

Land Disposal Restrictions Compliance Notebook



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Understanding the Land Disposal Restrictions

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Land Disposal Restrictions What's It All About?

In general, no hazardous waste can be placed in a land disposal unit (e.g., landfill) until it has been treated to meet applicable treatment standards



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Land Disposal Restrictions What You Need to Know

- The applicable waste codes
- The specific constituents in the waste
- The amount of total suspended solids and organic compounds
- Whether it is a "special waste" with special requirements



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What Do You Already Know

Which of the Following Statements Are True?

~~The initial generator is responsible for determining the applicable LDRs for their wastes~~

~~Generators have to send LDR paperwork with every shipment of hazardous waste~~

~~Generators must communicate the LDR information to their TSDF~~

~~If a waste is recycled, it doesn't have to meet LDR standards~~

~~Generators are responsible for treating their waste on site to meet the applicable standards themselves~~

~~The LDRs apply at the point of generation of a waste~~

~~Generators must ensure that every single waste code is treated to meet its applicable standard~~

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Land Disposal Restrictions (LDRs)

- Hazardous waste must meet LDR standards before land disposal
- LDRs are treatment standards intended to:
 - Minimize the long-term threat to human health and the environment
 - Treat hazardous wastes using the best demonstrated available technology (BDAT)



[40 CFR 268]
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Land Disposal Restrictions

- LDRs apply at the moment a hazardous waste is generated
- The generator has the ultimate responsibility to determine LDRs and communicate information to the TSDF



[40 CFR 268]
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Three Basic Steps for Determining LDRs

1. Determine the “significant” waste codes
2. Determine LDR treatment standards (based on the significant waste codes)
3. Identify any underlying hazardous constituents (UHCs) for wastes with significant characteristic waste codes



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Step 1: Identify “Significant” Waste Codes

The generator is required to identify all the “significant” waste codes

- Significant codes are the codes that must be treated for before the waste can be disposed
- Not all waste codes are significant



[40 CFR 268.9(b)]

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Step 1: Identify “Significant” Codes

Only Listed Codes	→	All Significant
Only Characteristic Codes	→	All Significant
Both	Listed Codes	→ All Significant
	Characteristic Codes	→ May or may not be significant





[40 CFR 268.9(b)]

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“Significant” Waste Code Example

Significant

Not significant

Significant

- D006 is caused by cadmium
- D010 is caused by selenium



The F007 treats for:

- Cadmium
- Chromium
- Cyanides
- Lead
- Nickel
- Silver

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Step 2: Identify Treatment Standards

Once the significant waste codes have been identified, to determine the appropriate treatment, must know two things about the waste:

- What is the waste “subcategory”?
- What is the “treatability group”?
 - Wastewater, or
 - Nonwastewater



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Step 2: Determining the Treatment Standards

- Treatment standards are found at 40 CFR 268.40
- Each waste code is listed with its appropriate treatment(s)

Waste Code	Waste description and treatment/regulatory subcategory	Regulated hazardous constituent		Wastewater	Non-wastewater
		Common name	CAS Number	Concentration in mg/L, or Technology Code	Concentration in mg/kg unless noted as mg/L, TCLP, or Technology code
D006	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for cadmium based on the toxicity characteristic leaching procedure (TCLP) in SW846	Cadmium	7440-43-9	0.69 and meet §268.48 standards	0.11 mg/l TCLP and meet §268.48 standards

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Step 2: Determining Treatment Standards Subcategory

If a waste is divided into subcategories, identify the one it matches best because treatments can vary for different subcategories

Waste Code	Waste description and treatment/regulatory subcategory ¹
D006	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for cadmium based on the toxicity characteristic leaching procedure (TCLP) in SW846 Cadmium Containing Batteries Subcategory. (Note: This subcategory consists of nonwastewaters only.) Radioactively contaminated cadmium containing batteries. (Note: This subcategory consists of nonwastewaters only.)

[40 CFR 268.2]

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Step 2: Determining Treatment Standards Treatability Group

- Wastewater
 - < 1% (by weight) total organic carbon (TOC) **AND**
 - < 1% (by weight) total suspended solids (TSS)
- Nonwastewater
 - TOC **OR** TSS are ≥ 1%

Wastewater	Nonwastewater
Concentration³ in mg/L; or Technology Code⁴ 0.69 and meet §268.48 standards⁸ NA NA	Concentration⁵ in mg/kg unless noted as "mg/L TCLP"; or Technology Code⁴ 0.11 mg/L TCLP and meet §268.48 standards⁸ RTHRM Macroencapsulation in accordance with 40 CFR 268.45

[40 CFR 268.40]

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Step 2: Determining Treatment Standards Treatment Standard

Waste Code	Waste description and treatment/regulatory subcategory	Regulated hazardous constituent		Wastewater	Non-wastewater
		Common name	CAS Number	Concentration in mg/L; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP; or Technology code
D006	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for cadmium based on the toxicity characteristic leaching procedure (TCLP) in SW846	Cadmium	7440-43-9	0.69 and meet §268.48 standards	0.11 mg/L TCLP and meet §268.48 standards
	Cadmium Containing Batteries Subcategory (note: This subcategory consists of nonwastewaters only)	Cadmium	7440-43-9	NA	RTHRM
	Radioactively contaminated cadmium batteries.	Cadmium	7440-43-9	NA	Macroencapsulation in accordance...

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Determining LDR Treatment Standards

Example: WWT Sludge That Is a D006

- D006
- Toxicity based on TCLP
- Nonwastewater

LDR treatment = treat cadmium down to 0.11 mg/L TCLP and meet 268.48 standards

Waste Code	Waste description and treatment/regulatory subcategory	Regulated hazardous constituent		Wastewater	Non-wastewater
		Common name	CAS Number	Concentration in mg/L or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP" or Technology code
D006	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for cadmium based on the toxicity characteristic leaching procedure (TCLP) in SW846	Cadmium	7440-43-9	0.69 and meet §268.48 standards	0.11 mg/L TCLP and meet §268.48 standards

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Underlying Hazardous Constituents (UHCs) Definition

"Any constituent listed in 268.48... which can reasonably be expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS treatment standards."

REGULATED CONSTITUENT (unless noted)	CAS Number	Minimum Standard	Maximum Standard
		Concentration in mg/l	Concentration in mg/kg unless noted as "mg/L TCLP"
Organic constituents			
Acrylonitrile	259-14-9	0.005	0.4
Acrylonitrile	40-12-9	0.005	0.4
Arsenic	57-30-9	0.005	1.00
Barium	74-29-4	0.4	36
Benzene	71-43-2	0.005	0.7
2,3-Dichlorodibenzodioxin	317-86-9	0.005	1.00
Dioxin	127-18-9	0.005	NA
Endrin	76-64-1	0.01	0.1
Endrin	101-15-3	0.005	0.1
Allyl	109-00-2	0.005	0.005
4-Aminophenol	62-50-1	0.01	NA
Aldrin	102-53-3	0.01	0.4

[40 CFR 268.2]
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Step 3: Determining Underlying Hazardous Constituents (UHCs)

Three questions determine if generators must identify UHCs:

- Are there any significant D codes?
- Does the treatment standard for any significant D code state "and meet §268.48 standards?"
- Is there a reasonable expectation that there is something in the waste that has not yet been treated?

Waste code	Wastewaters		Nonwastewaters
	Concentration in mg/l or Technology Code ¹	Concentration in mg/kg unless noted as "mg/L TCLP" or Technology Code ¹	Concentration in mg/kg unless noted as "mg/L TCLP" or Technology Code ¹
D006 ²	0.69 and meet §268.48 standards ³	0.11 mg/L TCLP and meet §268.48 standards ³	0.11 mg/L TCLP and meet §268.48 standards ³
NA	NA	NA	NA
NA	NA	NA	NA

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Example 1: Unused Methyl Ethyl Ketone

Waste Profile
U159, D001, D035 TOC: > 10% TSS: 0%
Significant Waste Codes
U159
Subcategory
First/only
Wastewater or Nonwastewater
Nonwastewater (TOC > 10%)
Treatment Standard
U159: 36 mg/kg
UHCs

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Example 1: Unused Methyl Ethyl Ketone

Determine underlying hazardous constituents:

- Are there any significant D codes?
- Was the phrase "and meet 268.48 standards" in the treatment standard?
- Is there a reasonable expectation there's something to treat that hasn't already been treated?

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Example 1: Unused Methyl Ethyl Ketone

Waste Profile
U159, D001, D035 TOC: > 10%TSS: 0%
Significant Waste Codes
U159
Subcategory
First/only
Wastewater or Nonwastewater
Nonwastewater (TOC > 10%)
Treatment Standard
U159: 36 mg/kg
UHCs
None

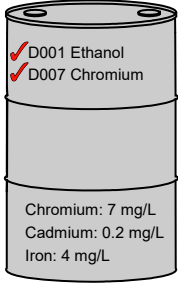
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Example 2: Spent Ethanol With Metals



Waste Profile D001, D007; TOC: > 10%, TSS: > 1%; TCLP: Chromium = 7 mg/L, Cadmium = 0.2 mg/L, Iron = 4 mg/L
Significant Waste Codes D001, D007
Subcategory D001: Second; D007: First/only
Wastewater or Nonwastewater Nonwastewater (TOC > 10% and TSS)

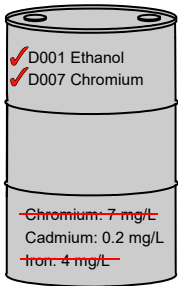
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Example 2: Spent Ethanol With Metals



Treatment Standard D001: RORGS, CMBST or POLYM D007: 0.60 mg/L TCLP "and meet §268.48 standards"
UHCs Cadmium 0.11 mg/L TCLP

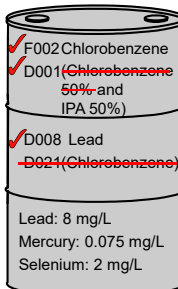
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Example 3: Isopropyl Alcohol and Chlorobenzene Blend With Metals



Waste Profile F002, D001, D008, D021; TOC: > 10%, TSS: > 1%; TCLP: Lead = 8 mg/L; Mercury = 0.075 mg/L; Selenium = 2 mg/L
Significant Waste Codes F002, D001, D008
Subcategory F002: First; D001: Second; D008: First
Wastewater or Nonwastewater Nonwastewater (TOC > 10% & TSS > 1%)

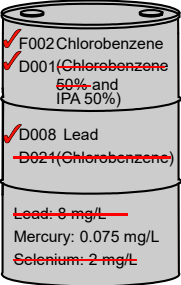
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Example 3: Isopropyl Alcohol and Chlorobenzene Blend With Metals



Treatment Standard
F002: Chlorobenzene: 6.0 mg/kg
D001: RORGs, CMBST or POLYM
D008: 0.75 mg/L TCLP "and meet §268.48 standards"

UHCs
Mercury 0.025 mg/L TCLP

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Alternative LDR Treatment Standards

Lab packs



Hazardous debris



Contaminated media



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Alternative LDR Treatments

Lab Packs

Lab packs = small amounts of various kinds of hazardous wastes packed together



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Alternative LDR Treatments Lab Packs

- Lab pack must be incinerated
- Residues may require further treatment
- All waste codes must be identified, but NOT required to determine UHCs
- Special certification is required



Some waste codes cannot be "lab packed"—must meet specific LDR treatment standard!

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Hazardous Debris

- Debris contaminated with listed hazardous waste is subject to same treatment standards that would apply to the listed waste
- In some cases, not practicable to do the same treatment to debris as for the listed waste



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Hazardous Debris Definition

Debris is defined as a solid material that:

- Has a particle size > 60 mm
- Is intended for disposal and is:
 - A manufactured object
 - Plant or animal matter
 - Natural geologic material

Debris becomes "hazardous" when mixed with listed waste or if it exhibits a characteristic



[40 CFR 268.2(g)-(h)]

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Treatment Standards for Hazardous Debris

Three possible treatment standards for debris:

1. Meet the LDR standards that apply to the listed waste contaminating the debris
2. Use the alternative treatment technologies at 40 CFR 268.45
3. Manage in accordance with EPA's "contained-in" policy



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Contaminated Media

"Contaminated media" is soil that is contaminated with listed hazardous waste or exhibits a characteristic

- Generally subject to same treatment standards that would apply to the listing or the characteristic
- In some cases, these standards unachievable or inappropriate for contaminated soil



[40 CFR 268.49]32© Lion Technology Inc.16-080123



Treatment Standards for Contaminated Media

Three possible treatment standards for contaminated soil:

1. Meet the LDR standards for hazardous waste at 40 CFR 268.40
2. Treat according to the alternative standards for soil at 40 CFR 268.49
3. Receive a site-specific variance in 40 CFR 268.44



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Alternative LDR Treatment for Contaminated Media

- Determine Constituents Subject to Treatment (CSTs)
 - Use 40 CFR 268.48 Table
- Treat CSTs to reduce by 90% or down to 10 times the Universal Treatment Standard (UTS) on table, whichever is *higher*

REGULATED CONSTITUENT (chemical name)	CERCLA Number	Maximum Standard (Concentration) in mg/L	Nonwastewater Standard (Concentration) in mg/kg, unless noted as "mg/L UTS"
Benign organic constituents			
Carbonates	7440-48-9	0.001	0.11 mg/L UTS
Chlorinated Solvents	7440-48-9	0.001	0.001 mg/L UTS
Chlorinated Solvents	7474-84-6	0.001	0.001
Chlorinated Solvents	7474-84-6	0.001	0.001
Fluorides	7440-48-9	0.001	0.001
Lead	7440-48-9	0.001	0.001 mg/L UTS
Mercury - Nonwastewater State Notice	7440-48-9	0.001	0.001 mg/L UTS
Mercury - All Others	7440-48-9	0.001	0.001 mg/L UTS
Other	7440-48-9	0.001	0.001 mg/L UTS

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Alternative LDR Treatment for Contaminated Media – Example 1

Soil contaminated with F005 spent solvent MEK

- Concentration of MEK in the soil is determined to be 4,000 mg/kg
- The UTS from 40 CFR 268.48 Table is 36 mg/kg (nonwastewater)



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Alternative LDR Treatment for Contaminated Media – Example 1

90% reduction

- $4,000 \text{ mg/kg} \times 0.9 = 3,600 \text{ mg/kg}$
- $4,000 - 3,600 = 400 \text{ mg/kg}$

10 times UTS

- $36 \text{ mg/kg} \times 10 = 360 \text{ mg/kg}$



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Alternative LDR Treatment for Contaminated Media – Example 1

- If had to treat to 90% reduction, would treat to 400 mg/kg
- If had to treat to 10 times UTS, would treat to 360 mg/kg

Since only required to treat to whichever level is higher, the alternative treatment standard is 400 mg/kg MEK in the soil



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Alternative LDR Treatment for Contaminated Media – Example 2

Soil contaminated with F005 spent solvent MEK

- Concentration of MEK in the soil is determined to be 3,000 mg/kg
- The UTS from 40 CFR 268.48 Table is 36 mg/kg (nonwastewater)



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Alternative LDR Treatment for Contaminated Media – Example 2

90% reduction

- $3,000 \text{ mg/kg} \times 0.9 = 2,700 \text{ mg/kg}$
- $3,000 - 2,700 = 300 \text{ mg/kg}$

10 times UTS

- $36 \text{ kg} \times 10 = 360 \text{ mg/kg}$



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Alternative LDR Treatment for Contaminated Media – Example 2

- If had to treat to 90% reduction, would treat to 300 mg/kg
- If had to treat to 10 times UTS, would treat to 360 mg/kg

Since only required to treat to whichever level is higher, the alternative treatment standard is 360 mg/kg MEK in the soil



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LDR Documentation Requirements

- LDR documentation must be created for any waste that had LDRs attached to it at the point of generation
 - Many different types of LDR documentation
- LDR records must be kept for three years after the last time the waste sent off site



[40 CFR 268.7(a)]

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Notifications

Notifications (“land ban forms”) are used when either:

- The waste hasn’t met its treatment standards
- The generator decides not to make the determination whether the waste needs to be treated



[40 CFR 268.7(a)(2)]

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Certifications

Certifications are used to indicate that a waste has met all its LDR treatment standards and can be legally land disposed

- Must include specific, signed certification from generator

"I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

[40 CFR 268.7(a)(3)]

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Format of Notifications and Certifications

Notifications and certification typically must include:

- Manifest document number of first shipment
- "Significant" EPA hazardous waste codes
- Treatability group
- Waste subcategory (when applicable)
- Any available waste analysis data

LAND DISPOSAL NOTIFICATION AND CERTIFICATION

D'Argo Waste Disposal
 365 Canton Avenue
 Springfield, MA 01102
 Phone: 781-555-5555

I. GENERAL INFORMATION

Generator: _____ Manifest Line No. 11a ☐ 11b ☐ 11c ☐ 11d ☐

Manifest No.: _____ US EPA ID No. _____

EPA Waste Code No(s): _____

Waste Category: ☐ Non-wastewater ☐ Wastewater

Waste Subcategory, if applicable: _____

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Requirements for Sending Notifications and Certifications

Notifications and certifications must be sent to the TSDF with the *initial* shipment of the waste

- If the waste changes, a new notification or certification must be sent to the TSDF



[40 CFR 268.7(a)(2) and (a)(3)]

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One-time Notice

Required for wastes that were subject to LDRs at the point of generation, but were later excluded from the hazardous waste regulations

- Must describe generation, exclusion from regulations, and ultimate disposition of the waste
- Must be kept on file at generating facility



[40 CFR 268.7(a)(7)]

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“One-time Notice to File” Example

Hazardous waste generated and stored on site, then sent to on-site wastewater treatment system where it was treated to meet Clean Water Act pre-treatment standards and discharged to the municipal sewer in compliance with the permit



Excluded from definition of solid waste when it enters the sewer per 40 CFR 261.4(a)(1)

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Waste Analysis Plan

- Plan is required if generator is treating hazardous wastes on site to meet LDRs
- Plan must:
 - Be based on a detailed analysis of wastes
 - Describe procedures used to comply with treatment standards (including testing frequency)



[40 CFR 268.7(a)(5)]

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LDR Determination Records

Generators must keep records on site, demonstrating that all applicable LDR treatment standards that applied at the point of generation have been identified

- If based solely on knowledge of the waste, all supporting data must be kept
- If based on testing, all waste analysis data must be kept

[40 CFR 268.7(a)(6)]



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Enjoy the rest of the conference!

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