Date _____

AIM: **How do we deal with our wastes?**

TYPES OF SOLID WASTE

Municipal Solid Waste	Nonmunicipal Solid Waste
waste from homes, schools, offices, restaurants, and stores paper - most common plastics – fastest growing * e-waste also becoming a bigger issue *	waste from industry, agriculture, mining largest % of waste generated in U.S.

WASTE DISPOSAL

1. Landfills

a. Unsanitary Landfill - open pit with no lining (old way: not used in US anymore)

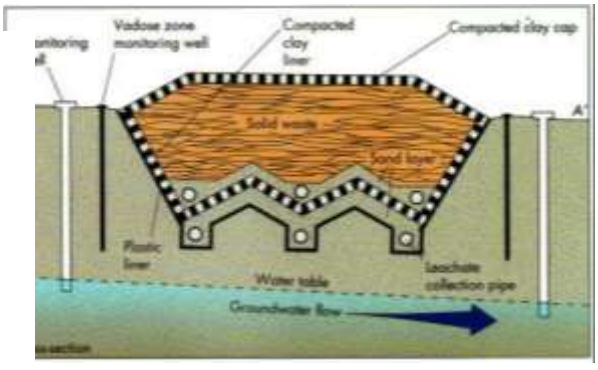
major problem: LEACHATE!! (liquid that drains in soil/groundwater)

b. Sanitary Landfill - - lined with impermeable layers of clay and plastic sheets

- "cells" are capped and sealed with clay (to prevent rainwater infiltration and gas release)
- leachate recovery systems
- methane recovery systems
- groundwater monitoring wells

Problems:

1. general air pollution (VOCs, etc)
2. eventually leaks leachate
3. CO_2 and CH_4 accumulation
4. lack of land area (NIMBY)

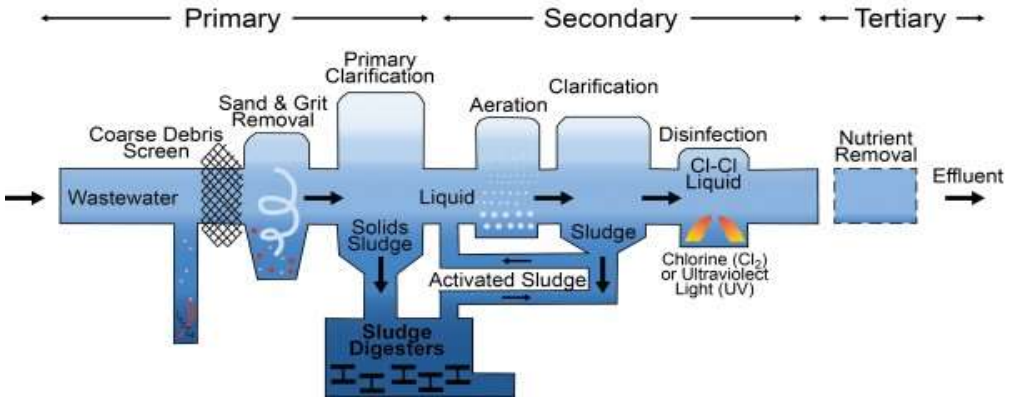


2. Incineration – mass burning of municipal solid waste

Pros	Cons
major reduction in trash volume <u>Waste-to-Energy Incineration</u> burn waste → heat →steam turbines in power plants ex. Covanta Waste to Energy Power Plants on Long Island	air pollutants: PM, CO, SO_2 heavy metals dioxins (toxic!) toxic ash disposal (ends up in a landfill somewhere) NIMBY

3. Wastewater Treatment

<u>blackwater</u>	**<u>graywater</u>**
wastewater that contains fecal matter and urine from toilets (coliform bacteria)	wastewater from showers, dishwashers, clothes washers, sinks



a. PRIMARY TREATMENT (PHYSICAL)	b. SECONDARY TREATMENT (BIOLOGICAL)	c. TERTIARY TREATMENT (ADVANCED)
<u>screens & settling tanks</u> - filter out solid particles/grit - allow grease/oil to float to be skimmed	- bacteria ("activated sludge") is used to accelerate decomposition of organics - aeration tanks promote aerobic decomposition - physical/chemical disinfection to remove viruses / bacteria (chlorine, UV light, ozone)	situation dependent - more excess nutrient removal (ex. N & P) - final heavy metal removal

Limitations: **does not remove pharmaceutical pollutants or microplastics / microbeads / microfibers well**
Microbead-Free Waters Act of 2015 (extension of FD & C) – bans plastic microbeads in cosmetics