

US EPA ARCHIVE DOCUMENT

## **SESSION 3**

# **THE RESOURCE CONSERVATION AND RECOVERY ACT: PROTECTING ENVIRONMENTAL MEDIA**



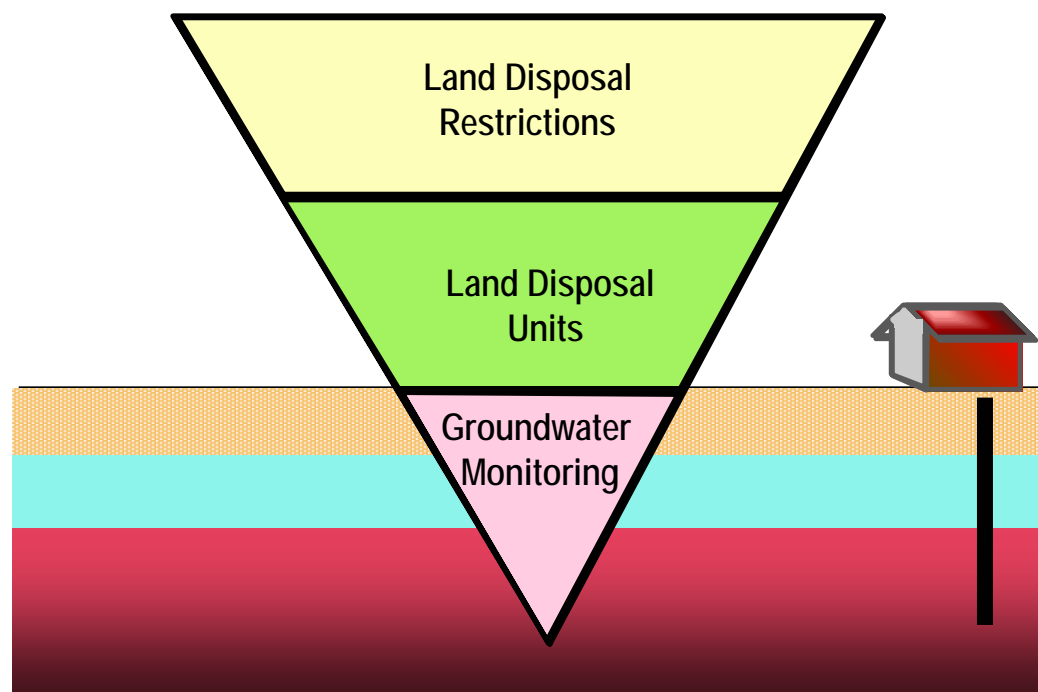
## Session 3 Agenda: Protecting Environmental Media

- ▶ Groundwater Protection Strategy
  - Land Disposal Restrictions (LDR)
  - Land Disposal Units (LDUs)
  - Groundwater Monitoring (GWM)
- ▶ Hazardous Waste Combustion
- ▶ Organic Air Emission Standards
- ▶ Review



Groundwater Protection Strategy

# EPA employs a three-tiered groundwater protection strategy



An individual uses approximately 50 gallons of water each day



Groundwater Protection Strategy: LDR

## Land disposal restrictions (LDR) are the first line of defense

- ▶ Hazardous waste placed on the ground poses a contamination risk to groundwater
- ▶ LDR treatment standards reduce the toxicity and mobility of each hazardous constituent
- ▶ LDR requirements apply to the entire cradle-to-grave chain (i.e., generator to TSDF)
  - ▶ Treatment standards
  - ▶ Notification requirements (no federal form)



Groundwater Protection Strategy: LDR

## The LDR program prohibits three activities

- ▶ Disposal of untreated waste
- ▶ Storage of hazardous waste for long periods of time to avoid proper treatment (§268.50)
- ▶ Dilution of hazardous waste to meet treatment standards (§268.3)



## Must treat waste to achieve LDR treatment standards prior to land disposal

- ▶ A treatment standard is based on an evaluation of best demonstrated available technologies (BDAT)
  - Demonstrated to treat the hazardous constituents present in the wastestream
  - Available for the public's use
  
- ▶ Waste must be treated in one of two ways:
  - By meeting **constituent concentrations** (e.g., 5 mg/L TCLP)
  - By using **specified technologies** (e.g., combustion)
  
- ▶ Must also treat some wastes for underlying hazardous constituents (Universal Treatment Standards)



Groundwater Protection Strategy: LDR

## Example of LDR treatment standards listed in §268.40

Treatment Standards for Hazardous Waste					
Waste Code	Waste Description and Treatment/Regulatory Subcategory	Regulated Hazardous Constituent		Wastewaters	Nonwastewaters
		Common Name	CAS Number		
D017	Wastes that are TC for 2,4,5-TP (Silvex) based on the TCLP in SW846 Method 1311	2,4,5-TP (Silvex)	93-72-1	CHOXD or CMBST	7.9 mg/L and meet §268.48 standards
D018	Wastes that are TC for Benzene based on the TCLP in SW846 Method 1311	Benzene	71-43-2	0.14 mg/L and meet §268.48 standards	10 mg/L and meet §268.48 standards

40 CFR §268.40





Groundwater Protection Strategy: LDR

## EPA created alternative LDR requirements for certain materials

- ▶ Debris
- ▶ Soil
- ▶ Lab packs



40 CFR §§268.45, 268.49, and 268.42



Groundwater Protection Strategy: LDR

## Debris treatment standards depend on the debris and contaminant type

- ▶ Debris means solid material exceeding a 60 mm particle size that is intended for disposal and that is a manufactured object; plant or animal matter; or natural geologic material
- ▶ Treat using a technology, not a concentration-based standard
- ▶ Debris treatment alternatives include:
  - Extraction technologies
  - Destruction technologies
  - Immobilization technologies



Groundwater Protection Strategy: LDR

## EPA established alternative soil treatment standards

- ▶ Soil is not a solid waste, yet it may contain hazardous waste via the “contained-in” policy
- ▶ Treat underlying hazardous constituents to 90 percent reduction capped at 10 times UTS and remove ignitability, corrosivity, and reactivity
- ▶ Soil that exhibits the TC for lead (40 mg/L TCLP):
  - **Option 1:** 90 percent reduction  
(40 mg/L \* 0.10 = 4 mg/L)
  - **Option 2:** 10 \* UTS  
(10 \* 0.75 mg/L = 7.5 mg/L)



Groundwater Protection Strategy: LDR

## Facilities may use alternative requirements for lab packs

- ▶ Lab packs are drums filled with many small containers packed in absorbent material
- ▶ Facilities may incinerate the entire lab pack and treat resultant residuals
- ▶ Certain waste codes specified in Appendix IV to Part 268 cannot use this option





Groundwater Protection Strategy: LDR

## EPA prohibits the storage of waste as a substitute for treatment

- ▶ TSDFs cannot store waste longer than one year unless the storage is to facilitate proper recovery, treatment, or disposal
- ▶ Generators and transporters are exempt from the storage prohibition if they follow their respective accumulation and storage standards



Groundwater Protection Strategy: LDR

## EPA prohibits hazardous waste dilution in lieu of adequate treatment

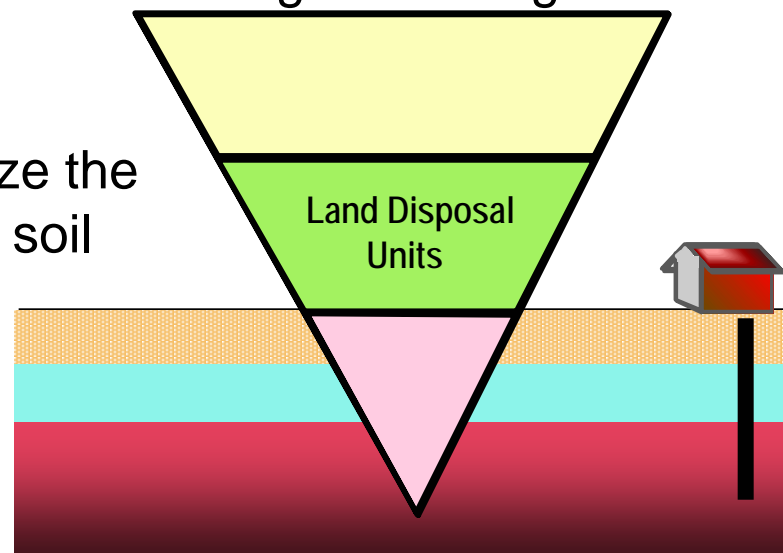
- ▶ In general, dilution does not satisfy the statutory requirement of reducing the toxicity and mobility of hazardous constituents (§3004(m))
  
- ▶ In some situations, dilution is permissible
  - Aggregating similar wastes to facilitate treatment
  - Managing characteristic wastes in Clean Water Act treatment systems



Groundwater Protection Strategy: LDUs

## Properly constructed land disposal units serve as the second line of groundwater defense

- ▶ **Surface impoundments**—natural or manmade depressions used for managing liquid wastes
- ▶ **Waste piles**—open piles used for storing or treating non-liquid waste
- ▶ **Land treatment units**—utilize the biodegradation properties of soil
- ▶ **Landfills**—final disposal unit for a significant portion of hazardous waste



In 2001, landfills and surface impoundments alone managed 2,089,701 tons of hazardous waste

*40 CFR Part 264/265, Subparts K, L, M, and N*



Groundwater Protection Strategy: LDUs

## **LDUs must meet minimum technological requirements (MTR) to prevent soil and groundwater contamination**

- ▶ **Liners** prevent migration of waste downward into groundwater
- ▶ **Leachate collection and removal systems** collect hazardous constituents before they leak into groundwater
- ▶ **Leak detection systems** detect leaks in time to prevent extensive contamination



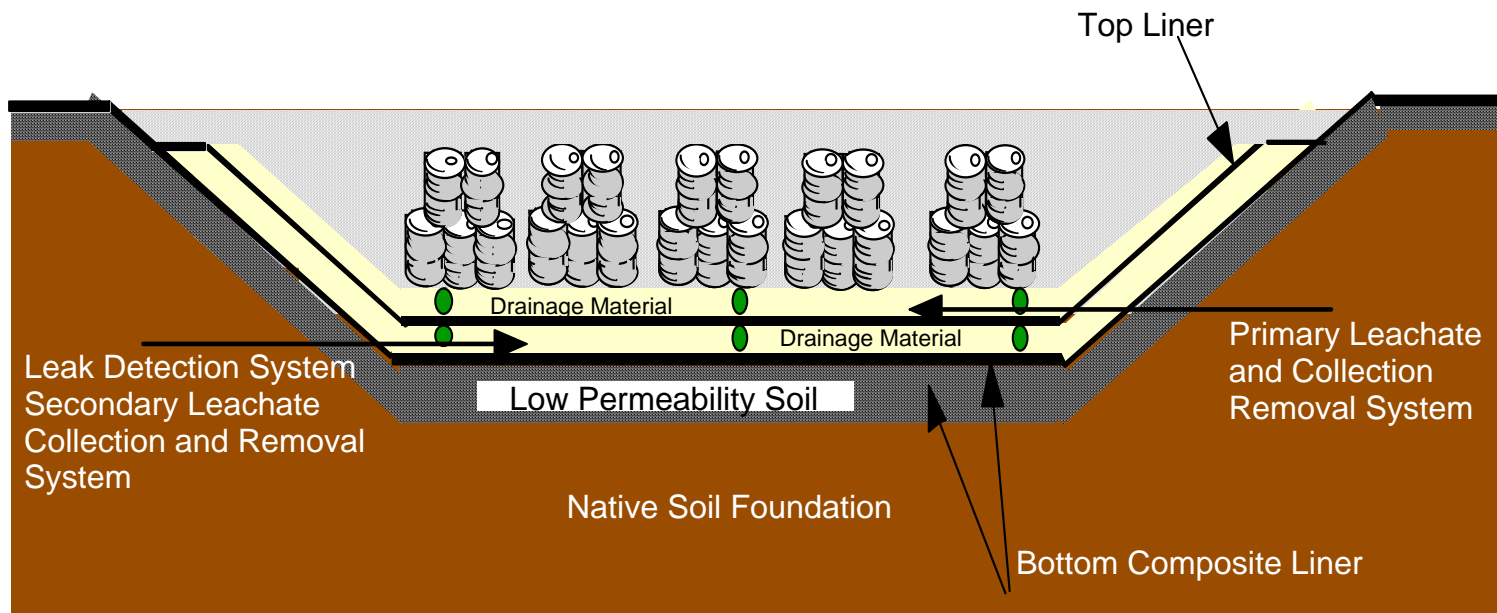
*40 CFR Part 264/265, Subparts K, L, M, and N*





Groundwater Protection Strategy: LDUs

# Example of LDU minimum technological requirements (MTR)



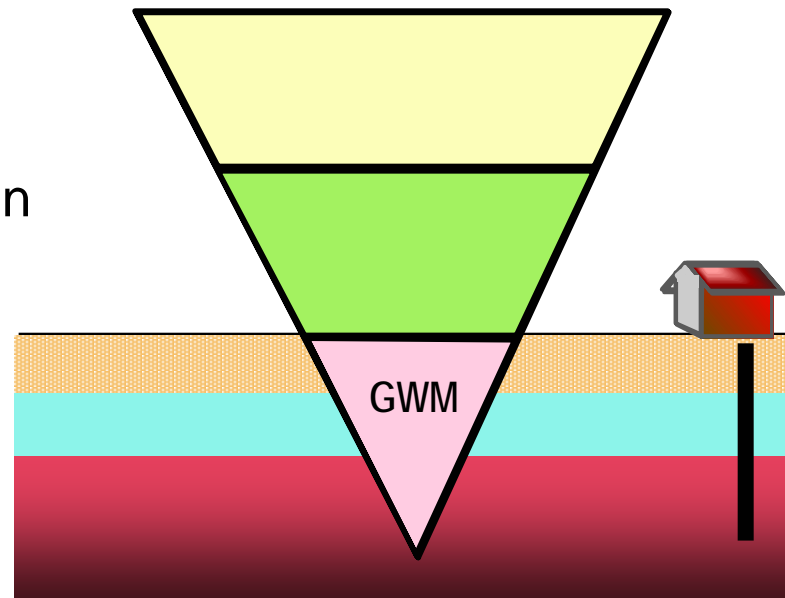
40 CFR Part 264/265, Subpart N



Groundwater Protection Strategy: GWM

## Groundwater monitoring (GWM) is the final line of defense

- ▶ LDU operators must monitor underlying aquifers for contamination to ensure that the unit is not leaking
- ▶ If monitoring results indicate a release, facilities must begin corrective action
- ▶ GWM programs must consider a site's hydrology & must include sampling and analysis procedures that ensure consistent results



Groundwater Protection Strategy: GWM

## Groundwater monitoring regulations have three phases

- ▶ **Detection monitoring** involves initial leak discovery
- ▶ **Compliance monitoring** ensures that contamination does not exceed acceptable levels (groundwater protection standard, GWPS)
- ▶ **Corrective action** begins when contamination threatens human health and the environment (exceeds GWPS)



*40 CFR Part 264/265, Subpart F*



Hazardous Waste Combustion & Organic Air Emission Standards

## **EPA protects air by regulating combustion and hazardous waste management units**

- ▶ Combustion units include incinerators, boilers & industrial furnaces (BIFs), and miscellaneous units
- ▶ The standards for hazardous waste combustion units are addressed by RCRA and the Clean Air Act (CAA)
- ▶ Organic air emission standards govern process vents, equipment leaks, tanks, containers, and surface impoundments



Approximately 11% of hazardous waste generated is treated using a combustion technology



## Hazardous Waste Combustion

## The standards for hazardous waste combustion units are addressed by RCRA and CAA

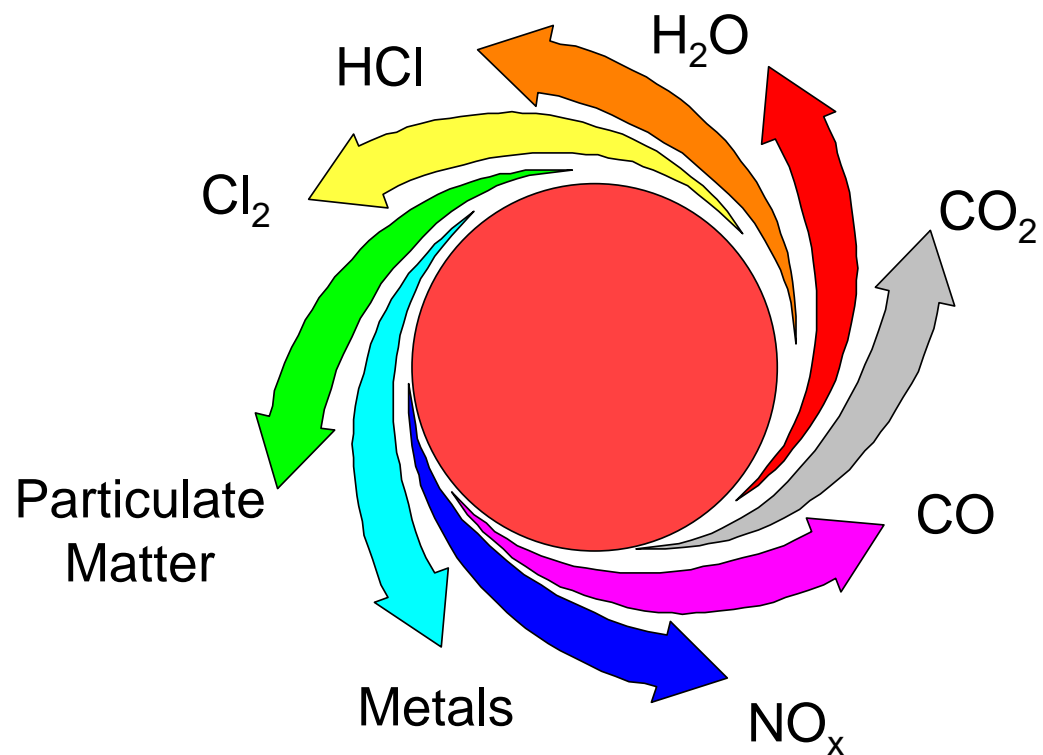
- ▶ CAA §112—provides the framework for protecting people and the environment from the harmful effects of air pollution
- ▶ Maximum Achievable Control Technology (MACT)—based on emissions levels already achieved by the best-performing similar facilities
- ▶ National Emissions Standards for Hazardous Air Pollutants (NESHAPs)—developed by compiling data related to emission source quantities, types of pollutants, and control technologies

The average adult breathes about 3,400 gallons of air per day



Hazardous Waste Combustion

**There are many byproducts of the combustion process that can cause harm to human health and the environment**



## Hazardous Waste Combustion

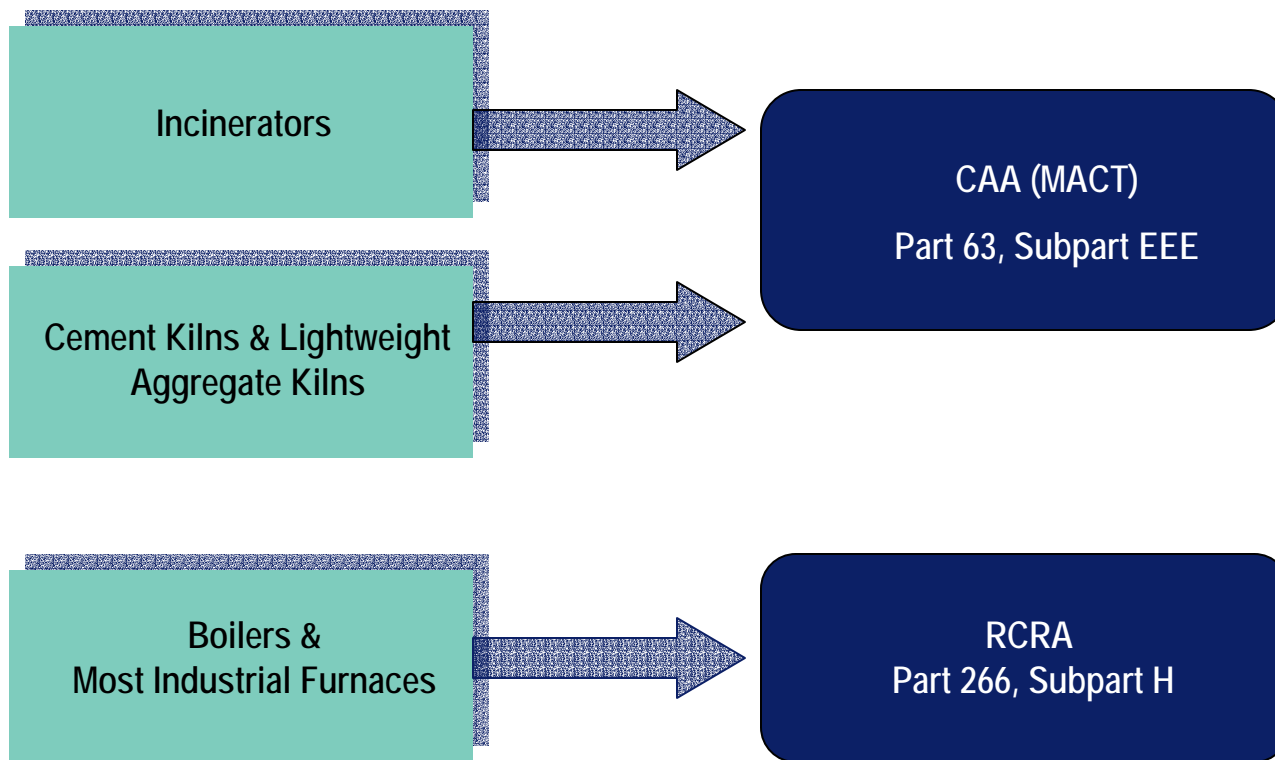
## There are 3 basic categories of hazardous waste combustion units

- ▶ Incinerators—enclosed device using controlled flame combustion (e.g., infrared incinerator, plasma arc incinerator)
- ▶ Industrial Furnaces—enclosed device that is an integral component of a manufacturing process and uses thermal treatment to recover materials or energy (e.g., cement kiln)
- ▶ Boilers—enclosed device using controlled flame combustion that has an energy recovery system



Hazardous Waste Combustion

# Different combustion units are subject to different regulations





## Hazardous Waste Combustion

## CAA establishes emission limits, known as MACT standards, for each regulated unit

- ▶ MACT standards limit emissions on materials such as dioxins, mercury, particulate matter, and hydrocarbons
  
- ▶ Standards for MACT units vary depending on age of unit
  - *New source*: any affected source, the construction or reconstruction of which commenced **after** April 19, 1996
  - *Existing source*: any affected source, the construction or reconstruction of which commenced **on or before** April 19, 1996



In 1999, there were 22 industrial furnaces subject to MACT standards

## Hazardous Waste Combustion

## There are two types of ways to monitor compliance with the MACT standards

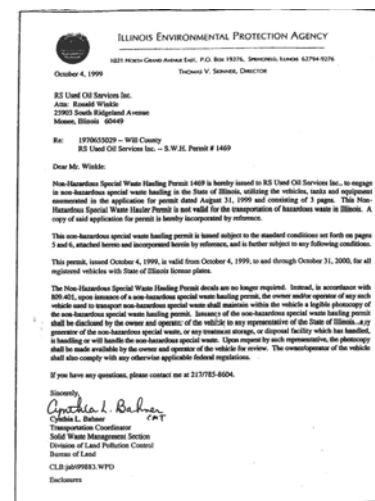
- ▶ Continuous Monitoring System (CMS)
  - Used to ensure compliance with standards
  - Monitors parameters such as temperature, pressure, and waste feed
  
- ▶ Continuous Emissions Monitoring System (CEMS)
  - Directly measures hazardous air pollutants exiting the unit
  - Required for carbon monoxide and hydrocarbons



## Hazardous Waste Combustion

## Units subject to the MACT standards must have both a RCRA and CAA Title V permit

- ▶ RCRA permit includes:
  - General facility standards
  - Corrective action
  - Combustor-specific concerns such as materials handling
  - Risk-based emissions limits and operating requirements under omnibus provision (§3005(c)(3)), if appropriate
- ▶ CAA permit includes:
  - Feed rate
  - Operating conditions
  - Emission standards



40 CFR §63.1200



## Court action has led to many changes in the MACT standards

- ▶ *Cement Kiln Recycling v. EPA*
  - Multiple petitioners challenged methodology used to set emission standards
  - Joint motion filed October 19, 2001, agreed upon interim standards
  
- ▶ Interim standards compliance date September 30, 2003 (67 FR 6792, February 13, 2002)
  
- ▶ EPA has proposed replacement standards for units currently subject to MACT as well as standards for additional units



## Hazardous Waste Combustion

## The remaining hazardous waste combustion units (e.g., boilers) only comply with RCRA

- ▶ RCRA units must meet performance standards and comply with operating conditions
- ▶ Performance standards—set emission limits for organics, particulate matter, metals, and hydrogen chloride and chlorine gas
- ▶ Operating conditions—specify parameters (e.g., feed rate) to ensure compliance with performance standards



Dioxin and mercury are of particular concern because they are toxic, persistent, and bioaccumulative

## RCRA regulations set forth additional requirements for combustion units



- ▶ Management prior to burning
- ▶ General TSDf standards
- ▶ Waste analysis
- ▶ Automatic waste feed cut off
- ▶ Inspection and monitoring
- ▶ Direct transfer
- ▶ Recordkeeping
- ▶ Closure





## Organic Air Emission Standards

## RCRA organic air emission standards control emissions from specific devices and units

- ▶ Process Vents (Subpart AA)
- ▶ Equipment leaks (Subpart BB)
- ▶ Tanks, containers, and surface impoundments (Subpart CC)
- ▶ Apply to specific members of the RCRA community:
  - TSDFs
  - Recycling units at TSDFs
  - LQGs



40 CFR Part 264/265, Subparts AA, BB, and CC



Organic Air Emission Standards

## **Subpart AA limits emissions from specific process vents on hazardous waste management units**

- ▶ Vents that manage waste with at least 10 ppmw organics
  
- ▶ Vents associated with:
  - Distillation
  - Fractionation
  - Thin-film evaporation
  - Steam stripping
  - Solvent extraction
  - Air stripping



40 CFR §264/265.1030





## Organic Air Emission Standards

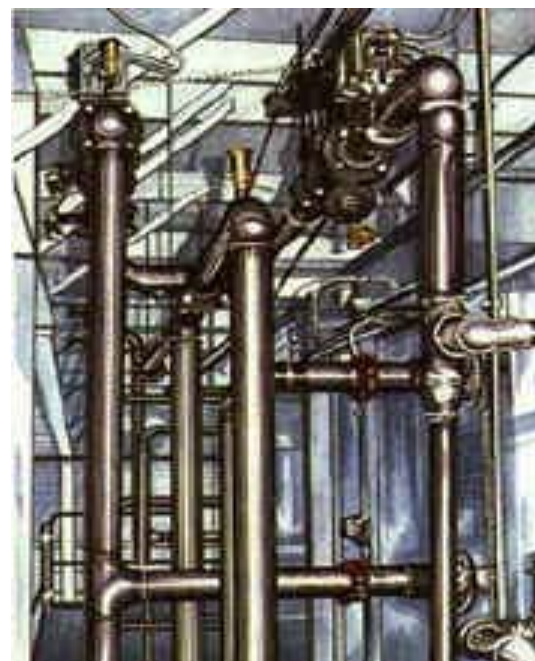
## Subpart AA requires emissions monitoring and controls to limit the amounts of emissions being released

- ▶ Subpart AA requires a facility to determine if emission rates exceed thresholds
- ▶ Subpart AA requires a facility to reduce emissions below acceptable levels by either:
  - Changing processes, or
  - Applying control devices



## Subpart BB limits emissions from equipment associated with hazardous waste management

- ▶ Equipment includes, but is not limited to, valves, pumps, and pressure relief devices
- ▶ Subpart BB regulates equipment that contains or contacts waste with at least 10 percent organics for more than 300 hours per year
- ▶ Other equipment is only subject to identification and recordkeeping requirements



## Organic Air Emission Standards

### **Subpart BB requires certain activities to ensure compliance**

- ▶ Leak detection monitoring for specific equipment
- ▶ Visual inspections to check for leaks
- ▶ Repairs must be made within specified time frames
- ▶ Equipment that is subject to regulations must be marked



## Organic Air Emission Standards

### **Subpart CC applies to tanks, containers, and surface impoundments storing specific wastes**

- ▶ Subpart CC units managing hazardous waste with at least 500 ppmw organics
- ▶ Subpart CC regulates units that received waste after December 6, 1996
- ▶ Some units are exempted in §264/265.1080 (e.g., units that meet CAA standards)



## Organic Air Emission Standards

**Subpart CC standards are different for each unit**

- ▶ Tank standards vary with size and vapor pressure and must be operated with no emissions; or with a control device; or within industry specifications
- ▶ Surface impoundments must remain covered and be equipped with control or closure devices
- ▶ Container controls vary according to size of container and properties of waste and must operate without emissions to the atmosphere; or in accordance with DOT standards; or as vapor tight units



## The RCRA regulations are designed to protect environmental media

- ▶ EPA employs a three-tiered approach to protecting groundwater
  - LDR requirements
  - LDU minimum technological requirements
  - Groundwater monitoring
  
- ▶ EPA protects air by regulating combustion and hazardous waste management units
  - Combustion units are addressed by RCRA and CAA
  - Organic air emission standards govern process vents, equipment leaks, tanks, containers, and surface impoundments

