LANDFILLS: SOLID WASTE DISPOSAL "FACTORIES"

Today's sanitary landfills serve not only as safe storage areas for solid waste, but also are enormous "factories". These factories use various processes, such as decomposition, to break down, or stabilize, solid waste.

The landfill factory begins its life as a giant bowl-shaped hole. This hole is then lined with several feet of clay. Clay is non-porous and helps to contain the garbage and its liquids within the bowl. After the clay is compacted into place a plastic liners is laid down. This liner is very strong and solid. It also helps to keep the waste from entering the local environment. A series of gravel and sand layers are then put onto of the liner. Woven within these layers is a system of large tubes that withdraw liquids and gases from the garbage mass that will be placed atop them.

Once these steps are completed the garbage can start to arrive. Waste from homes, businesses, schools, restaurants and hotels are delivered, usually by truck, to the landfill factory. The garbage, or waste mass, is crushed and compacted with enormous machinery. Once compacted the entire days worth of waste is covered with "daily cover," a layer of several inches of sand, gravel or soil. This helps to reduce odors and keeps animals from scrounging through the garbage.

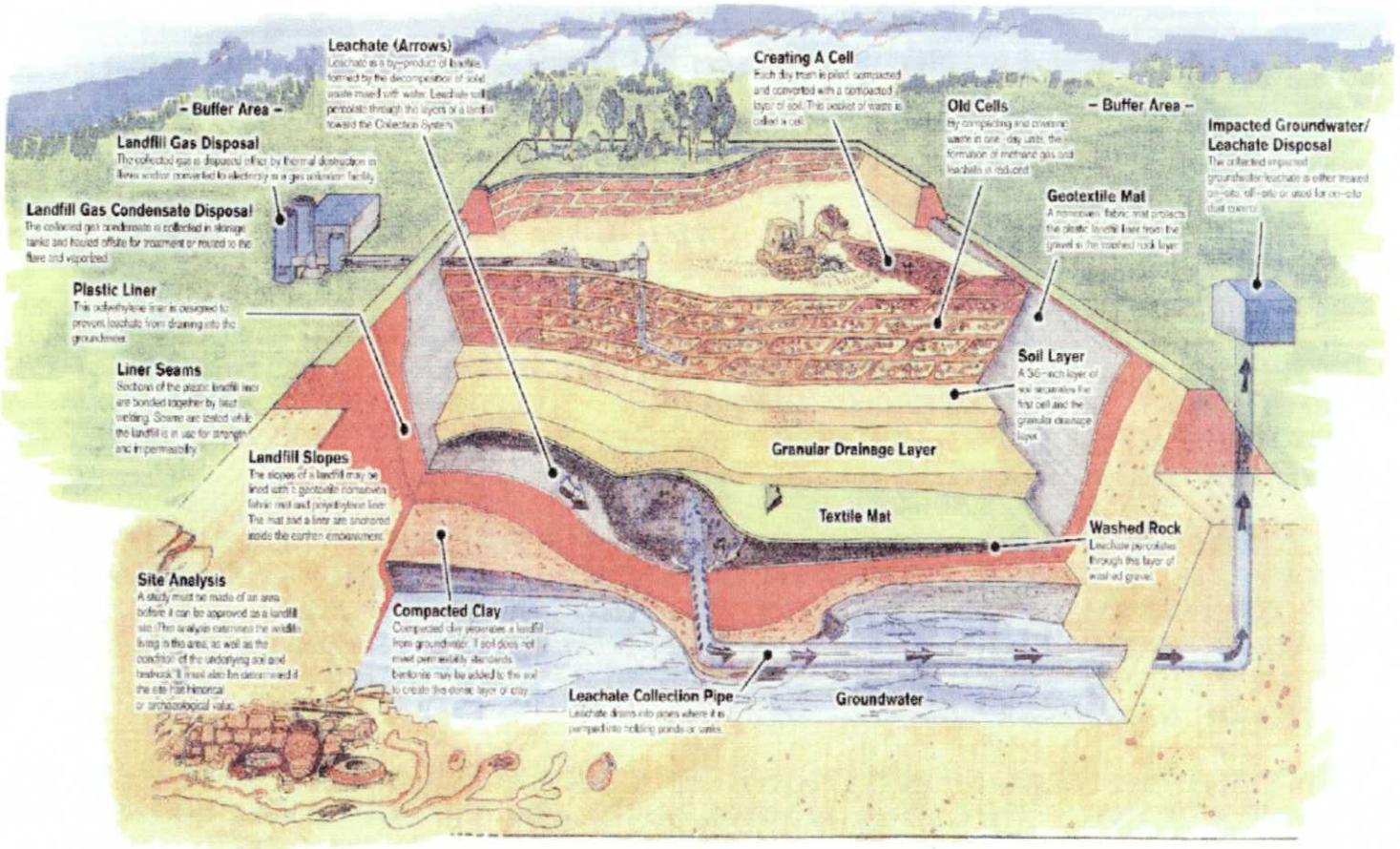
As the waste mass decomposes, or rots, it produces some pretty nasty byproducts. The various items in our garbage, from food waste to old diapers, mix together in the landfill factory. Rain and snow melt flow through the waste mass. Heat from the sun increases the rotting. As the waste mass rots two main byproducts must be looked after.

The leachate collection system removes the unsafe liquids called leachate, through the tubing at the bottom of the landfill factory. Leachate flows through the piping and is collected in a holding tank. When the tank is full the leachate is removed and treated, either onsite or taken to a wastewater treatment facility to remove toxins, chemicals and other dangerous compounds.

The gas extraction system (GES) removes explosive gases, such as methane, from the Landfill factory through the same piping. The GES helps to make landfills safer. Some landfills extract the gas and make energy, such as electricity. Other landfills simply burn the gas at the end of a large "candlestick" flare.

Environmental monitoring is a key component of landfill operations. Ground water and air quality is tested to ensure contaminants are contained within the landfill. Ground water is tested for dozens of contaminants. This monitoring is required to continue for years and years after the landfill closes. Should any of the monitoring show problems work can quickly be initiated to correct the situation.

Recycling, composting, reusing items and reducing the waste we produce help to save landfill space for those items that must go to a landfill. New technologies are developed every day to better manage our landfill factories. But for now, sanitary landfills are the best solid waste factories we have.


Leachate (Arrows)
Leachate is a by-product of landfills formed by the decomposition of solid waste mixed with water. Leachate will percolate through the layers of a landfill toward the Collection System.
Creating A Cell
Each day trash is piled, compacted and converted with a compacted layer of soil. This packet of waste is called a cell.
– Buffer Area –
Landfill Gas Disposal
The collected gas is disposed of/or by thermal destruction in flares and/or converted to electricity in a gas extraction facility.
Old Cells
By compacting and covering waste in one day units, the formation of methane gas and leachate is reduced.
– Buffer Area –
Impacted Groundwater/ Leachate Disposal
The collected impacted groundwater/leachate is either treated on-site, off-site or used for on-site dust control.
Landfill Gas Condensate Disposal
The collected gas condensate is collected in storage tanks and hauled offsite for treatment or routed to the flare and vaporized.
Geotextile Mat
A nonwoven fabric mat protects the plastic landfill liner from the gravel in the washed rock layer.
Plastic Liner
This polyethylene liner is designed to prevent leachate from draining into the groundwater.
Soil Layer
A 50-inch layer of soil separates the first cell and the granular drainage layer.
Liner Seams
Sections of the plastic landfill liner are bonded together by heat welding. Seams are tested while the landfill is in use for strength and impermeability.
Granular Drainage Layer
Landfill Slopes
The slopes of a landfill may be lined with a geotextile nonwoven fabric mat and polyethylene liner. The mat and liner are anchored inside the earthen embankment.
Textile Mat
Washed Rock
Leachate percolates through this layer of washed gravel.
Site Analysis
A study must be made of an area before it can be approved as a landfill site. The analysis determines the wildlife living in the area, as well as the condition of the underlying soil and bedrock. It must also be determined if the site has historical or archaeological value.
Compacted Clay
Compacted clay separates a landfill from groundwater. If soil does not meet permeability standards bentonite may be added to the soil to create the dense layer of clay.
Leachate Collection Pipe
Leachate drains into pipes where it is pumped into holding ponds or tanks.
Groundwater