SAND2009-4294P

Disposal of Hazardous Chemicals

What Should be Done and How

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Hosted by:

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Chemicals for Disposal

Chemicals that are:

- Still good … but no longer needed for use (e.g., do not perform that work anymore, excess)
- Out of Date (i.e., expired shelf-life)
- Have impurities and can not be used (e.g., contaminated)

Chemicals for Disposal (Cont.)

Typically not safe to throw away in the regular trash, and may be hazardous waste

- If hazardous waste, it must be managed per regulations
- If not hazardous waste, it must still manage safely (e.g., segregated storage)

Pollution Prevention

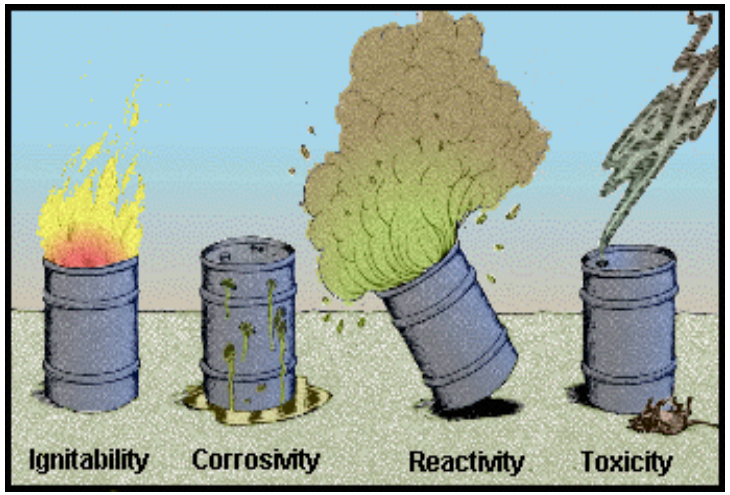
- **Reduce**
  - Probably not applicable, since already have it
- **Reuse**
  - Find someone else that needs or can use it within your organization
  - Contact the original manufacturer:
    - Can the expiration date be extended (typically dependant upon storage conditions)?
    - Is there another facility nearby that uses the chemical?
    - Will they take it back?

Pollution Prevention (Cont.)

- **Recycle**
  - Locate a recycling facility that handles the chemical and can:
    - Broker the chemical to another user
    - Re-evaluate the expiration date - to extend it
    - Remove contaminants and certify purity
    - Otherwise beneficially use the chemical (e.g., burn for energy generation)

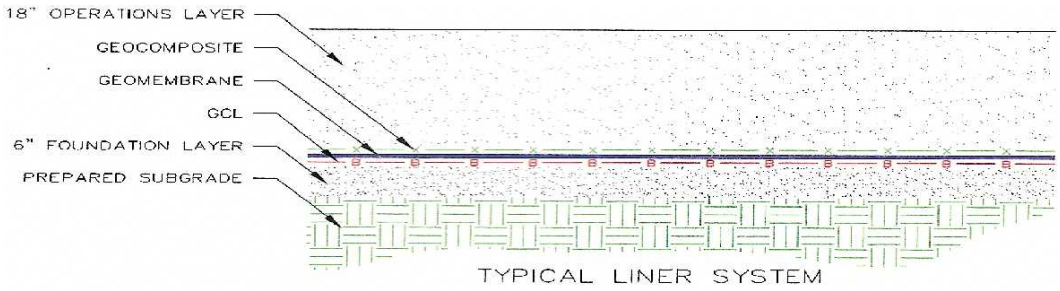
Disposal Consideration

- What type of hazard does the chemical present?
  - Ignitibility
  - Corrosivity
  - Reactivity
  - Toxicity
- Type of hazard drives the type of treatment and disposal
- Consider multiple hazards



Forms of Disposal

- Destruction
- Treatment to make non-hazardous
- Make non-mobile in the environment and place in an engineered landfill



TYPICAL LINER SYSTEM

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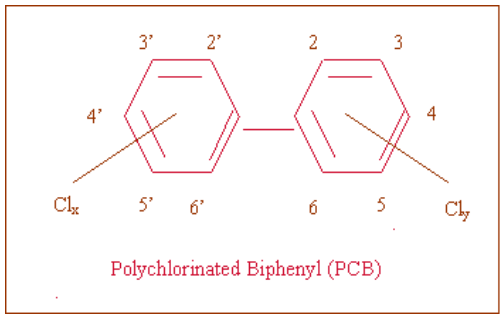
Destruction

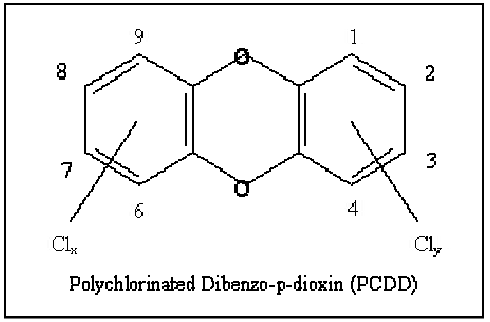
Applicability:

- *Ignitable* hazard
  - Primary method
- *Corrosive* hazard
  - Can be used, but not primary method
- *Reactive* hazard
  - Can be used, but not primary method
- *Toxic* hazard
  - Primary method for organic chemicals, etc.
  - Not typically used for inorganic chemicals, etc.

Destruction (Cont.)

- Never burn chemicals in open air
  - May result in toxic exposures of people
  - May result in environmental damage
  - May not destroy chemical



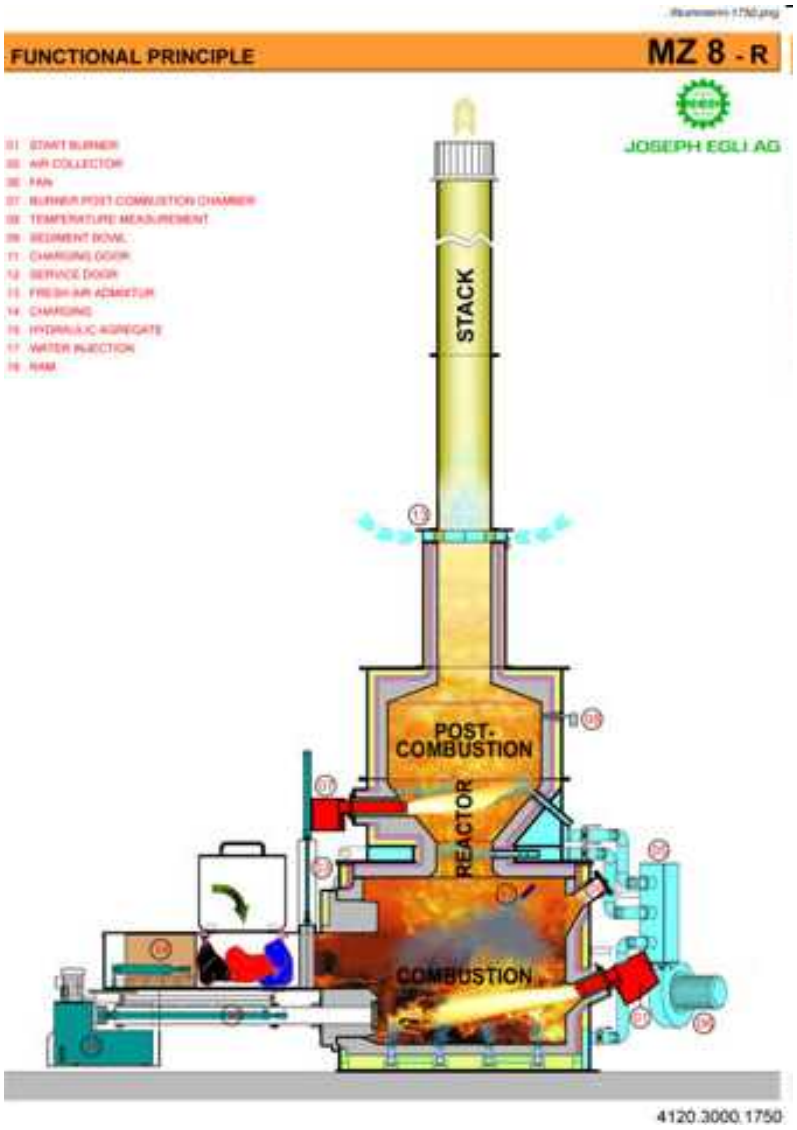


Destruction (Cont.)

- Physically destroy using combustion:
  - Incineration Units
    - Rotary kilns
    - Fluidized bed units
    - Liquid injection units
    - Fixed hearth units
  - Boilers / Industrial Furnaces
    - Typically produce energy for a manufacturing process (e.g., cement kilns, coke ovens)

NOTE: Air emissions control is necessary, and ash may still be hazardous (e.g., for metals)

Fixed Hearth Incinerator



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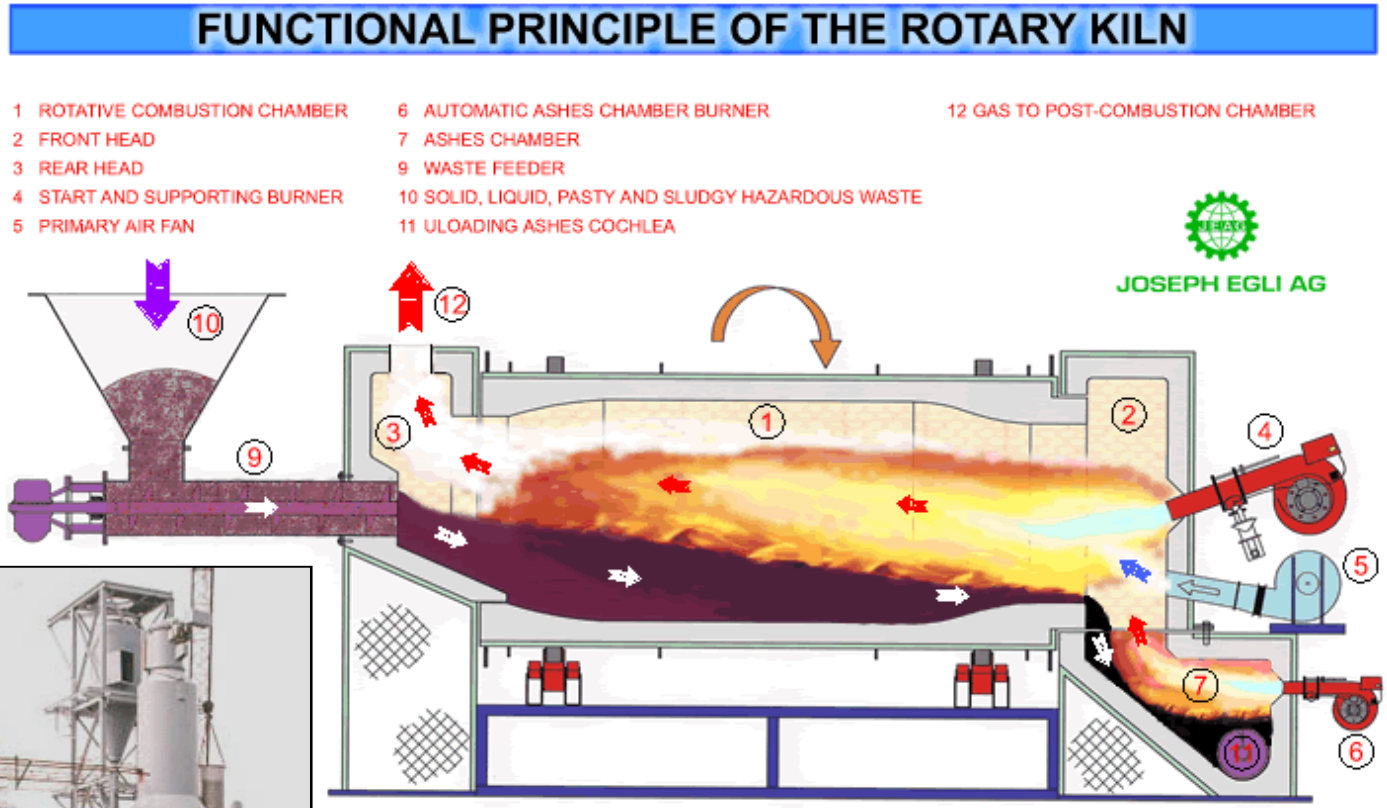
Rotary Kiln Incinerator



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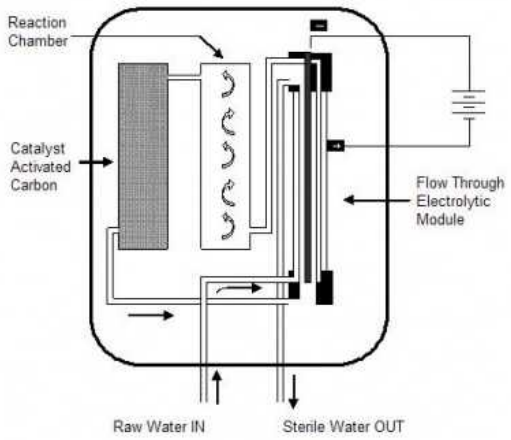
Make Non-Hazardous

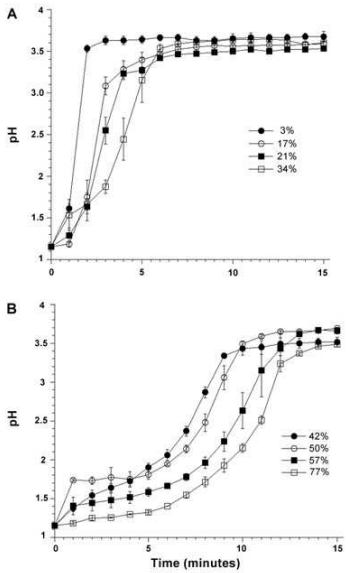
Applicability:

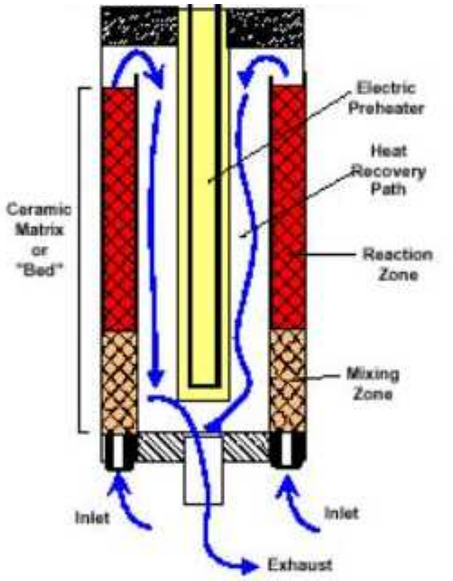
- *Ignitable* hazard
  - Not typically used
- *Corrosive* hazard
  - Primary method
- *Reactive* hazard
  - Primary method
- *Toxic* hazard
  - Can be used for organic chemicals, etc.
  - Can be used for inorganic chemicals, etc.

Make Non-Hazardous (Cont.)

- Chemically change into non-hazardous form
  - Acid/Base neutralization
  - Controlled reaction of reactive chemicals
  - Oxidation to cause chemical break-down







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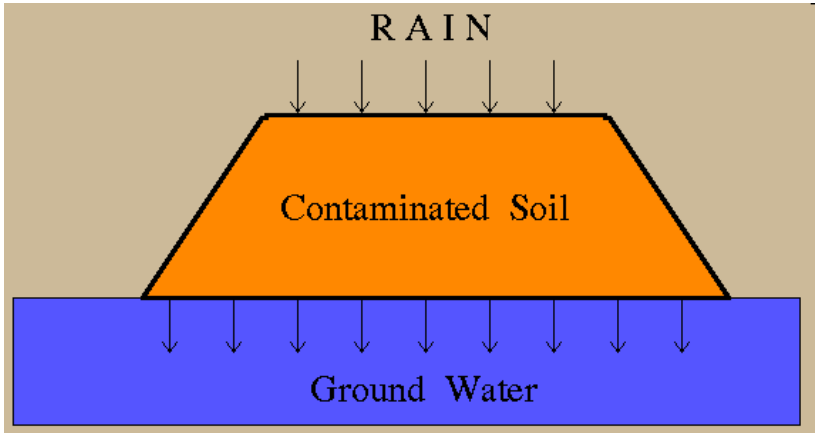
Make Non-Mobile

Applicability:

- *Ignitable* hazard
  - Not typically used
- *Corrosive* hazard
  - Not typically used
- *Reactive* hazard
  - Not typically used
- *Toxic* hazard
  - Can be used for organic chemicals, etc.
  - Primary method for inorganic chemicals, etc.



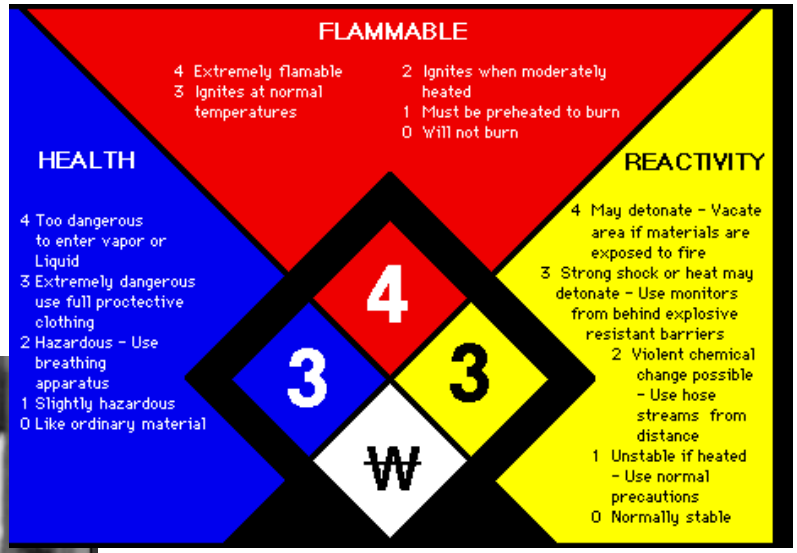
Make Non-Mobile (Cont.)

- Treat chemical such that it does not leach
  - Chemically bind
    - Chemical precipitation (e.g., insoluble salts)
  - Physically bind
    - Solidify by embedding in a matrix (e.g., cement, vitrification)
    - Encapsulate (e.g., polymer)

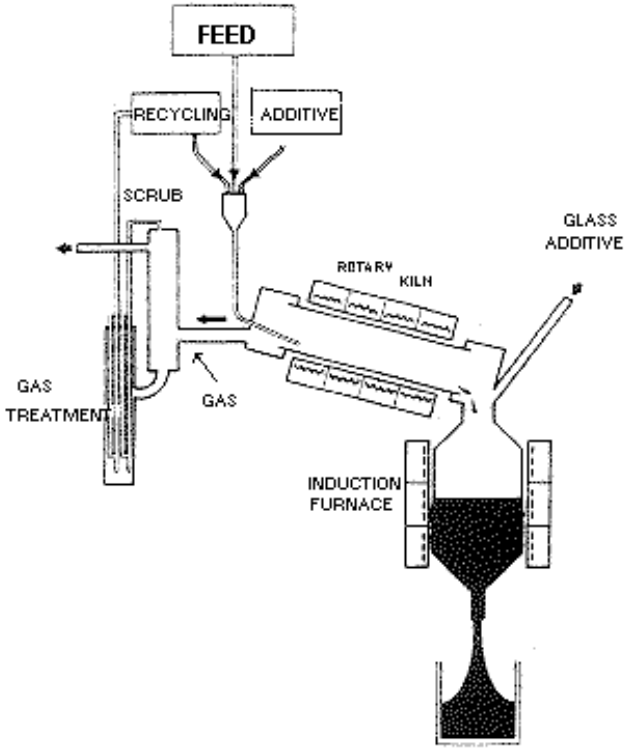
$$Cr^{3+} + 3\ OH^{-} \rightarrow Cr(OH)_3$$

Chemically Bind

- Dilution is ***NOT*** the solution to pollution!



Physically Bind



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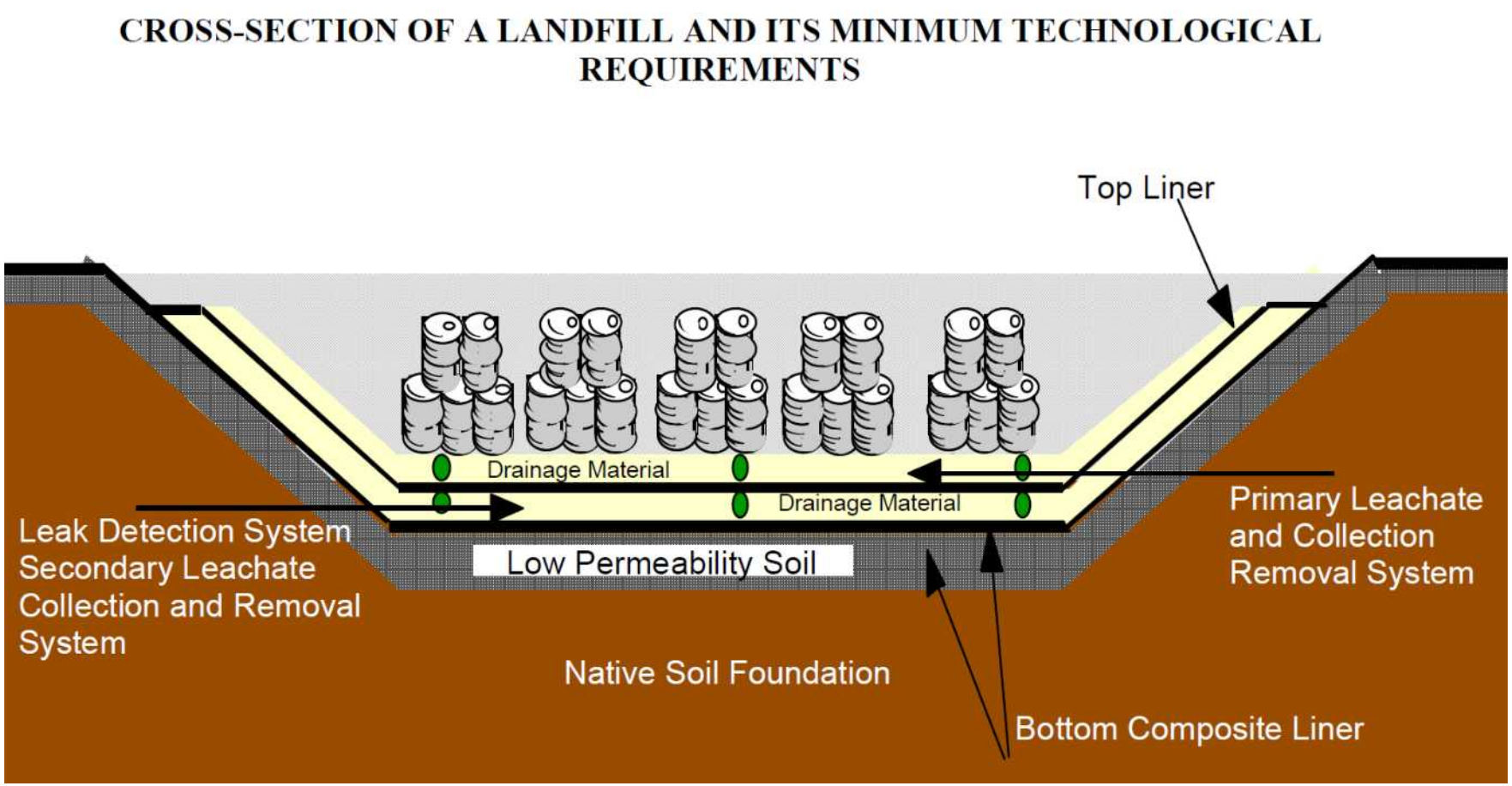
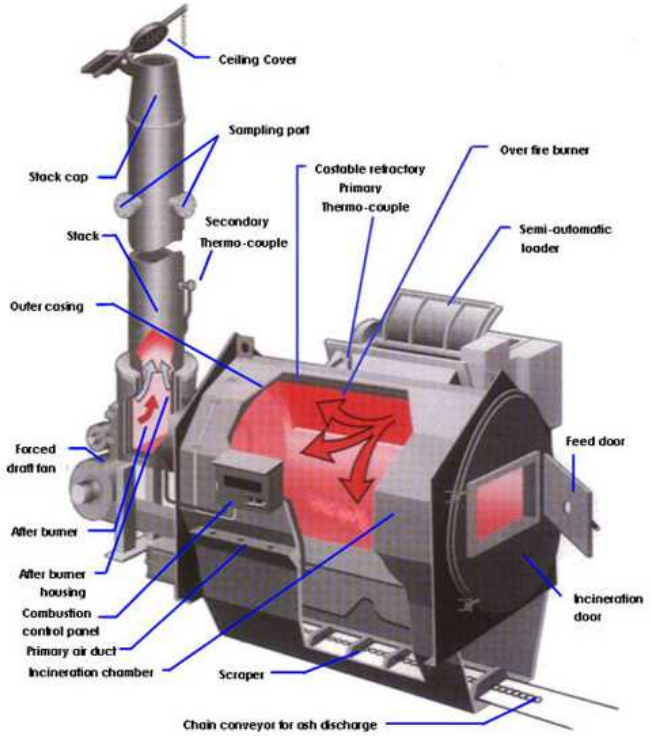
Engineered Landfill



Summary

- Eliminate Hazardous Characteristic(s)
  - Treatment is technology and characteristic driven
- Render safe for environmental disposal
- Treat and dispose appropriately
  - Typically not the local landfill



Portable incinerator