Class 5 - Solid Waste
Outline

I. INTRO

A. Introduce ourselves. Explain what we're doing for this class.

B. What is "Solid Waste"

1. It's garbage - grab the garbage can

Use the trash in the can to show what kinds of solid waste there are

Get class to list other kinds of solid waste, i.e.

- Paper - computer paper/white paper, cardboard
- Vegetable/Plant
  - Banana peels, coffee grounds, etc
  - Wood, sticks, leaves
- Metals
  - Iron
  - Tin
  - Aluminum
- Glass
- Plastic
- Dirt and Rocks - ie fill from construction sites
- Human and animal waste - manure, carcasses

2. Hazardous Waste - EPA considers it a special kind of solid waste

Toxic, corrosive, flammable or reactive [explain each word] = Nasty

Dangerous Stuff

Get them to list some examples

- Batteries
- Nail Polish - Acetone
- Computers - CRT, motherboard, etc.
- Light Bulbs
- Fly ash from an incinerator - full of toxic constituents
- Things that contain
  - Mercury
  - Lead
  - Acids
  - Cyanide
  - Chemicals
    - Pesticides - DDT, Chlordane, etc.
    - Dry Cleaning Chemicals - PERC

C. What happens to your garbage? Get them to fill in the cycle.

Garbage can → Dumpster → Garbage Truck → Solid Waste Facility (Incinerator) → Separated → Burned.

(Hand out diagram of an incinerator)

Discuss problems/issues if have time [already did in first class]

D. What can you do?? The three Rs

Reduce
Reuse
Recycle

II. COMPOSTING DEMONSTRATION

A. What is composting??

Rotting, basically. Can speed up the process by doing certain things.

B. Worms - Redworms - invite student volunteer to help with the worms (give them the gloves)

1. Explain how they work - eat dead/rotting plant material
   So need bacteria to break down, then worm can eat.
2. Biology of worms
   Live in the top layer of soils (nightcrawlers live further down generally)
   Eat dead leaves and other plant material
   Turn it into worm poop - which is a very rich soil
   Great for gardening/growing plants
   Both sexes - one end is male, other end is female.
   Excrete a liquid so their skin stays moist
   Don't like the light - avoid by crawling down deeper

3. Caring for them
   Not too wet - if add too much waste
   Not too acidic - from adding citrus
   Worms will crawl up the sides if conditions aren't right.

C. Bottle Bioreactor

1. Composting - let bacteria break down.
   A little slower than the worms, but under good conditions, can do very well.
2. As bacteria decomposes the waste, it generates heat.
   Heat affects the rate of decomposition
   If too hot, kills some of the bacteria
   If too cold, slows down the bacteria

C. Why this is good - Get students to list

Reduces landfill space
Space = $
Valuable fertilizer
A bag of fertilizer/potting soil = $
Waste that doesn't have to be transported
Fewer trips with the dump trucks = $ & less pollution
This kind of waste doesn't incinerate very well
Wet/moist - so little/no electricity generated from burning. If anything, uses electricity by soiling the good flammable materials.
Less separation has to be done at the facility

D. Why this doesn't work so well at a landfill.

These worms like the top 6 inches. Often buried very deep.
Toxics mixed with organic matter
Worms poisoned by the garbage
Motor Oil, other leachates, etc.
Contamination - hard to sell because pieces of other stuff that people don't want/worried about.

E. Mention Biosolids example
Use compost from sewage plants - apply to farms
Controversial - dispute over.
Minneapolis = sells its sewage compost - you can buy it as potting soil.

III. BRIEF EXPLANATION OF STRUCTURE OF WASTE LAWS

A. Local
1. No littering
2. Municipal solid waste disposal
B. State: implementation of RCRA
C. Federal: RCRA, CERCLA

IV. CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT

A. Liability : release or threat of release of pollutant or contaminant into the environment which may present an imminent and substantial danger to public health or welfare
1. Potentially Responsible Parties ("PRPs")
a. Owners, Operators, Transporters, Arrangers
2. Strict Liability
a. Contrast with intent crimes, e.g. murder
3. Joint and Several

B. Equitable Factors (or Fairness): how a judge might decide how much a PRP owes to clean up the site.
1. *how much waste they contributed to the site relative to other PRPs*;

2. the *amount of the hazardous waste involved*;

3. the degree of *toxicity* of the hazardous waste involved;

4. the degree of *involvement* by the parties in the generation, transportation, treatment, storage, or disposal of the hazardous waste;

5. the *degree of care* exercised by the parties with respect to the hazardous waste concerned, taking into account the characteristics of such hazardous waste;

6. the *degree of cooperation* by the parties with Federal, State, or local officials to prevent any harm to the public health or the environment.

V. ACTIVITY

A. EPA has identified you as PRPs. Pass out scenario. Read scenario and explain. Describe each of the five PRPs. Divide into five groups.

B. Explain the activity: Each group has a different scenario with two parts.

1. Part 1: Liability.
   Each group will have an opportunity to argue why they are not liable.
   Mediator/Judge: Everyone is liable.
2. Part 2: Allocation.
   Each group will have an opportunity to argue how much they think they should pay.

Superfund Site at Town Dump Landfill

EPA has found widespread contamination at the site of Town Dump, Inc. landfill in the Town of Littleville. The groundwater has been contaminated by trichloroethylene (TCE), a clear liquid that was disposed of at the landfill. The groundwater contaminated with TCE is the main drinking water source for the Town of Littleville. Drinking small amounts of TCE may cause dizziness and headaches. Long term exposure to TCE may result in nervous system changes, liver and kidney damage, and leukemia. EPA believes there would be less TCE in the groundwater if there had been a plastic liner at the landfill.

The soil at the landfill is contaminated with heavy metals such as lead. EPA believes the source of the heavy metals is electronic equipment that was dumped at the landfill. Exposure from eating food or soil containing lead is particularly dangerous to children and can cause stunted growth and hearing problems.

The majority of the waste at the landfill is municipal solid waste, or household trash, that contains some hazardous waste.

EPA has proposed a clean up strategy that includes air stripping the groundwater and capping the landfill. Air stripping is a process by which groundwater is pumped out of the ground and poured through a tower. Air is blown from the bottom of the tower and pushes dissolved TCE out into the air. Up to 98% of the TCE can be removed by this method. The landfill will also be capped to prevent further contamination. The cap will consist of plastic sheeting covered with soil and grass. The cap will prevent drainage from the site and keep heavy metals from spreading. The clean up would cost approximately $1,000,000.00.

Your class represents each of five potentially responsible parties at the site: Town Dump, Inc., Big Wheels Trucking Co., Electron, Inc., Leaky Chemical Co., and the Town of Littleville. EPA has sued you to pay for the clean up of the landfill. You are now in mediation to resolve the issues of whether you are liable for the contamination at the site and, if you are liable, how much you should pay.

Group 1 Town Dump, Inc.: Owners of landfill

You represent the owners of Town Dump, Inc. Before 1980, Town Dump, Inc. accepted hazardous waste in liquid form and allowed it to be poured over the landfill. EPA now tells you this liquid waste is the cause of large amounts of leachate that is contaminating groundwater. Although it was common practice to have a clay or plastic liner at landfills that accepted liquid hazardous waste, Town Dump, Inc. decided the liner was too expensive and never installed it.

After Superfund was passed by Congress, Town Dump, Inc. stopped accepting liquid hazardous waste because it was afraid of its Superfund liability.

In 1990, Town Dump, Inc. began accepting electronic waste (computers, televisions, stereos) to be disposed of at the landfill. In 1998, the County began a mandatory recycling program for electronics waste. Although it was a crime to dispose of electronics waste outside the County mandatory recycling program, Town Dump, Inc. continued to accept small amounts of electronics waste to be dumped at the landfill.

You do not think you should be liable for the waste received before 1980, before Superfund became a law. You also think that you are not liable for the other hazardous waste at the site because the majority of the environmental damage is from the TCE dumped before 1980.

If liable, you estimate that Town Dump, Inc.'s share of the Clean-up cost is $200,000, but Town Dump, Inc. can only afford $100,000. It employs 10 people in the community. If it has to pay more than $100,000 it will go out of business.

Part 1: Are you liable for cleaning up the landfill site?

- Are you an owner, operator, transporter, or arranger?

Part 2: How much should you pay to clean up the site?

Factors:

- How much of your waste is at the landfill?
- How much of your waste is hazardous?
- How toxic is your waste?
- How involved you were in the generation, transportation, or disposal of the waste?
- Were you careful to keep waste from getting into soil or groundwater?
- Have you cooperated with EPA?

Group 2 Big Wheels Trucking Company: Transported waste to Town Dump, Inc.

You represent Big Wheels Trucking Company.
The CEO of Big Wheels Trucking Co. says the company never transported any hazardous waste to Town Dump, Inc., but former truck drivers remember picking up liquid hazardous waste at a chemical plant and taking it to Town Dump, Inc. prior to 1980.

Big Wheels Trucking Company has transported electronics waste from households since 1998 and brought it to the dump.

You do not think Big Wheels Trucking Company should be liable because it did not make the decision to send hazardous waste to Town Dump, Inc.

If liable, you estimate that Big Wheels Trucking Company's share of the Clean-up cost is $100,000.

Part 1: Are you liable for cleaning up the landfill site?

- Are you an owner, operator, transporter, or arranger?

Part 2: How much should you pay to clean up the site?

Factors:

- How much of your waste is at the landfill?
- How much of your waste is hazardous?
- How toxic is your waste?
- How involved you were in the generation, transportation, or disposal of the waste?
- Were you careful to keep waste from getting into soil or groundwater?
- Have you cooperated with EPA?

Group 3 Electron, Inc.: Manufactures electronics.

You represent Electron, Inc. Electron, Inc. was aware that its products contained heavy metals that could cause contamination if disposed of in landfills. Prior to 1998, it had paid over $700,000 to clean up other landfills where its products were disposed. In the hopes of preventing more liability for itself and to benefit all people, Electron, Inc. collaborated with the County to develop a mandatory recycling program for electronics. Electron, Inc. invested $10,000 to develop the recycling program that the County now administers.

Prior to 1998, Electron, Inc. regularly sent electronic waste containing heavy metals to Town Dump, Inc.

You do not think Electron, Inc. should be liable because its waste did not contribute to the major problem at the site which is groundwater contamination.

You do not think Electron, Inc. should pay very much for the clean up because most of the cost of the clean up is for the air stripping to remove ground water contamination by TCE, not heavy metals from electronics. You estimate that Electron, Inc.'s share of the Clean-up cost is $200,000. Electron, Inc. is a $10 billion company.

Part 1: Are you liable for cleaning up the landfill site?

- Are you an owner, operator, transporter, or arranger?

Part 2: How much should you pay to clean up the site?

Factors:

- How much of your waste is at the landfill?
- How much of your waste is hazardous?
- How toxic is your waste?
- How involved you were in the generation, transportation, or disposal of the waste?
- Were you careful to keep waste from getting into soil or groundwater?
- Have you cooperated with EPA?

Group 4 Leaky Chemical Company Manufacturers chemicals; by-products are hazardous liquid waste.

You represent Leaky Chemical Company. Prior to 1980, Leaky Chemical Company regularly sent liquid hazardous waste to Town Dump, Inc. Although Big Wheels Trucking Co. denies it, Leaky Chemical Co. records show that it paid Big Wheels Trucking Co. to transport wastes containing TCE from Leaky Chemical Co.'s manufacturing plant to Town Dump, Inc.

Some of the liquid hazardous waste was poured directly onto the landfill. Other hazardous waste was brought to Town Dump, Inc. in barrels. Today, these barrels are rusted and leaking. The barrels have the name, Leaky Chemical Company printed on them. The amount of waste actually sent by Leaky Chemical Co. is small compared to others.

You do not think that Leaky Chemical Co. should be liable or have to pay for the clean up because it sent waste to Town Dump, Inc. before CERCLA (or Superfund) became a law. Also, the amount of waste sent was very small.

If liable, you estimate that Leaky Chemical Company's share of the Clean-up cost is $500,000.

Part 1: Are you liable for cleaning up the landfill site?

- Are you an owner, operator, transporter, or arranger?

Part 2: How much should you pay to clean up the site?

Factors:

- How much of your waste is at the landfill?
- How much of your waste is hazardous?
- How toxic is your waste?
- How involved you were in the generation, transportation, or disposal of the waste?
- Were you careful to keep waste from getting into soil or groundwater?
- Have you cooperated with EPA?

Group 5 Town of Littleville, USA

You represent the Town of Littleville.

The Town of Littleville has had a contract with Big Wheels Trucking Co. since 1975 to transport municipal solid waste, or household trash, to Town Dump, Inc. The household trash includes small amounts of hazardous waste such as batteries, nail polish remover, and household cleaners. Although widespread throughout the trash, EPA has told you that these hazardous wastes have not contributed to the groundwater contamination.

You do not think the Town of Littleville should be liable because, although the Town of Littleville contributed most of the volume of trash at the landfill, the toxicity of this trash is very low. You question whether there would have to be a clean up at all if the only waste at the site was from the Town of Littleville.

If liable, you estimate that Town of Littleville's share of the Clean-up cost is $100,000. Littleville is a small town and will have to raise taxes to pay this amount.

Part 1: Are you liable for cleaning up the landfill site?

- Are you an owner, operator, transporter, or arranger?

Part 2: How much should you pay to clean up the site?

Factors:

- How much of your waste is at the landfill?
- How much of your waste is hazardous?
- How toxic is your waste?
- How involved you were in the generation, transportation, or disposal of the waste?
- Were you careful to keep waste from getting into soil or groundwater?
- Have you cooperated with EPA?

Mediator Memo

Part 1: Everyone is liable.

1. **Town Dump, Inc. is liable as an owner and operator** of a facility where hazardous wastes were released into the environment.

    a. Town Dump, Inc. is liable even though they accepted hazardous waste before Superfund became a law. Superfund liability is retroactive.
    b. Town Dump, Inc. is also liable for the heavy metal contamination and household trash because it is an owner/operator.

2. **Big Wheels Trucking, Inc. is liable as a transporter.** Even though its CEO says they didn't send any hazardous waste to Town Dump, Inc., the evidence shows that they did.

3. **Electron, Inc. is liable as an arranger**. It does not matter that Electron, Inc. may not have contributed to the groundwater contamination. It admits to sending hazardous waste to the landfill. Therefore, it is liable.

4. **Leaky Chemical Co. is liable as an arranger** because it sent hazardous waste to the landfill. Superfund is retroactive so it does not matter that the waste was sent before 1980.

5. **Town of Littleville is also liable as an arranger** because it admits to sending hazardous waste to the landfill.

Part 2: Allocation: depending on how well the groups argue, adjust the $ amount:

1. **Town Dump, Inc. $200,000**

Although Town Dump, Inc. might go out of business, this allocation is best for the clean up. There would not be as much groundwater contamination if Town Dump, Inc. had installed a plastic liner. Also, it violated local law by accepting electronics waste after the mandatory recycling program began. It is fair to the other PRPs that Town Dump, Inc. pay this much.

2. **Big Wheels Trucking, Inc. $100,000**

Big Wheels Trucking, Inc. brought hazardous waste to the site. It was not responsible for how the waste was handled at the site, so it is only liable for this amount.

3. **Electron, Inc. $200,000**

The waste Electron, Inc., including heavy metals, sent to the site is highly toxic, and is found throughout the soil at the site. The cap to cover the site is necessary to keep the heavy metals from spreading in the environment. It is fair that Electron, Inc. should pay this much.

4. **Leaky Chemical Co. $400,000**

Although the quantity of the waste sent by Leaky Chemical Co. was not as great as some other PRPs, the waste is highly toxic. The greatest expense in the clean up is the air stripping of the groundwater to remove the TCE that was originally sent to the site by Leaky Chemical Co.

5. **Town of Littleville $100,000**

Although Town of Littleville will have to raise taxes to pay this amount, it is fair for it to pay this much. The cap, while not the most expensive remedy, is fairly expensive because it has to cover a lot of trash in the landfill. Most of that trash was sent by the Town.