

# **RCRA FUNDAMENTALS TRAINING COURSE**

## **REGION 4**



*For more information on EPA training courses, contact the EPA training coordinator,  
Denise Housley at (404) 562-8495.*

**AGENDA**  
**RCRA FUNDAMENTALS COURSE**  
**EPA REGION 4**  
**DAY 1**

8:30 - 8:45	Registration
8:45 – 9:00	Introductions
9:00 – 9:15	History of RCRA
9:15 – 9:30	RCRA Information Sources
9:30 – 10:15	Identifying Solid Wastes
10:15 - 10:30	Break
10:30 - 11:30	Identifying Solid Wastes (continued)
11:30 – 12:00	Hazardous Waste Exclusion
12:00 - 1:00	Lunch
1:00 - 2:00	Characteristic Hazardous Waste
2:00 - 2:30	Listed Hazardous Waste
2:30 - 2:45	Break
2:45 - 3:15	Mixture Rule/“Contained-In” Interpretation
3:00 - 3:15	“Derived From” Rule
3:15 - 3:45	Radioactive Mixed Wastes
3:45 – 4:15	Problem Wastes
4:15 – 4:45	Case Studies/Question & Answers

## **AGENDA**

### **RCRA FUNDAMENTALS COURSE EPA REGION 4 DAY 2**

8:30 - 9:00	Spills and Spill Residues
9:00 – 9:30	Universal Wastes
9:30 – 10:00	Treating Wastes without a Permit
10:00 - 10:30	Hazardous Waste Tanks
10:30 - 10:45	Break
10:45 – 11:30	Recycling
11:30 – 12:00	Used Oil Management
12:00 - 1:00	Lunch
1:00 – 2:30	Corrective Action Under HSWA
2:30 - 2:45	Break
2:45 – 3:45	Land Disposal Restrictions
3:45 - 4:15	Universal Treatment Standards and Underlying Hazardous Constituents
4:15 - 5:00	Case Studies/Question & Answers

## **AGENDA**

### **RCRA FUNDAMENTALS COURSE**

#### **EPA REGION 4**

#### **DAY 3**

8:30 - 9:00	Review
9:00 -9:30	Rules for Applying Characteristic Codes to Listed Wastes
9:30 – 10:00	Rules for Determining if Dilution is Allowable
10:0 - 10:15	Break
10:15 - 11:00	Management of Remediation Waste
11:00 - 11:45	Contaminated Soil and Hazardous Debris
11:45 – 12:00	Question/Answer/Case Studies
12:00 - 1:00	Lunch
1:00 - 2:30	RCRA Organic Air Emissions Standards
2:30 - 3:30	Case Studies
3:30 -4:00	Wrap-up/Question & Answers

## EPA REGION 4

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### RCRA Fundamentals Training Day 1



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## History of RCRA



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## Solid Waste Disposal Act of 1965

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- Technical assistance to states and localities
- General criteria for designing landfills
- No authorities to regulate hazardous waste



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## Resource Conservation and Recovery Act 1976

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- Completely replaced Solid Waste Disposal Act (SWDA)
- Established criteria for sanitary landfills
- Authorized a regulatory program for hazardous waste including inspection and enforcement authorities
- Provided mechanisms for:
  - Citizen suits
  - Restraining orders for imminent hazards
  - Research and development

RCRA 1004(27)



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## Resource Conservation and Recovery Act 1976 (cont'd)

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- To achieve the goals of RCRA, these programs were developed:
  - Subtitle D
  - Subtitle C
  - Subtitle I
- Subtitle D addresses non-hazardous waste by encouraging (mandates) states to develop management plans for solid waste

45 FR 33093



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## Resource Conservation and Recovery Act 1976 (cont'd)

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- Subtitle C
  - Establishes a regulatory program to identify hazardous waste and to track from "cradle to grave"
  - Called for the development of technical standards for the design and safe operations of TSD facilities
- Subtitle I
  - Relates to underground storage tanks
    - ◆ Storing hazardous materials
  - Establishes performance standards for new tanks
  - Corrective action program

45 FR 33093



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## May 1980: Major RCRA Components Promulgated

- Definition of hazardous waste
- Rules for generators and transporters
- Limited roles for existing hazardous waste facilities
- Initial standards for permitting hazardous waste facilities
- Permit processing requirements

261.3, 262, 263, 270



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## Major Omissions

- Standards for existing (interim status) facilities and for permitting facilities contained:
  - No groundwater monitoring regulations
  - Minimal land disposal regulations



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## Additional Significant Dates for RCRA

- 1981 - Land disposal facility regulations
  - Single liner
  - Many variances
- 1982 - Groundwater monitoring regulations
  - Significant technical challenge with minimal Agency interaction
- 1981 to 1983 - Significant Congressional concern with RCRA and CERCLA program implementation

RCRA 3004(u)



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## Hazardous and Solid Waste Amendments of 1984

- Strong vote against land disposal
  - Minimum technology requirements (MTR)
  - Land disposal restrictions (land ban)
- Corrective action at RCRA facilities
- Waste minimization
- Permit deadlines
- Federal facilities requirements

RCRA 3004(u)



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## Land Disposal Restrictions (LDR)

- EPA required to:
  - Evaluate all listed/characteristic wastes
  - Determine which wastes can be placed in the landfill environment "as is"
  - Determine what wastes can be landfilled after pretreatment

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## Waste Minimization

Generator must design and implement a program to reduce the volume or quantity and toxicity of hazardous waste generated on-site

RCRA 3005(c)(3)



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## RCRA Statutory Authorities

- Section 3007
- HSWA 3004 u and v permits
- Omnibus Provision
- Section 3008(h) Consent Orders
- Section 3008(a) Orders ("Compliance Orders")
- Section 7003 Orders
- Section 3013 Orders
- Section 9006 Orders



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## RCRA Section 3007

- Provides EPA authority to enter hazardous waste facilities at reasonable times to conduct inspections to determine compliance
- Allows EPA to collect samples to determine compliance
- Allows EPA to request information to support rulemaking or determine compliance
- Not limited to Subtitle C facilities



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## HSWA Section 3004 (u) and (v)

- Section 3004(u) requires that all RCRA permits address corrective action for releases of hazardous waste or hazardous constituents from solid waste management units (SWMUs).
- Section 3004(v) requires facility owners/operators to take corrective action beyond the facility boundary.



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### Omnibus Provision

- §3005 (c)(3) allows permit writer to establish any permit terms or conditions that are necessary to protect human health and the environment

270.32(b)(2)




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### RCRA Section 3008(h)

- Provides authority to require corrective action at:
  - Interim status facilities;
  - Facilities who have terminated interim status;
  - Facilities that have lost interim status; or
  - Facilities that treat, store, or dispose of hazardous waste but have not obtained interim status because they did not fully comply with section 3010 notification requirements or submit a timely Part A.




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### RCRA Section 3008(a)

- Used to require any person that is not in compliance with the requirements of RCRA to take steps immediately or within a stated time period to return to compliance
- Used to revoke permit or interim status
- Penalties up to \$32,500 per day may be assessed




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### RCRA Section 7003 Orders

- Used when there is evidence that the past or present handling, storage, treatment, transportation or disposal of hazardous or nonhazardous waste may present an "imminent and substantial endangerment to health or the environment"
- Can be used to require entity to cease and desist or require cleanup



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### RCRA Section 3013 Orders

- Used to evaluate the nature and extent of a problem or potential problem through monitoring, testing, and analysis when it is found that site may present a substantial hazard to human health or the environment.



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### RCRA 9006 Orders

- Requires immediate compliance with UST regulations
- Can establish a specific compliance schedule
- May assess penalties for non-compliance



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RCRA Information Sources



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RCRA Information Sources

- RCRA Online
- EPA website
- OSWER Directives
- Federal Register Notices
- RCRA Orientation Manual
- RCRA Training Modules
- National Enforcement Training Institute (NETI)



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RCRA Information Sources

- Environmental Response Training Program Virtual University (ERTP VU)
- Trainex
- Regional Guidance and Tools on Subparts AA/BB/CC and Subpart X



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## Internet Sites

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- EPA website  
<http://www.epa.gov>
- EPA Office of Solid Waste  
<http://www.epa.gov/osw>
- RCRA Online  
<http://www.epa.gov/waste/inforesources/online/index.htm>
- EPA Office of Enforcement Compliance and Assistance (OECA)  
<http://www.epa.gov/compliance/index.html>





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## Internet Sites

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- Enforcement and Compliance Document and Information Center (ECDIC)  
<http://www.epa.gov/compliance/resources/policies/index.html>
- National Service Center for Environmental Publications (NSCEP)  
<http://www.epa.gov/nscep/>
- Environmental Response Training Program Virtual University (ERTP VU)  
[http://www.ertpvu.org/kc/login/login.asp?kc\\_ident=kc0001](http://www.ertpvu.org/kc/login/login.asp?kc_ident=kc0001)


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## Internet Sites

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- OSWER Training Forum (Trainex)  
<http://www.trainex.org>
- National Enforcement Training Institute  
<https://www.netionline.com/Default.asp>
- Government Printing Office (GPO)  
[http://www.access.gpo.gov/su\\_docs/db2.html](http://www.access.gpo.gov/su_docs/db2.html)





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## Identifying Solid Wastes



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## Universe of Solid Wastes



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## Definition of a Solid Waste

- RCRA §1004 (27) states:
  - The term "solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material . . .



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## Discarded Material

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- A material is a solid waste if it is discarded

261.2(a)(1)



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## Discarded Material (cont'd)

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- Garbage, refuse, or sludge
- Thrown away, abandoned or destroyed
- Spent materials
- Incidental residues

261.2(a)(2)



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## Discarded Material (cont'd)

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- Also includes materials that are being stored rather than discarded
  - Old or unusable products
  - Materials which can no longer be recycled or reclaimed

261.2(b)(3)



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## Categories of Solid Waste

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- Abandoned
- Inherently waste-like
- Certain recycled materials
- Military munitions identified in 40 CFR §266.202

261.2(a)(2)(i)





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## Abandoned

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- Disposed of
- Burned or incinerated
- Accumulated, stored, or treated before, or instead of, being disposed, burned, or incinerated

261.2(b)


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## Inherently Waste-like

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- Wastes specifically listed
  - F020
  - F021
  - F022
  - F023
  - F026
  - F028

261.2(d)


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### Inherently Waste-like (cont'd)

- Secondary materials fed to a halogen acid furnace that exhibit a characteristic of, or are listed as, a hazardous waste
- Other materials may be determined by EPA to be inherently waste-like

261.2(d)



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### Recycled Materials

- Specified types of recycled materials are considered discarded
  - Used in a manner constituting disposal
  - Burned for energy recovery
  - Reclaimed
  - Accumulated speculatively

261.2(c)



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### Recycled Materials (cont'd)

- A material is considered discarded if it is accumulated, stored, or treated before recycling

261.2(c)



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## Recycled Materials (cont'd)

- A hazardous secondary material is not discarded, if:
  - Generated and reclaimed under the control of the generator
  - Not accumulated speculatively
  - Handled only in non land-based units
  - Generated and reclaimed within the US and its territories
  - Not subject to material-specific management practices when reclaimed
  - It is not a spent lead acid battery and does not meet the listing description for K171 or K172
  - It is legitimately recycled

261.2(a)(2)(ii)



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In general, determination of whether a recycled material is a solid waste depends upon the NATURE of the material and the MANNER in which it is recycled

261.2(c)



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## Nature of Recycled Materials

- For purposes of determining if a recycled material is a solid waste when recycled, five classes of materials are considered
  - Spent materials
  - Sludges
  - By-products
  - Commercial chemical products
  - Scrap metal

261.2(c)



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## Spent Material

- Any material that has been used and, as a result of contamination, can no longer serve its intended purpose without reprocessing
  - Spent solvents
  - Spent catalysts
  - Spent pickle liquor
  - Spent plating bath solutions

261.1(c)(1)



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## Sludge

- Residues from pollution control devices
  - Wastewater treatment plant sludges
  - Electric arc furnace dust (K061)
  - Baghouse dusts
  - Spent carbon from the treatment of wastewater or air streams
  - Oil from an oil/water separator
  - Ion-exchange resin

260.10 and 261(c)(2)



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## By-Products

- Process residues that are not one of the primary products of a production process
  - Distillation column bottoms
  - Heavy ends
  - Slag

261.1(c)(3)



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## By-Products (cont'd)

- By-products should not be confused with co-products
  - A co-product is intentionally produced by the manufacturing process and is ordinarily used in its existing state as a commodity in trade by the general public
  - Co-products must have a recognized use, and must be usable without reprocessing

261.1(c)(3)



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## Commercial Chemical Products

- Compounds listed in 40 CFR §261.33
  - P-listed wastes
  - U-listed wastes

261.33



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## Scrap Metal

- Metal pieces and parts which, when worn or superfluous, can be recycled
- Examples:
  - Scrap automobiles
  - Machine shop turnings
  - Radiators
  - Railroad box cars

261.1(c)(6)



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## Manner of Recycling

- Four methods of recycling are to be considered in determining if a recycled material is a solid waste
  - Use in a manner constituting disposal
  - Use as a fuel or burning for energy recovery
  - Reclamation
  - Speculative accumulation

261.2(c)



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## Use Constituting Disposal

- The material is applied to or placed on land
- The material is contained in a product applied to the land (except for commercial chemical products that are normally placed on the land, such as fertilizers)

261.2(c)(1)



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## Burned for Energy Recovery/Used as a Fuel

- The material is burned for energy recovery in a boiler or industrial furnace
- The material is used to produce a fuel
- The material is contained in a fuel

261.2(c)(2)



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## Reclamation

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- Processing to recover a usable product
- Regeneration

261.1(c)(4) and 261.2(c)(3)

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## Speculative Accumulation

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- Speculative accumulation is defined as the accumulation of waste materials prior to recycling without sufficient amounts being recycled
  - Sufficient amount is defined as at least 75% during a calendar year
- EPA may grant a variance on a case-by-case basis for materials that are accumulated speculatively (40 CFR §260.30)

261.1(c)(8) and 261.2(c)(4)

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	Use Constituting Disposal [261.2(c)(1)]	Energy Recovery/Fuel [261.2(c)(2)]	Reclamation [261.2(c)(3) except for: ]	Speculative Accumulation [261.2(c)(4)]
Spent Materials	●	●	●	●
Sludges that are listed hazardous wastes	●	●	●	●
Sludges exhibiting a characteristic of hazardous waste	●	●	---	●
By-products that are listed hazardous waste	●	●	●	●
By-products exhibiting a characteristic of hazardous waste	●	●	---	●
Commercial chemical products listed in 40 CFR §261.33	●	●	---	---
Scrap Metal	●	●	●	●

● = Material is considered a solid waste

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## Military Munitions

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- Unused or defective munitions are solid wastes if abandoned or treated prior to disposal, rendered unusable or declared a waste
- Used munitions may be a solid waste if collected for storage, treatment, recycling, or disposal

62 FR 6621, 266.202

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## Decision Diagram- Is it a Solid Waste?

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Is material discarded by either:



1. Abandoned;
2. Inherently waste-like
3. Discarded military munition
4. Recycled

IF YES, THEN

MATERIAL IS A SOLID WASTE

IF NO, THEN

MATERIAL IS NOT A SOLID WASTE

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## Solid Waste Exclusions

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## Solid Waste Exclusions

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- A discarded material is not a solid waste if it is specifically excluded from regulation

261.4(a)



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## Solid Waste Exclusions (cont'd)

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- Domestic sewage, and any mixture of domestic sewage and other wastes, that passes through a sewer system to a publicly owned treatment works (POTW) for treatment [307(b) of the Clean Water Act (CWA)]

45 FR 33097, 261.4(a)(1)



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## Solid Waste Exclusions (cont'd)

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- Industrial wastewater discharges that are point source discharges subject to regulation under Section 402 of the CWA
- Irrigation return flows
- Source, special nuclear or by-product materials as defined by the Atomic Energy Act

261.4(a)(2), (3), and (4)



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### Solid Waste Exclusions (cont'd)

- Materials subjected to in-situ mining techniques and which remain in the ground
- Pulping liquors reclaimed in a pulping liquor recovery furnace and then reused in the pulping process, unless accumulated speculatively

261.4(a)(5) and (6)



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### Solid Waste Exclusions (cont'd)

- Spent sulfuric acid used to produce virgin sulfuric acid, unless accumulated speculatively

261.4(a)(7)



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### Solid Waste Exclusions (cont'd)

- Secondary materials reclaimed and returned for reuse to the original process in which they were generated, provided:
  - Only tank storage is involved
  - Closed process
  - Reclamation does not involve controlled flame combustion

261.4(a)(8)



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### Solid Waste Exclusions (cont'd)

- Less than 12 months accumulation prior to reclamation
- Reclaimed material is not used to produce fuel
- Reclaimed material is not used in a manner constituting disposal

261.4(a)(8)



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### Solid Waste Exclusions (cont'd)

- Spent wood preserving solutions that have been used are reclaimed and reused for their original intended purpose
- K060, K087, K141-K145, K147 and K148 and any wastes from coke by-products processes that exhibit the TC when these materials are recycled in coke ovens for the coal tar production process

261.4(a)(9) and (10)



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### Solid Waste Exclusions (cont'd)

- Non-wastewater splash condenser dross residue from treatment of K061 in high temperature recovery units (if shipped, residue must be shipped in drums)
- Oil-bearing secondary materials and recovered oil that are inserted into the refining process

261.4(a)(11) and (12)



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### Solid Waste Exclusions (cont'd)

- Excluded scrap metal (processed scrap metal, unprocessed home scrap metal, and unprocessed prompt scrap metal\*) which is being recycled

261.4(a)(13)

\*See 40 CFR§261.1(c)(9-12) for definitions of these terms





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### Solid Waste Exclusions (cont'd)

- Shredded circuit boards being recycled, provided they are:
  - Stored in containers which will prevent a release to the environment, and
  - Free of mercury switches, mercury relays, nickel-cadmium batteries, and lithium batteries

261.4(a)(14)


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### Solid Waste Exclusions (cont'd)

- Condensates derived from overhead gases from kraft mill steam strippers that are used to comply with 40 CFR §63.446(e)
  - This exemption applies only to combustion at mill generating the condensates

261.4(a)(15)


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### Solid Waste Exclusions (cont'd)

- Comparable fuels or comparable syngas fuels that meet the requirements of 40 CFR §261.38

261.4(a)(16)



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### Solid Waste Exclusions (cont'd)

- Secondary materials (i.e., sludges, by-products and spent materials as defined in 40 CFR §261.1) (other than hazardous wastes listed in subpart D) generated within the primary mineral processing industry from which minerals, acids, cyanide, water or other values are recovered by mineral processing or beneficiation provided that:

261.4(a)(17)



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### Solid Waste Exclusions (cont'd)

- Secondary material is legitimately recycled to recover minerals, acids, cyanide, water or other values
- Secondary material is not accumulated speculatively
- Secondary material is stored in tanks, containers or buildings meeting minimum integrity standards

261.4(a)(17)



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### Solid Waste Exclusions (cont'd)

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- Petrochemical recovered oil from an associated organics chemical manufacturing facility, where oil is inserted into the petrochemical refining process (SIC Code 2911) along with normal petroleum refinery process streams, provided:
  - Oil is only hazardous due to the characteristic of ignitability and/or the toxicity of benzene
  - The oil generated by the organic chemical facility is not placed on the land or speculatively accumulated before being recycled

261.4(a)(18)

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### Solid Waste Exclusions (cont'd)

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- Spent caustic solutions from the petroleum refining liquid treating processes used as a feedstock to produce cresylic or naphthenic acid
  - Material cannot be placed on the land or accumulated speculatively

261.4(a)(19)

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### Solid Waste Exclusions (cont'd)

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- Hazardous secondary materials used to make zinc micronutrient fertilizers
  - Material cannot be accumulated speculatively
  - Material must be stored in tanks, containers or buildings constructed and maintained to prevent releases
  - Must submit a one-time notice to Regional Administrator or State Director

261.4(a)(20)

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### Solid Waste Exclusions (cont'd)

- Zinc fertilizers made from hazardous wastes or hazardous secondary materials that are excluded under 40 CFR §261.4(a)(20) provided that:
  - Meet contaminant limits for As, Cd, Cr, Pb, Hg and dioxins
  - Semi-annual sampling and analyses
  - Maintain records for 3 years

261.4(a)(21)



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### Solid Waste Exclusions (cont'd)

- Used cathode ray tubes (CRTs) provided that:
  - Unless they are disposed of or speculatively accumulated
  - Meet the requirements of 40 CFR §261.40 if exported for recycling
  - Broken CRTs must meet requirements of 40 CFR §261.39
  - Glass removed from CRTs must meet requirements of 40 CFR §261.39

261.4(a)(22)



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77

### Solid Waste Exclusions (cont'd)

- Hazardous secondary materials generated in U.S. or its territories and managed in land-based units provided that:
  - Material is contained
  - Must be generated and reclaimed under control of generator
  - Can not be speculatively accumulated and must be legitimately recycled
  - Material is not subject to other material specific management practices

261.4(a)(23)



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78

## Solid Waste Exclusions (cont'd)

- Hazardous secondary material that is generated and then transferred to another person for the purposes of reclamation provided that:
  - Can not be speculatively accumulated and must be legitimately recycled
  - During transport, can not be stored for more than 10 days at a transfer facility
  - Can only be handled by generator, transporter, and intermediate facility or reclaimer

261.4(a)(24)



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79

## Appropriate Documentation Must Be Provided

- Respondents who raise a claim that a certain material is not a solid waste, or is conditionally exempt from regulation, must demonstrate a known market or disposition and that terms of exclusion or exemption are met

261.2(f)



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80

## Documentation Requirements

- Under Generator Control Exclusion Notification Requirements
  - Facilities must send a notification prior to operating under the exclusion and by March 1 of each even numbered year thereafter to the Regional Administrator using the Site ID form (EPA Form 8700-12)
- Information submitted in the notifications enables EPA and states to:
  - (1) monitor compliance of facilities
  - (2) compile credible information for the public
  - (3) measure performance and impacts of the rulemaking
  - (4) target future program efforts to achieve further increases in recycling



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81  
**Non-Waste Determination Requirements**

- To obtain a non-waste determination, facilities must:
  - Legitimately recycle materials
  - Demonstrate that the hazardous secondary material meets eligibility criteria
  - Submit application to EPA or authorized state
- Regulatory authorities may also stipulate conditions as part of the non-waste determination

261.2(f)



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82  
**Non-Waste Determination Requirements (cont'd)**

- Persons must address the mandatory factors:
  - Material provides a useful contribution to the recycling process or a product or intermediate if it:
    - ◆ Contributes valuable ingredients;
    - ◆ Replaces a catalyst or carrier in the recycling process;
    - ◆ Is a source of a valuable constituent recovered;
    - ◆ Is recovered or regenerated; OR
    - ◆ Is used as an effective substitute for a commercial product

261.2(f)



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83  
**Non-Waste Determination Requirements (cont'd)**

- Recycling produces a valuable product or intermediate if it is:
  - ◆ Sold to a third party; OR
  - ◆ Used by the recycler or generator as an effective substitute for a commercial product or as an ingredient or intermediate

261.2(f)



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84

## Management of Solid Wastes

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- Solid wastes, if not excluded, are regulated under Subtitle D of RCRA
- Often referred to as Municipal Solid Waste (MSW)
- Regulations governing management of solid wastes are found in 40 CFR §§240 – 258
- Solid waste regulations are state implemented

240-258




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## Identification of Solid Wastes

### Case Studies




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86



## Case Study 1-1

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- The Goldfinger Company, which is an electroplating operation, installed a wastewater treatment system approximately 10 years ago. One of the components of this system is a cation exchange unit used to remove heavy metals from the wastewater. Since this unit is no longer operating at design removal efficiencies, the company has replaced the old resin with new resin. The old resin has been placed in 55-gallon drums which have been stored onsite now for six months.

Question:

- Is the old resin a solid waste?

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87



### Case Study 1-2

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- Beacon Chemical Company, located in Staten Island, is a formulator of specialty chemicals. The wastewater from reaction tank cleaning contains minimal amounts of reaction residues. Some of the chemicals used in the reaction are listed as commercial chemical products in 40 CFR §261.33. The wastewater is discharged to an offsite publicly-owned treatment works (POTW) via the city sewer line.

Question:

- Is the wastewater a solid waste?


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88



### Case Study 1-3

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- Westar Refining generates a process wastewater that flows to an API separator. At the API separator, the oil layer at the surface is skimmed off, sludges settle out and are pumped off the bottom of the separator unit, and the wastewater is discharged to a surface impoundment prior to discharge through an NPDES outfall into the Hudson River. The oil is stored in a holding tank prior to land treatment. The sludges are placed in a settling pond, where further sedimentation occurs prior to disposal at the Foreversafe Landfill, a permitted Subtitle C facility.

Question:

- Are any of these wastes (the oil, the sludge, or the wastewater) solid wastes?


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89

### Case Study 1-4

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- PROCHEMCO generates a vent gas stream from its organics production process. The vent gas stream contains the following components:
 

Methyl ethyl ketone	20% (by volume)
Methanol	20%
Methyl ether	20%
Nitrogen	40%

The temperature of this gas stream is 240° F. This stream is burned in a fume incinerator.

Question:

- Is this gas stream considered a solid waste?


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# Hazardous Wastes



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# Universe of Hazardous Waste



Discarded Material

Solid Waste

Hazardous Waste



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# Definition of Hazardous Waste

- A solid waste is a hazardous waste if:
  - It is not excluded; and
  - It exhibits a characteristic or
  - It is listed in 40 CFR §261.3 Subpart D

261.3



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93

## Hazardous Waste Exclusions

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- Household waste
  - Any material derived from a household including garbage, trash and sanitary wastes in septic systems
  - A resource recovery facility managing municipal solid waste is not managing hazardous waste as long as:
    - ◆ The facility receives and burns only household or solid waste from commercial or industrial sources that does not contain hazardous waste
    - ◆ The facility does not accept hazardous wastes



261.4(b)(1)  


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94

## Hazardous Waste Exclusions (cont'd)

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- Solid waste generated by any of the following and which are returned to the soil as fertilizers
  - Growing and harvesting of agricultural crops
  - Raising of animals, including animal manure
- Mining overburden returned to the mine site

261.4(b)(2) and (3)

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95

## Hazardous Waste Exclusions (cont'd)

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- Fly ash waste, bottom ash waste, slag waste, flue gas emission control waste generated primarily from combustion of gas or other fossil fuel, except as provided by 40 CFR §266.112 for facilities that burn or process hazardous wastes

261.4(b)(4)

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96  
**Hazardous Waste Exclusions  
(cont'd)**

- Drilling fluids, produced water, and other wastes associated with the exploration, development, or production of crude oil, natural gas, or geothermal energy

261.4(b)(5)



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97  
**Hazardous Waste Exclusions  
(cont'd)**

- Wastes which fail the test for the toxicity characteristic because chromium is present, or are listed due to the presence of chromium, as long as no other constituent is present
- Specific wastes generated from the leather tanning and finishing industries which meet the chromium exclusion

261.4(b)(6)(i) and (ii)



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98  
**Hazardous Waste Exclusions  
(cont'd)**

- Certain solid waste from the extraction, beneficiation, and processing of ores and minerals (including coal), including phosphate rock and overburden from the mining of uranium ore, except as provided by 40 CFR §266.112 for facilities that burn or process hazardous waste

261.4(b)(7)



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99  
**Hazardous Waste Exclusions  
(cont'd)**

- Cement kiln dust, except as provided by 40 CFR §266.112 for facilities that burn or process hazardous wastes
- Discarded wood treated with arsenic, or wood products which fail the test for toxicity for waste codes D004-D017

261.4(b)(8) and (9)



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100  
**Hazardous Waste Exclusions  
(cont'd)**

- Petroleum-contaminated media and debris that fail the test for the Toxicity Characteristic (D018 – D043) and are subject to UST corrective action regulations

261.4(b)(10)



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101  
**Hazardous Waste Exclusions  
(cont'd)**

- Injected groundwater that is hazardous only because it exhibits the Toxicity Characteristic (waste codes D018 to D043 only), that is reinjected through an underground injection well pursuant to the free phase hydrocarbon recovery undertaken at certain petroleum facilities until January 25, 1993

261.4(b)(11)



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102

## Hazardous Waste Exclusions (cont'd)

- Used chlorofluorocarbon (CFC) refrigerants from totally enclosed heat transfer equipment, provided the refrigerant is reclaimed for further use

261.4(b)(12)



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103

## Hazardous Waste Exclusions (cont'd)

- Non-terne plated used oil filters, which are not mixed with listed wastes, if the filters are gravity drained through one of the following methods:
  - Puncturing the filter anti-drain back valve or filter dome end and hot draining
  - Hot draining and crushing
  - Dismantling and crushing
  - Any equivalent hot-draining method to remove the used oil

261.4(b)(13)



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104

## Hazardous Waste Exclusions (cont'd)

- Used oil re-refining distillation bottoms that are used as feedstock to manufacture asphalt products

261.4(b)(14)



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## Hazardous Waste Exclusions (cont'd)

105

- Leachate or gas condensate collected from landfills where solid wastes have been disposed, provided that:
  - Solid wastes meet the description for Hazardous waste codes K169 through K172 or K174 through K178, if wastes are generated after February 8, 1999

261.4(b)(15)



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## Hazardous Waste Exclusions (cont'd)

106

- Solid wastes were disposed of prior to February 8, 1999
- Leachate or gas condensate does not exhibit any characteristic of hazardous waste nor are derived from any other listed hazardous waste
- After certain dates, K-listed leachate or gas condensate no longer exempt if stored or managed in a surface impoundment

261.4(b)(15)



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## Other Hazardous Waste Excluded From Regulation

107

- Wastes specific to certain sites and processes as described in 40 CFR Part 261 Appendix IX
- Wastes in active tanks, vessels, pipelines, or manufacturing process units

260.20, 260.22 and 261.4(c)



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108

### Other Hazardous Waste Excluded From Regulation (cont'd)

- Samples of solid waste or samples of water, soil, or air collected for the sole purpose of testing to determine their characteristics or composition, during storage or transportation\*
- Samples collected for the purpose of treatability studies during storage or transportation\*

\*To qualify, a shipper must comply with the proper shipping requirements (DOT, USPS, or any other requirements)

261.4(d) and (e)



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109

### Other Hazardous Waste Excluded From Regulation (cont'd)

- Samples undergoing treatability studies at laboratories and testing facilities

261.4(f)



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110

### Other Hazardous Waste Excluded From Regulation (cont'd)

- Dredged material that is subject to the requirements of a permit issued under 404 of the Federal Water Pollution Control Act or Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972

261.4(g)



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## Characteristic Hazardous Waste



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112

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A solid waste may be a regulated hazardous waste if it is either:

Listed  
or  
Characteristic



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113

## Does the Waste Exhibit a Characteristic?

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- A solid waste is a hazardous waste (unless excluded) if it exhibits any of the characteristics of a hazardous waste:
  - Ignitability (D001)
  - Corrosivity (D002)
  - Reactivity (D003)
  - Toxicity (D004 to D043)

261.20-.261.24



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114

## Characteristic of Ignitability (D001)

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- A solid waste exhibits the characteristic of ignitability if:
  - It is a liquid and has a flash point less than 60° C (140° F) (aqueous solutions containing less than 24% alcohol are excluded)

261.21

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115

## Characteristic of Ignitability (D001) (cont'd)

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- It is **not a liquid** and is capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes **and** when ignited, burns so vigorously and persistently that it creates a hazard
- It is an ignitable **compressed gas** as defined in 40 CFR Part 173
- It is an **oxidizer** as defined in 40 CFR Part 173

261.21

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116

## Characteristic of Corrosivity (D002)

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- A solid waste exhibits the characteristic of corrosivity if:
  - It is aqueous and has a pH of  $\leq 2$  or  $\geq 12.5$
  - It is liquid and corrodes steel at a rate greater than 6.35 mm (0.25 inches) per year at a temperature of 55° C (130° F)

261.22

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117

## Characteristic of Reactivity (D003)

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- A solid waste exhibits the characteristic of reactivity if:
  - It is normally unstable and readily undergoes violent change without detonation
  - It reacts violently with water
  - It forms potentially explosive mixtures with water
  - It generates toxic gases, vapors, or fumes in dangerous quantities when mixed with water

261.23

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118

## Characteristic of Reactivity (D003) (cont'd)

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- It is a cyanide- or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in dangerous quantities
- It is capable of detonation or explosive reaction if subjected to strong initiating sources or if heated under confinement
- It is readily capable of detonation, explosive decomposition, or reaction at standard temperature and pressure (STP)
- It is a Forbidden, Class A, or Class B Explosive

261.23

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119

## Toxicity Characteristic -- Background

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- The Extraction Procedure (EP) Toxicity Characteristic was promulgated in May 1980 as the fourth characteristic
  - 14 constituents regulated
  - Applied a dilution and attenuation factor (DAF) of 100 to the National Interim Drinking Water Standards
  - EP leach test (Method 1310) used to evaluate wastes

261.24

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120

## Toxicity Characteristic -- Background (cont'd)

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- EPA proposed the Toxicity Characteristic (TC) to replace the EP on June 13, 1986
  - Adds 38 organic constituents (retained 14 EP constituents)
  - Develops regulatory levels based on subsurface fate and transport model
  - Replaces EP test protocol with Toxicity Characteristic Leaching Procedure (TCLP)

261.24

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121

## Toxicity Characteristic

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- The Toxicity Characteristic was promulgated on March 29, 1990
  - Added 25 of 38 proposed organic constituents
  - Retained original 14 EP constituents
  - Used subsurface fate and transport model to develop DAFs used to calculate regulatory levels
  - Replaced EP test protocol with TCLP

261.24(b)

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122

## Toxicity Characteristic (cont'd)

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- 7 of the original 38 proposed constituents were deferred for future action because:
  - Subsurface model predicts high DAFs for hydrolyzing constituents
  - Model does not account for toxicity of byproducts generated

261.24(b)

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123

## Toxicity Characteristic (cont'd)

- 6 of the original 38 proposed organic constituents were deferred because:
  - Steady-state assumption may be inappropriate for constituents that:
    - ◆ Move slowly in the subsurface environment
    - ◆ Have relatively low toxicity
    - ◆ Occur in relatively low concentrations in waste

261.24(b)



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124

## Toxicity Characteristic Leaching Procedure (TCLP)

- The TCLP replaces the EP (Appendix II of Part 261)
  - Sampling for the TC is required at the point of generation
  - Filtration, extraction, and/or separation of waste used to test the mobility of non-volatile organics
  - Zero-Headspace Extraction Vessel (ZHE) used to test the mobility of volatile organics

261.24(a)



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125

## TCLP Issues

- Oily wastes
- Sample holding times
- Using total analysis vs. TCLP

261.24(a)



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126

### TCLP vs. Totals Results

- TCLP uses a dilution of 20
- Totals can be used as screening tool (i.e., if totals results less than TC regulatory limit then do not need to conduct TCLP)
- Rule of 20 only applicable to solids
- For LDR, several treatment standards require TCLP results

261.24(a)



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127

### Toxicity Characteristic Exemptions

- Toxic spent materials, by-products and commercial chemical products that are reclaimed
- Materials that are not solid wastes when recycled
- Lead-based paints from residences

261.24, SW-846 Method 1311



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128

### Toxicity Characteristic Exemptions (cont'd)

- Petroleum-contaminated media and debris
- Scrap metal that is recycled
- Used CFCs

261.2(c)(3), 261.4(b)(1)



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129

## Waste Identification

- Generators are responsible for determining whether wastes are hazardous
- Determination is at the point of generation
- If waste is not excluded, the generator must determine whether the waste is listed or exhibits any hazardous waste characteristics

262.11



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130

## Waste Identification (cont'd)

- Determination may be based on testing or generator knowledge
- If waste is hazardous and subject to Subtitle C control, generator must keep records unless the waste is specifically excluded or managed in exempt units

262.11



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131

## Common Waste Identification Errors

- Waste generation process not described
- Test methods not identified
- Sampling methods not specified
- Field and laboratory QA/QC not identified
- Proper conversion factors not used



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132

## Point of Generation

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- Defined as “the point at which the material will initially be considered to be a hazardous waste is the point at which the material leaves a process tank or area” or
- 90 days after the unit is taken out of service if waste remains in an inactive unit

261.4(c), RO 11425



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## Characteristic Hazardous Waste Case Studies



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134



## Case Study 1-5

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- Ewing Oil Company is in the business of exploration, development, and production of crude oil. Solvents such as methylene chloride are used to clean well drilling equipment. The owner of the company, J.R. Ewing, claims that the spent solvent is exempt from the hazardous waste regulations under 40 §CFR 261.4(b)(5) because it is a waste associated with the exploration, development, or production of crude oil.

Question:

- Do you agree with J.R.'s claim?



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135



## Case Study 1-6

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- The Handy-Dandy Cement Company generates cement kiln dust which contains 5,000 ppm lead and 1,000 ppm chromium. In addition, the waste is highly alkaline. The waste is disposed of in a landfill.

Question:

- Is the waste a solid waste?

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136



## Case Study 1-7

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- ABC Piping produces a waste silica material. The waste silica material fails the toxicity characteristic for chromium, ABC believes that this waste material is excluded from being classified as a hazardous waste.

Question:

- Do you agree with ABC's claim?

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137

## Case Study 1-8



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- Capital Chemical Company manufactures organic chemicals. Process wastewaters from the plant flow through a series of concrete trenches to an API separator. The skimmed oil from the top of the API separator is collected in 55-gallon drums, which are sent to an incineration facility on a weekly basis. The wastewater is discharged to a publicly-owned treatment works. A laboratory analysis of the oil showed that it has the following characteristics:

Flashpoint	>180° F (closed cup test method)
Lead	20 mg/L
Zinc	10 mg/L
Chromium	4 mg/L
Benzene	1 mg/L

Question:

- Is the oil a hazardous waste? If yes, what EPA waste code should be assigned to it?

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## Listed Hazardous Waste



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139

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A solid waste may be a regulated hazardous waste if it is either:

**Listed**  
or  
**Characteristic**



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140

## Lists of Hazardous Wastes

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- Identified in 40 CFR §261, Subpart D
- Lists include industrial waste streams and waste commercial chemical products that typically
  - Exhibit one or more hazardous waste characteristics
  - Contain hazardous constituents

261 Subpart D



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141

## Lists of Hazardous Wastes (cont'd)

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- Wastes are identified by a single letter prefix (F, K, P, or U) followed by a three digit number

261 Subpart D

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142

## Lists of Hazardous Wastes (cont'd)

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- Non-specific sources (40 CFR §261.31): "F" wastes
- Specific source (40 CFR §261.32): "K" wastes
- Discarded commercial chemical products, off-specification materials, residues in containers, and spill residues (40 CFR §261.33): "P" and "U" wastes
  - "P" wastes -- acutely hazardous waste
  - "U" wastes -- toxic hazardous waste

261.31-33

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143

## F-Listed Wastes

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- Wastes from non-specific sources
  - Spent solvents (F001-F005)
  - Heavy metal and cyanide electroplating wastes (F006-F019)
  - Dioxin-containing wastes (F020-F023, F026-F028)
  - Chlorinated aliphatic hydrocarbon production wastes (F024-F025)

261.31




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144

### F-Listed Wastes (cont'd)

- Wood preserving wastes (F032-F035)
- Petroleum refinery oil/water separation floats and sludges (F037-F038)
- Hazardous waste landfill leachates (F039)

261.31



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145

### F001-F005 Listings

- Cover only solvents used for their solvent properties, as in degreasing, cleaning, fabric scouring, use as diluents, reaction and synthesis media
- Do not cover products disposed of which are produced using solvents as ingredients in the production process
  - Examples include paints, inks, and adhesives

261.31



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146

### F001-F005 Listings (cont'd)

- F001, F002, F004, and F005 listings include all spent solvent mixtures containing a total of 10% or more (by volume) of all of the solvents listed under those waste codes
  - The 10% threshold is applied to the solvent mixture before use
- F003 solvents are listed for ignitability only; the 10% threshold does not apply

261.31



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147



### Case Study 1-9

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- A solvent (50% acetone and 50% methanol, before use) is used to remove water from products in a manufacturing unit. The solvent stream that exits the unit has picked up enough water that it is not ignitable.

Question:

- What is the status of the solvent waste?



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148



### Case Study 1-10

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- A spent solvent consists of 91% isopropyl alcohol, 5% methylene chloride, and 4% methyl ethyl ketone. The flash point of the solvent is < 140 degrees.

Question:

- Is the spent solvent an F-listed waste?



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149

### K-Listed Wastes

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- Wastes from specific sources
- Identified by industry:
  - Wood preserving
  - Production of inorganic pigments
  - Veterinary pharmaceuticals
  - Production of organic chemicals
  - Production of inorganic chemicals
  - Production of pesticides
  - Petroleum refining

261.32



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150

## K-Listed Wastes (cont'd)

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- Ink formulations
- Production of explosives
- Production of iron and steel
- Production of primary metals (smelting wastes)
- Coking

261.32

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151

## P- and U-Listed Wastes

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- 40 CFR §261.33 lists over 350 commercial products which are hazardous when discarded
- P-listed wastes are known as acute hazardous wastes [40 CFR §261.33(e)]
- U-listed wastes are known as toxic hazardous wastes [40 CFR §261.33(f)]

261.33

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152

## P- and U-Listed Wastes (cont'd)

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- Unused chemical substances
- Pure or technical grade chemical formulations
- Formulations in which the chemical is the sole active ingredient
- Off-specification commercial chemical products or manufacturing chemical intermediates

261.33




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153

## P- and U-Listed Wastes (cont'd)

- Residues of the above materials remaining in "non-empty" containers
- Residues, contaminated soil, water, or debris resulting from clean-up of spills of the above materials

261.33



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154

## How Does EPA Decide To List A Waste?



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155

## Listing Criteria

- The waste exhibits one or more characteristics of a hazardous waste:
  - Ignitability (D001)
  - Corrosivity (D002)
  - Reactivity (D003)
  - Toxicity (D004 to D043)

261.11



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156

## Listing Criteria (cont'd)

- The waste is fatal to humans in low doses or available toxicity data indicate that the waste is acutely toxic
  - Oral LD50 (rat) < 50 mg/kg
  - Inhalation LD50 (rat) < 2 mg/l
  - Dermal LD50 (rabbit) < 200 mg/kg
- The waste contains one or more of the hazardous constituents listed in Appendix VIII

261.11



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157

## Hazardous Constituents

- The list of hazardous constituents used by EPA to list waste as hazardous is included in Appendix VIII of Part 261
- Appendix VII of Part 261 identifies the specific hazardous constituents which caused F and K wastes to be listed

261 Appendix VIII



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158

## Listing A Hazardous Waste

- After making the decision to list the waste, EPA then
  - Publishes in the Federal Register the proposal to list the waste
  - Evaluates public comments on the proposed listing
  - Promulgates in the Federal Register the final listing for the waste



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## Case Study 1-11

- Formaldehyde is added to ship ballast fluid to control biological growth.

Question:

- When the ballast fluid is disposed, is it listed as hazardous waste U122-formaldehyde? Is this waste stream considered a solid waste?



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## Case Study 1-12

- Creosote-containing railroad ties are to be disposed. Creosote appears on the U-list as U051.

Question:

- Are the railroad ties listed as hazardous waste U051?



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## Mixture Rule



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162

## Mixtures

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- A solid waste is a hazardous waste if:
  - It is a mixture of a solid waste and a hazardous waste that is listed solely because it exhibits a characteristic and the mixture continues to exhibit a characteristic(s) (i.e., exhibits characteristic of ignitability, corrosivity, reactivity, or fails TCLP)

261.3(b)(3)


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163

## Mixtures (cont'd)

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- A solid waste is a hazardous waste if:
  - It is a mixture of a solid waste and a hazardous waste not listed solely because it exhibits a characteristic (i.e., listed because it is toxic or acutely toxic -- marked with code T or H in §261 Subpart D)

261.3(g)(2)(i)


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164

## Mixtures (cont'd)

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- A solid waste is a hazardous waste if:
  - It is a mixture of a solid waste and a listed hazardous waste

261.3(a)(2)(iv)


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165

## Mixtures (cont'd)

- A solid waste is not a hazardous waste if:
  - It is a mixture of solid waste and an ICR-Listed waste and the mixture no longer exhibits the characteristic for which was listed
  - It is a mixture of solid waste and listed hazardous waste which has been excluded under 40 CFR §260.20 and §260.22

261.3(g)(4)


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166

## Exceptions to the Mixture Rule

- A mixture is not a hazardous waste if it consists of wastewater that is regulated under Sections 402 or 307(b) of the Clean Water Act and any of the following hazardous wastes:
  - Spent carbon tetrachloride, tetrachloroethylene, and/or trichloroethylene (total weekly usage discharged ÷ average weekly wastewater flow < 1 ppm)

261.3(a)(2)(iv)


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167

## Exceptions to the Mixture Rule (cont'd)

- Spent methylene chloride, 1,1,1-trichloroethane, chlorobenzene, o-dichlorobenzene, cresols, cresylic acid, nitrobenzene, toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, chlorofluorocarbon solvents (total weekly usage discharge ÷ average weekly wastewater flow < 25 ppm)

261.3(a)(2)(iv)


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168

### Exceptions to the Mixture Rule (cont'd)

- Heat exchanger bundle cleaning sludge (K050), crude oil storage tank sediment (K169), clarified slurry oil tank sediment (K170), spent hydrotreating catalyst (K171) and spent hydrorefining catalyst (K172)

261.3(a)(2)(iv)



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169

### Exceptions to the Mixture Rule (cont'd)

- Minor spills or leaks of discarded commercial chemical product or listed chemical intermediate -- "de minimis" losses
- Wastewater from laboratory operations containing toxic listed wastes (annualized average flow of laboratory wastewater < 1% total wastewater flow)

261.3(a)(2)(iv)



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170

### Exceptions to the Mixture Rule (cont'd)

- Wastewaters from the production of carbamates and carbamoyl oximes (K157) (total weekly usage discharge of formaldehyde, methyl chloride, methylene chloride and triethylamine % average weekly wastewater flow < 5 ppm)

261.3(a)(2)(iv)



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## Contained-In Policy



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172

## Contained-In Policy

- Environmental media (i.e., soil, surface water, groundwater) itself not a hazardous waste
- Environmental media contaminated by a characteristic hazardous waste is subject to RCRA if it exhibits a characteristic
- Environmental media contaminated by a listed hazardous waste is subject to RCRA if it exceeds health-based levels
- EPA Region 4 Regional Screening Levels:  
[http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/Generic\\_Tables/index.htm](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm)

RO 1195, 11434, 11593



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173

## Contaminated Environmental Media Determination

- For environmental media containing listed hazardous waste, need to evaluate all 40 CFR Part 261 Appendix VIII constituents

261 Appendix VIII



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174

### Contained-In Policy for Ignitable, Corrosive and Reactive (ICR) Only Listed Wastes

- If the contaminated media does not exhibit the characteristic of ignitability, corrosivity or reactivity, then it would not be RCRA regulated

268.45(a)(2)



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175

### Contaminated Sediments

- Dredged sediments are excluded from RCRA regulation under 40 CFR §261.4(g)

261.4(g)



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176

### Contaminated Debris

- Contained-In regulations for contaminated debris found in 40 CFR §261.3(f)(2)
- EPA or an authorized state can determine whether or not debris is no longer contaminated with or no longer contains a hazardous waste

261.3(f)(2)



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## “Derived-From” Rule



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178


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## “Derived-From” Rule

- Solid waste generated from the treatment, storage, or disposal of a listed hazardous waste is a hazardous waste

Once a hazardous waste,  
Always a hazardous waste  
(Except sometimes)

261.3(c)(2)(i)



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179

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## “Derived-From” Rule

Waste derived from the treatment, storage, or disposal of a characteristic hazardous waste is a hazardous waste if it continues to exhibit the characteristic

261.3(c)(2)(ii)



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180

### “Derived-From” Rule

- Residues from the treatment, storage, or disposal of a waste listed in 40 CFR §§261.31 - 261.33 solely because it exhibits the characteristic of ignitability, corrosivity or reactivity are listed hazardous waste only if they continue to exhibit the characteristic for which they were listed

261.3(g)(2)(ii)



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181

### “Derived-From” Rule

Waste derived from the treatment, storage, or disposal of a listed hazardous waste is a listed hazardous waste

261.3(c)(2)(i)



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182

### “Derived-From” Rule Exceptions

- Lime-stabilized waste pickle liquor sludge from the iron and steel industry
- Wastes generated from the burning of certain petroleum-based wastes
- Non-wastewater residues (such as slag) resulting from high temperature metals recovery (HTMR) processing of K061 wastes

261.3(c)(2)(ii)



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183

## “Derived-From” Rule Exceptions

- Biological treatment sludge from treating K156 or K157
- Inert catalyst-support media that are separated from K171 or K172 spent catalyst

261.3(c)(2)(ii)



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184

## Case Study 1-13

- Toluene is used to convey reactants into a reactor during pesticide production. After the product is formed, the toluene (which is a reactor medium) is separated from the product-bearing stream and returned to the process to convey more reactants. The product-bearing stream is distilled to remove any impurities; the separated impurities are sent offsite for disposal.

Question:

- Is the impurities stream an F005 listed hazardous waste?



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## Radioactive Mixed Waste



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186

## What We Will Cover

- What is a radioactive mixed waste?
- Common types of radioactive mixed waste
  - Definition and examples
- Radioactive mixed waste management under RCRA
- Radioactive mixed waste currently subject to land disposal restrictions
  - Current treatment standards for mixed waste
- Exemptions



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187

## What Is a Radioactive Mixed Waste?

- Definition
  - A waste mixture containing radioactive material subject to the Atomic Energy Act (AEA) and a hazardous waste regulated under RCRA
  - Hazardous waste (i.e., the non-AEA material) can be either:
    - ◆ Listed hazardous waste
    - ◆ Characteristic hazardous waste

266.210



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188

## Common Types of Mixed Waste

- High-level mixed wastes (HLMW)
- Transuranic (TRU) mixed wastes
- Low-level mixed wastes (LLMW)



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189

## Common Types of Mixed Waste (cont'd)

- Transuranic mixed waste (TRU-Mixed)
  - Transuranic nuclides
    - ◆ Atomic number > Uranium (92)
    - ◆ Half-life > 20 years
  - Concentrations > 100 nanocuries/gram (100 n Ci/g)
  - Alpha-emitting isotopes



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190

## Common Types of Mixed Waste (cont'd)

- Primarily from fuel reprocessing and fabrication of plutonium weapons and plutonium-bearing reactor fuel
- Two classifications
  - ◆ Contact-handled
  - ◆ Remote-handled



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191

## Mixed Waste Management Under RCRA

- Subject to same RCRA regulations as for hazardous waste
- Storage permit required if store mixed wastes for more than 90 days (LQG facilities)
- Must meet RCRA manifest requirements when being shipped
- LDR and Corrective Action also apply



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192

## Mixed Waste Currently Subject to Land Disposal Restriction (LDR)

- Mixed wastes are subject to the treatment standards in 40 CFR §268.40
  - Where treatment standards are specified for mixed wastes, those treatment standards will govern
  - Where there is no specific treatment standard for mixed waste, the treatment standard for the hazardous waste component applies (55 FR 22626)

268.40



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193

## Mixed Waste Exemptions

- Conditional exemption for LLMW during storage and treatment
- Exemption for LLMW during transport and disposal
- Exemptions found in 40 CFR Part 266, Subpart N

266 Subpart N



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194

## CERCLA Off-Site Rule

- Limits Management, Disposal or Treatment of any CERCLA wastes to ONLY RCRA Compliant facilities
- Designed to limit/eliminate CERCLA wastes from contributing to present or future environmental concerns
- Only applies to "Fund-financed" or CERCLA-Authority sites
- Only applies to CERCLA Wastes under 40 CFR §300.440(a)(1)



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**Radioactive Mixed Waste  
Case Study**



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196

**Case Study 1-14**

■ A Veterans Administration Hospital in Georgia operates several research facilities that conduct significant research using radioactive isotopes and scintillation fluids. The resulting wastes are considered a mixed waste as they also contain a D001 waste. The Hospital intends to send these wastes off to a RCRA regulated treatment facility that has recently received interim status after previously operating illegally without a permit.



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197

**Case Study 1-14 (cont'd)**

Question 1:



- What are the manifesting requirements for these wastes?

Question 2:

- Will the receiving treatment facility need to modify its RCRA Part A Permit Application in order to receive this waste?

Question 3:

- Are there other considerations that may be relevant in this instance?



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## Problem Wastes



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199

## Electronic Wastes

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- Represents 1-2% of US waste stream
- Two million tons of used electronics, including computers and televisions, are discarded each year
- Examples of e-wastes
  - Central processing units (CPUs)
  - Circuit boards
  - Mercury-containing equipment



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200

## Electronic Wastes (cont'd)

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- Cathode ray tubes (CRTs) from computer monitors and older televisions contain an average of four pounds of lead
- In addition, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and brominated flame retardants



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201

## EPA Goals for Electronics

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- Goal 1: Foster environmentally conscious design and manufacturing
- Goal 2: Increase purchasing and use of more environmentally sustainable electronic products
- Goal 3: Increase safe, environmentally sound reuse and recycling of used electronics



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202

## EPA National Electronics Action Plan

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- Addresses environmental concerns along the entire life cycle of electronics, including design, operation, reuse, recycling, and disposal of equipment
- Action plan will focus initially on computers (PCs), televisions, and cell phones



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203

## Recycling of Electronic Wastes

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- EPA's Plug-In To eCycling
  - A consumer electronics campaign working to increase the number of electronic devices collected and safely recycled in the United States
  - Goal is to recycle 35 percent of electronic wastes going to landfills



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204

## Management of Electronic Wastes

- Management options for e-wastes
  - Reuse -- resale
  - Recycle
  - Reclaim -- Demanufacture (For precious metals)
  - Manage as a Universal Waste
    - ◆ Mercury-Containing Equipment Rule
  - Manage as a Solid or Hazardous Waste



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205

## Aerosol Cans

- Cans may be reactive (D003)
- Puncturing cans may be considered treatment
- Use the scrap metal exemption if possible



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206

## Industrial Rags and Wipes – Proposed Rulemaking

- Industrial wipes are used to wipe down machinery, floors, and other surfaces
- On November 20, 2003, EPA proposed a rule to conditionally exclude:
  - Disposable industrial wipes contaminated with hazardous solvents from the definition of hazardous waste, and
  - Reusable industrial wipes (such as rags) contaminated with hazardous solvents and sent for laundering from the definition of solid waste



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207

## Industrial Rags and Wipes – Proposed Rulemaking (cont'd)

- EPA's proposed rule has not been finalized
- Currently rags and wipes are regulated by regions/states on a case-by-case basis. Generally, if the solvent-contaminated rag/wipe is a non-disposable textile that is sent for laundering, then the rag/wipe is neither a solid nor a hazardous waste
- Proposed rule does not cover any other solvent-contaminated materials, such as mats, uniforms, or absorbents



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208

## Industrial Rags and Wipes – Proposed Rulemaking (cont'd)

- Whether cleaned on-site or off-site, wipes must have no free liquids
  - Liquids regulated under 40 CFR Parts 261 – 268, and 270
- Intra-company transfer of wipes is allowed:
  - For solvent removal to meet the "no free liquids" condition
  - Liquids regulated under 40 CFR Parts 261 – 268, and 270



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209

## Industrial Rags and Wipes – Proposed Rulemaking (cont'd)

- Industrial laundry, dry cleaner, and industrial wipes handling facility:
  - Manage wipes in non-leaking, covered containers OR in containers that minimize releases to the environment
  - If free liquids are found in container, then must:
    - ◆ Remove liquids and manage in accordance with 40 CFR Parts 261 through 268 and 270, or
    - ◆ Return the container to the generator



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210

## Industrial Rags and Wipes – Proposed Rulemaking (cont'd)

- If disposable wipes are sent to a municipal landfill, municipal combustor, or other combustion facility the following requirements must be met for the hazardous waste exclusion to apply:
  - Accumulated, stored, and managed in non-leaking, covered containers
  - When transported off-site, the containers must minimize releases to the environment





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211

## Industrial Rags and Wipes – Proposed Rulemaking (cont'd)

- Containers must be labeled "Excluded solvent-contaminated wipes"
- Intra-company transfer of wipes is allowed
- Wipes destined for landfill disposal must contain less than 5 grams of solvent each, or have been treated by solvent extraction
- Wipes destined for a municipal combustor or other combustion facility must contain no free liquids, or must have been treated by solvent extraction





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212

## Industrial Rags and Wipes – Proposed Rulemaking (cont'd)

- Wipes destined for landfill disposal cannot contain any of the following solvents:
 

2-nitropropane	Methylene chloride
Benzene	Nitrobenzene
Carbon tetrachloride	Pyridine
Chlorobenzene	Tetrachloroethylene
Cresols (o, m, p)	Trichloroethylene
Methyl ethyl ketone	





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213

## Polychlorinated Biphenyls (PCBs)

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- Typical Uses
  - Transformers and Capacitors
  - Oil used in motors and hydraulic systems
  - Fluorescent light ballasts
  - Cable insulation/thermal insulation
  - Adhesives and tapes
  - Oil-based Paints
  - Caulking/plastics/floor finishers

268.2(e)




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214

## PCB Composition

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- The PCBs used in these products were chemical mixtures made up of a variety of individual chlorinated biphenyl components, known as congeners. Most commercial PCB mixtures are known by their industrial trade names, with the most common trade name being Aroclor
  - 209 Congeners
  - 16 Aroclors

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215

## PCB Management and Regulations

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- Managed under Toxic Substance Control Act (15 U.S.C. 2605) and 40 CFR Part 271
- Transferred from OPPTS to OSWER (ORCR as of 1/18/09) in Oct 2007
- PCBs are not “defined” as a Hazardous Waste under RCRA, BUT may be an incidental contaminant in a Listed or Characteristic Waste, which is otherwise covered under RCRA

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Question/Answer/Discussion



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End of Day 1  
Case Studies



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218

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Case Study 1-15

- Goldfinger Company just expanded its operations. A tin electroplating on carbon steel process has been installed. A wastewater treatment system has also been installed to handle wastewater only from this unit.
- Question 1:
  - Is the sludge from the wastewater treatment system a solid waste?
- Question 2:
  - Is the sludge a hazardous waste? If yes, what EPA waste code should be assigned to it?



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### Case Study 1-16

- Columbus Chemicals, Inc. produces aniline from phenol and ammonia. Several times during each production shift, distillation column bottoms are tested at the in-house laboratory to determine if they have the properties required for recycling back into the process. Spent and excess sample materials are discarded via the laboratory sinks.

Several organic waste streams at the plant are treated at an activated sludge treatment facility. The effluent from the treatment facility is disposed via deep well injection. The waste streams entering the treatment plant and their annual flows are as follows:




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### Case Study 1-16 (cont'd)

Sanitary wastewaters . . . . . 2,000,000 gallons  
 Oxidizer water from the production unit  
 (non-hazardous) . . . . . 15,000,000 gallons  
 Rinsewater from emergency showers and equipment  
 washdown (assumed non-hazardous) . 500,000 gallons  
 Laboratory wastewater . . . . . 50,000 gallons

Question:

- Is the mixed wastewater a hazardous waste?




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### Case Study 1-17

- Burns Well, Inc. (BWI) operates commercial solid and hazardous waste incinerators.

In Incinerator 1, BWI incinerates a tank truck load of waste K094 (distillation bottoms from the production of phthalic anhydride from ortho-xylene).

In Incinerator 2, BWI incinerates a mixture of trash and 20 drums of spent benzene that were used as a solvent.

In Incinerator 3, BWI incinerates a mixture of trash and 20 drums of waste oil contaminated with lead (D008).

In Incinerator 4, BWI incinerates trash.




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## Case Study 1-17 (cont'd)

### Question 1:

- Assuming that bottom ash is removed from the incinerator at the end of each day's burn, which days' ash is a hazardous waste?

### Question 2:

- If dust is also removed from the electrostatic precipitator (ESP) used for air pollution control on each incinerator, which incinerators' ESP dust is a hazardous waste?



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**EPA REGION 4**

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RCRA Fundamentals Training  
Day 2



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**Spills and Spill Residues**



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**General Considerations for Spills**

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- Clean up spills promptly
- If spills are not cleaned up promptly, then the material could be considered “abandoned”
- If spills are not cleaned up promptly, then the “abandoned” material could be subject to more regulation

261.2(b)



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## Spill as a Waste

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- If hazardous waste is spilled
  - The spilled material is a hazardous waste
  - The material used to clean up the spill is also hazardous per "contained-in" policy
- If a product is spilled
  - Determine if it may still be used for intended purpose
  - Determine if it can be sent for reclamation

261.2(c), 261.33(d)

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4

## Spill as a Waste (cont'd)

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- Environmental media affected by listed waste
  - Spill is a listed waste
  - Cleanup residue is also classified as containing a listed waste and must be managed as such until waste is removed
- Environmental media affected by characteristic waste
  - If the media exhibits the characteristic then it is a hazardous waste

RO 11195, 11434, 11593

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## Spill Response Time

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- Immediate response is required
- Definition of "Immediate" depends on situation
- Extended responses may support view of abandonment of spilled material
- Contingency plans or permits may provide framework for acceptable timeframe for responding to spills

RO 12748

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## Spill Response Time - Extended

- Spill area considered a disposal area
- Permits may be required
- Routine responses to operational spills are probably not exempted from the 40 CFR §§264 and 265 standards



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7

## Spill Reporting Requirements

- RCRA requires reporting of releases from tanks -- 40 CFR §264.196(d)
  - Notification not required if cleaned up immediately
  - Notification not required if less than one pound
  - Notification not required if tank is in secondary containment
- CERCLA requirement for spills in excess of reportable quantity (RQ)
- Local reporting requirements

264.196(d)



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## Spills and Spill Residues

### Case Studies



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## Case Study 2-1

- Over-application of the pesticide heptachlor at a residence caused a swimming pool and the surrounding soil to become contaminated.

Question:

- When disposed, are the pool water and soil classified as P059?



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## Case Study 2-2

- A product, which contains two active ingredients, toluene and benzene, spills on the ground.

Question:

- How is the spill residue regulated under RCRA?



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## Regulation of Universal Wastes



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12

## Universal Wastes

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- Goals
  - Encourage resource conservation while ensuring adequate protection
  - Reduce illegal disposal in MSW landfills and combustors
  - Improving implementation of current hazardous waste regulatory program
  - Provide incentives for recycling wastes

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13

## Universal Wastes (cont'd)

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- Regulations found in 40 CFR §273 -- Universal Waste Regulations:
  - Specific Waste Types -- §§273.2 – 273.5
  - Small Quantity Handlers -- §273.10
  - Large Quantity Handlers -- §273.30
  - Destination Facilities -- §§273.60-.62




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14

## Universal Wastes (cont'd)

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- Scope of the regulations includes only these 4 types of hazardous wastes:
  - Batteries
  - Pesticides
  - Mercury-containing equipment
    - ◆ Expanded rule – FR Notice August 5, 2005
  - Lamps (including used fluorescent bulbs)

273.2, 273.3, 273.4, 273.5

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15

## Universal Wastes (cont'd)

- Batteries -- 40 CFR §273.2
  - Definition includes all types & sizes of waste batteries except for lead-acid batteries
  - Spent lead-acid batteries may be addressed under either 40 CFR Part 266, Subpart G or §273.2(a);
  - Leaking or damaged batteries must be properly containerized



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16

## Universal Wastes (cont'd)

- Pesticides -- 40 CFR §273.3
  - Includes only recalled pesticides or unused pesticides that have been collected as part of a waste pesticide collection program
  - Spills of pesticides must be cleaned up in accordance with 40 CFR §273.17



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17

## Universal Wastes (cont'd)

- Mercury-containing equipment -- 40 CFR §273.4
  - Definition includes mercury thermometers, manometers, barometers, flow meters, light switches, regulators, pressure relief valves, regulators and gas safety relays
  - Universal waste program not applicable to equipment or devices where the mercury containing components have been removed



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18  
**Universal Wastes (cont'd)**

- Lamps -- 40 CFR §273.5
  - Also referred to as universal waste lamp
  - Includes fluorescent, high-intensity discharge, neon, mercury vapor, high-pressure sodium and metal halide lamps and
  - Any waste lamp that exhibits a characteristic of hazardous waste



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19  
**Universal Wastes (cont'd)**

- Additional waste types may be added at the federal level in the future
- Individual states have added other hazardous wastes to their state universal waste programs



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20  
**Universal Waste Handler**

- Definition of a Universal Waste Handler
  - Generator of universal wastes; or
  - Owner/operator of a facility that receives universal waste from other universal waste handlers, accumulates universal wastes, and sends universal waste to another universal waste handler, destination facility, or to a foreign destination

260.10



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21

### Requirements for Small Quantity Handlers

- Cannot accumulate more than 5,000 kilograms (kg) of universal waste at any time
- Can accumulate universal wastes for one year without a RCRA permit
  - Must prevent releases to the environment
  - Universal wastes must be marked/labeled per 40 CFR §273.14
- Manifests/Land Disposal Restrictions (LDR) forms not required for shipments of universal waste

273, Subpart B



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22

### Requirements for Small Quantity Handlers (cont'd)

- Employee training required
- EPA ID number and waste shipment tracking not required
- Need to track accumulation time

273, Subpart B



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23

### Requirements for Large Quantity Handlers

- Can accumulate > 5,000 kg of universal waste
- Must notify and obtain EPA ID No.
- Can accumulate universal wastes for one year without a permit
- Must keep a record of each shipment to or from the facility
- Employee training required

273, Subpart C



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24

## Destination Facilities

- Can treat, store, recycle or dispose of universal waste
- Subject to all applicable requirements in 40 CFR Parts 264, 265, 266, 268, and 270
- Must keep a record of each shipment of universal waste received at the facility
- Recyclers that do not store universal wastes prior to recycling must comply with 40 CFR §261.6(c)(2)

273, Subpart E



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25

## State Authorization Issues

- Universal waste rules not applicable in authorized states until they modify their program and obtain EPA authorization for change
- Authorized states are not required to modify their programs
- States can obtain authorization to add wastes to state universal waste programs

60 FR 25536, RO 11952



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26

## State Authorization Issues (cont'd)

- Interstate transportation may be complicated
  - Hazardous waste manifests required in authorized states that have not yet adopted universal waste rules

67 FR 40520



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**Treating Wastes Without a Permit**



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28

**Classes of Generators**

- Large quantity generators
- Small quantity generators
- Conditionally exempt small quantity generators



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29

**Definition of Treatment**

- “ Any method, technique or process including neutralization, designed to change the physical, chemical or biological character or composition of any hazardous waste so as to neutralize such waste or so as to recover energy or material resources from the waste or so as to render such waste nonhazardous or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage or reduced in volume.”

260.10



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30

## Waste Treatment Exemptions

- Treatment in wastewater treatment units
- Treatment in 90- and 180- day storage units
- Treatment in elementary neutralization units
- Treatment in totally enclosed treatment units
- Recycling
- Adding absorbents to wastes
- Immediate responses



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31

## Wastewater Treatment Unit Exemption

- Applies to equipment used to treat hazardous wastewaters and wastewater treatment sludge
- Equipment must be part of wastewater treatment facility subject to regulation under Clean Water Act
- Equipment must meet definition of tank or tank system per 40 CFR Part 260.10

264.1(g)(6)



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32

## Wastewater Treatment Unit Exemption (cont'd)

- Exemption applies only to the equipment not to the wastewaters or sludges
- Generator exempted from having to obtain a RCRA permit for the unit as well as requirements under 40 CFR Parts 264 and 265
- Also exempt from generator accumulation standards in 40 CFR §262.34



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33  
**Treatment in 90/180/270-day Accumulation Units Exemption**

- LQGs can treat wastes in containers, tanks, drip pads and containment buildings without a permit for up to 90 days
- SQGs can treat wastes in tanks and containers only for up to 180 days
- Thermal treatment prohibited
- Applies only to wastes generated onsite
- States may not allow it

268.7(a)



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34  
**Elementary Neutralization Unit Exemption**

- Applies to device that is used for neutralizing hazardous wastes that exhibit the characteristic of corrosivity (D002)
- Device must meet definition of tank, tank systems, containers, transport vehicle or vessel as defined in 40 CFR §260.10.
- Generator exempted from having to obtain a RCRA permit for the unit as well as requirements under 40 CFR Parts 264 and 265

264.1(g)(6)



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35  
**Totally Enclosed Treatment Unit Exemption**

- Unit must be directly connected to the industrial production process; and
- No releases of any hazardous waste or constituent into environment during treatment
- Generator exempted from having to obtain a RCRA permit for the unit as well as requirements under 40 CFR Parts 264 and 265

264.1(g)(5)



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36

## Recycling Exemption

- Applies to the recycling unit only
- Process is exempt from RCRA requirements except for Subparts AA and BB
- Recycling process can not include land disposal, incineration or burning for energy/material recovery

261.6(c)-(d)



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37

## Adding Absorbents to Wastes Exemption

- Generators can add absorbents to wastes in containers at time waste is first placed in container
- Must comply with 40 CFR Parts 264.17(b), 264.171 and 264.172 requirements

270.1(c)(2)(vii)



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## Immediate Response Exemption

- Permit not required if treatment and containment activities taken during immediate response to:
  - Discharge of hazardous waste
  - Imminent and substantial threat of a discharge of hazardous waste
  - Discharge of material that when discharged, becomes a hazardous waste
  - Immediate threat posed by military munitions, explosive device or other explosive materials

264.1(g)(8)



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39

## Immediate Response Exemption (cont'd)

- Facility also exempted from RCRA substantive management standards in 40 CFR Parts 264 and 265 except for:
  - Subpart C- Preparedness and Prevention
  - Subpart D- Contingency Plan and Emergency Procedures



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## Hazardous Waste Tanks



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41

## Definition - Tank Systems

- Any storage or treatment tank and associated ancillary equipment and containment system

260.10



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42

## Definition - Existing vs. New Tank System

- Existing tank system or component
  - Handled hazardous waste, or installation commenced, prior to July 14, 1986
- New tank system or component
  - Installation commenced after July 14, 1986

260.10



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43

## Tank Types

- Aboveground - entire surface is completely above plane of adjacent surrounding surface
- Onground tank - bottom of tank on same level as adjacent surrounding surface
- Inground tank - base below plane of ground level; not completely buried
- Underground tank - entire surface area below ground level

260.10



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## New Tank Systems

- Written assessment, including
  - Design and construction certification
    - ◆ Construction design standards
    - ◆ Hazardous characteristics of waste(s)
    - ◆ Corrosion assessment
    - ◆ For underground tanks, protection from traffic
    - ◆ Foundation conditions
    - ◆ Certification by qualified registered PE

264/265.191



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45

## New Tank Systems (cont'd)

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- Written assessment, including (cont'd)
  - Inspection prior to covering, enclosing, or placing tank or component in use
    - ◆ Performed and certified by qualified installation inspector or IQRPE
  - Backfill material must be noncorrosive, porous, homogeneous
    - ◆ Tank and piping must be fully and uniformly supported




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## New Tank Systems (cont'd)

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- Written assessment, including (cont'd)
  - Integrity test of new tank and ancillary equipment
    - ◆ Certification by qualified registered PE
  - Provide the type and degree of corrosion protection recommended by an independent corrosion expert
    - ◆ Independent corrosion expert must supervise installation of field-fabricated corrosion protection
    - ◆ Certification by independent corrosion expert




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## Certification of Major Repairs

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- Tank system with extensive repairs may not be returned to service until:
  - Certification is obtained which states the repaired tank system is capable of handling hazardous wastes without release for the intended life of the system
    - ◆ Qualified registered P.E.
    - ◆ Must use certification statement provided in 40 CFR §270.11(d)
    - ◆ Submit to regulatory authority within 7 days after tank system is back in use



270.11



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## Performance Standards for Secondary Containment

- Design, installation, and operation to prevent migration of wastes or liquids outside of tank system to soil, groundwater, or surface water at any time during use of system
- System capable of detecting and collecting releases until materials removed (detection within 24 hours; removal within 24 hours of detection)



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## Options for Secondary Containment

- External liner system
- Vault
- Double-walled tank
- Equivalent device
- Containment building
- Variance

264.193(d)



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## Compliance Schedules for Secondary Containment

- New tank systems: prior to use
- Existing tank systems handling dioxin wastes: January 12, 1989
- Existing tank systems known to be older than 15 years as of January 12, 1987: January 12, 1989

264/265.193



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51  
**Compliance Schedules for Secondary Containment (cont'd)**

- Existing tank systems of known and documented age, or known to be older than seven years: at age 15 or January 12, 1989, whichever is later
- Newly listed wastes: apply above timeframe
- Existing tank of undocumented age is assumed to be seven years, unless facility is older than seven years: at facility age 15 or January 12, 1989

264/265.193



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52  
**Variance from Secondary Containment Requirements**

- Demonstration based on:
  - Equivalent protection of groundwater and surface water
  - No substantial present or potential hazard
  - No free liquids; location inside building

264.193(g)-(h)



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53  
**Special Requirements for Ignitable Reactive or Incompatible Wastes**

- Ignitables - Reactives
  - Must prevent ignition or reaction
  - NFPA buffer zones
- Incompatibles
  - Not in same tank
  - Clean tanks between batches

264.198, 264.199



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## Hazardous Waste Tank Case Studies



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### Case Study 2-3

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- The Tapper Chemical Company manages several hazardous waste storage tanks that are housed within a containment building. The tanks manage D001 and D003 wastes and are operated in compliance with Subpart J. The containment building is managed in accordance with RCRA Part 264, Subpart DD standards and all pertinent physical structures appear to be in good condition.



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56

### Case Study 2-3 (cont'd)



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Question 1:

- In this scenario, since the tanks manage D001 and D003 wastes, are they excluded from regulation as hazardous waste tanks?

Question 2:

- Are the tanks considered to be ancillary equipment to the "containment building" and therefore not themselves regulated?



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## Case Study 2-4

- Miller Chemical Company has encountered a spill from one of their tanks which was managing TCE resulting from off specification batches. MCC expects that the tank contents may be able to be reused in the manufacturing process to develop a product for sale by MCC. The tank fill valve developed a leak and a spill of approximately 1,000 gallons of the contents was released to the nearby containment structure. MCC positioned a portable tank in the area, situated on the ground surface, to temporarily store the spilled contents which were vacuumed and placed into the tank while repairs to the main/permanent tank are performed.




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## Case Study 2-4 (cont'd)

### Question 1:

- What is the "regulatory status" of the tank contents?

### Question 2:

- What is the "regulatory status" of the portable tank?




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## Recycling




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60

## Recycling

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- Definition
- Certain materials are not subject to regulation when recycled
- Materials are not solid waste when recycled
- Certain recycled materials are regulated under Part 266
- Recycling determination process
- Regulation of recycling process



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61

## Recycling: A General Definition

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A material is recycled if it is used, reused, or reclaimed

261.1(c)(7)



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62

## Reclamation

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- Processing to recover a usable product
- Regeneration

261.2(c)(4)



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## Use/Reuse Solid Waste Exclusions

63

- Recyclable materials are not solid wastes when:
  - Used or reused as ingredients or feedstocks in a production process
  - Used or reused as effective substitutes for commercial products
  - Returned directly to the original primary production process in which they are generated

261.2(e)(1) and 261.4(a)(8)



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## Regulations Governing Materials That Are Recycled

64

- Exclude some recycled materials from the definition of solid waste
- Specify the applicable regulations for the management of recycled wastes (recyclable materials); 40 CFR 266 Subparts C, G and I

261.2, 261.6, 266 Subparts C, G and I



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## Materials Not Subject To Regulation When Recycled

65

- Scrap metal not excluded under 40 CFR §261.4(a)(13)
- A variety of reclaimed oils and oil-derived fuels associated with oil refining (40 CFR §261.4(a)(12) and (18))

261.6(a)(3)



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66  
**Materials Not Subject To Regulation  
When Recycled (cont'd)**

- Industrial ethyl alcohol that is reclaimed
- Used oil exhibiting any of the characteristics of hazardous waste that is recycled in a manner other than burning for energy recovery

261.6(a)(3)



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67  
**Recycled Materials Regulated  
Under Part 266**

- Materials used in a manner constituting disposal (Subpart C)
- Recyclable materials utilized for precious metals recovery (Subpart F)
- Spent lead-acid batteries being reclaimed (Subpart G)
- Hazardous waste burned in boilers and industrial furnaces (Subpart H)
- Military munitions (Subpart M)

261.6(a)(2)



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68  
**Determination Process for  
Hazardous Secondary Material**

- Is the material a solid waste per Table 1 of 40 CFR §261.2(c)?
- Is the secondary material excluded per the use/reuse recycling exemptions listed in 40 CFR §261.2(e)(1)(i-iii) and §261.4(a)(8)?



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69  
**Determination Process for Hazardous Secondary Material (cont'd)**

- Is the recycling legitimate?
- Does the facility meet the required documentation procedures in 40 CFR §261.2(f)?

RO 11426, 73 FR 64700



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70  
**Regulation of Recycling Process**

- Hazardous wastes prior to reclamation are subject to the full set of hazardous waste regulations (40 CFR Parts 262 to 268, 270, and 124)
- The reclamation process itself is exempt from regulation (except for 40 CFR Part 264 Subparts AA and BB, for permitted facilities)

261.6(a)(1), (b), and (c)



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**Recycling  
Case Studies**



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### Case Study 2-5

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- Coal tar decanter sludge is recycled to produce coke.

Question:

- Can the Simpson Coking facility take advantage of the 40 CFR §261.2(e)(1)(iii) exemption for the recycled sludge?



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### Case Study 2-6

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- A facility wants to use petroleum-contaminated soils from a cleanup site as an ingredient in the production of asphalt.

Question:

- Does this qualify as legitimate recycling that is exempt from RCRA?



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### Case Study 2-7

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- Copper chloride and copper ammonium are by-products from the printed circuit board manufacturing process. These by-products are used directly as ingredients in the production of copper sulfate and copper hydroxide.

Question:

- What is the regulatory status of these by-products?



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## Case Study 2-8

- A facility reclaims K047 “red water” to produce a sodium sulfite product that is used as an ingredient to make a product.

### Question:

- Can the facility qualify for the recycling exemption listed in 40 CFR §261.2(e)(1)(i)?



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## Used Oil Management



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## Used Oil Definition, §279.1

- Used oil is any oil that has been refined from crude oil or any synthetic oil that has been used and, as a result of such use, is contaminated by physical or chemical impurities
- Same definition as in §266, but with synthetic oil added (57 FR 41574)



279.1



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## Synthetic Oils

- Definition of used oil encompasses used synthetic oils, including those derived from coal, shale, or a polymer-based starting material
- Synthetic oils (e.g., Mobil 1, Castrol Syntec) are generally used for the same purposes as petroleum-based oils, are usually mixed and managed in the same manner, and present the same level of hazard

279.1



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## Examples of Used Oil

- Motor oil
- Refrigeration coolant
- Metalworking fluids and oils
- Laminating oils
- Hydraulic fluid
- Copper and aluminum wire drawing solution
- Electrical insulating oil



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## Types of Used Oils

- EPA expects that most used oils regulated under the standards will be
  - Lubricants
  - Heat transfer fluids
  - Hydraulic fluids
  - Similar oils used for different purposes (similarly managed oils used for different purposes)



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81

## Examples of Used Lubricants

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- Motor oils
- Greases
- Metalworking lubricants
- Emulsions



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82

## Examples of Used Heat Transfer Fluids

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- Coolants
- Heating media
- Refrigeration oils
- Electrical insulation oils
- Machining and quenching oils



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## Examples of Used Hydraulic Fluids

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- Transmission fluids
- Brake fluids
- Steering fluids
- Fluids used in any hydraulic equipment (e.g., dump trucks, fork lifts)



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## Materials Not Regulated as Used Oil

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- Waste oils or oily wastes, including bottom cleanout waste from virgin fuel storage tanks, virgin fuel oil spill cleanup, or other oil wastes that have not been used (50 FR 49174, November 29, 1985)

50 FR 49174


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85

## Materials Not Regulated as Used Oil (cont'd)

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- Materials refined from crude or manufactured from synthetic materials, and used as cleaning agents or solely for their solvent properties (57 FR 41574)
- Antifreeze
- Animal and vegetable oils




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## Used Oil that Exhibits Hazardous Characteristics

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- Used oil that exhibits one or more RCRA hazardous characteristics **by its own nature** is managed under 40 CFR 279, and not as hazardous waste, when recycled
- Conversely, used oil that exhibits one or more RCRA hazardous characteristics is managed under 40 CFR 261 as hazardous waste, when not recycled



279, 261




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## Mixtures

- Used oil sometimes is mixed with other substances after use
- EPA is concerned that mixing may render the used oil hazardous
- Mixtures of used oil and other substances must be managed according to 40 CFR §279.10 standards. Substances of concern include RCRA listed hazardous wastes, characteristic hazardous wastes, and PCBs

279.10(b)



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## Used Oil and Listed Hazardous Waste Mixtures, §279.10(b)(1)(i)

- Mixtures of used oil and a listed hazardous waste must be managed as a listed hazardous waste

279.10(b)(1)(i)



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## Used Oil and Characteristic Hazardous Waste Mixtures, §279.10(b)(2)

- EPA distinguishes between two types of these mixtures
  - Ignitable-only characteristic hazardous waste
  - Characteristic hazardous waste

279.10(b)(2)



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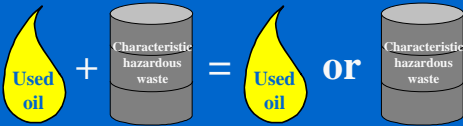
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90  
**Used Oil and Characteristic Hazardous Waste Mixtures, §279.10(b)(2)(ii)**

- Mixtures of used oil and characteristic hazardous waste can be managed as used oil if the resultant mixture does not exhibit any hazardous characteristic

279.10(b)(2)(ii)



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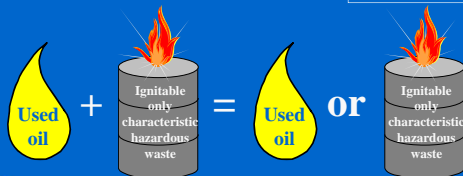
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91  
**Used Oil and Ignitable-Only Characteristic Hazardous Waste Mixtures, §279.10(b)(2)(iii)**

- Mixtures of used oil and ignitable-only characteristic hazardous waste can be managed as used oil if the resultant mixture does not exhibit the ignitability characteristic

279.10(b)(2)(iii)



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92  
**Used Oil and CESQG Waste Mixtures, §279.10(b)(3)**

- Mixtures of used oil and CESQG hazardous waste are subject to regulation as used oil (Federal Regulation)

279.10(b)(3)



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## Materials Containing or Otherwise Contaminated with Used Oil, §279.10(c)

- Any used oil that is drained or removed from a material is regulated as used oil
- Materials from which used oil has been removed continue to be regulated as used oil if they are to be burned for energy recovery, regardless of the degree of removal
- If free-flowing oil is removed from a material, the material is not regulated as used oil, but a hazardous waste determination must be made

**279.10(c)**






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94


## Rebuttable Presumption of Mixing

- The rebuttable presumption is an objective test to determine if used oil has been mixed with hazardous waste. Only necessary when used oil contains greater than 1,000 ppm total halogens
- Used oil containing greater than 1,000 ppm total halogens is presumed to have been mixed with a hazardous waste, and therefore is regulated as a hazardous waste
- Generators, transporters, processors, re-refiners, and burners must determine whether the total halogen content of used oil is greater than 1,000 ppm
- Testing or waste knowledge may be used



Used oil


or




Hazardous waste

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**279.10(b)(1)(ii)**






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95

## Test Methods for Determining Halogen Content

Measurement	Method Number (SW-846)	Procedure
Total Halogens	-Method 9075	Oxidative combustion and microcoulometry  Three Field Kit Tests: Chlor-D-Tect 1000 Quanti-Chlor Kit Chlor-D-Tect Q4000
	-Method 9076	
	-Method 9077	






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## Test Methods for Determining Halogen Content (cont'd)

Measurement	Method Number (SW-846)	Procedure
Individual Halogens	Method 8021	GC/HECD Capillary column technique
	Method 8010A	Packed column method




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## Total Halogen Confusion – Level 1 of 3

Total halogen content	Hazardous waste determination	Used oil fuel determination
	Rebuttable presumption	Acceptable units
Less than 1,000 ppm	Used oil; no rebuttal needed	May be burned in an on-specification unit if used oil meets other specifications in §279.11




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## Total Halogen Confusion – Level 2 of 3

Total halogen content	Hazardous waste determination	Used oil fuel determination
	Rebuttable presumption	Acceptable units
Between 1,000 and 4,000 ppm	Hazardous waste: successful rebuttal needed to manage as used oil	With successful rebuttal, may be burned in an on-specification unit if used oil meets other specifications




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## Total Halogen Confusion – Level 3 of 3

99

Total halogen content	Rebuttable presumption	Acceptable units
More than 4,000 ppm	Hazardous waste: successful rebuttal needed to manage as used oil	With successful rebuttal, must be burned in an off-specification unit regulated under 40 CFR Part 279, Subpart G, or undergo further processing to be burned in an on-specification unit



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## Used Oil Management Case Studies



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## Case Study 2-9

101

- Texeracon refines oils and fuels at their South Texas facility and undergoes an annual shutdown of the entire facility to perform necessary housekeeping and regular maintenance on equipment and tanks. This process allows the facility to replace faulty valves, fittings and other systems to ensure that the tanks and ancillary equipment retain their integrity, to the extent possible. During this time period, a large volume of general trash is generated as are sludges and bottoms from many of the storage tanks. These wastes are generally further managed on site or are otherwise disposed of properly.



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102

## Case Study 2-9 (cont'd)



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Question 1:

- What options does the facility have for managing this "Used Oil"?

Question 2:

- What other issues appear relevant to this scenario?



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103

## Case Study 2-10

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- Texeracon stores large volumes of off spec oils, used oil and/or waste oils in two large 250,000 gallon tanks along the periphery of the operational facility. These tanks are not located in secondary containment, do not undergo frequent inspections and are otherwise not maintained. The facility records indicate that some of the materials in the tanks were placed there 16 months ago, while most of the contents are more recent following the facility shutdown. To date, no releases have occurred from these tanks, and the facility contends that they are storing the wastes for potential further processing.



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104

## Case Study 2-10 (cont'd)



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Question 1:

- What is the regulatory status of the contents of the tanks?

Question 2:

- What is the regulatory status of the tanks?



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## Corrective Action Under the Hazardous and Solid Waste Amendments (HSWA)


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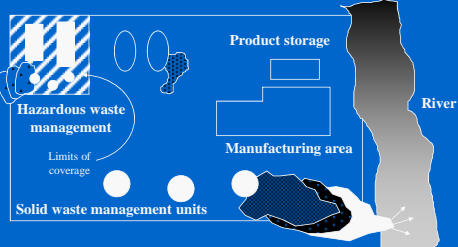
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106

## Corrective Action - Pre-HSWA



Before HSWA, the RCRA Corrective Action program addressed only groundwater releases from RCRA units


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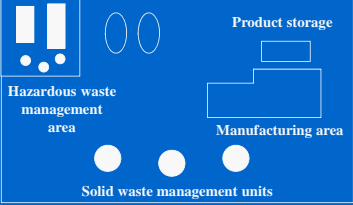
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107

## “Facility”



HSWA Corrective Action encompasses the entire property under the owner/operator's control at RCRA interim status and permitted facilities (also releases that extend off-site)


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108

## Corrective Action - Post-HSWA

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The diagram illustrates a facility layout with several key areas: 'Hazardous waste management' (represented by two tall chimneys), 'Product storage' (a rectangular area), 'Manufacturing area' (a larger rectangular area), and 'Solid waste management units' (two circular units). A 'River' is shown on the right side of the facility. A hand icon is shown pointing towards the river, indicating a release or monitoring point.

The HSWA Corrective Action program addresses releases to all media, both on and off-site, as well as the contaminant sources across the entire facility

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109

## Statutory Authority

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- HSWA permits
  - Section 3004(u)
  - Section 3004(v)
- Consent orders
  - Section 3008(h)
- Statutory authority orders
  - Section 3008(a)
- Imminent Hazard

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110

## HSWA Section 3004(u) Permit

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- Requires corrective action for release of hazardous constituents from any SWMU at a facility with a RCRA permit issued after HSWA amendments
- Effective regardless of the time in which waste was placed in unit
- Otherwise known as HSWA permit

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111

### HSWA Section 3004(v)

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- Authorizes EPA to require corrective action beyond the facility owner/operator boundary
- Goal is to protect the surrounding human health and environment



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112

### 3008(h) Consent Orders

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- Authorizes EPA to issue orders requiring corrective action
- Orders based on information that a release to the environment has occurred



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113

### 3008(h) Consent Orders (cont'd)

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- Otherwise known as interim status corrective action orders
- Negotiated settlement between regulatory authority and facility



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114

## Statutory Authority Orders

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- Under HSWA section 3008 (a), a permit may be revoked or a civil action commenced in a U.S. district court in the event that appropriate relief is necessary to protect human health or the environment



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115

## Imminent Hazard Provision

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- Section 7003 - imminent and substantial endangerment
  - Codified in 40 CFR §270.32(b)
  - Catch-all provision which ensures protection of human health and the environment



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116

## Imminent Hazard Provision (cont'd)

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- Authorizes regulatory authority to implement and enforce regulations
  - Generators who would not need a RCRA permit may receive a corrective action order requiring clean-up



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117

## Initiation of Corrective Action

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- Voluntary
  - Pros and cons
- Regulatory authority
  - Responsible for RCRA Facility Assessment

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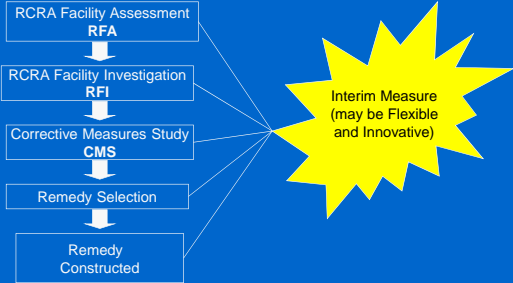
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118

## Corrective Action Process

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119

## Purposes of the RFA

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- Describe the facility in terms of its past and present operations and waste management practices
- Identify releases
- Identify and evaluate SWMUs and AOCs for releases to all media
- Make preliminary determinations about releases, need for corrective measures, further investigations and interim measures

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120

## Steps in the RFA Process

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1	File search	}	Necessary for all RFAs
2	Preliminary review (PR)		
3	Visual site inspection (VSI)		
4	Sampling visit (SV)	}	Necessary dependent on “comfort level” with data collected during PR/VSI
5	Final RFA report	}	Key document for the administrative record

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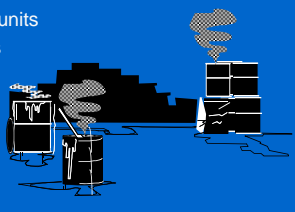
121



## Various Kinds of SWMUs

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■ These include:

- Drum storage areas
- Satellite accumulation areas
- Wastewater treatment units
- Surface impoundments
- Maintenance areas
- Landfills
- Drip areas
- Waste piles
- Others?



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122

## Containers

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## Containers

123



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## Containers

124



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## Containers

125



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## Containers and Tanks



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## Tanks & Tank Systems



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## Surface Impoundments & Waste Piles



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## Waste Piles & Landfills



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## Rotary Klin



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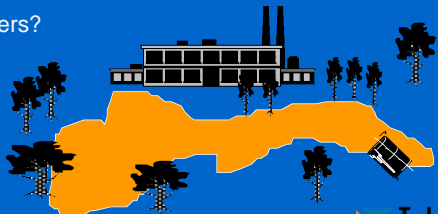
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## Various Kinds of AOCs

- Spill locations
- On-site ponds/streams
- Storm sewers
- Others?



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132

## Areas of Concern

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133

## RCRA Facility Investigations (RFIs)

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- **Objective** - to characterize the nature, extent, and rate of migration of a release of hazardous waste/constituents from a SWMU or AOC
- The ultimate goal of an RFI is to determine whether a Corrective Measures Study (CMS) is required

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134

## Interim Measure - Defined

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- **Definition**
  - Umbrella term for wide range of institutional and physical corrective action activities to achieve stabilization
- **Corrective action goals**
  - Abate
  - Minimize
  - Stabilize
  - Mitigate
  - Eliminate

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135

## Purpose of the CMS

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- Identify, develop and evaluate potential corrective measures (remedy) alternatives for releases identified at the facility



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136

## Purpose of the CMI

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- Corrective Measure Implementation
  - Design
  - Construct
  - Operate
  - Maintain
  - Monitor



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137

## ANPR

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- Published Advance Notice of Proposed Rulemaking 5/1/96 (61 FR 19432)
- Three primary purposes:
  - Open dialogue
  - Describe current implementation
  - Emphasize areas of available flexibility
  - Memo (1/17/97) conveys expectation that ANPR will be used as guidance



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138

### ANPR Program Philosophy of "Should"

- Corrective action should be based on risk
- Should focus on results rather than process
- Interim actions and stabilization should be used to reduce risk
- Should be phased to focus resources on areas of pathways of great concern



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139

### ANPR Program Philosophy of "Should" (cont'd)

- Should provide meaningful inclusion of all stakeholders
- Should be implemented using most appropriate authority, including state authorities and voluntary actions
- States will be the primary implementers



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140

### ANPR: Examples of Flexibility

- Investigation tools and approaches
  - Conceptual site model
  - Data quality objectives
  - Innovative sampling and analytical techniques



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141

### Examples of Flexibility (cont'd)

- Action levels
  - Industrial based action may be appropriate in some settings, especially for interim actions
- Delineation of contamination
  - Not always needed to background concentrations



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142

### Examples of Flexibility (cont'd)

- Future land use should be considered
  - Non-residential cleanups can be acceptable
- Formal evaluation of remedial alternatives not always needed
- Technical impracticability
- Natural Attenuation
- Performance-based remedies



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143

### Post-Closure Care Requirements

- Rule promulgated on October 22, 1998 (63 FR 56710) amended the 40 CFR Parts 264, 265, 270 and 271 requirements in two areas:
  - EPA and the States are allowed to use a variety of authorities (alternatives to permits) to impose requirements on non-permitted land disposal units requiring post-closure care, and;



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144

## Post-Closure Care Requirements (cont'd)

- Rule promulgated on October 22, 1998 (63 FR 56710) amended the 40 CFR Parts 264, 265, 270 and 271 requirements in two areas:
  - Land-based units located near SWMUs or areas of concern that also have released hazardous constituents to the environment may be addressed through HSWA Corrective Action program instead of the 40 CFR §264 Subpart F Corrective Action requirements



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145

## Post-Closure Care Under Alternatives to Permits

- Prior to the rule, all closing or closed interim status facilities with regulated land-based units were required to obtain post-closure permits for the units
- The rule allows for post-closure care of land-based units at closing or closed facilities via an "enforceable document"



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146

## Post-Closure Care Under Alternatives to Permit (cont'd)

- The "enforceable document" requires the same substantive requirements that apply to units receiving post-closure permits:
  - Facility Information
  - Groundwater Protection
  - Corrective Action
  - Public Participation
  - Financial Responsibility
  - Post-closure Care of a Regulated Unit



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147

## Remediation of Land-Based Units with Releases to the Environment

- Prior to Post-closure rule:
  - Regulated units with releases required to comply with the 40 CFR Part 264 or 265 groundwater monitoring, post-closure, and corrective action requirements
- After Post-closure rule:
  - Regulated units with releases of hazardous constituents located near SWMUs or AOCs with releases may be addressed through the HSWA Corrective Action program



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148

## RCRA Cleanup Reforms

- July 8, 1999: EPA announced implementation of RCRA Cleanup Reforms
  - Provide new results-oriented guidance with clear objectives
  - Foster maximum use of program flexibility and practical approaches
  - Enhance community involvement, including greater public access to cleanup status



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149

## RCRA Cleanup Reforms (cont'd)

- Federal Register, Vol. 65, No. 58, pages 15904-15906, March 24, 2000
- Three new guidances
  - Results-Based Approaches to Corrective Action
  - Final Guidance on Completion of Corrective Action Activities at RCRA Facilities (issued February 13, 2003)
  - Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action (EPA-530-R-01-015, September 2002)



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## Land Disposal Restriction Regulations





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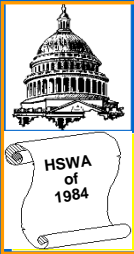
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151

## Land Disposal Restrictions (LDR) Program Background and Objectives



- Hazardous and Solid Waste Amendments of 1984
- Objectives
  - Protect human health and environment
  - Minimize reliance on land disposal
- Regulations codified in 40 CFR Parts 148 and 268


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152

## Statutory Background - 1984 HSWA Mandates

- Required EPA to promulgate treatment standards that diminish the toxicity of wastes or reduce the mobility of the constituents in the wastes
- Prohibited land disposal of hazardous wastes unless treatment standards had been met, or disposal was in a unit for which a “no migration” petition (40 CFR §268.6) had been granted


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153

### Applicability of LDRs

- LDR does not apply to waste placed before November 8, 1986, unless it is removed from the unit
- LDR does not apply to remediation wastes placed in a CAMU
- LDR does not apply to OB/OD Units

RO 12793



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154

### Applicability of LDRs (cont'd)

- Restricted wastes may be land disposed if they meet the following conditions specified by EPA:
  - Conditionally-exempt small quantities
  - Wastes included in exemptions, variances, or extensions
  - Pesticides used by a farmer on the farmer's land
  - Wastes identified or listed after November 8, 1984 for which standards or prohibitions are not yet promulgated



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155

### Definition of Land Disposal

- Land disposal is defined (40 CFR §268.2(c)) as any placement of hazardous waste in or on the land, including, but not limited to such units as a:
  - Landfill
  - Surface impoundment
  - Waste pile

268.2(c)



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156

## Definition of Land Disposal (cont'd)

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- Injection well
- Land treatment facility unit
- Salt dome or bed foundation
- Underground mine or cave
- Placement in concrete vault or bunker intended for disposal purposes

268.2(c), 268.40-48




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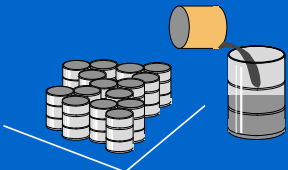
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157

## Key Provisions of the LDR Program

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- Treatment Standards – Best Demonstrated Available Technology
- Point of Generation
- Storage Prohibition
- Dilution Prohibition
- Recordkeeping



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158

## Key Provisions of the LDR Program (cont'd)

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- Treatment standards must be met prior to disposal (40 CFR §268.40-268.48)
- Treatment is not evaded by long-term storage (40 CFR §268.50)
- Dilution is prohibited as a substitute for treatment (40 CFR §268.3)
- Can store up to 1 year to facilitate proper treatment and recovery

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## Key Provisions of the LDR Program (cont'd)

- Recordkeeping must follow a waste from cradle to grave (40 CFR §268.7). As of 8/11/97, only the first shipment (62 FR 26020, May 12, 1997)
- Treatment standards are established by best demonstrated available technologies (BDAT) and are not health-based standards (51 FR 19300 and 51 FR 40636)



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## Variances, Extensions, and Exemptions



- Treatability variance (40 CFR §268.44)
- "No-migration" variance (40 CFR §268.6)
- National capacity variance (40 CFR §268.30-35)
- Case-by-case extension (40 CFR §268.5)
- Surface impoundment exemption (40 CFR §268.4)
- Equivalent treatment method (40 CFR §268.42(b))



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## Treatment Standards

- All LDR treatment standards are technology-based rather than risk-based
  - Most are expressed as concentration levels
  - Some are expressed as required technologies



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## Concentration-Based Treatment Standards

162

- EPA set concentration-based treatment standards by:
  - Evaluating known and available treatment technologies
  - Comparing efficiency of different technologies
  - Setting reasonably achievable treatment levels based on the best demonstrated available technology (BDAT)

268.41



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## Concentration-Based Treatment Standards (cont'd)

163

- Concentration-based Treatment Standards:
  - Concentration levels represent maximum contaminant concentrations that may be present in a waste or an extract of a waste at which the waste is eligible for land disposal
  - In most cases, based on totals analysis
  - Use of BDAT not required
  - Concentration-based standards offer flexibility, and encourage development of new treatment technologies



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## Technology-Based Treatment Standards

164

- Technology-based Treatment Standards:
  - Technology is the treatment standard
  - Once waste is treated by that method, it can be land disposed
  - No analytical work required
  - Technology based standards mainly for P, U, and D, where analytical methods are not reliable

268.42



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165

## Treatability Groups

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- Treatment standard depends on the form of waste handled when land disposed (i.e., wastewater or non wastewater)
  - Wastewater – wastes that contain less than 1% by weight total organic carbon and total suspended solids
  - Non wastewater – any waste that does not meet the definition of wastewater

268.2(f)

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## Universal Treatment Standards and Underlying Hazardous Constituents

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167

## Universal Treatment Standards (UTS)

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- EPA established treatment standards for characteristic wastes in 1990
- The deactivation (DEACT) treatment standard challenged and overturned by court
- Court ordered that DEACT standard be remanded and underlying hazardous constituents be considered

268.48




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168

## Universal Treatment Standards (UTS) (cont'd)

- Prior to UTS, treatment standards often lacked consistency for a common constituent present in different waste codes
  - F005 (NWW): benzene - 3.7 mg/kg
  - F037 (NWW): benzene - 14 mg/kg
- UTS simplify treatment of hazardous wastes with the same hazardous constituents
  - F005 (NWW): benzene - 10 mg/kg
  - F037 (NWW): benzene - 10 mg/kg
  - D018 (NWW): benzene - 10 mg/kg

268.48


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169

## Underlying Hazardous Constituents (UHCs)

- A series of rulemakings addressed that underlying hazardous constituents (UHCs) in characteristic wastes be identified and treated
  - Ignitable and Corrosive Characteristic Wastes Interim Final Rule (May 24, 1993)
  - Phase II Rule (September 19, 1994)
  - Phase III Rule and Land Disposal Program Flexibility Act (April 8, 1996)

268.2(i)


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170

## UHCs and the Phase II Rule - September 19, 1994

- Established treatment standards for toxicity characteristic (TC) wastes (D012-D043) and other newly listed wastes (59 FR 47982)
  - Also applied the requirement to identify and treat UHCs to most categories of D012-D043 wastes
- Expanded the list of potential UHCs in characteristic wastes to include all hazardous constituents in the newly established UTS
  - UTS made treatment standards more consistent

59 FR 47982


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171

## Summary of Current UHC Requirements

- Facilities do not have to identify and treat underlying hazardous constituents in most characteristic wastes (D001, D002, D003 and D012-D043) that are decharacterized in tanks and subsequently managed in CWA/CWA-equivalent systems or SDWA Class I wells
  - Characteristic can be removed by any means including dilution or other deactivation through aggregation of different wastestreams

61 FR 15661



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172

## Summary of Current UHC Requirements (cont'd)

- For most D001, D002, D003 and D012-D043 wastes not managed in CWA/CWA-equivalent systems or Class I SDWA systems, generators must identify any underlying hazardous constituents in the waste and treat the waste to meet the universal treatment standards for those constituents
- The list of underlying hazardous constituents is codified in 40 CFR §268.48

268.9(a)



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173

## CWA systems and Class I SDWA Wells

- CWA systems discharge to waters of the U.S. under a NPDES permit or treat wastes to the pretreatment requirements in Section 307 of CWA
- CWA equivalent systems – conduct biological treatment of wastewater but are zero discharge facilities (40 CFR §268.38(a))
- Class I SDWA wells are injection wells



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174

## Basic Principals of LDR

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- Confirm waste is hazardous
- Determine appropriate waste code(s)
- Determine form of waste to be land disposed (i.e., wastewater or non-wastewater)
- Determine appropriate treatment standard and whether need to treat UHCs



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## Question/Answer/Discussion



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## End of Day 2

### Case Studies



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### Case Study 2-11

■ The XYZ Corporation produces metal parts using a chrome electroplating process. No cyanides are used during production. The process generates a wastewater treatment sludge that fails the TC for chrome. The sludge is pumped into 55-gallon containers and placed in an onsite container storage area. During the last two years, approximately 500 gallons of the sludge have been added to the container storage area every six months. The owner of XYZ is planning to ship the sludge to a recycler that operates a chrome recovery process. However, no shipments of sludge have been made to the recycler within the last two years. XYZ asserts that the sludge will be shipped to the recycler in the next year.

Question:

- What is the regulatory status of the sludge?




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### Case Study 2-12

■ A hazardous waste landfill cell generates approximately 200 gallons of F039 leachate every three months. The leachate is typically pumped from the leachate detection system to a tank truck, mixed with portland cement in a pug mill, and solidified prior to disposal in the same landfill cell. During one collection event, the drain valve on the tank truck was not properly closed resulting in the release of about 50 gallons of leachate on the ground. The contaminated soil was removed and placed in drums for disposal.

Question:

- What is the waste code for the soil and why?




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### Case Study 2-13

■ A military installation conducts open burning of bags of propellant in a burn pan. The waste codes for the propellant are D001 (ignitability), D003 (reactivity), and various toxicity characteristic metals (barium, D005; cadmium, D006; chromium, D007; and lead, D008) depending on the composition of the propellant. After the open burning is completed, a black residue is present in the bottom of the burn pan.

Question:

- What waste codes, if any, are applied to the residue and why?




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### Case Study 2-14

- Used oil containing more than 1,000 ppm halogens is sprayed on coal for dust suppression during transportation. The coal is subsequently burned in a utility boiler or industrial furnace.

Question:

- What is the regulatory status of the coal/oil mixture?




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### Case Study 2-15

- An interim status facility completes closure of its units and then resumes operations as a generator.

Question:

- Can the facility avoid corrective action?




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## EPA REGION 4

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### RCRA Fundamentals Training Day 3



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## Review



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### LDR Rules for Determining When Characterization Waste Codes and Treatment Standards Apply to Listed Waste



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## Rules

- What are the standards for waste that are both Listed and Characteristic?
  - 40 CFR §268.9 requires generators to identify all listed and characteristic waste codes that could apply to their waste
  - If a listed waste also exhibits a characteristic, the waste must meet the treatment standard for both the listed and characteristic waste codes

268.9



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## Rules (cont'd)

- The exception to the rule is when a treatment standard for the listed waste also contains the constituent that caused the waste to exhibit a characteristic
  - ◆ In that case, the treatment standard for the listed waste would operate rather than the characteristic treatment standard
    - ▶ Thus there would be no need to meet treatment standards for underlying hazardous constituents

268.9(b)



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## Rules (cont'd)

- Example:
  - Spent tetrachloroethylene at greater than 10% concentration typically qualifies as both F001 and D039. Since the treatment specifically addresses tetrachloroethylene, the F001 treatment operates instead of the D039 treatment standard



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## Rules (cont'd)

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- However, if the listed treatment standard does not directly address the constituent that makes the waste characteristic, then both apply (first part of rule)

268.9(b)



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## Rules for Determining If Dilution Is Allowable



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## Acceptability of Dilution

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- Dilution is permissible when wastes are aggregated for the purpose of centralized treatment if:
  - All restricted wastes are legitimately amenable to the same type of treatment that is utilized for the aggregated wastes
  - The treatment applied after aggregation meets the appropriate Best Demonstrated Available Treatment Standard (BDAT)

268.3(a) and 55 FR 22666



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9

## Acceptability of Dilution (cont'd)

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- Dilution of certain characteristic wastes that are managed in a Clean Water Act regulated treatment system (40 CFR §268.3(b))
- Dilution of wastes to be deep well injected to render them non-hazardous before injection (40 CFR §268.1(c)(3))

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10

## Acceptability of Dilution (cont'd)

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- Dilution is prohibited when wastes are:
  - "Treated" by inappropriate methods
  - Sent to treatment systems that do not treat the waste
  - Diluted to render the waste delistable

268.3

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11

## Treatment Issues – Dilution Versus Treatment

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- Can generally add substances that either:
  - Must be treated themselves (e.g., other restricted wastes); or
  - Treat the waste or aid in its treatment (e.g., adding lime to neutralize or precipitate wastes prior to further treatment)
  - Must reduce the toxicity or mobility of at least one BDAT constituent in the waste (ordinarily, reductions in more than one BDAT constituent will be required)

268.3(a) and 55 FR 22666

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## Waste Subject to Dilution Prohibition

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Type of Waste	Yes	No
Characteristic wastes managed in Clean Water Act-Regulated Treatment Systems (40 CFR §268.3(b))		X
Characteristic waste disposed of in Safe Drinking Water Act Underground Injection Control Wells (40 CFR §268.1(c)(3))		X
Waste subject to a National Capacity Variance (40 CFR §3004(h)(2)) –Note: all variances have expired		X
Waste disposed of in a unit with a No-Migration Variance (40 CFR §268.6)		X
Waste subject to a case-by-case extension to an effective date (40 CFR §268.5)		X

Reprinted from RCRA, Superfund & EPCRA Call Center training module, Land Disposal Restrictions, Solid Waste and Emergency Response (5305W); EPA 530-R-04-013




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## Waste Subject to Dilution Prohibition (cont'd)

13

Type of waste	Yes	No
Newly identified or listed wastes for which EPA has not yet established a treatment standard (40 CFR §268.1(e)(3))		X
Wastes that meet all treatment standards and prohibition levels		X
Metal-bearing hazardous wastes that are incinerated	X	
Wastes managed in a corrective action management unit (CAMU) or temporary unit (TU)		X
Wastes from conditionally exempt small quantity generators regulated under 40 CFR §261.5 (40 CFR §268.1(e)(1))		X
Farmers disposing of waste on their own land under 40 CFR §262.70 (40 CFR §268.1(e)(1))		X

Reprinted from RCRA, Superfund & EPCRA Call Center training module, Land Disposal Restrictions, Solid Waste and Emergency Response (5305W); EPA 530-R-04-013




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## Management of Remediation Waste




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15

## Actively Managed Wastes

- RCRA applies to media contaminated with listed or characteristic hazardous waste that is actively managed
- Contaminated soil disturbed during construction activities may be managed within the area of contamination

55 FR 8762, RO 11671



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16

## Wastes that are Not Actively Managed

- If wastes are not actively managed then they are being stored
- Inactive units may still be SWMUs or AOCs subject to corrective action

55 FR 8762, RO 11671



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17

## Management of Remediation Waste Guidance

- Management of Remediation Waste Under RCRA (October 1998)
  - Remediation Waste
  - Contaminated Media
  - Contaminated Debris

260.10



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18

## Area of Contamination Policy

- AOC is a portion of the site that already has been affected by contamination
- Managing remediation waste in this area will not trigger Land Disposal Restrictions (LDRs) or minimum technology requirements
- Can not transfer waste across uncontaminated areas
- March 13, 1996 EPA Memo



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19

## CAMUs and TUs

- Corrective Action Management Unit (CAMU)
  - Can be used to treat, store, or dispose of hazardous remediation wastes
- Temporary Unit (TU)
  - Non-land-based treatment or storage of hazardous remediation waste
- CAMUs and TUs must be approved by EPA or a State in a permit, order, or other enforceable document

264.552, 264.553



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## Management of Remediation Waste – Other Considerations

- May be able to assume not listed waste
- Site-specific LDR variances possible
- Treatability study exemption
- 90-day exemption
- Permit waivers for CERCLA response
- Spill and Munitions and Explosives of Concern exemptions

264.1(g)(8)



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21

## Groundwater Guidance

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- Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action (April 2004)
- Internet training is available



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## Contaminated Soil and Hazardous Debris



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23

## Contaminated Soil

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- Land Disposal Restrictions (LDRs) only apply to soil that has been generated and will be placed in a land disposal unit.
- LDRs always apply to characteristic soils
- LDRs may apply to soils containing listed wastes

268.49



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24  
**Treatment Options for Hazardous Soil**

- Meet treatment standards
- Obtain a treatability variance
- Use alternative treatment standards
  - Treat constituents present at >10 times universal treatment standards (UTS)
  - Reduce concentrations by 90%
  - Soils containing constituents that can not be analyzed must be treated by specific methods.

268.40, 268.44(h)(3)-(4), 268.49



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25  
**Hazardous Debris Final Rule - August 18, 1992**

- Set treatment standards for several newly listed F, K, and U waste codes
- Set alternative treatment standards for debris contaminated with hazardous waste
- Established containment building standards

268.45, 264 Subpart DD, 265 Subpart DD



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26  
**Hazardous Debris Final Rule (cont'd)**

- Treatment standards were established for:
  - Petroleum refining wastes (F037 and F038)
  - Wastes from the production of unsymmetrical dimethylhydrazine (K107, K108, K109, and K110)
  - 2-Ethoxyethanol (U359)
  - Discarded commercial chemical product and process wastes from the production of dinitrotoluene and toluenediamine (K111 and K112, U328 and U353)

268.45



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## Hazardous Debris Final Rule (cont'd)

27

- Treatment standards were established for:
  - Wastes from the production of ethylene dibromide (K117, K118, and K136) and methyl bromide (K131 and K132)
  - Wastes from the production of ethylenebisdithiocarbamic acids (K123, K124, K125, and K126)
- Note: A number of the treatment standards for various constituents in these wastes were adjusted by the universal treatment standards (UTS) promulgated in LDR Phase II

268.45



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## Hazardous Debris Overview

28

- Prior to the rule, treated debris contaminated with a listed hazardous waste was required to be disposed in a Subtitle C unit
- After the rule, hazardous debris treated by an extraction or destruction technology is allowed to exit Subtitle C regulation provided the debris no longer exhibits a characteristic



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## Hazardous Debris Overview (cont'd)

29

- The “contained-in” policy, used historically for contaminated media, was codified for debris in 40 CFR §261.3[f](2), and LDR notification for debris codified in 40 CFR §268.7[d]

261.3(f)(2), 268.7(d)



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## Treatment Standards of Hazardous Debris

30

- Requirements for hazardous debris and treatment residuals are contained in 40 CFR §268.45
- Debris treated by an extraction or destruction technology listed in Table 1 of 40 CFR §268.45 and that does not exhibit a characteristic is excluded from Subtitle C regulation [261.3(f)(1)]
- Debris treated by an immobilization technology listed in 40 CFR §268.45
- Remains subject to Subtitle C requirements

268.45



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## Treatment Standards of Hazardous Debris (cont'd)

31

- Debris may also be treated to the treatment standards in 40 CFR §268.40 for the wastes contaminating the debris

*Note:* If this last treatment path is chosen, debris contaminated with a listed waste must continue to be managed under Subtitle C

*Note:* If debris is characteristic at point of generation and analyzed after treatment to prove characteristic (and underlying hazardous constituents [UHCs]) removed, it could go to a Subtitle D facility

268.40



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## Question/Answer/Case Studies



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## RCRA Organic Air Emission Standards Overview

A brief summary of Subparts AA, BB and CC Standards for RCRA permitted, interim status, and generator facilities.



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## Applicability: Who is Covered?

- Facilities subject to 40 CFR Part 270:
  - ◆ Permitted;
  - ◆ Interim status;
- Hazardous waste recycling units located at 90-day facilities, provided another unit at the facility has to obtain a RCRA permit (previously exempt); and
- Large Quantity Generator (LQG) 90-day tanks and containers.

264.1030(b)(1-3)



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## RCRA Organic Air Emissions Standards: What is Subject to the Standards?

Hazardous Waste Management Units (HWMUs) and associated equipment that manage organic hazardous waste streams:

- Subpart AA: Process vents at Treatment, Storage & Disposal Facilities (TSDFs) and LQGs.
- Subpart BB: Equipment leaks at TSDFs and LQGs.
- Subpart CC: Tanks, Surface Impoundments, Containers & Miscellaneous Units at TSDFs and,
  - ◆ LQG containers and tank systems (i.e., 90-day units).
- Recycling Units are potentially subject to Subparts AA, BB and CC at LQGs or TSDFs.



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36

## Why the Standards were/are Needed

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The Standards were designed to address 3 Major Emission Issues:

- Odor,
- Ozone precursors,
- Air toxic pollutants which include many carcinogens found to impact populated areas of the Country.

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37



## The Standards were developed under RCRA Section 3004(n)

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- Phase I (Subparts AA and BB)
  - *Process Vents and Equipment Leaks (55 FR 25494, June 21, 1990).*
- Phase II (Subpart CC)
  - *Tanks, surface impoundments, containers, miscellaneous units (59 FR 62927, December 6, 1994).*

The Standards are effective for all existing, interim status and permitted hazardous waste handling facilities in all states.

All hazardous waste handling facilities should be able to demonstrate compliance.

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38

## States with RCRA Organic Air Emission Standards Authorization

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- Most states are authorized for the RCRA Organic Air Emission Standards and are responsible for applying the Standards and inspecting for Standard compliance.
- If the state has not yet adopted and been authorized, the EPA is responsible for applying the Standards and inspecting for Standard compliance.
  - *Including the issuance of a federal portion of the RCRA Hazardous Waste Management Permit concurrently/jointly with the state to constitute a full RCRA Permit for the facility.*

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39

## The Standards Regulated Universe: Facts to Keep in Mind

- Almost every facility that handles organic waste streams is subject to the Standards.
  - Most commonly Subpart BB and Subpart CC.
- Exemptions claimed from the Standards are normally not applicable at most of the facilities.
- Application of the Standards are extremely detailed and specific to the unit, equipment and device.



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## RCRA Organic Air Emissions Standards: What is the Control Approach?

- Application of controls based on organic content of the hazardous waste streams handled and the existence of physical, unit-, equipment- and device-specific emission controls.
- Units that manage waste below threshold levels of organic concentration are exempt from control requirements:
  - Subpart AA – 10 ppmw total organic concentration of waste stream.
  - Subpart BB – equipment contacting waste with total organic concentrations of 10% by weight.
  - Subpart CC – 500 ppmw average volatile organic concentrations at point of origination.



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41

## RCRA Organic Air Emission Standards: How is Compliance Demonstrated?

- The Standards intend the facility *demonstrate* compliance *through recordkeeping*.
  - Control choices need to be well documented and the Leak Detection and Repair and inspection records well detailed to clearly show compliance.
  - Employee training should be well documented to show employee expertise in leak detection methods, corrective action, and repair recordkeeping for Standard compliance.
  - Can be done combined with tank/HWMU inspection and recordkeeping.

264.1035, 264.1064-264.1065, 264.1090



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42

## The Standards: Quick High Level Overview of Each

- The Standards are very detailed and cover a significant number of pieces of equipment, a number of HWMUs and emissions control devices specifically.
- To train front line level staff that will apply and inspect for compliance, requires a more intense 3- to 5-day course and hands-on experience investigating and understanding system components at the regulated facilities.
- This presentation is designed to only introduce the Standards and open discussion with the states as to which areas of the Standards need to be targeted for future training efforts.

*The remainder of this presentation will brief you on the general requirements of each Standard.*


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43

## Subpart AA: Process Vents What Vents are Subject to Comply?

- Applicable to certain TSD and LQG process vents associated with:
  - ◆ Distillation
  - ◆ Fractionation
  - ◆ Thin-film evaporation
  - ◆ Solvent extraction
  - ◆ Or air or steam stripping operations
- Units that manage hazardous wastes with **(total) organic concentrations** of at least 10 parts per million by weight (ppmw).

264.1030 (a) and (b)


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44

## Subpart AA: Process Vent Definition

**Process vent:**

Any open-ended pipe or stack that is vented to the atmosphere either directly, through a vacuum-producing system, or a tank associated with hazardous waste distillation, thin-film evaporation, solvent extraction or air or steam stripping.

264.1031


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## Process Vent: Applicability

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The diagram illustrates a process vent system. It starts with 'Waste In' entering a 'Storage and Feed Tank'. From there, the material goes to a 'Primary Condenser' which has a 'Vapor Phase' outlet leading to a 'Process Vent'. Below the condenser is an 'Accumulator Tank'. The bottom of the condenser leads to a 'Bottoms Receiver', which then feeds into another 'Storage Tank'. A 'Valve Pump' is shown at the top left of the condenser section. The TechLaw logo is in the bottom right corner.

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46

## Subpart AA: Emissions Control Requirements

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- Reduce total organic emissions from ALL affected (i.e., subject units facility wide) process vents <1.4 kg/h (3 lb/h) and 2.8 Mg/yr (3.1 tons/yr) or use of a unit-specific control devices to reduce the total organic emissions from the source (i.e., control device) by 95 percent by weight.
- If the facility chooses to use a control device, Subpart AA specifies closed-vent system and control device performance, monitoring and repair requirements.
- If a closed-vent system to a control device is used, the closed-vent system and control device must be operating at all times when emissions may be vented.

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## Subpart AA: Inspection & Monitoring

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- Each control device must have an installed and operating flow indicator that records at least once per hour.
- Each control device must have an installed and operating control device-specific monitoring device to continuously monitor control device operation per that specified by the Standard.
- Must inspect monitoring records at least once each operating day.
- If control device inspection indicates a problem, corrective action must be immediately implemented and recorded.
- Closed vent systems must be monitored annually; detectable emissions controlled as soon as practicable, but not later than 15 days.

264.1033

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## Subpart AA: Recordkeeping & Reporting

- Record:
  - Design documentation, repairs, training, monitoring and inspection information.
- Report:
  - Must report to agency instances where control device exceeded design specifications for longer than 24 hours.

264.1035 (a) and (b)



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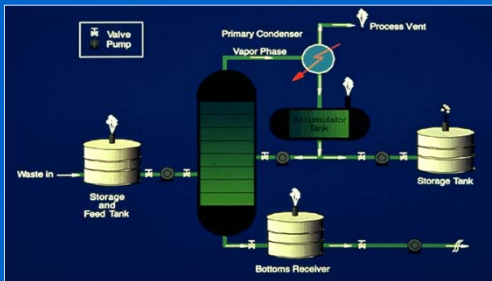
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## Subpart BB: Equipment Standards



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## Subparts BB Applicability: Who is Covered?

- Facilities subject to 40 CFR Part 270
  - Permitted
  - Interim Status
- Hazardous waste recycling units located at 90-day facilities, provided another unit at the facility has to obtain a RCRA permit (previously exempt).
- LQG 90-day tanks and containers.

264.1030



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51

## Subpart BB: What Equipment is Subject?

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- Equipment that contacts hazardous waste streams containing at least **10% total organic concentrations by weight**.
- Specific Requirements are detailed for:
  - Pumps
  - Compressors
  - Pressure relief devices
  - Sampling connecting systems
  - Open-ended valves or lines
  - Valves
  - Flanges and other connectors

264.1052-1058

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52

## Subpart BB: Exemptions

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- Equipment which contains or contacts hazardous waste < 300 hours per year.  
[264.1064(g)(6), 265.1064(g)(6)]
- Equipment in vacuum service.  
[264.1064(g)(5), 265.1064(g)(5)]

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53

## Subpart BB: Pumps in Light Liquid Service

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- Monitored monthly to detect leaks,
- Checked weekly for indication of liquids dripping from pump seal,
- Instrument reading of 10,000 ppm or greater indicates a leak,
- Indications of liquids dripping from pump seal indicates a leak.

264.1052

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54

## Subpart BB: Compressors

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- Equipped with a seal system with a barrier fluid system,
- Seal system operation and performance requirements are specified in the Standard,
- Barrier fluid must not be a hazardous waste with organic concentration of 10 percent by weight or greater,
- Sensor detected failure of seal system, barrier fluid system, or both = Leak,
- Daily/monthly check of sensor and leak repair requirements.

264.1053


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55

## Subpart BB: Pressure Relief Devices in Gas/Vapor Service

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- Operated with no detectable emissions (< 500 ppm above background) except during pressure releases,
- Returned to no detectable emissions (to be monitored and confirmed within five days) after each pressure release,
- Repair requirements when a leak is detected.

264.1054


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56

## Subpart BB: Sampling Connections

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- Must be equipped with a closed-purge, closed-loop, or closed-vent system,
- In-situ or no-purge sampling systems are exempt,
- Some operational requirements on purge return.

264.1055


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57

## Subpart BB: Open-ended Valves or Lines

- Can't have open ended lines.
- Must be equipped with cap, blind flange, plug or second valve.
- Operational requirements for second valves and double-block-and-bleed systems are specified by the Standard.

264.1056


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58

## Subpart BB: Valves in Gas/Vapor or Light Liquid Service

- Monitored monthly by Method 21
- Leak  $\geq$  10,000 ppm
- Valve is exempt from monthly if designated to operate with 'no detectable emissions' tested annually
- Special requirements for valves unsafe to monitor and difficult to monitor

264.1057


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## Subpart BB: Everything Else

- Heavy service pumps and valves, light and heavy liquid service pressure relief devices and flanges and connectors
  - Visual, audible, olfactory or other leak detection monitoring required,
  - Should be monitored concurrent with tank/HMMU inspections for efficiency,
  - Repair requirements 1<sup>st</sup> attempt within 5 days / repaired within 15 days (next slide)
  - Inaccessible or ceramic/ceramic-lined connectors are exempt.


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60


## Subpart BB: Repair Requirements

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- Leak must be repaired as soon as practicable, but no later than 15 calendar days after detected.
  
- First attempt at a repair shall be made no later than 5 calendar days after detected.
  
- Delays in repair beyond 15 days, must be documented and reported semi-annually.

264.1059






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## Subpart BB: Recordkeeping Requirements

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- *Equipment identification numbers,*
- Associated HWMU identification,
- Location of equipment on the HWMU,
- Type of equipment,
- Waste state and percent-by-weight total organics in waste stream contacting the piece of equipment,
- Control method used to comply with Standard,
- Can be recorded with other similar records for CAA compliance and with RCRA tank, HWMU or container inspection records.

264.1064-264.1065






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62

## Subpart BB: Recordkeeping for Leaks

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- When a leak is detected:
  - Equipment shall be identified with a weatherproof visible ID tag
  - Record shall be entered into inspection log including:
    - ◆ Instrument, operator, and equipment identification number
    - ◆ Cause and hazardous waste leaking,
    - ◆ Dates and method of repair.

264.1064- 264-1065






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## Subpart BB: Reporting Requirements

63

- Semi-annual report for
  - Valve, pump, or compressor leak not repaired as required,
  - Dates of HWMU shutdowns,
  - Control device exceedance(s),
    - ◆ When, what, how long, repair date, cause & repair information
  - Report is not required if no exceedance occurs.

264.1065



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## Applicability to Auto Manufacturing

64

- Auto Manufacturers generate large volumes of hazardous waste purge solvent from painting and coating systems.
- Once solvent has been used to clean spray guns and is discharged, the resulting mixture of purged solvent is hazardous waste.
- Auto Manufacturers' pipes, valves, pumps etc. required to comply with CAA Subpart IIII, are exempt from Subpart BB.



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## RCRA Subpart CC - Overview

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Circa 1935 Chemical Plant in NJ



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66

## Subpart CC Applicability

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- Affected units are tanks, containers, surface impoundments, and miscellaneous unit which are:
  - ◆ *Subject to permit (Part 264), interim status (Part 265) or less-than 90-day large quantity generator (Part 262) standards, and,*
  - ◆ *Not expressly exempted from the Standards.*
- Subpart CC controls are required if the waste has an **average volatile organic (VO)** concentration at the point of waste origination of 500 ppmw or greater

264.1080


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67

## Subpart CC Exclusions

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- Wastewater treatment units
- Elementary neutralization units
- Emergency or spill management units
- Totally enclosed treatment facilities
- Hazardous waste recycling units (if no other permitted units at facility)
- Conditionally exempt small quantity generators
- Small quantity generators
- Satellite accumulation units
- Other permitting exemptions
- RCRA empty containers

264.1080 (b)


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68

## Units with CAA, NESHAP or NSPS Control

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- Subpart CC excludes units which are equipped and operating with air emission control devices required by CAA 40 CFR Part 60, 61 or 63
  - Clean Air Act (CAA)
  - National Emission Standard for Hazardous Air Pollutants (NESHAP)
  - New Source Performance Standard (NSPS)

61 FR 59938


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69  
**What is Subpart CC's Volatile Organic (VO) Waste Concentration Criteria?**

- Subpart CC requires organic emission controls on affected units, unless the average VO concentration of hazardous waste managed in unit is < 500 ppmw at point of waste origination.

264.1082(d)



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70  
**Subpart CC: What is the Point of Waste Origination?**

- Owner or operator responsible for ensuring the waste determination is representative of current worst case waste streams.
  - Repeat when conditions change or when waste stream changes
  - Update annually
- The Point of Origination is where a material or by-product produced by a process, is intended to be discarded (i.e., no longer can be used and is diverted from or separated from the production process).
  - Solid waste produced by the system becomes a hazardous waste as defined by Part 261

264.1082(d)



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71  
**What is considered a Volatile Organic Compound?**

- Organic compounds with a Henry's law constant value of at least 0.1 mole-fraction-in-the-gas phase/mole-fraction-in-the liquid-phase at 25 degrees (°) Celsius (C) (40 CFR §265.1081).
- Appendix VI of Subpart CC presents a list of compounds known to have a Henry's law constant values less than the cutoff level.

265.1081



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## How is the VO Concentration Determined?

- Testing:
  - Sample hazardous waste
  - Analyze samples using one of seven specified methods or other method validated using specified procedures (Method 25D)
- Process knowledge:
  - Application of owner/operator experience using appropriate information
- VO concentration must be determined for each waste stream.

264.1083(a)(2)



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## Process Knowledge

- Provides flexibility to use available information to determine VO concentration of a hazardous waste.
- Information sources can be:
  - Existing information collected for other purposes;
  - New information collected specifically for the waste determination;
  - For hazardous waste generated off-site, information provided to TSDF by waste generator.

264.1082(d)



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## Subpart CC: Container Control Requirements



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## Container Standards are Organized into Three Levels

- Less than 26.4 gallons are exempt
- Level 1
  - *Less than or equal to 122 gallons, or*
  - *Larger than 122 gal AND do not manage hazardous waste in light material service*
- Level 2
  - *Larger than 122 gal AND manages hazardous waste in light material service*
- Level 3
  - *Larger than 0.1 m<sup>3</sup> (26.4 gallons) AND treat hazardous waste by a stabilization process*

264.1086


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## Container Level 1 Controls

- Three control alternatives
  - *Use container that meets DOT regulations*
  - *Use a tight-fitting cover on the container and ensure there are no visible gaps*
  - *Use organic vapor suppression barrier on or above the hazardous waste in the container*
- May use conservation vents or safety vents if normally closed

264.1086 (c)


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## DOT Container Use and Compliance with Subpart CC Container Standards

- In DOT Hazardous Materials (HzMat) regulations, waste makeup or constituents all have specified DOT containers in which the waste is allowed to be stored and transported.
- Each approved container for a specific waste has been tested in a multi-test procedure by DOT.
- Approved containers for specific waste constituents can be found tabulated in 49 CFR §172
- The DOT code for the container is embossed in the container's construction.


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78

### Subpart CC Container Standards: DOT Container Violations

- A facility that places hazardous waste in a container that is not specifically approved for that waste; is not in compliance with RCRA Subpart CC, if DOT-compliant containers are their designated control option.
- A facility should include the DOT container types they intend to use for each waste or grouping of waste they will be handling in their RCRA Part B Permit Application.



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79

### Container Level 2 Controls

- Three control alternatives:
  - Use container that meets DOT regulations
  - Use container that operates with no detectable organic emissions as tested using Method 21
  - Use container that is demonstrated to be vapor-tight within the last 12 months using Method 27

264.1086 (d)



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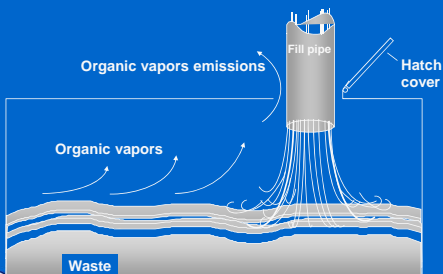
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80

### Splash Loading: Not Allowed for Level 2 Containers



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## Container Level 3 Controls

- Two control alternatives
  - Vent container directly through a closed-vent system to a control device, or,
  - Container inside an enclosure which is exhausted through a closed-vent to a combustion control device.
- Transfer requirements same as Level 2.
- Standard specifies design and operating criteria for venting vapors directly to a control device.

64 FR 3389, 264.1086 (e)



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## Container Level 3 Enclosures

- Enclosures must meet the design and operating criteria specified in "Procedure T Criteria for and Verification of a Permanent or Temporary Total Enclosure" under 40 CFR §52.741.



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## Subject Container Example: The Dumpster



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84  
Subject Container Example:  
The Roll-off



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85  
Subject Container Example:  
The Vacuum Truck



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86  
Subpart CC:  
Control Requirements for Tanks



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## Tank Control Requirement Considerations

87

- Two levels of air emission controls for tanks containing hazardous waste which have volatile organic (VO) concentration  $\geq 500$  ppmw at point of waste generation.
- Level of compliance is dependent on the volume of the tank and the vapor pressure of the worst case waste at normal atm conditions:
  - Level 1 (less extensive)
  - Level 2 (more extensive)

264.1084



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## Tank Level 1

88

- Tank must meet ALL three conditions to qualify to use Tank Level 1 controls
  - Maximum organic vapor pressure of waste is less than tank design capacity for the maximum organic vapor pressure of the worst case hazardous waste managed.
  - Contents are not heated to temperatures above the temperature of vapor pressure determination.
  - No waste stabilization done in the tank.

264.1084(b)(1)



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## Tank Level 1 Controls - Fixed Roof

89

- Fixed roof is stationary (doesn't fluctuate with the level of material in tank):
  - An integral part of the structural design, or,
  - May separate from rest of tank (e.g., removable top on a vertical tank).
- Fixed roof openings can be equipped with:
  - Closure devices if no visible cracks, holes, gaps or other open spaces when secured in closed position.
  - Permanent openings if vented to an organic emission control device.
  - Pressure relief devices (e.g., conservation vent) that are vented to atmosphere if set point is appropriate for tank design pressure limits.

264.1084(c)(2)



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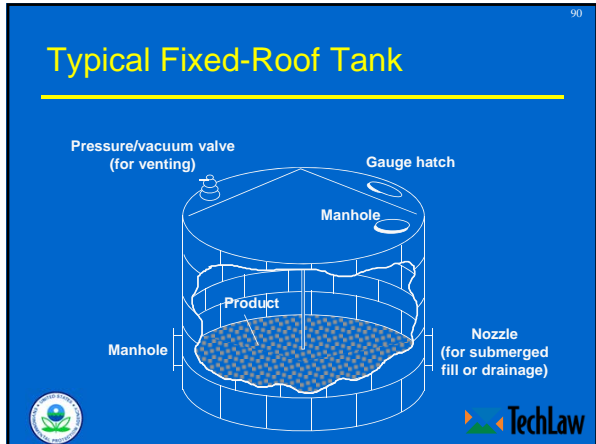
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## Tank Level 2 Controls

- Tanks that hold waste exceeding the Level 1 criteria or can not be proved otherwise are required to use Level 2 controls.

264.1084(d)

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## Tank Level 2 - Design Options

- Five design options allowed for Level 2 Tank Controls:
  - Cover vented to control device
  - Pressure tank
  - Tank inside enclosure which is vented to combustion control device
  - Fixed roof with internal floating roof
  - External floating roof.

264.1084(d)

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## Waste Transfer Operations

- Transfer of hazardous waste among Level 2 tanks and surface impoundments subject to Subpart CC, must be conducted using hard-piping or other closed system that does not allow exposure of the waste to the atmosphere
- An individual drain system meeting the requirements of 40 CFR §63, Subpart RR is considered a closed system

264.1084(j)



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## Control Requirements for Surface Impoundments



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## Subpart CC: Surface Impoundments

- Floating membrane cover, or
- Cover and vent to a control device, or,
- Demonstration that Subpart CC controls are not required:
  - Waste placed in unit has average VO concentration < 500 ppmw at the point of waste origination, or,
  - Waste placed in unit has been treated to meet LDRs for organics or by one of the treatment alternatives specified in the rule,
  - Unit is used for biological waste treatment (meeting requirements for biological treatment alternative).



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96  
Subpart CC Example:  
Floating Cover



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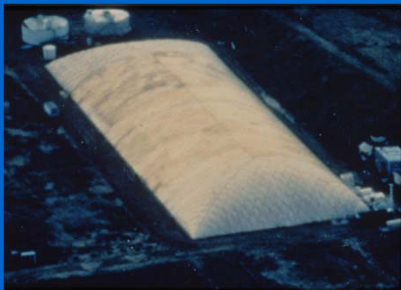
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97  
Subpart CC Example:  
Cover Vented To A Control Device



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98  
RCRA Organic Air Emission Standard  
On-line:

- Complete Workshop Application (based on intense, Region 4, 3-day Workshop),
- Searchable for research topics,
- Non-linear, so you can review only information you need,
- Includes all reference documents with hyperlinks in the training to the reference,
- Narrated w/speaker notes;
- Available at the EPA Environmental Response Training Programs Virtual University (ERTPVU) at this link:

[RCRA Organic Air Emission Standards](#)

Note: You will need to establish a user name and pass word with the ERTPVU.



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## RCRA Organic Air Emission Standards Handy Flipbook

- Designed for quick reference in the field.
  - *The requirement for each device, HWMU and piece of equipment*
  - *Documents that should be at the facility to demonstrate compliance.*

[Get the RCRA Organic Air Emissions Standards Flipbook here now.](#)



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## RCRA Organic Air Emissions Standards Case Studies



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101

## Case Study 3-1

- Scents Incorporated operates a scent development and manufacturing facility in upstate New York. The facility has manufactured the same products using the same procedures for 50 years and generates a large volume of waste with a flash point of 138 degrees F and a total organic content of approximately 9.86% by weight.



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### Case Study 3-1 (cont'd)

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Question 1:

- Are leaks/emissions from the facility's valves regulated under Subpart AA?

Question 2:



- Are leaks/emissions from the facility's valves regulated under Subpart BB?

Question 3:

- What information/documentation is needed?

Question 4:

- What other issues are noted?



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## End of Day 3 Case Studies



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### Case Study 3-2

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■ A generator is excavating an area of soil contaminated by F004 (spent nonhalogenated solvents). F004 was land disposed in 1984 (before the effective date of the applicable LDR prohibition). The contaminated soil contained high concentrations of creosols (a listed constituent of F004), and is deemed to contain hazardous waste.

Question:

- Does the contaminated soil have to meet the LDR treatment standards?



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### Case Study 3-3

- An accidental one-time spill containing F004 waste occurred at a generator site. A spill response occurred and the facility and fire department immediately cleaned up the spill of listed waste.

Question:

- Would LDR be triggered by the spill and response? Would the cleanup require a RCRA permits?




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### Case Study 3-4

- A petroleum refinery, located in Bayamon Bay, Puerto Rico, sends a caustic (corrosive) wastewater to its on-site wastewater treatment unit. The wastewater has several stages of treatment. The waste is first sent to an API separator, after which the waste enters a series of settling tanks. After the tanks, the wastewater is sent to a biological treatment pond, and is discharged under a National Pollutant Discharge Elimination System (NPDES) Permit. The facility used process knowledge to determine that the wastewater exhibits the corrosivity characteristic (D002) and toxicity characteristic for benzene (D018). As the wastewater commingles with other process wastewaters in the wastewater collection system, the caustic wastewater is diluted and no longer exhibits any hazardous waste characteristics.




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### Case Study 3-4 (cont'd)

Question 1:

- What is the treatment standard for D002 in this case?

■ Question 2:

- What is the treatment standard for benzene (D018)?

■ Question 3:

- Is the distribution in the wastewater treatment system for this waste acceptable?

■ Question 4:

- Is process knowledge acceptable under this situation, or should the facility test the waste?




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108

### Case Study 3-5

- Harley Heavy Metal Company (HHM), uses a pickling solution for metal surface preparation. HHM tested the waste to determine that the waste is a corrosive hazardous waste and is classified as D002. HHM also found that the spent solution contained metal contaminants that do not exceed any toxicity characteristic levels but are above the 40 CFR §268.48 levels for underlying hazardous constituents (UHCs). HHM intends to simultaneously precipitate metals and neutralize the spent acidic solution using lime in an elementary neutralization tank unit (this will occur on-site). The resulting wastewaters that have been treated so that they are not characteristic are discharged to a POTW. The resulting sludge from the metal neutralization system is a new point of generation, which means that it must be assessed to see if it is a hazardous waste. HHM has determined the sludge contained chromium at 6.00 mg/L TCLP, thus it fails the toxicity characteristic.



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109

### Case Study 3-5 (cont'd)

Question 1:



- What are the treatment standards for HHM's waste?

Question 2:

- Does HHM need to address UHCs?

Question 3:

- Does HHM need to treat the sludge for chromium and all UHCs reasonably expected to be present in the waste?



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### Question/Answer/Discussion



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[45 FR 33084; May 19, 1980](#)

Interim Final Rule amending the May 19, 1980 rule (eighteen additional wastes are listed as hazardous)  
[45 FR 47832; July 16, 1980](#)

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[45 FR 74884; November 12, 1980](#)

Final Rule - Commercial chemical products, off-specification products, and intermediates  
[45 FR 78532; November 25, 1980](#)

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U.S. EPA, Office of Solid Waste and Emergency Response, Technical Resource Document for Storage and Treatment of Hazardous Waste in Tank Systems, OSWER Policy Directive 9483.00-3, EPA/530/SW-86/044, December 1986

### Land Disposal Restrictions

RCRA Policy Statement: Clarification of the Land Disposal Restrictions' Dilution Prohibition and Combustion of Inorganic Metal-Bearing Hazardous Wastes

U.S. EPA, Land Disposal Restrictions: Summary of Requirements (EPA530-R-01-007) Revised August 2001

U.S. EPA, Guidance on Demonstrating Compliance With the Land Disposal Restrictions (LDR) Alternative Soil Treatment Standards (EPA530-R-02-003) July 2002

Variance Assistance Document: Land Disposal Restrictions Treatability Variances & Determinations Of Equivalent Treatment

### Analytical Sampling

U.S. EPA, Methods for Chemical Analysis of Water and Waste (MCAWW), EPA/600/4-79/020, March 1979

## REFERENCE DOCUMENTS (CONT'D)

U.S. EPA, Office of Research and Development, Environmental Monitoring Systems Laboratory, Research Triangle Park, NC, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, EPA/600/4-84/041, April 1984

U.S. EPA, Environmental Monitoring Systems Laboratory, Las Vegas, NV, Characterization of Hazardous Waste Sites - A Methods Manual: Volume II: Available Sampling Methods, Second Edition, EPA/600/4-84/076, December 1984

U.S. EPA, Office of Research and Development, Environmental Monitoring Systems Laboratory, Las Vegas, NV, Characterization of Hazardous Waste Sites - A Methods Manual: Volume I: Site Investigations, EPA/600/4-84/075, April 1985

U.S. EPA/OWPE, Chemical, Physical and Biological Properties of Compounds Present at Hazardous Waste Sites, EPA/530-SW-89-010, September 1985

U.S. Department of Health and Human Services, NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH publication number 85-115, October 1985

U.S. EPA, Guidance for Data Quality Assessment, EPA/600/R-96/084, July 1986

U.S. EPA, Office of Emergency and Remedial Response, Washington, D.C., A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001 a and b.

U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, Data Quality Objectives for Remedial Response Activities, Development Process, EPA/540/G-87/003, March 1987

U.S. EPA, Office of Solid Waste and Emergency Response, User's Guide to the Contract Laboratory Program, OSWER Directive 9240.0-1, December 1988

U.S. EPA, Office of Research and Development, Environmental Monitoring System Laboratory, Las Vegas, NV, and Environmental Research Center, UN-LV, Las Vegas, NV, Soil Sampling Quality Assurance User's Guide, Second Edition, EPA/600/8-89/046, March 1989

U.S. EPA, Office of Research and Development, Technology Transfer, Center for Environmental Research Laboratory Seminar Publication, Transport and Fate of Contaminants in the Subsurface, EPA/625/4-89/019, September 1989

Memorandum from Sylvia Lowrance, Director OSWER, to Waste Management Division Directors and Environmental Service Division Directors, OSWER, Quality Assurance Project Plans for RCRA Groundwater Monitoring and Corrective Action Activities, July 7, 1993

U.S. EPA, Waste Analysis at Facilities that Generate, Treat, Store and Dispose of Hazardous Waste, EPA/530-R-94-024, April 1994.



## REFERENCE DOCUMENTS (CONT'D)

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods and Final Update, Third Edition, Update III, June 13, 1997

U.S. EPA, Environmental Monitoring Systems Laboratory, Office of Research and Development, Las Vegas, NV, Dewitt, Dale A.; Evans, Roy B.; Jury, William A.; and Starks, Thomas H. Of the Environmental Research Center, Soil Gas Sensing for Detection and Mapping of Volatile Organics

## COMMONLY USED RCRA ACRONYMS

<b>API</b>	American Petroleum Institute
<b>ARAR</b>	Applicable or Relevant and Appropriate Requirements
<b>ASTM</b>	American Society for Testing and Materials
<b>BIF</b>	Boiler and Industrial Furnace
<b>CAMU</b>	Corrective Action Management Unit
<b>CAS</b>	Chemical Abstract Service
<b>CCP</b>	Commercial Chemical Product
<b>CDD</b>	Chlorodibenzodioxin
<b>CDF</b>	Chlorodibenzofuran
<b>CERCLA</b>	Comprehensive Environmental Response Compensation Liability Act of 1980
<b>CESQG</b>	Conditionally Exempt Small Quantity Generator
<b>CFC</b>	Chloroflourocarbon
<b>CWA</b>	Clean Water Act
<b>CFR</b>	Code of Regulations
<b>DDT</b>	Dichlorodiphenyltrichloroethane
<b>DOD</b>	Department of Defense
<b>DOE</b>	Department of Energy
<b>DOT</b>	Department of Transportation
<b>EPA</b>	Environmental Protection Agency
<b>FFCA</b>	Federal Facility Compliance Act
<b>First Third</b>	August 17, 1988, Federal Register (53 FR 31138)
<b>FR</b>	Federal Register
<b>HSWA</b>	Hazardous and Solid Waste Amendments of 1984
<b>ID (as in ID number)</b>	Hazardous Waste Identification Number assigned to RCRA generators, transporters, and TSDFs
<b>Implementing Agency</b>	Refers to the State or Regional office implementing RCRA
<b>LQG</b>	Large Quantity Generator
<b>MARPOL</b>	International Convention on the Prevention of Pollution from Ships
<b>MCL</b>	Maximum Concentration Limit
<b>MRQ</b>	Monthly Call Center Report Q&A, The Call Center prepares a monthly report that contains questions and answers on common or difficult RCRA topics. EPA publishes this report. The questions and answers can be used as EPA guidance.
<b>NCP</b>	National Contingency Plan
<b>NPL</b>	National Priorities List
<b>ORD</b>	Office of Research and Development
<b>OSHA</b>	Occupational Safety and Health Administration
<b>OSW</b>	Office of Solid Waste
<b>OSWER</b>	Office of Solid Waste and Emergency Response
<b>PCB</b>	Polychlorinated biphenyl
<b>PCE</b>	Tetrachloroethylene, perchloroethylene
<b>PCP</b>	Pentachlorophenol
<b>QA/QC</b>	Quality Assurance/Quality Control
<b>RCRA</b>	Resource Conservation and Recovery Act of 1976
<b>RO</b>	RCRA Online

<b>SDWA</b>	Safe Drinking Water Act of 1974
<b>Second Third</b>	June 23, 1989, Federal Register (54 FR 26594)
<b>SIC</b>	Standard Industrial Classification
<b>SQG</b>	Small Quantity Generator
<b>TCDD</b>	Tetrachlorodibenzodioxin
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>Third Third</b>	June 1, 1990, Federal Register (55 FR 22520)
<b>TSCA</b>	Toxic Substances Control Act of 1976
<b>TSDF</b>	Treatment, Storage, or Disposal Facility
<b>USPS</b>	United States Postal Service
<b>UST</b>	Underground Storage Tank

## INTERNET SITES

### Characteristic Hazardous Wastes

U.S. Army Corp of Engineers, Ordnance and Explosives Waste Website  
<http://www.hnd.usace.army.mil/ow/>

EPA Characteristic Wastes  
<http://www.epa.gov/osw/hazard/wastetypes/characteristic.htm>

SW-846 Test Methods  
<http://www.epa.gov/osw/hazard/testmethods/sw846/index.htm>

Waste Analysis Guidance  
[http://www.epa.gov/osw/hazard/testmethods/sw846/samp\\_guid.htm](http://www.epa.gov/osw/hazard/testmethods/sw846/samp_guid.htm)

Waste Identification  
<http://www.epa.gov/osw/hazard/wastetypes/wasteid/index.htm>

Waste Sampling Technical Guidance  
[http://www.epa.gov/osw/hazard/testmethods/sw846/samp\\_guid.htm](http://www.epa.gov/osw/hazard/testmethods/sw846/samp_guid.htm)

### Corrective Action

Corrective Action Resources  
<http://www.epa.gov/osw/hazard/correctiveaction/resources/>

### Listed Hazardous Wastes

CamSoft Chemfinder  
<http://chemfinder.camsoft.com>

CAS Worldwide Representatives  
<http://www.cas.org/supp.html>

Chemical Abstracts Service (CAS)  
<http://www.cas.org>

Dockets Containing Background Documents for F and K Lists of Wastes  
<http://www.regulations.gov/fdmspublic/component/main>

\*Note: On this website, enter identification number "EPA-HQ-RCRA-2004-0016" to search background documents for the F list wastes and enter identification number "EPA-HQ-RCRA-2004-0017" to search background documents for the K list wastes.

EPA Hazardous Waste Homepage  
<http://www.epa.gov/osw/hazard/>

## INTERNET SITES (cont.)

EPA Hazardous Waste Resources

<http://www.epa.gov/osw/hazard/generation/resources.htm>

EPA Introduction to Hazardous Waste Identification

<http://www.epa.gov/osw/hazard/international/hwid-intro2.htm>

OPPT Chemical Fact Sheets

<http://www.epa.gov/opptintr/chemfact>

OPPT Home Page

<http://www.epa.gov/opptintr>

Toxics & Pesticides Enforcement Division (OECA)

<http://es.epa.gov/oeca/ore/tped/index.html>

### **Mixed Wastes**

EPA Mixed Waste

<http://www.epa.gov/osw/hazard/wastetypes/mixed.htm>

EPA Mixed Waste

<http://www.epa.gov/rpdweb00/mixed-waste/>

### **Problem Wastes**

EPA eCycling:

<http://www.epa.gov/epaoswer/hazwaste/recycle/ecycling/index.htm>

EPA Goals for Electronics

<http://www.epa.gov/epaoswer/non-hw/reduce/epr/products/ele-programs.htm>

EPA Website for Solvent-Contaminated Industrial Wipes:

<http://www.epa.gov/epaoswer/hazwaste/id/solvents/wipes.htm>.

TSCA Enforcement Responses Policies

<http://es.epa.gov/oeca/ore/tped/toxpest.html>

TSCA Federal Registers (10/94)

<http://www.epa.gov/fedrgstr/EPA-TOX/>

TSCA Inventory (NTIS ordering information)

<http://www.ntis.gov/yellowbk/1nty268.htm>

TSCA Inventory (searchable database)

<http://msds.pdc.cornell.edu/issearch/tscasrch.htm>

## INTERNET SITES (cont.)

TSCA Statute

<http://www.law.cornell.edu/uscode/15/ch53.html>

### **Spills and Spill Residues**

Hazardous Waste Clean-up Information Web Site

<http://www.clu-in.com/>

### **RCRA Information Sources**

Alabama Department of Conservation and Natural Resources

<http://www.outdooralabama.com/>

Alabama Department of Environmental Management

<http://www.adem.state.al.us/>

American Society for Testing and Materials (ASTM)

<http://www.astm.org>

Audit Protocols

<http://epa.gov/compliance/incentives/auditing/protocol.html>

Department of Transportation (DOT)

<http://www.dot.gov>

Design for the Environment (DfE)

<http://es.epa.gov/dfore/>

Environmental Protection Agency

<http://www.epa.gov>

e-CFR: Title 40 -- Protection of Environment (Parts 1-799)

[http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=8fdaecd0be1e196d40236468c5ce279e&c=ecfr&tpl=/ecfrbrowse/Title40/40tab\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=8fdaecd0be1e196d40236468c5ce279e&c=ecfr&tpl=/ecfrbrowse/Title40/40tab_02.tpl)

Enforcement and Compliance Document and Information Center (ECDIC)

<http://www.epa.gov/compliance/resources/policies/index.html>

Environmental Response Training Program Virtual University (ERTP VU)

[http://www.ertpvu.org/kc/login/login.asp?kc\\_ident=kc0001](http://www.ertpvu.org/kc/login/login.asp?kc_ident=kc0001)

EPA Civil Court Cases (all statutes)

[http://www.rtk.net/www/data/doc\\_gen.html](http://www.rtk.net/www/data/doc_gen.html)

EPA Compliance Assistance

<http://www.assistancecenters.net>

## INTERNET SITES (cont.)

EPA Federal Register Homepage

<http://www.epa.gov/fedrgstr/>

EPA Office of Enforcement Compliance and Assistance (OECA)

<http://www.epa.gov/compliance/index.html>

EPA Office of Pollution Prevention and Toxics

<http://www.epa.gov/oppt>

EPA Office of Research and Development

<http://www.epa.gov/ord>

EPA Office of Solid Waste

<http://www.epa.gov/osw>

EPA Office of Solid Waste and Emergency Response Homepage

<http://www.epa.gov/swerrims/index.htm>

EPA RCRA Training Modules

<http://www.epa.gov/osw/inforesources/pubs/hotline/rmods.htm>

Florida Department of Environmental Protection

<http://www.dep.state.fl.us/>

Georgia Department of Natural Resources

<http://www.gadnr.org/>

Georgia Environmental Protection Division

<http://www.gaepd.org/>

Government Printing Office (GPO)

[http://www.access.gpo.gov/su\\_docs/db2.html](http://www.access.gpo.gov/su_docs/db2.html)

Kentucky Department for Environmental Protection

<http://www.dep.ky.gov/>

Kentucky Department for Natural Resources

<http://www.dnr.ky.gov>

Kentucky Environmental Quality Commission

<http://www.eqc.ky.gov>

Louisiana Department of Environmental Quality

<http://www.deq.louisiana.gov/portal/>

National Center for Environmental Publications & Information

<http://www.epa.gov/ncepihom>

## INTERNET SITES (cont.)

National Enforcement Training Institute  
<https://www.netionline.com/Default.asp>

National Environmental Compliance Assistance Clearinghouse  
<http://epa.gov/clearinghouse>

National Service Center for Environmental Publications (NSCEP)  
<http://www.epa.gov/nscep/>

North Carolina Department of Environment & Natural Resources  
<http://www.enr.state.nc.us/>

North Carolina Division of Pollution Prevention & Environmental Assistance  
<http://www.p2pays.org/>

OSWER Training Forum (Trainex)  
<http://www.trainex.org>

RCRA Frequent Questions Database  
[http://waste.custhelp.com/cgi-bin/waste.cfg/php/enduser/std\\_alp.php](http://waste.custhelp.com/cgi-bin/waste.cfg/php/enduser/std_alp.php)

RCRA Online  
<http://www.epa.gov/waste/inforesources/online/index.htm>

South Carolina Department of Health & Environmental Control  
<http://www.scdhec.gov/>

South Carolina Department of Natural Resources  
<http://www.dnr.sc.gov/>

Tennessee Department of Environment & Conservation  
<http://www.tennessee.gov/environment/>

### **Land Disposal Restrictions**

EPA Land Disposal Restrictions  
<http://www.epa.gov/osw/hazard/tsd/ldr/>

### **Listed Wastes**

Delisting  
<http://www.epa.gov/epawaste/hazard/wastetypes/wasteid/delisting.htm>

Industry Sector Notebooks  
<http://epa.gov/compliance/sectornotebooks.html>



## INTERNET SITES (cont.)

Listed wastes

<http://www.epa.gov/epawaste/hazard/wastetypes/listed.htm>

### **RCRA Organic Air Emissions Standards**

Office of Air Quality Planning & Standards

<http://www.epa.gov/oar/oaqps/org/>

### **Solid Wastes**

Definition of a Solid Waste

<http://www.epa.gov/osw/hazard/dsw/index.htm>

The Military Munitions Rule (62 FR 6622; February 12, 1997)

[http://www.epa.gov/epawaste/hazard/downloads/muns\\_fs.txt](http://www.epa.gov/epawaste/hazard/downloads/muns_fs.txt)

Identification of Non-Hazardous Waste

<http://www.epa.gov/osw/nonhaz/definition.htm>

### **Tanks**

Introduction to Tanks

<http://www.epa.gov/osw/inforesources/pubs/hotline/training/tanks05.pdf>

### **Universal Wastes**

EPA Universal Wastes

<http://www.epa.gov/osw/hazard/wastetypes/universal/index.htm>

U.S. EPA Region 4  
RCRA Fundamentals Course Evaluation



Our goal is to ensure that we are providing an effective program that meets your needs and expectations. We value your opinion and need your feedback. Please take a moment to complete this evaluation.

Date: \_\_\_\_\_ Your job responsibility: \_\_\_\_\_

**Presenters**

*Circle a number that matches your opinion on each statement.*

- The presenters communicated clearly.
- The presenters answered my questions satisfactorily.
- The presenters effectively led the discussion sessions.
- The presenters were knowledgeable on their subject matter.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5

This space is provided for additional comments regarding the Presenters/Presentations.

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**Satisfaction**

*Circle a number that matches your opinion on each statement.*

- The training met my expectations.
- I would recommend this training course to others.
- I can apply the skills I learned.
- The written materials were useful.
- The content was organized and easy to follow.
- Adequate time was provided for questions and discussion.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5

Why did you attend this RCRA Fundamentals Training Course?

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