chemicals & batteries

D. Septic system operation and problems

E. Your involvement in a community recycling program

F. An interview with an older adult on recycling practices in their lifetime

4. Design and record a TV message that promotes recycling (one minute maximum). Submit video tape and typed script. You may invite other people to act in your video.

5. Action Demonstration