CVEN 4474/5474 Haz Waste
Outline

• The regulatory “process”
• RCRA Regulations
  – Regulation
  – Definition of hazardous waste
  – Haz Waste generators
  – Excluded wastes - a good idea?

Change in Industrial Strategy for Hazardous Wastes

• Pre 1970
  – Inconsistent waste management
  – unaware of risks?
  – Low cost option (“dumping”)
• 1970s-1980s
  – Regulatory compliance
  – End of pipe control
• 1990s
  – Prevent waste generation
  – Life cycle approach

1976 RCRA & 1984 HSWA
Resource Conservation & Recovery Act
Hazardous and Solid Waste Amendments

• Defined Hazardous Waste (Subtitle C)
• Cradle-to-Grave manifest system
• Permit system for TSDFs
• Classified generators by quantity
• Land ban on haz waste disposal
• Other wastes covered
  – UST (Subtitle I), Medical (Subtitle J), Solid Waste (Subtitle D)

Cradle-to-Grave

• Everyone involved in the haz waste process (generators, transporters, treaters) can be held liable for problems even if they were not directly “at fault”
• The manifest system helps to ensure responsible waste management
  – everyone has a copy of the manifest from all stages

Land Ban

• No non-containerized liquid disposal (lagoons, etc.)
  – what about deep well (~>2000’) injection?
• Generally, no disposal of containerized liquids
  – Treat (generally by solid/stab) to remove free liquid
• Specifically designed landfills for haz waste

RCRA Regs
...solid, liquid, or contained gas fitting haz waste criteria

Three Criteria of Haz Waste

• Listed material
  – F list: wastes from general chemical use
  – K list: specific wastes from 17 specific industries
  – P list: acutely hazardous chemicals
  – U list: acutely toxic and characteristic of toxicity
• 4 Characteristics (TRIC)
• Not on exclusion list
4 Characteristics of Haz Waste

- **Toxic** (TCLP test)
  - Adverse human or environmental effects
  - Chemical concs in acid liquid extractant
    >100x drinking water limits
- **Reactive**
  - Reacts violently with water &/or explosive
- **Ignitable**
  - Capable of spontaneous combustion
- **Corrosive**
  - pH <2 or >12.5; rate of steel corrosion

What about radioactive waste?

- It is “hazardous” based on toxicity to humans from the radiation & also potentially explosive if the quantity stored “goes critical”
- However, regulated by the Nuclear Regulatory Committee (NRC), not EPA, under the Atomic Energy Act (& 6 other regs)
  - we will still discuss rad waste in this class!

RCRA Regs

3 Categories of Haz Waste Generators

- **LQGs** (Large Quantity Generators)
  - >1000 kg/mo haz w or >1 kg/mo acutely haz
- **SQGs** (Small Quantity Generators)
  - 100-1000 kg/mo haz w
- **CESQGs** (Conditionally Exempt SQGs)
  - <100 kg/mo haz w & <1 kg/mo acutely haz

RCRA Regs

Generator Requirements

- **LQGs**: - EPA ID number
  - ID and track all haz waste
  - Storage and safety req’s (contingency plan)
  - Hazardous Waste Manifests to reg TSDFs
  - Biennial reporting
- **SQGs** - EPA ID number, store no more than req’d amts on site using approved methods, safety precautions, send waste to regulated TSDF w/ manifest
- **CESQGs** - store <1000 kg, deliver for tmt or disposal (to haz w. TSDF NOT req’d)

Number of Generators and Quantity of Waste Produced

<table>
<thead>
<tr>
<th>Category</th>
<th># (1997)</th>
<th>Qty (tons)</th>
<th>where?</th>
</tr>
</thead>
<tbody>
<tr>
<td>LQGs</td>
<td>20,316</td>
<td>214M ’95</td>
<td>40.7M ’97  71% Tx, La, II, OH, Mi</td>
</tr>
<tr>
<td>SQGs</td>
<td>236,000</td>
<td>~21M ’95</td>
<td>~4M ’97</td>
</tr>
<tr>
<td>CESQGs</td>
<td>455,000-700,000</td>
<td>~0.2M</td>
<td></td>
</tr>
</tbody>
</table>

?: real, significant decrease 1995-1997

1995 vs 1997?

- 81% decrease in LQG mass of haz waste shown
- …due to wastewater!
  ⇒ Solid mass haz waste increased 11%

Source: EPA Biennial Report based on generator reports to EPA (pub. 1999)
Treatment, Storage, Disposal Facilities (TSDFs)

- 2025 in 1997 (1078 storage only)
- 37.7M tons managed (7% from 1995)
- Disposal options used
  - 76% Land disposal (26M deep well inj, 2M LF)
  - 10% recovery
  - 9% thermal (1.7M RDF, 1.7M incinerated)
  - 5% other
- 18,029 shippers
  - 7.3M tons...4.4M tons between states

1997 Biennial RCRA Data from LQGs

Excluded Wastes

- POTW sewage
- Ash from MSW incin
- CWA point discharges
- Ag. waste
- Irrigation return flow
- Mining wastes
- Radioactive waste
- Oil & gas drilling fluid

- What characteristics common to “hazardous” waste might these wastes have?
- Why are these wastes excluded if they have hazardous characteristics?
- What are the pros/cons for these exclusions (cost:benefit analysis)?