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Land Disposal Restrictions:

Summary of Requirements

Revised August 2001

NOTICE

Development of this document was funded, wholly or in part, by the United States Environmental Protection Agency under Contract No. 68-W4-0005 and 68-W-98-025. It has been subjected to the Agency's review process and approved for publication as an EPA document.

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DISCLAIMER

This document presents a brief summary of the Land Disposal Restrictions regulations. It is not meant to be a complete or detailed description of all applicable LDR regulations. For more information concerning specific requirements, consult the *Federal Registers* cited and the *Code of Federal Regulations*, Title 40, Parts 124 and 260 through 271.

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LIST OF ACRONYMS

BTU	British Thermal Unit
BDAT	Best Demonstrated Available Technology
CAMUs	Corrective Action Management Units
CFR	Code of Federal Regulations
CWA	Clean Water Act
DRE	Destruction and removal efficiency
EPA	Environmental Protection Agency
EDF	Environmental Defense Fund
HOC	Halogenated Organic Compounds
HSWA	Hazardous and Solid Waste Amendments
HTMR	High Temperature Metals Recovery
kg	kilogram
LDR	Land Disposal Restrictions
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
mm	millimeter
MTR	Minimum Technological Requirements
NPDES	National Pollutant Discharge Elimination System
NWW	Nonwastewater
OECA	Office of Enforcement and Compliance Assurance
PCB	Polychlorinated Biphenyls
POTW	Publicly Owned Treatment Works
ppm	part per million
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TSDF	Treatment, Storage, and Disposal Facility
UIC	Underground Injection Control
UTS	Universal Treatment Standards
TSS	Total Suspended Solids

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I. INTRODUCTION

1.1 What Is the Purpose of this Document?

The purpose of this document is to provide you with a usable summary of the requirements of the Land Disposal Restrictions (LDR) program. The LDR program under 40 *CFR* Part 268 has grown and changed since its introduction in 1986. The Environmental Protection Agency (EPA) made significant efforts over the years to address public and industry suggestions for improvement by streamlining the program and providing compliance assistance. This document is organized in a question-answer format to provide information about LDR regulations that may apply to your facility and is designed to meet the following objectives:

- Clarify the requirements of the LDR program;
- Explain how the regulations work so that your facility's level of effort is reduced.

The document is organized in the following manner:

Chapter 1 introduces and discusses the LDR program and provides information about obtaining additional compliance assistance.

Chapter 2 clarifies who is subject to the LDR program. This chapter summarizes how to identify whether your waste is hazardous and how to treat your hazardous waste to comply with the LDR requirements. This chapter also introduces key terms that may be encountered as you read the LDR regulations.

Chapter 3 and **Chapter 4** introduce and describe the disposal prohibition and treatment standards. The treatment standards are the requirements at the heart of this program. These chapters are designed to help you determine which treatment standards apply to your hazardous waste or whether your waste qualifies for alternative standards.

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Chapter 5 explains two specific LDR hazardous waste management requirements: the dilution prohibition and the storage prohibition.

Chapter 6 discusses recordkeeping requirements for the LDR program. The chapter helps you determine which records to prepare, submit, and keep at your facility.

Chapter 7 describes the variances, extensions, and exemptions under the LDR program that may apply to the waste you are managing.

Chapter 8 provides in-depth discussion of the two most frequently asked questions about the LDR program — hazardous waste point of generation and site remediation issues.

Chapter 9 provides a historical context to the LDR program because it may be helpful to understand how this program evolved and why certain provisions in the LDR program were promulgated.

1.2 How Did the LDR Program Originate?

Congress created the LDR program on November 8, 1984 as part of the Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA). This law prohibits the land disposal of untreated hazardous wastes. It required EPA to specify either concentration levels or methods of treatment for hazardous constituents to either substantially decrease the toxicity of a waste or decrease the likelihood that contaminants would migrate from a waste and cause contamination of land and groundwater. EPA responded by establishing the LDR program found in 40 *CFR* Part 268. The LDR program identifies treatment standards for hazardous wastes and specifies requirements that generators, transporters, and owners or operators of treatment, storage, and disposal facilities (TSDFs) that manage restricted wastes destined for land disposal must meet.

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The LDR program consists of three main components:

Disposal Prohibition — Requires that waste-specific treatment standards must be met before a waste can be land disposed.

Dilution Prohibition — Ensures that wastes are properly treated and not simply diluted to mask the concentration of hazardous constituents.

Storage Prohibition — Prevents the indefinite storage of hazardous wastes instead of treating the waste promptly.

Together these prohibitions protect human health and the environment by providing for the proper treatment and management of hazardous waste prior to land disposal.

1.3 Why Is the LDR Program Important?

The primary goal of RCRA is to protect human health and the environment from the dangers of hazardous waste generation, transportation, treatment, storage, and disposal. Currently, about 23 million tons of hazardous waste are disposed on land annually. Uncontrolled land disposal of hazardous waste is threatening to human health and the environment. For example, groundwater contamination can occur when rainwater percolates through buried hazardous waste, separates (or leaches) hazardous constituents from wastes, and carries the hazardous constituents into the groundwater supply. Regulating land disposal is one of the most important strategies used by EPA to protect groundwater.

Our LDR program ensures that wastes are properly treated prior to disposal. This makes hazardous waste less harmful to groundwater in one of two ways: by reducing the potential for leaching hazardous constituents from waste by immobilizing the constituents; or by reducing waste toxicity by destroying or removing harmful constituents.

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1.4 Where Can I Go for Further Compliance Assistance?

The RCRA Call Center can provide regulatory assistance and references to interpretive guidance. The Call Center can be contacted at (800) 424-9346 or DC Area Local (703) 412-9810 or TDD (800) 553-7672 or TDD DC Area Local (703) 412-3323.

There is also a wealth of information available via the Internet. The Office of Solid Waste Home Page (http://www.epa.gov/osw) contains links to recent LDR rulemakings in the *Federal Register* and other RCRA and LDR guidance.

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II. WHO IS SUBJECT TO LDR REGULATIONS?

2.1 What Is the Purpose of this Chapter?

Chapter 2 clarifies who is subject to the LDR program. This chapter summarizes how to identify whether your waste is hazardous and how to treat your hazardous waste to comply with the LDR requirements. This chapter also introduces key terms that may be encountered as you read the LDR regulations.

For generators or waste handlers to determine if they are subject to Land Disposal Restrictions, they must answer three key questions:

Step 1) Do you generate, treat, store, or dispose of hazardous wastes?
Step 2) Do the wastes qualify for any exemptions?
Step 3) Are your hazardous wastes destined for land disposal?

This chapter will help you answer each of these questions and identify whether your waste is subject to LDR regulations.

2.2 Do You Generate, Treat, Store or Dispose of Hazardous Waste? (Step 1)

EPA uses the term "hazardous waste" to identify certain wastes that are harmful to human health and the environment. Hazardous wastes can be solid, liquid, contained gas, or sludge, and they can be generated from many different sources. To accommodate this varied universe of waste, we developed a system to identify not only specific substances known to be hazardous, but also other materials that present certain hazards. A waste is considered hazardous in two ways: by being specifically listed as a hazardous waste or by exhibiting a characteristic of hazardous waste. Only those wastes specifically listed or exhibiting a characteristic of hazardous waste are hazardous wastes (see 40 *CFR* 262.11).

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Listed Wastes

RCRA regulations list specific industrial wastestreams and identify them as "Listed Wastes." These wastes are considered hazardous if they meet one of the narrative listing descriptions found in the regulations and do not meet any of the exclusions described in 40 *CFR* 261.4. Listed wastes are divided into four different categories:

F listed waste — wastes from non-specific industrial processes, such as spent solvents used for cleaning or degreasing;
K listed waste — wastes that are from specific industry sources, such as certain petroleum refining wastes and veterinary pharmaceuticals;
P listed waste — unused, acutely hazardous commercial chemical products, such as aldrin, a chemical used as an agricultural insecticide;
U listed waste — unused, commercial chemical products, such as DDT and formaldehyde.

The definitions and determinations for these listings can be found in 40 *CFR* 261.31 through 261.33.

Generators may petition the Agency on a site-specific basis to "delist" a hazardous waste if the generator believes their waste does not meet the criteria that originally caused EPA to list it as hazardous. If a waste is delisted, it ceases to be subject to RCRA regulation.

Characteristic Wastes

Not all wastes that present a hazard will meet one of the narrative descriptions for listed wastes, yet the wastes can still possess hazardous properties. EPA identified specific properties (or characteristics) that would cause a waste to pose a threat to human health and the environment. Waste considered to be a characteristic hazardous waste has one or more of the following properties:

- Ignitability — waste that can catch fire and sustain combustion;
- Corrosivity — waste that corrodes metals or has a high or low pH;
- Reactivity — waste that readily explodes or undergoes violent reactions;
- Toxicity — waste category of 40 constituents that are known to be harmful or fatal when ingested and are known to leach into

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groundwater at certain levels (e.g., arsenic, lead, and mercury).

The definitions and determinations for these characteristics are found in 40 *CFR* 261.21 through 261.24. Figure 2-1 represents the decision-making process in hazardous waste identification. Waste that meets one or more of these descriptions and is not specifically excluded under 40 *CFR* 261.4 is considered hazardous waste, meeting STEP 1 of the three-step criteria.

2.3 What Are the Mixture and Derived-From Rules?

The Mixture and Derived-From Rules regulate the management of mixtures of hazardous wastes with other wastes (see 40 *CFR* 261.3(b) and (c)(2)). The Mixture Rule operates differently for listed and characteristic hazardous wastes.

- When a *listed* hazardous waste is combined with a nonhazardous waste, the resulting waste stream is considered to be a listed waste. This is because a listed waste is considered to be hazardous regardless of any mixing, treatment, or other changes.

- When a *characteristic* waste is combined with a nonhazardous waste, you must determine whether the mixture has one or more of the characteristics (i.e., ignitability, corrosivity, reactivity, or toxicity). If it does not, then it is generally not subject to RCRA requirements; however, LDRs must still be satisfied prior to land disposal. For example, if a corrosive waste is neutralized with an alkaline chemical, the resulting material may now be a non-hazardous waste, but the handler is still subject to LDR requirements, such as record keeping.

The Derived-From Rule states that residuals derived from the treatment, storage, or disposal of listed hazardous waste must continue to be regulated as hazardous waste (see 40 *CFR* 261.3(c)(2)). Under the Derived-From Rule, materials derived from a listed hazardous waste remain listed. For example, sludge generated from the treatment of a listed hazardous wastewater would carry the same waste code and regulatory status as the original listed waste. The Derived-From Rule does not apply to characteristic wastes. Therefore, treatment residues and materials derived from characteristic hazardous wastes are hazardous only if they continue to exhibit a characteristic.

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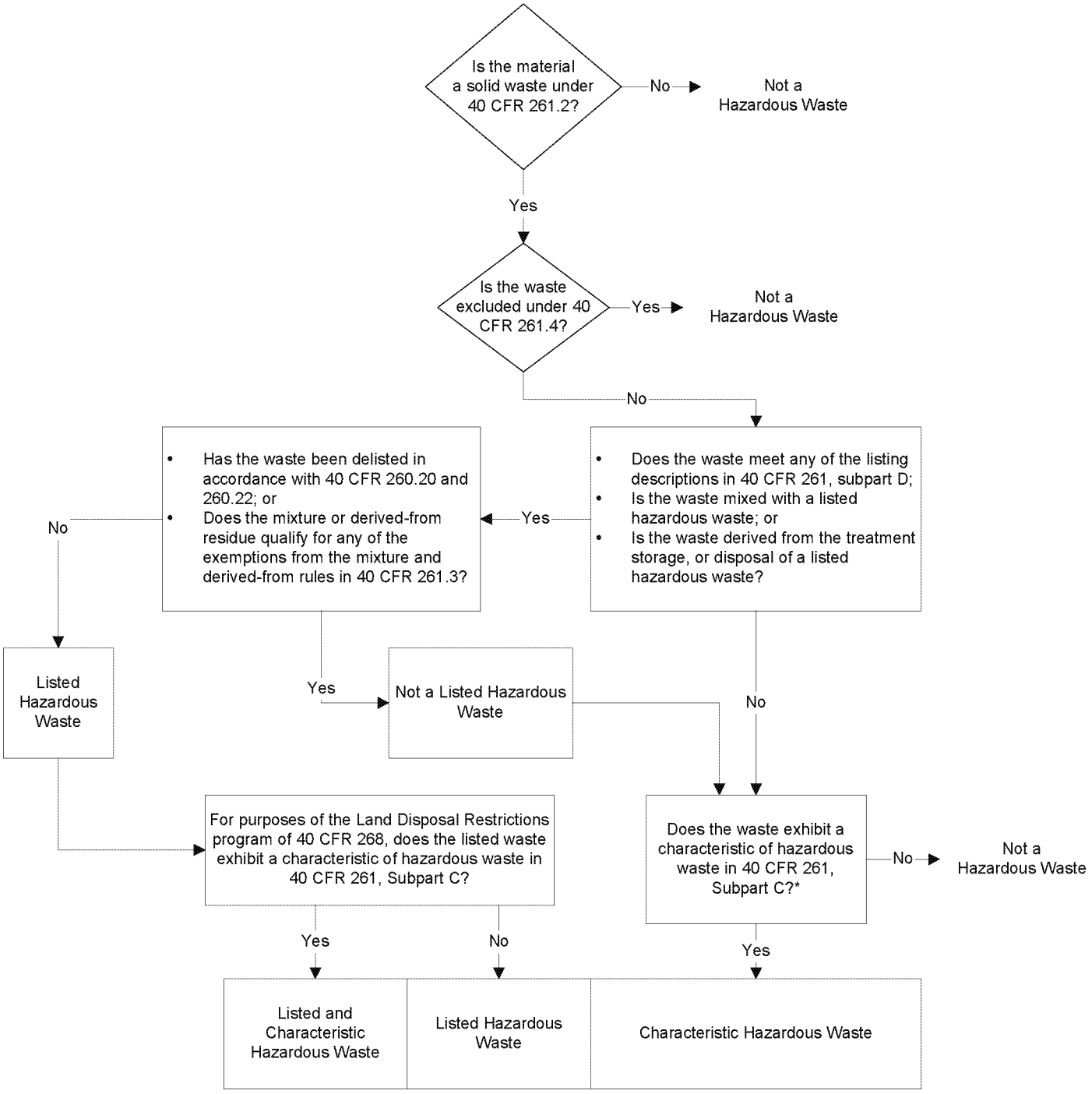
Figure 2-1. Hazardous Waste Identification



These wastes have passed Step 1 and are subject to the LDR program

*Note exception for mixtures of characteristic wastes and mining/mineral processing wastes in 40 CFR §261.3(a)(2)(i).

Certain wastes have exceptions to the mixture and derived-from rules provided they meet specific criteria set forth in the RCRA regulations (See 40 *CFR* 261.3 for more detail). These exceptions were recently amended in a final rule to include: mixtures with or wastes derived-from treatment of wastes that are listed solely for the ignitability, corrosivity, or reactivity characteristics; and mixtures with or wastes derived-from treatment of hazardous waste containing radioactive waste (for more detail on these two additions, see the May 16, 2001 *Federal Register*; 66 *FR* 27266).

2.4 Do My Wastes Qualify for Any Exemptions? (Step 2)

All listed and characteristic hazardous wastes that will be land disposed are subject to the LDR program. However, certain exceptions apply if wastes meet an exclusion. There are general exclusions that apply to all RCRA regulations, such as the exclusions from the definition of solid waste (e.g., the domestic sewage exclusion) under 40 *CFR* 261.4(a) or exclusions from the definition of hazardous waste (e.g., the household hazardous waste exclusion) under 40 *CFR* 261.4 (b). In addition, the following wastes are not subject to the LDR regulations (40 *CFR* 268.1(e)):

- Waste generated by conditionally exempt small quantity generators (CESQGs);
- Waste pesticide and container residues disposed of by farmers on their own land (40 *CFR* 262.70);
- Newly identified or newly listed hazardous wastes for which EPA has not yet promulgated treatment standards;
- Certain low-volume releases of characteristic wastes, known as *de minimis* losses, or characteristic laboratory chemicals that are mixed with a facility's wastewater and discharged under Clean Water Act (CWA) regulation.

Wastes that are excluded from the definitions of solid and hazardous waste or are otherwise exempt from the LDR program can be land disposed without meeting LDR treatment standards. In addition, if a waste is regulated only by a state, it is not subject to LDR unless it can be categorized as a federally-regulated hazardous waste. For example, if waste paint is subject to state regulation, but does not

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exhibit any characteristic of hazardous waste, it is not subject to the LDRs. However if the same waste paint exhibits the EPA characteristic of ignitability (D001), the waste is subject to LDRs, provided it is destined for land disposal.

If your hazardous waste is not excluded or exempt, and it is a federally-regulated waste, it meets Step 2 of the three-step criteria.

2.5 Are My Hazardous Wastes Destined for Land Disposal? (Step 3)

Land disposal is the placement of waste in or on the land. We define land disposal to be any placement onto the land including, but not be limited to, use constituting disposal (see 40 *CFR* 266.20) or placement of hazardous waste into the following hazardous waste management units:

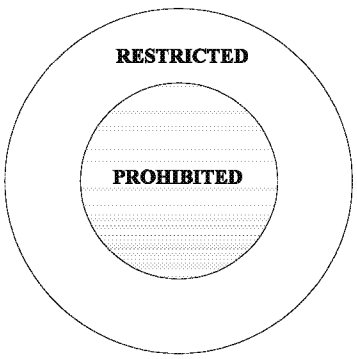
- Landfills;
- Surface impoundments;
- Waste piles;
- Injection wells;
- Land treatment facilities;
- Salt domes or salt bed formations;
- Underground mines or caves;
- Concrete vaults or bunkers.

If your hazardous waste is sent to land disposal or used in a manner constituting disposal, you meet Step 3 of the three-step criteria. Wastes that are not placed on the land are not subject to the requirements of the LDR program.

Wastes meeting Steps 1, 2, and 3 must comply with the LDR program.

2.6 What Is the Difference Between Restricted and Prohibited Wastes?

Two terms frequently used in reference to wastes subject to the Land Disposal Restrictions are *restricted* and *prohibited*. Restricted wastes are hazardous wastes subject to the LDR program. Prohibited wastes have an EPA-established treatment standard that is currently in effect.



When we establish a treatment standard for a waste destined for land disposal, we also specify the date that the waste must meet the standard. This is called the "effective date" of the treatment standard. During the time the treatment standard has been established for a waste and prior to the effective date, the waste is considered "restricted." It does not have to be treated to meet the LDR treatment standards during this time, however, it can only be disposed in a landfill unit meeting the minimum technological requirements of 40 *CFR* 268.5(h)(2). Once a waste is restricted, the minimum requirements that apply include the waste analysis, notification, and recordkeeping requirements in 40 *CFR* 268.7. We discuss these requirements in Chapter 6 of this document.

Prohibited wastes are a subset of restricted wastes. Once the effective date has passed, LDR treatment standards must be met before the waste can be disposed on the land unless the waste is eligible for a variance, extension, or exemption. (Wastes not destined for land disposal are not considered "prohibited" wastes). If the waste does not meet the treatment standard as generated, it is considered a prohibited waste. Prohibited wastes cannot be land disposed because they do not meet the treatment standard and they are not eligible for a variance, extension, or exemption. Once a prohibited waste is treated to meet the treatment standard, however, it is no longer prohibited from land disposal.

We generally promulgate LDR treatment standards in conjunction with a new hazardous waste listing, so virtually all current wastes now have treatment standards that are in effect. However, if a variance delays the effective date of the treatment standard beyond the normal effective date of a new listing, there may be a period of time when the waste is only restricted and not prohibited. This is common with unusual forms of a waste stream, such as waste mixed with radioactive material, often called "mixed wastes." See Chapter 7 for a full description of LDR variances and extensions.

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III. THE DISPOSAL PROHIBITION AND TREATMENT STANDARDS

3.1 What Is the Purpose of this Chapter?

Chapter 3 introduces and describes the treatment standards. This chapter is designed to help you determine which treatment standards apply to your hazardous waste and how to read and comply with the treatment standards.

3.2 Which Treatment Standard Table Applies to the Hazardous Waste at My Facility?

Hazardous wastes that meet the criteria outlined in Steps 1 through 3 in Section 2.1 must meet all applicable treatment standards prior to land disposal. Hazardous waste handlers are responsible for identifying all applicable listed and characteristic waste codes in each waste stream (see 40 *CFR* 262.11) and ensuring that their wastes meet all appropriate treatment standards before disposal.

> **Hazardous Waste Handlers** are any entity that handles hazardous waste. This term includes generators, treaters, or disposal entities.

After a waste is generated, handlers must decide which treatment standards apply. The treatment standard table (located at 40 *CFR* 268.40), which we discuss in this section, applies to all hazardous wastes. Alternative treatment standards are optional and available only for specific wastes (e.g., soil, debris, lab packs, and residues from high temperature metal recovery). Alternative treatment standards are discussed in Chapter 4.

> **As-generated wastes** are wastes which are produced or generated directly from an operation, and have not undergone treatment. Remediation wastes are not "as-generated."

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3.3 What Are the Treatment Standards?

Treatment standards for hazardous wastes are found in the treatment standards table in 40 *CFR* 268.40. The complete treatment standards table shows the applicable standards for wastewater and nonwastewater forms of each hazardous waste, by EPA hazardous waste code. A small portion of this table is shown below for the purposes of illustration. Each column is numbered and discussed below.

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

① WASTE CODE	② WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	③ REGULATED HAZARDOUS CONSTITUENT		④ WASTEWATERS	⑤ NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/L; or Technology Code[4]	Concentration in mg/kg unless noted as "mg/l TCLP;" or Technology Code[4]
K010	Distillation side cuts from the production of acetaldehyde from ethylene.	Chloroform	67-66-3	0.046	6.0
K011	Bottom stream from the wastewater stripper in the production of acrylonitrile.	Acetonitrile	75-05-8	5.6	38
		Acrylonitrile	107-13-1	0.24	84
		Acrylamide	79-06-1	19	23
		Benzene	71-43-2	0.14	10
		Cyanide (Total)	57-12-5	1.2	590

Column ① — Waste Code:

This column helps you, the waste handler, to locate the EPA hazardous waste codes applicable to your wastes. You should locate *all* hazardous waste codes applicable to your waste.

Column ② — Waste Description and Treatment/Regulated Subcategory:

For listed hazardous wastes, the waste description defines the listed waste. For characteristic waste, the waste description specifies the characteristic (e.g., ignitable, corrosive, or reactive) or the toxicity characteristic

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chemical, such as lead or benzene. In some cases, we have identified subcategories for waste descriptions because a range of wastes or constituents may require different levels or types of treatment. If subcategories are included for one of your waste codes, you should take special care to ensure that you are complying with the appropriate subcategory treatment standards.

Column ③ — Regulated Hazardous Constituents:

This column lists the specific regulated hazardous constituents that must be treated for each waste code. You must determine whether your waste meets the treatment standard for all regulated constituents that apply to your waste code. This determination can be made by either performing a chemical analysis of your waste or by applying your knowledge of the waste (best engineering judgement). You must also document this determination (see 40 *CFR* 268.7(a)(6)). Guidance on how to make this determination is available in the guidance document entitled, *Waste Analysis at Facilities that Treat, Store, or Dispose of Hazardous Waste* available from the RCRA Call Center or on the EPA home page (http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html).

Column ④ and ⑤ — Wastewaters versus Nonwastewaters:

Treatment standards differ depending on whether the waste is in a wastewater or a nonwastewater form. Handlers must determine the category in which their waste best fits to determine the appropriate treatment standard. Wastewaters are usually aqueous wastes. We use carbon and solids as indicators to distinguish between wastewaters and nonwastewaters.

Definition of Wastewater:
Wastewaters are wastes that contain less than 1% by weight total organic carbon (TOC) and less than 1% by weight total suspended solids (TSS).

All treatment standards are expressed as either numerical standards or required methods of treatment. To meet treatment standards, regulated hazardous constituents in the waste must be at or below the specified concentrations or the waste must be treated using the required technology.

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These two types of treatment standards are discussed in the next two sections.

3.4 What Are the Numerical Standards?

If numerical standards are specified for a waste, the levels of the hazardous constituents in the waste must be at or below the treatment standard concentrations before it may be disposed. Waste handlers may use any suitable technology to treat their hazardous wastes to meet the concentration levels (as long as the use of the technology is not considered "impermissible dilution" under 40 *CFR* 268.3). Hazardous waste handlers may not dilute to meet the treatment standard with the exception of ignitable, corrosive, or reactive wastes, which may be diluted in certain cases to remove the hazardous characteristic (see Section 5.1).

Numerical standards are either expressed as a "totals" measurement, or as an "extract" (or "TCLP") measurement. A "totals" measurement compares EPA's numerical standard with the total concentration of a hazardous constituent in a representative sample of a waste. For wastewaters, totals measurements are in milligrams per liter (mg/l) to reflect the liquid nature of the waste, while nonwastewater totals measurements are in milligrams per kilogram (mg/kg). If an "extract" or "TCLP" measurement is required, the waste handler must prepare an extract of the waste using the Toxicity Characteristic Leaching Procedure (see *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* Test Method 1311, EPA Publication SW-846). If the hazardous constituent concentrations in the extract are at or below the corresponding regulatory levels, then the waste meets the treatment standard for that waste code unless it is achieved through impermissible dilution.

3.5 What Are the Required Technology Standards?

In some instances, numerical treatment standards cannot be developed. Usually, this occurs when analytical methods cannot reliably measure the constituents

What if both a concentration and a technology are listed in a treatment standard?

- If both a concentration and technology-based standard are included in a treatment standard, such as in F024, you must comply with them both. F024 wastes must undergo combustion to treat dioxins and furans <u>and</u> meet numerical standards for other organic and metal constituents.
- If the technology code is given as an "or" then you comply with either the concentration-based treatment standard <u>or</u> the technology-based treatment standard.

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of concern in the treatment residual. In such cases, we specify that a technology or technologies must be used prior to land disposal.

Required technology standards are included in the wastewater or nonwastewater columns of the treatment standards table in 40 *CFR* 268.40. When a treatment standard specifies a method of treatment, the waste must undergo that method of treatment before land disposal can take place. These technologies are designated by abbreviations, such as CMBST for combustion.

In some cases, we specify a series of treatment technologies. For example, F005 spent solvent waste that contains 2-nitropropane has a treatment standard of: (WETOX or CHOXD) f b CARBN; or CMBST. This means that a handler could treat F005 containing 2-nitropropane using wet air oxidation <u>or</u> chemical oxidation <u>followed by</u> carbon adsorption <u>or</u> the handler could treat using combustion alone. EPA occasionally specifies a choice of technologies, such as the treatment standard for P009 ammonium picrate: CHOXD; CHRED; CARBN; BIODG; or CMBST (chemical oxidation <u>or</u> chemical reduction <u>or</u> carbon adsorption <u>or</u> biodegradation <u>or</u> combustion). Each abbreviation is described in a table located at 40 *CFR* 268.42.

Case Study — Treatment Standards for Listed Waste

Fred's Autobody and Repair generates solvent wastes from cleaning and degreasing parts, and other solvent wastes from removing old paint from vehicles. Based on Material Safety Data Sheets (MSDSs) and other information given to Fred by the manufacturer of the solvents, Fred determines that his business is handling hazardous wastes (see Chapter 1 of this manual) and that he is a large quantity generator. Because it is spent toluene, the solvent Fred uses for degreasing and paint stripping is a "listed" hazardous waste under 40 *CFR* 261.31 (waste code F005). When the solvents are spent, Fred's employees know to place the waste in containers that meet the standards for the generator accumulation unit (exempt from permitting under 40 *CFR* 262.34). Fred has a contract with Waste Haulers, Inc. to pick up the waste and transport it to a recycling, treatment, and disposal facility.

<u>TREATMENT STANDARD</u>

- **Fred must look to the consolidated treatment table at 40 *CFR* 268.40 to identify the treatment standards for listed wastes. The other tables in Part 268, which identify standards for wastes such as soil, debris, and high temperature metals recovery residues would not apply.**

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- **The treatment standard for F005 shows 30 different constituents, each with different treatment standards for wastewater and nonwastewater. Fred has narrowed down this list by determining that the F005 waste is a nonwastewater, since the waste is greater than 1% total organic carbon (40 *CFR* 268.2). Therefore, Fred must either test or apply knowledge regarding which of the 30 constituents are present in the waste, and if any of the 30 constituents are present, Fred must determine whether the levels are higher than the nonwastewater levels in the treatment table. However, based on the information given to Fred by the manufacturer of the solvents, Fred can apply knowledge that the waste contains only one of the constituents listed in 40 *CFR* 268.40, toluene.**

DISPOSAL OPTIONS

- **Fred could choose to perform testing on (rather than apply knowledge of) the waste. If testing shows that the toluene in the F005 waste is at or below the levels given in 40 *CFR* 268.40, the waste may be disposed in a Subtitle C hazardous waste unit without further LDR treatment (although if he wanted to landfill the waste, he would have to pass the paint filter liquids test because it is impermissible to dispose liquids in landfills). In addition, the tests could be used in the future to show that the waste does not contain toluene above the treatment standard, as long as the waste does not change significantly. If Fred changes solvents, or the solvent manufacturer reformulates the product, Fred would need to retest his wastes or use knowledge to make another waste determination.**

- **If testing or application of knowledge shows that constituent levels are above the treatment standards, then Fred must send the waste to a RCRA-*permitted* treatment or recycling facility prior to disposal.**

- **Once the waste is treated, the disposal facility must make sure that the waste meets treatment standards prior to disposal in a Subtitle C hazardous waste unit.**

RECORDKEEPING

- **See Chapter 6 for specific recordkeeping requirements.**

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3.6 Are There Special Requirements for Characteristic Wastes?

Yes. We established special rules for characteristic waste in 40 *CFR* 268.9. Characteristic wastes are regulated somewhat differently from listed wastes because a characteristic waste that is "decharacterized" as a result of treatment can be disposed in nonhazardous, solid waste (i.e., Subtitle D) land-based units. This is important because solid waste units, such as landfills, are less protective of groundwater than the fully regulated hazardous waste landfills (or Subtitle C landfills) where most listed wastes are sent. When a characteristic waste is "decharacterized" it no longer exhibits a hazardous waste characteristic. However, these decharacterized wastes may still contain "underlying hazardous constituents." Therefore, we promulgated standards for characteristic wastes to ensure that the concentrations of all underlying hazardous constituents in characteristic wastes have been minimized.

> **Underlying Hazardous Constituents** are any constituents listed in the universal treatment standards (UTS) table (40 *CFR* 268.48), except fluoride, selenium, sulfides, vanadium, and zinc, 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.

Characteristic wastes cannot be land disposed until they meet all applicable treatment standards for the waste characteristic and underlying hazardous constituents that apply to the waste. Even if a characteristic waste no longer exhibits a characteristic, it cannot be land disposed until the waste is in compliance with the treatment standards. Importantly, in most cases, characteristic waste cannot be merely diluted to meet specified treatment standards. (see Section 5.1 for discussion of the dilution prohibition.)

3.6.1 What Are the Standards for Underlying Hazardous Constituents?

When determining the treatment standard for your characteristic waste, if directed by the treatment standard table in 40 *CFR* 268.40 to address underlying hazardous constituents (i.e., the table reads "and meet 268.48"), you must identify underlying hazardous constituents in your waste. For example, if no pesticides are ever produced or used on-site, it is unlikely that a pesticide would be an underlying hazardous constituent in your characteristic waste. Conversely, if methylene

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chloride is used in a low concentration (less than 1% before use), it is a potential underlying hazardous constituent. Figure 3-1 presents a flowchart showing the decision-making steps for identifying underlying hazardous constituents in characteristic wastes.

Do I Have to Retreat Waste If Metal Constituents Are Concentrated Above Universal Treatment Standards During Treatment?

You are only required to identify underlying hazardous constituents above the Universal Treatment Standard (UTS) levels at the point of generation. If metal constituents are concentrated above UTS levels during treatment, you are not required to view the treatment residual as a new point of generation or to treat those metal constituents. For example, a D008 lead wastewater contains no underlying hazardous constituents as generated, but is treated with dithiocarbamate, a metal precipitating agent. Dithiocarbamate is also a hazardous constituent that appears on the list of potential UHCs in 40 *CFR* 268.48. The dithiocarbamate assists the stabilization of the lead but, after treatment, is present at levels above the UTS in the treatment residuals. In this case the treatment residual demonstrates compliance with treatment standards because the original waste is decharacterized, and all underlying hazardous constituents that existed above the UTS levels prior to treatment are below the UTS levels. Any underlying hazardous constituents added or created by the treatment process are not required to be treated because there is no new point of generation for LDR purposes. *However, if the treatment residuals are now characteristic due to a new property, the creation of the residuals would be considered a new point of generation and the treater would have to make a new determination of the UHCs present—either through knowledge or additional testing.* This is the same obligation that attaches to any generator of a hazardous waste. See Section 8.1 for more detail on new points of generation due to the concentration of metal constituents during treatment. (See also 64 *FR* 25411; May 11, 1999 *Federal Register.*)

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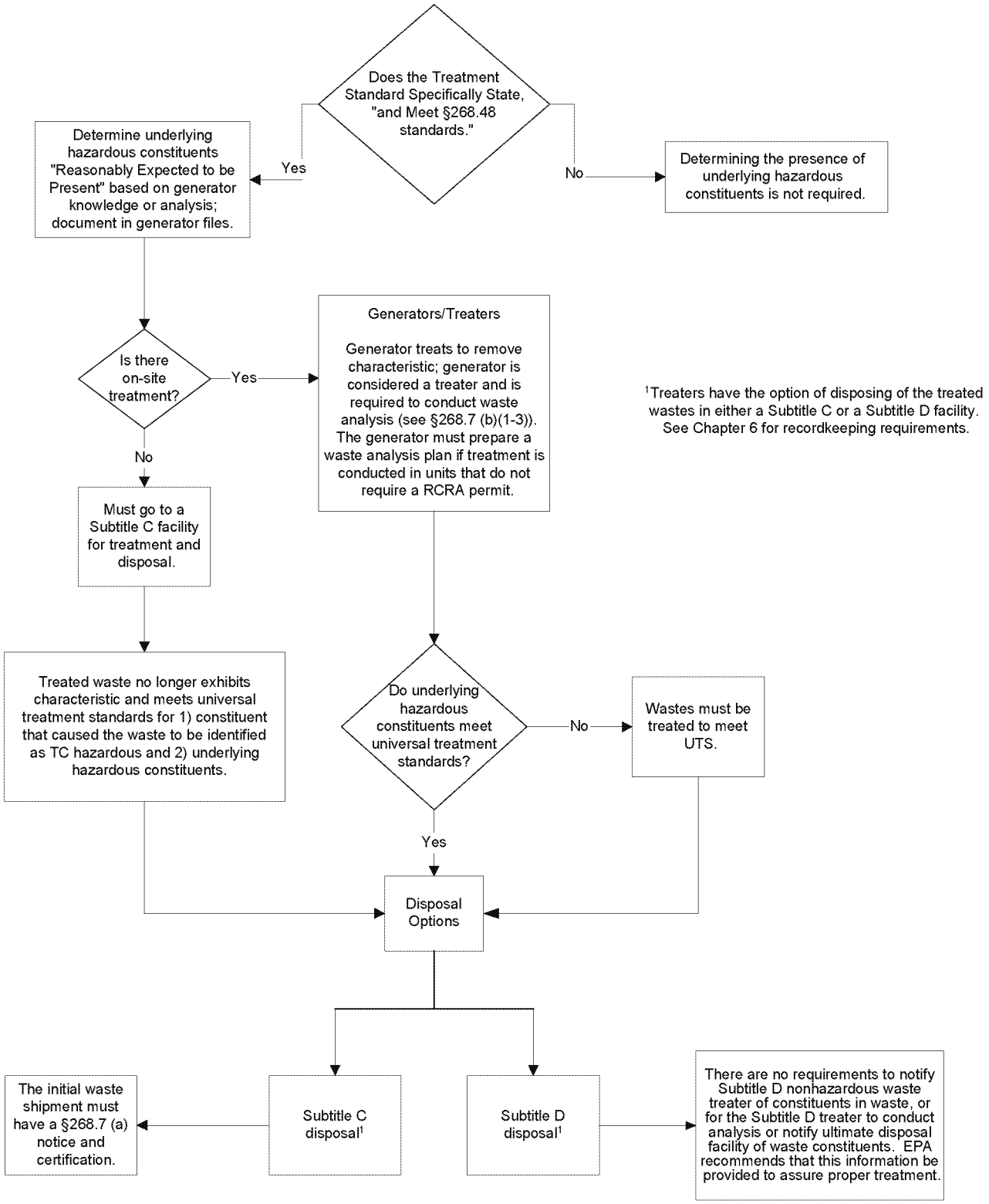
Figure 3-1. Underlying Hazardous Constituents



3.6.2 What Are the Treatment Standards for Characteristic Wastes?

Ignitable Wastes

Under the LDR program, ignitable wastes are divided into two subcategories: 1) wastes with greater than or equal to 10 percent total organic carbon (*i.e.*, the high TOC subcategory), which are, by definition, nonwastewaters; and 2) all other ignitable wastes. The high TOC subcategory includes ignitable wastes that contain significant concentrations of organics, such as solvents. The treatment standard for these wastes is combustion, recovery of organics, or polymerization (see 40 *CFR* 268.42 for a description of each treatment technology).

The treatment standard for the other category of ignitable wastes can be met in one of three ways:

- removal of the ignitability characteristic by deactivation and treatment of underlying hazardous constituents to meet universal treatment standards;
- combustion; or
- recovery of organics.

If the waste has less than 10 percent TOC, and is being managed in a Clean Water Act (CWA), CWA-equivalent, or Class I Safe Drinking Water Act (underground injection) system, the treatment standard requires deactivation to remove the ignitability characteristic. Appendix D contains a table showing recommended technologies for achieving deactivation of ignitable wastes.

Corrosive Wastes

There are two subcategories for corrosive wastes in the LDR treatment standards. The first subcategory is the treatment standard for management of most corrosive wastes. The treatment standard requires removal of the corrosivity characteristic by deactivation and treatment of underlying hazardous constituents to meet universal treatment standards. For corrosive wastes managed in CWA, CWA-equivalent, or Class I SDWA systems, the treatment standard is removal of the corrosivity characteristic by deactivation.

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The second subcategory is for corrosive wastes that are also high-level radioactive wastes generated during the reprocessing of fuel rods. These waste must be treated by high-level radioactive waste vitrification (these wastes are only nonwastewaters).

Appendix D contains a table showing the recommended technologies for achieving deactivation of corrosive wastes.

Reactive Wastes

With only three exceptions, reactive hazardous wastes must be treated by deactivation and treated to ensure that underlying hazardous constituents meet universal treatment standards. The first exception is for deactivated reactive wastewaters destined for a CWA, CWA-equivalent, or SDWA Class I injection well systems. Wastes managed in one of these systems may be treated by removing of the reactivity characteristic. The second exception is for unexploded ordinance (UXO) and other explosive devices which have been the subject of an emergency response. These wastes may be treated by deactivation only. The last exception is for reactive cyanides, which must be treated to specific concentration-based standards: 590 mg/kg total and 30 mg/kg amenable cyanide for nonwastewaters, 0.86 mg/L amenable cyanide for wastewaters.

Appendix D contains a table showing the recommended technologies for achieving deactivation of reactive wastes.

Toxicity Characteristic Wastes

There are three types of toxicity characteristic (TC) constituents: metals, pesticides, and organics. For metal toxicity characteristic wastes, subcategories of waste types have been created to account for different forms of the waste or circumstances in which the waste was generated. For example, for each TC metal waste, a separate subcategory has been established for high-level radioactive wastes generated during the reprocessing of fuel rods. Other radioactive waste subcategories include cadmium-containing batteries, lead-acid batteries, and hydraulic oil contaminated with mercury.

The treatment standards for all toxicity characteristic hazardous wastes depend largely upon the method by which the wastes will be disposed. Most wastes must

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be treated to a specific numerical standard and meet the universal treatment standards under 40 *CFR* 268.48 for underlying hazardous constituents.

List of Toxicity Characteristic Wastes

Metals:		Organics:		Organics (continued):	
D004	Arsenic	D018	Benzene	D033	Hexachlorobutadiene
D005	Barium	D019	Carbon Tetrachoride	D034	Hexachloroethane
D006	Cadmium	D020	Chlordane	D035	Methyl ethyl ketone
D007	Chromium	D021	Chlorobenzene	D036	Nitrobenzene
D008	Lead	D022	Chloroform	D037	Pentrachlorophenol
D009	Mercury	D023	o-cresol	D038	Pyridine
D010	Selenium	D024	m-cresol	D039	Tetrachloroethylene
D011	Silver	D025	p-cresol	D040	Trichloroethylene
		D026	Cresol	D041	2,4,5-Trichlorophenol
Pesticides:		D027	1,4-Dichlorobenzene	D042	2,4,6-Trichlorophenol
D012	Endrin	D028	1,2-Dichloroethane	D043	Vinyl Chloride
D013	Lindane	D029	1,1-Dichloroethylene		
D014	Methoxychlor	D030	2,4-Dinitrotoluene		
D015	Toxaphene	D031	Heptachlor		
D016	2,4-D	D032	Hexachlorobenzene		
D017	Silvex				

Case Study — Characteristic Waste Destined for Land Disposal

Mike's Metal Company manufactures motor vehicle parts and accessories. One of Mike's processes uses a pickling solution for metal surface preparation. Because this solution is highly acidic, Mike determines that it is a corrosive hazardous waste which is classified as D002 (see Chapter 1). The spent solution also contains metal contaminants that do not exceed any toxicity characteristic levels but are above the 40 CFR 268.48 levels for underlying hazardous constituents (UHCs). Mike intends to simultaneously precipitate metals and neutralize the spent acidic solution using lime in an elementary neutralization tank unit. The resulting wastewaters that have been treated so that they are not characteristic are discharged to a POTW. The resulting sludge is a new point of generation, which means that it must be assessed to see if it is a hazardous waste. Mike determines it contains chromium (total) at 6.00 mg/L TCLP, thus it fails the toxicity characteristic. This means that Mike must treat the sludge for chromium and for all UHCs reasonably expected to be present in the waste before it is land disposed.

THE WASTEWATER TREATMENT STANDARD

- **The spent acidic solution is a corrosive hazardous wastewater. It is subject to treatment standards if it is land disposed at some point in the POTW treatment system. If that were the case, Mike would be required to refer to the treatment standard table at 40 *CFR* 268.40 to**

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identify the treatment standard for the (D002) corrosive wastewater. According to 40 *CFR* 268.40, the waste must be deactivated (DEACT) (i.e., rendered non-corrosive, and thus, non-hazardous). In addition, it would have to meet 40 *CFR* 268.48 standards for UHCs under certain circumstances. (A footnote in the table at 40 CFR 268.40 for D002 wastes indicates that if the corrosive waste will be sent to a Clean Water Act or Safe Drinking Water Act system, it must only be deactivated. Mike's wastewater meets this criteria, thus it may be sent to the POTW without treatment of UHCs.) (See Section 3.4.3).

THE NONWASTEWATER TREATMENT STANDARD

- **Mike must assess whether the sludge from treatment of the corrosive wastewater is a hazardous waste. If it is Mike must treat the sludge to remove the hazardous characteristic and to meet treatment standards for the UHCs reasonably expected to be present.**

- **To determine whether the sludge fails a hazardous characteristic and contains UHCs, Mike may choose to perform chemical analysis. Alternatively, Mike may rely on his knowledge of the composition of the sludge to determine if the sludge is hazardous and if there are any UHCs reasonably expected to be present.**

- **If analysis or Mike's knowledge of the sludge shows that the concentration of chromium (total) and UHCs are at or below the values given in 40 *CFR* 268.48, the sludge meets the LDR treatment standards and does not require treatment prior to land disposal. Mike should be aware, however, that if he uses knowledge of the waste to determine that the sludge is non-hazardous, it may not satisfy the state requirements for non-hazardous waste (i.e., states may have their own, more stringent, requirements).**

- **If analysis or Mike's knowledge of the sludge indicates that the concentration of total chromium and UHCs are above the standards at 40 CFR 268.48 then treatment is required. Mike must treat the total chromium and the UHCs reasonably expected to be present, without dilution, prior to land disposal. Mike may treat the waste on-site, send the waste off-site to a hazardous waste treatment and disposal facility, or, if the waste is no longer toxic for chromium, to a non-hazardous waste facility for further treatment of UHCs.**

RECORDKEEPING

- **See Chapter 6 for specific recordkeeping requirements.**

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3.6.3 What Are the Standards for Wastes that are Both Listed and Characteristic?

The rules for characteristic wastes under 40 *CFR* 268.9 require generators to identify all the listed and characteristic waste codes that could apply to their waste. Therefore, if a listed waste also exhibits a characteristic, the waste must meet the treatment standards for both the listed and characteristic waste codes prior to land disposal. The exception to this 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 instead of the characteristic treatment standard (thus there would be no need to meet treatment standards for underlying hazardous constituents).

> **Example:**
> Spent tetrachloroethylene at greater than 10% concentration typically qualifies as both F001and D039. Since the treatment standard for F001 specifically addresses tetracholoethylene, the F001 treatment standard operates **instead** of the D039 treatment standard.

3.6.4 What Are the Standards for Management in Clean Water Act, Clean Water Act-equivalent, and Safe Drinking Water Act Injection Well Systems?

Due to a series of court decisions and 1996 amendments to RCRA, the treatment standards for characteristic wastes differentiate between waste managed in Clean Water Act (CWA), CWA-equivalent, and Safe Drinking Water Act (SDWA) systems and wastes managed in any other unit.

It was determined that characteristic wastes destined for disposal in a CWA, CWA-equivalent, or SDWA injection well are only required to remove the characteristic prior to land disposal (e.g., in a surface impoundment or injection well). There is no need to treat possible underlying hazardous constituents in the waste. Characteristic wastes destined for disposal in any system other than CWA, CWA-equivalent, and SDWA injection well systems must be treated to remove the characteristic and account for any

> **CWA equivalent treatment includes:**
> - biological treatment for organics
> - alkaline chlorination
> - precipitation/sedimentation of metals
> - reduction of chromium
> - or any other treatment technology demonstrated to perform equally or better than these technologies.

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possible underlying hazardous constituents in the waste. In addition, any treatment residuals, such as sludge, must be evaluated at the point it is generated to determine if it is a characteristic waste. If it is, the sludge is subject to the LDR treatment standards for that characteristic.

Case Study — Characteristic Waste Destined for a Clean Water Act (CWA) Discharge

A petroleum refinery sends a caustic process wastewater to its on-site wastewater treatment unit. The wastewater first enters the primary treatment system, consisting of an API separator, then a series of tanks for settling. The wastewater then enters a secondary biological treatment pond, and is discharged under a National Pollutant Discharge Elimination System (NPDES) Permit.

The waste handler uses their 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, however, the caustic wastewater is diluted and no longer exhibits any hazardous waste characteristics.

<u>TREATMENT STANDARDS</u>

- **Under the consolidated treatment standard table (40 *CFR* 268.40), the treatment standard for D002 wastewaters is given as "DEACT and meet 268.48 standards.[8]" Footnote 8 provides that wastes that have been rendered nonhazardous (i.e., they no longer exhibit a hazardous waste characteristic) and that are then sent to a Clean Water Act system are not subject to treatment standards. Therefore, the caustic waste must simply be "deactivated" so that it no longer exhibits a characteristic prior to entering the biological treatment unit. Since the caustic wastewater ceases to exhibit any hazardous waste characteristic after it has been commingled with other process wastewaters, no further treatment would be needed for LDR purposes. Sludges produced in the treatment unit do not require further treatment under Subtitle C unless they display a hazardous characteristic when removed from the unit.**

- **Similarly, the treatment standard for D018 is ".014 mg/l and meet 268.48 standards."[8] The same footnote 8 applies. As long as the wastewater exhibits no characteristics prior to its entering the CWA treatment pond, no further treatment would be required under the LDRs.**

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- **In this case, deactivation can include dilution without violating the dilution prohibition of 40 *CFR* 268.3.**

- **Any sludge produced in the treatment system would require treatment or Subtitle C disposal if it displays a hazardous characteristic when it is removed from the system and destined for land disposal.**

TESTING

- **To comply with the treatment standard, the facility would need to show that both characteristics in the waste stream are deactivated (i.e., removed) prior to placement of the waste in the biological treatment pond.**

RECORDKEEPING

- **See Chapter 6 for specific recordkeeping requirements.**

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IV. ALTERNATIVE TREATMENT STANDARDS

4.1 What Is the Purpose of this Chapter?

Chapter 4 describes all of the alternative treatment standards. The chapter is designed to describe which hazardous wastes can use the alternative treatment standards and how to read the alternative treatment standard tables.

4.2 Why Did EPA Develop Alternative Treatment Standards?

We established alternative treatment standards to allow for common sense management approaches for wastes (e.g., debris, soil, or lab packs) or to encourage the use of specific waste treatment or recovery practices that benefit protection of human health and the environment. These treatment standards are optional, and generators or treaters can comply with either the "as-generated" treatment standards or the alternative standards. There are alternative treatment standards for debris, soil, high temperature metals recovery residues, and lab packs.

4.3 What Are the Hazardous Debris Alternative Treatment Standards (40 *CFR* 268.45)?

4.3.1 What Is Hazardous Debris?

Debris may be comprised of virtually any manufactured object, plant, animal matter, or geologic material bigger than the approximate size of a tennis ball. Debris is often generated when a building or structure is undergoing demolition or renovation. Chunks of material generated during remediation may be contaminated with or "contain" a hazardous waste (e.g., scrap

Debris is defined as a solid material exceeding a 60 mm particle size that is intended for land disposal and that is: a manufactured object; plant or animal matter; or natural geologic material.

The following materials are not debris:

- Any material for which a specific treatment standard is provided in Subpart D, Part 268 (for example lead acid batteries, cadmium batteries, and radioactive lead solids)
- Process residuals such as smelter slag and residues from the treatment of waste;
- Wastewater;
- Sludges or air emission residues; and
- Intact containers of hazardous waste that are not ruptured and that retain at least 75 percent of their original volume.

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piping or tanks that held hazardous waste) and thus be classified as a hazardous debris. We recognized that the treatment standards for "as-generated" hazardous wastes (under 40 *CFR* 268.40) were difficult to apply to hazardous debris. As a result, the Agency developed alternative treatment standards for hazardous debris.

If you manage hazardous debris, you have the option of meeting either the hazardous debris alternative treatment standards or the "as-generated" treatment standards in 40 *CFR* 268.40. The hazardous debris alternative treatment standards specified technologies are found under 40 *CFR* 268.45, Table 1, entitled "Alternative Treatment Standards for Hazardous Debris."

4.3.2 What Wastes Are Covered by the Alternative Hazardous Debris Treatment Standards?

The alternative hazardous debris treatment standards apply to any material defined as debris that either is contaminated with (contains) a listed waste or exhibits a characteristic of hazardous waste. There are three special subcategories of debris:

Mixtures of debris types — if hazardous debris consists of more than one waste type (*e.g.*, a mixture of glass, metal, and plastic), then the facility must meet the treatment standard for each type of debris;

> **Mixing of Debris and Hazardous Waste:** Any deliberate mixing of prohibited waste with debris that changes its treatment classification (i.e., from waste to debris) is not allowed under the dilution prohibition in 40 *CFR* 268.3. For more information, see the May 11, 1999 *Federal Register* (64 *FR* 25411).

Mixtures of contaminant types — if hazardous debris of one type is contaminated with more than one contaminant, then each of the contaminants must be treated with the specified technology in Table 1, 40 *CFR* 268.45; and

Waste polychlorinated biphenyls (PCBs) — if hazardous debris is contaminated with PCBs, then the waste is subject to the treatment requirements specified at either 40 *CFR* Part 761 (regulations for materials controlled under the Toxic Substances Control Act) or 40 *CFR* 268.45.

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4.3.3 What Are the Alternative Treatment Standards for Hazardous Debris?

To meet the alternative treatment standards, the regulations give specific instructions concerning what constituents must be treated before you can land dispose the debris. These comprise the "contaminants subject to treatment."

Toxicity characteristic debris — debris that is hazardous for the toxicity characteristic must be treated to ensure that all constituents causing the debris to exhibit the toxicity characteristic are addressed.

Debris contaminated with a listed hazardous waste — if debris contains a listed hazardous waste, then you must review the treatment table for as-generated wastes (40 *CFR* 268.40) to determine which hazardous constituents must be treated in the listed waste. All of those hazardous constituents in the contaminated debris must then be treated using one or more of the alternative treatment standards.

Cyanide-reactive debris — cyanide-contaminated debris that qualifies as a reactive waste (D003) must be treated to address the cyanide content (See Section 3.4.4).

Once a determination is made regarding which constituents must be treated in the debris, you must then determine what type of treatment or combination of treatments will address all constituents. The alternative treatment standards for hazardous debris are divided into three technology types: extraction, destruction, and immobilization technologies. Each technology type is defined as follows:

Extraction technologies — consist of physical, chemical and thermal extraction technologies such as abrasive blasting, liquid phase solvent extraction, and high temperature metals recovery, respectively.

Destruction technologies — consist of biological, chemical, and thermal destruction technologies such as biodegradation, chemical oxidation, and incineration, respectively.

Immobilization technologies — consist of macroencapsulation, microencapsulation, and sealing immobilization technologies through the use of polymeric organics, Portland cement, and urethane compounds, respectively.

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Residue resulting from the treatment of hazardous debris must be separated from the treated debris and the two materials are addressed very differently by the alternative treatment regulations.

Debris Resulting from Treatment

Hazardous debris that was treated using either the **extraction or destruction** technologies (and that does not, after treatment, exhibit a characteristic of hazardous waste) is no longer hazardous and need not be managed in a hazardous waste unit.

Hazardous debris that has been treated by **immobilization** technologies remains hazardous, but meets the alternative treatment standards. Immobilized hazardous debris (that does not, after treatment, exhibit a characteristic) must be disposed in a hazardous waste unit.

Residues Resulting from Treatment

With some exceptions, non-debris residues resulting from the treatment of hazardous debris must meet the waste-specific treatment standards in the treatment standards table at 40 *CFR* 268.40. Some special provisions to this general rule are described below.

- Residues generated by deactivating hazardous debris that exhibited the ignitable, corrosive, and/or reactive characteristic (except for reactive cyanide contaminated debris) need only to be deactivated prior to disposal. Such residues are not subject to the waste-specific treatment standards of 40 *CFR* 268.40.

- Residues generated by deactivating cyanide-reactive debris must meet the waste-specific treatment standards for D003 wastes at 40 *CFR* 268.40.

- Residues that exhibit the ignitable characteristic and contain greater than 10% total organic carbon must meet the waste-specific treatment standards at 40 *CFR* 268.40.

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- The layers of residue debris removed by spalling continue to meet the definition of hazardous debris and remain subject to the alternative treatment standards for hazardous debris.

Figure 4-1 presents a flowchart showing the decision-making steps for hazardous debris.

The "Contained-in" Alternative for Debris

When we promulgated the hazardous debris alternative treatment standards, we also promulgated the "contained-in" policy for debris. The policy states that debris that no longer "contains" listed hazardous waste is no longer subject to subtitle C regulation, provided that it does not exhibit any hazardous waste characteristic (40 *CFR* 261.3(f)). You can request a determination of whether debris does or does not contain a listed waste from either your state regulatory agency or from an EPA regional office. Decisions are made on a case-by-case basis and if you succeed in obtaining a determination that your debris does not contain a listed hazardous waste, your debris is not subject to LDR treatment standards. However, if you have not obtained a "contained-in" determination your debris remains subject to the LDR regulations.

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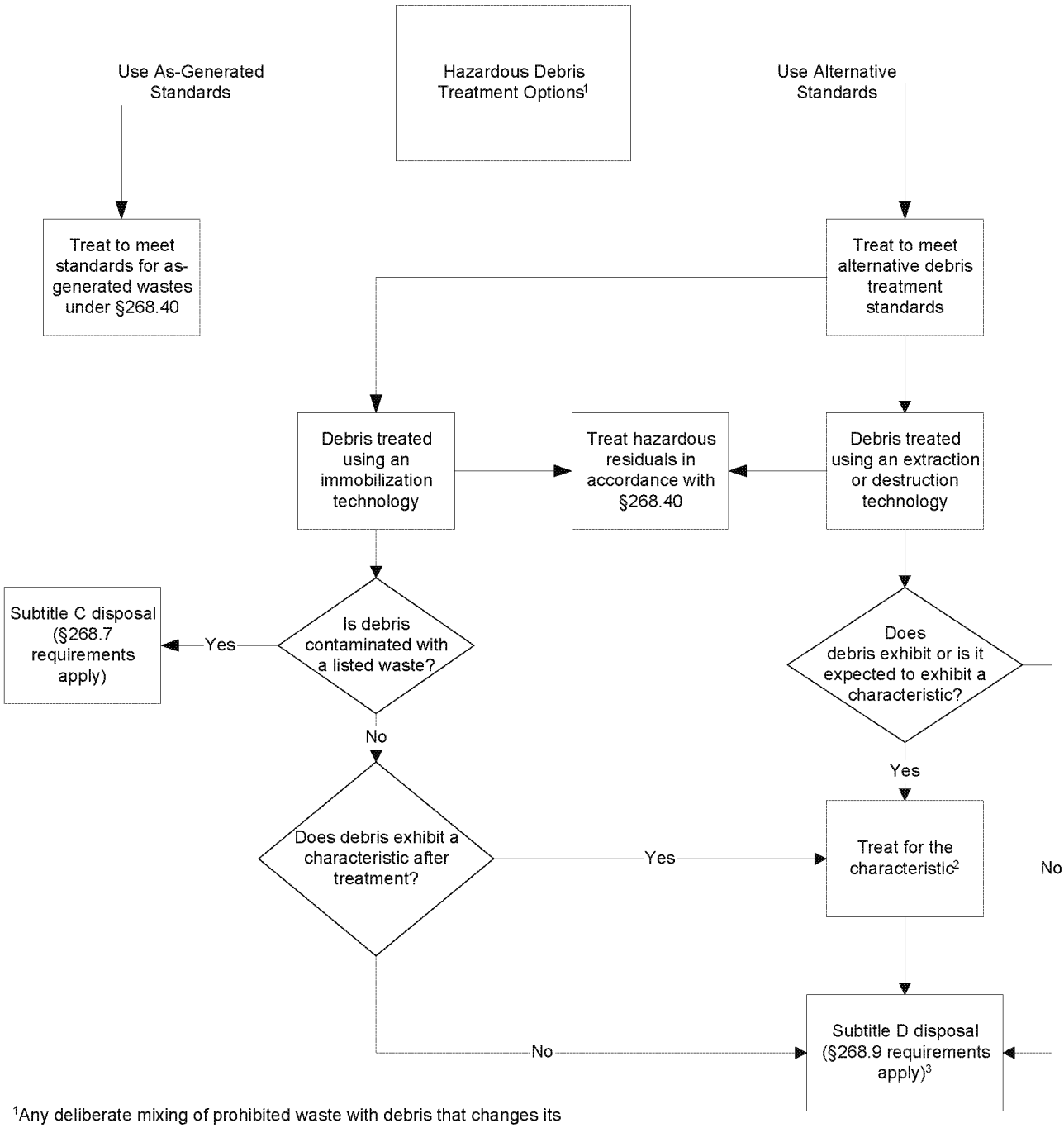
Figure 4-1. Alternative Debris Treatment Standards



[1]Any deliberate mixing of prohibited waste with debris that changes its treatment classification (i.e., from waste to debris) is not allowed under the dilution prohibition in 40 CFR 268.3.

[2]Treaters have the choice of meeting the treatment standards for as-generated wastes or the alternative treatment standards for debris.

[3]Treaters have the option of disposing of their treated wastes in either a subtitle C or a Subtitle D facility.

Case Study — Alternative Treatment Standards for Debris

Wilma's Wood Preserving Plant uses wood preserving formulations that contain creosote. Wilma is removing the old drip pads and installing new ones. The concrete pad that is being removed is contaminated by the creosote formulations used in the wood preserving process.

From manifests sent from the site, Wilma determined that the spent creosote formulations remaining on the pad are classified as a listed hazardous waste (F034) in the hazardous waste regulations (40 *CFR* 261.31), and were disposed as hazardous waste in the past. The dismantled concrete pad is contaminated with the F034 waste and must be managed as a hazardous waste, subject to the LDR program. The concrete meets the definition of hazardous debris in 40 *CFR* 268.2, the F034 hazardous waste is contained in the concrete, and the concrete can qualify for the alternative treatment standards for hazardous debris in 40 *CFR* 268.45.

TESTING

- **Before managing the concrete as a hazardous waste, Wilma may choose to contact the state or EPA Region (the "implementing agency") and request a "contained-in" determination that the concrete no longer contains hazardous waste.**

- **If the chemical analysis indicates that the concentration of creosote formulations in the concrete is higher than the "contained-in" concentration set by the implementing Agency, then further treatment is required to comply with the LDR treatment standards.**

- **Wilma may also choose to rely on her own "knowledge" of the creosote concentration in the concrete. However, Wilma must be able to substantiate the concentration through documentation of her basis for claiming "knowledge."**

TREATMENT STANDARD

- **If concentrations are higher than the "contained-in" concentrations, if applicable, or if concentrations are above the hazardous characteristic, Wilma must determine the contaminants subject to treatment in F034. Debris containing hazardous waste above the treatment standard must be treated.**

- **For Wilma to treat the hazardous concrete in accordance with the alternative debris standards of 40 *CFR* 268.45, she must select from a list of technologies under Table 1 of 40 *CFR* 268.45. These**

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technologies are categorized into three lists: extraction, destruction, or immobilization technologies.

- **Any residue generated from the treatment of the concrete (as opposed to the treated concrete itself) must meet the treatment standards in 40 *CFR* 268.40 for F034 since the residue is no longer a debris.**

MANAGEMENT

- **If Wilma chooses to treat her debris with one of the extraction or destruction technologies, the resulting debris (but not any treatment residues that have been removed) may be sent to a nonhazardous waste disposal unit (e.g., Subtitle D facility) without further testing.**

- **If Wilma chooses to treat her debris with one of the immobilization technologies, the resulting debris must be sent to a hazardous waste disposal unit (Subtitle C facility). However, the resulting debris is considered to be in compliance with LDR treatment standards and does not require further testing prior to disposal.**

RECORDKEEPING

- **See Chapter 6 for specific recordkeeping requirements.**

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4.4 What Are the Soil Alternative Treatment Standards (40 *CFR* 268.49)?

4.4.1 Background

The soil-specific LDR treatment standards were promulgated in the LDR Phase IV final rule on May 26, 1998. They provide alternative treatment standard options for contaminated soils. When referring to treatment standards in general, however, it should be understood that either the alternative soil treatment standards at 40 *CFR* 268.49 or the treatment standards at 40 *CFR* 268.40 may be applied to contaminated soils. While the guidelines outlined below are generally applicable to contaminated soil subject to LDR requirements, they do not account for all circumstances that may occur when managing specific remediation sites.

4.4.2 What Are the Alternative Soil Treatment Standards?

Under the soil treatment standards in 40 *CFR* 268.49, a contaminated soil has two treatment requirement alternatives:

- hazardous constituents must be reduced by at least 90% through treatment so that no more than 10% of their initial concentration remains or comparable reductions in mobility for metals; **OR**

- hazardous constituents must not exceed 10 times the universal treatment standards (UTS) at 40 *CFR* 268.48.

Constituents in contaminated soils are not required to be reduced to levels lower than 10 times UTS, unless specified under a site-specific cleanup requirement (e.g., permit or order).

A hazardous constituent is a regulated constituent specified in a treatment standard at 40 *CFR* 268.40 or it may be an underlying hazardous constituent (UHC). Any constituent that is listed in Table UTS in 40 *CFR* 268.48, except for fluoride, selenium, sulfides, vanadium, and zinc, can be a UHC. A facility may use process knowledge to identify those UHCs reasonably expected to be present when hazardous soils are generated. Facilities should use a process knowledge determination judiciously in identifying which specific UHCs are reasonably expected to be present in a volume of soil (for more information on appropriate use of process knowledge, see EPA's *Waste Analysis At Facilities That Generate,*

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Treat, Store, And Dispose Of Hazardous Wastes; A Guidance Manual, April 1994 (available at http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html). If a facility chooses to use the soil treatment standards, all UHCs present at levels greater than 10 times UTS must be treated regardless of whether the soil contains a listed waste or exhibits a characteristic when the soil is generated.

A contaminated soil that is going to be used in products that are subsequently used in a manner constituting disposal must meet the treatment standards developed for as-generated industrial waste at 40 *CFR* 268.40.

4.4.3 Why Did EPA Develop Alternative Soil Treatment Standards?

The soil treatment standards are designed to encourage more feasible cleanup of hazardous contaminated soils subject to LDRs. Before these treatment standards were developed, soils subject to LDRs were required to comply with traditional technology-based treatment standards at 40 *CFR* 268.40 developed for industrial hazardous waste. These treatment standards sometimes proved to be inappropriate (e.g., requiring large quantities of soil to be incinerated) or unachievable (e.g., did not account for heterogeneous soil matrices) when applied to hazardous constituents present in soils, and thus acted as a disincentive to cleanup. The soil treatment standards at 40 *CFR* 268.49 continue to be protective of human health and the environment (as dictated under the RCRA statute under section 3004(m)), but provide for more flexible treatment requirements that consider the unique characteristics of soils and applicable treatment technologies and are achievable using a variety of non-combustion treatment alternatives.

4.4.4 Why Are Contaminated Soils Regulated As Hazardous Waste?

Before treatment standards apply to contaminated soils, a soil must first "contain" hazardous waste. Under RCRA, soil is not a solid waste, but it must be managed as a hazardous waste if it "contains" hazardous waste. Soil "contains" hazardous waste (i.e., is a hazardous contaminated soil) if, when generated (e.g., is excavated), it:

- is contaminated by a listed hazardous waste; or
- exhibits a hazardous waste characteristic.

Contained-in Policy
The contained-in principle is the basis for our long-standing policy that applies RCRA Subtitle C requirements to media contaminated with hazardous wastes. Under the contained-in policy, media (e.g., soil) must be managed as a hazardous waste as long as it contains listed hazardous waste or exhibits a hazardous waste characteristic. Under the contained-in policy, when hazardous constituents are present in media below site-specific risk-based levels, the media should no longer be regulated as a hazardous waste. The decision to no longer regulate media as a hazardous waste is made by an authorized state or EPA region on a case-by-case basis via a contained-in determination.

Impermissible Dilution
It is illegal to add soil to a hazardous waste (or vice versa) to dilute a hazardous waste to change its treatment classification from non-soil to soil and thereby avoid proper treatment. It is therefore illegal to falsely claim eligibility as a soil to take advantage of the soil-specific treatment standards. Dilution is also impermissible if uncontaminated soil is added to hazardous soil in order to meet treatment standards. However, incidental mixing of contaminated and uncontaminated soils during pretreatment, removal, remediation, or normal earthmoving/grading activities is not considered impermissible dilution.

4.4.5 When Do Hazardous Soil Alternative Treatment Standards Apply to Hazardous Contaminated Soils?

Generally, hazardous contaminated soil is subject to treatment under the LDR program if:

- the soil is removed from the land (i.e., generated); and
- the soil does not already meet applicable LDR treatment standards.

Treatment standards do not apply to *in situ* soils, nor do they force soils to be excavated. If a contaminated soil is managed within an area of contamination (AOC), even if it is "removed from the land" within such an area, the soil would not be considered generated, and the LDR treatment requirements do not apply.

Area of Contamination (AOC)
We equate a discrete area of generally dispersed contamination to a RCRA unit. An AOC is a RCRA unit where contamination is contiguous and of similar nature, but not necessarily homogenous. For more information, the most recent EPA guidance is a March 25, 1996 EPA letter titled, "Use of the Area of Contamination Concept During RCRA Cleanups." (Available from the RCRA Call Center or http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#memos.)

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For more information about AOCs and CAMUs, as well as other topics pertaining to remediation waste, refer to the document, "*Management of Remediation Wastes Under RCRA*," October 1998, in Appendix C.

4.4.6 When Are Alternative Soil Treatment Standards Available in Authorized and Unauthorized States?

Like all LDR treatment standards, the soil treatment standards are promulgated pursuant to the Hazardous and Solid Waste Amendments of 1984 (HSWA). Because the alternative soil treatment standards are generally less stringent than current federal requirements for soils, they will not go into effect in authorized States until the States adopt and become authorized for them — even though the soil treatment standards are promulgated pursuant to HSWA.

If a state is authorized to implement the LDR treatment standards for any given waste or constituent, and that waste or constituent is contained in contaminated soil that is subject to LDRs, generally the more stringent treatment standard for the as-generated industrial waste or constituent applies to contaminated soil until the state adopts and becomes authorized for the soil treatment standards. Similarly, if a state has adopted, under state law, an LDR treatment standard for any given waste or constituent but has not yet received authorization for the requirement, and that waste or constituent is contained in contaminated soil that is subject to LDRs, the more stringent state requirement continues to apply until the state adopts, under state law, the soil treatment standards. (See EPA guidance memorandum from Elizabeth A. Cotsworth to RCRA Senior Policy Advisors, Regions I–X, "Phase IV Land Disposal Restrictions Rule — Clarification Of Effective Dates" October 19, 1998).

Despite this convention, a state could, through implementation of state waiver authorities or other state laws, allow compliance with the soil treatment standards in advance of adoption or authorization. Thus, by using state law to waive authorized or non-authorized state requirements, a state can allow immediate implementation of the soil treatment standards without jeopardizing their RCRA authorization. (This is similar to the approach the Agency took in promulgation of the corrective action management unit rule. See 58 *FR* 8677, February 16, 1993.) Therefore, it would be wise to contact the state regulatory agency before undertaking soil remediation to see if the alternative soil treatment standards are available in your state.

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4.4.7 When Do Treatment Standards Apply to Soils Contaminated by a Listed Waste?

When treatment standards apply to soil contaminated by a listed waste depends on when the soil was contaminated. The following table summarizes how soils contaminated with listed wastes must be handled:

If LDRs:	And If LDRs:	And If:	Then You:
Applied to the listed waste when it contaminated the soil	Apply to the listed waste now		Must comply with LDR treatment standards.
Did not apply to the listed waste when the waste contaminated the soil	Apply to the listed waste now	No contained-in determination has been made prior to generation of the contaminated soils	Must comply with LDR treatment standards
Did not apply to the listed waste when it contaminated the soil	Apply to the listed waste now	The soil has been determined to not contain the listed waste prior to the soils first being generated	Do not need to comply with LDR treatment standards
Did not apply to the listed waste when it contaminated the soil	Do not apply to the listed waste now		Do not need to comply with LDR treatment standards

The following examples illustrate the concepts described in the table.

Example of Contained-In Determination
Scenario: A generator is in the process of excavating soil lightly contaminated with F006 sludge. This sludge was land disposed before the effective date of the LDR prohibition. The soil does not exhibit a characteristic. Before the soil is excavated (i.e. generated) a contained-in determination is made because the constituent concentrations are below health-based levels.

Outcome: The contaminated soil does not have to meet LDR treatment standards.

Rationale: When the soil was first contaminated, there were no treatment standards for F006. LDRs never attach to the soil because it is determined before the soil is generated that the soil does not contain a listed waste or exhibit a characteristic.

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Example of Soil Containing a Listed Waste
Scenario: A generator is excavating soil contaminated by F004 (spent halogenated solvents). F004 was land disposed in 1984 (before the effective date of the applicable LDR prohibition). The contaminated soil contains high concentrations of cresols (a listed constituent of F004), and is deemed to contain hazardous waste.

Outcome: The excavated soils are contaminated with a prohibited waste, and must meet LDR treatment standards, before placement in a land disposal unit.

Rationale: Although the contaminating waste was not prohibited at the original point of disposal, the soil now contains a prohibited hazardous waste when it is generated. Therefore, LDRs attach to the soil at its point of generation.

Note that F004 became a prohibited waste after disposal of the original waste, but before generation of the contaminated soils.

How Are Spills of Listed Waste Regulated Under the LDR Program?
Accidental one-time spills of listed prohibited waste are not considered placement of hazardous waste into a land disposal unit, and thus do not trigger LDR requirements. In addition, hazardous waste management activities during an immediate response period are exempt from RCRA permitting requirements. However, spills of any sort that are routine and systematic could be considered land disposal, and spills not cleaned up in a timely manner could be considered to be abandoned, constituting land disposal. Such contaminated soils are subject to LDR treatment standards when removed from the land. They remain applicable throughout the spill remediation because the treatment standards attached to the original waste at the point it was generated. These spills are typically addressed by state or federal authorities as "illegal disposal" under RCRA enforcement authorities, or through other enforcement mechanisms.

4.4.8 What LDR Treatment Standards Apply to Soils Contaminated by Listed Waste?

If a hazardous contaminated soil must meet LDRs before it is land disposed, then you may choose to apply either:

- the alternative soil treatment standards at 40 *CFR* 268.49, when available in authorized states or where the LDR program is implemented entirely by EPA; **OR**

- the treatment standards for as-generated listed wastes at 40 *CFR* 268.40.

If a facility applies the soil treatment standards at 40 *CFR* 268.49, then *all underlying hazardous constituents present at levels greater than 10 times UTS when the soils are generated must also be treated.* If, however, a facility chooses to comply with the treatment standards at 40 *CFR* 268.40 for as-generated

industrial waste, then underlying hazardous constituents do not have to be treated if the soil is contaminated only with listed hazardous waste.

4.4.9 When May Soils Contaminated by a Listed Waste Be Disposed in a Nonhazardous Waste (Subtitle D) Landfill?

If soil is contaminated by a listed waste and you want to dispose it in a nonhazardous waste (Subtitle D) landfill, then:

- the hazardous soil must meet applicable treatment standards; **AND**
- EPA or an authorized state must determine that the soil no longer contains hazardous waste (i.e., a contained-in determination).

These are minimum criteria. States or landfill owners can impose more stringent standards or prohibit placement altogether.

Unless a facility receives a contained-in determination from EPA or the authorized state, soils contaminated by listed wastes continue to carry the listed waste code — even after meeting applicable treatment standards — and must be managed in hazardous waste (Subtitle C) facilities.

4.4.10 How Do Treatment Standards Apply to Soils That Exhibit a Hazardous Waste Characteristic When Generated?

If a soil exhibits the ignitability (D001), corrosivity (D002), reactivity (D003), or toxicity (D004-D043) characteristic when generated, then the soil must be managed as a hazardous waste. Underlying hazardous constituents must be identified and treated for all wastes that exhibit a hazardous waste characteristic. This applies to soils as well.

Spills of Hazardous Characteristic Waste:
If a soil is contaminated by a spill of characteristic waste, then a determination must be made as to whether the soil exhibits characteristic properties. If the soil is identified as characteristic, then the soil is considered to contain hazardous waste and RCRA requirements, including LDR treatment requirements, apply. If the soil does not exhibit a characteristic, then LDR requirements do not apply. However, treatment of the soil may still be required under cleanup authorities.

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4.4.11 What LDR Treatment Standards Apply to Soils That Exhibit a Hazardous Waste Characteristic When Generated?

If a hazardous waste-contaminated soil exhibits a hazardous waste characteristic when removed from the land (i.e., generated), and therefore must meet LDRs before it is land disposed, then a facility may choose to apply either:

- the alternative soil treatment standards at 40 *CFR* 268.49, when available in authorized states or where the LDR program is implemented entirely by EPA; **OR**

- the treatment standards for as-generated characteristic wastes at 40 *CFR* 268.40.

(Note that soil managed within an area of contamination (AOC), even if it is "removed from the land" within such an area, would not be considered generated, and the LDR treatment requirements would not apply. For more information, the most recent EPA guidance is a March 25, 1996 EPA letter titled, "Use of the Area of Contamination Concept During RCRA Cleanups." (Available from the RCRA Call Center, or http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#memos.)

When applying either of these treatment standard options, all underlying hazardous constituents (UHCs) present at levels greater than 10 times UTS when the soils are generated must also be treated, except fluoride, selenium, sulfides, vanadium and zinc. (Note: this is different than when soils are contaminated with listed waste. In that case, if the treatment standards for as-generated industrial waste at 40 *CFR* 268.40 are used, then there is no requirement to treat UHCs. This difference is the result of court decisions interpreting EPA mandates under RCRA.)

Special Consideration for Soils that Exhibit the Toxicity Characteristic for Metals

We are currently temporarily deferring the requirement that polychlorinated biphenyls (PCBs) be considered a UHC when they are present in soils that exhibit the Toxicity Characteristic for metals (65 *FR* 81373; December 26, 2000). We took this action because the regulation appears to be discouraging generators from cleaning up contaminated soils, which is contrary to what we intended when we

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promulgated alternative treatment standards for contaminated soils. In addition, we need more time to restudy the issue of appropriate treatment standards for metal-contaminated soils which also contain PCBs as UHC. The Agency still requires generators to treat these soils to meet LDR standards for all hazardous constituents except PCBs. Generators are also required to treat PCBs if the total concentration of halogenated organic compounds in the soil equals or exceeds 1000 parts per million.

4.4.12 When May Soils That Exhibit Only a Hazardous Waste Characteristic When Generated be Disposed in a Nonhazardous Waste (Subtitle D) Landfill?

Soil that exhibits a hazardous waste characteristic when removed from the land (i.e., generated) may be disposed in a nonhazardous waste (Subtitle D) landfill or placed back on the land when the soil:

- meets applicable treatment standards; **AND**
- no longer exhibits a hazardous waste characteristic.

When applying the soil treatment standards, it is important to make sure that both of the above criteria are met. In particular, soils that exhibit the toxicity characteristic may be treated to the alternative soil treatment standards, yet still be characteristic since the 10 times UTS can sometimes be above the hazardous waste characteristic level. For example, the UTS for nonwastewater lead is 0.75 mg/L TCLP; 10 times UTS is 7.5 mg/L TCLP. This concentration is greater than the characteristic level of 5.0 mg/L TCLP for lead. While a characteristically hazardous soil treated to 7.5 mg/L TCLP for lead (assuming treatment of any UHCs as well) meets the LDR treatment requirements, it is still characteristically hazardous. This soil may be disposed of in a Subtitle C landfill, but cannot be disposed in a Subtitle D landfill until it has also been treated below the characteristic level.

4.4.13 How is Compliance with the Alternative Soil Treatment Standards Measured?

When characterizing soils for purposes of complying with the soil treatment standards, you should use normal soil characterization sampling and analysis procedures. These procedures should be specified in the facility's waste analysis

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plan and will be site specific. Compliance with the soil treatment standards will be measured and enforced using grab samples of the treated residuals.

If you choose to reduce hazardous constituents by at least 90% so that no more than 10% of the initial concentration remains or comparable reductions in mobility for metals, then compliance with LDR treatment standards should be based on:

- *total constituent analyses* if soils are contaminated with constituents such as organics and cyanide or if soils are contaminated with metals that have been treated with removal technologies.

- *TCLP extract analyses* if soils are contaminated with constituents such as carbon disulfide, cyclohexanone, and methanol; and metals that have been treated with stabilization technologies.

4.4.14 How Are Nonanalyzable Constituents Treated Using the Soil Treatment Standards?

Nonanalyzable constituents do not have appropriate test methods or chemical standards to properly measure compliance with LDR concentration-based standards. A constituent is non-analyzable under LDR regulations when:

- the appropriate 40 *CFR* 268.40 treatment standard specifies a treatment technology; **AND**

- there is no UTS numerical limit in Table UTS in 40 *CFR* 268.48.

If *only* nonanalyzable constituents are present, then constituents must be treated using the 40 *CFR* 268.40-specified method for the contaminating waste.

If both analyzable and nonanalyzable *organic* constituents are present, then analyzable organic constituents can be treated to the alternative soil treatment levels. You may assume that nonanalyzable organic constituents are adequately treated. It is not necessary to additionally test or treat the nonanalyzable organic constituents once the analyzable organic constituents meet the alternative soil treatment levels.

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If both analyzable and nonanalyzable hazardous constituents are present and they are comprised of a mixture of organics and inorganics, it is *not* reasonable to assume in all situations that organic treatment would serve as a surrogate for inorganic or metal treatment, or vice versa. Should the situation arise, it should be addressed on a site-specific basis. The relevant factors to be considered include the types of hazardous constituents, their concentrations (for the analyzable constituents), and their amenability to common treatment.

4.4.15 How Are Treatment Residuals Resulting from Application of the Alternative Soil Treatment Standards Managed?

If a treatment residual is a soil, then it should continue to be managed under the soil treatment standards. Non-soil residuals, such as wastes generated during application of separation technologies, are regulated as hazardous wastes if they exhibit a characteristic of hazardous waste or if they derive from treating a soil which contains listed hazardous waste. These non-soil residuals are subject to the Universal Treatment Standards at 40 *CFR* 268.48.

4.4.16 Can I Obtain a Site-specific Variance from the LDR Treatment Standards?

A risk-based treatability variance allows site managers, on a site-specific basis, to essentially set LDR treatment standards at risk-based levels. If LDR treatment levels will require you to treat soils beyond the point at which threats are minimized — as determined by site-specific assessment — then EPA or an authorized state may approve a variance from an otherwise applicable LDR treatment standard. These variances are evaluated according to existing treatability variance procedures at 40 *CFR* 268.44(h), including public notice and comment.

Site-specific risk-based analysis must consider both short- and long-term threats to human health and the environment, as well as uncertainties associated with land disposal. This will encourage remedy choices that rely predominantly on treatment to permanently and significantly reduce the concentrations or mobility of hazardous constituents in contaminated soil. We anticipate that these variances will most often be applied to on-site activities. If this variance were applied to off-site land disposal, then the treatment standard would have to incorporate the exposure pathways and receptors present at the off-site land disposal areas.

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For further guidance, refer to the following documents:

- A memorandum entitled, "*Use of Site-Specific Land Disposal Restriction Treatability Variances Under 40 CFR 268.44(h) During Cleanups*" (Available from the RCRA Call Center or on the EPA Home Page at http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#memos.)

- *Variance Assistance Document: Land Disposal Restrictions Treatability Variances & Determinations of Equivalent Treatment* (Available from the RCRA Call Center or on the EPA Home Page at http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#variance.)

4.4.17 Does the Variance Take into Account Natural Background Levels?

This variance also may be applied to sites where natural background levels conflict with the soil treatment standards, as long as the soils will be managed entirely on-site. In this case, soil treatment requirements may be set at the site's naturally-occurring background concentrations.

Of course, EPA or an authorized state could determine, at any time, that any given volume of soil did not contain (or no longer contained) any solid or hazardous waste. These types of determinations might be made, for example, if concentrations of hazardous constituents fall below background levels or are at nondetectable levels. Such a determination would terminate all RCRA Subtitle C requirements, including LDRs. The following flowchart is designed to assist you in understanding the soil alternative treatment standards.

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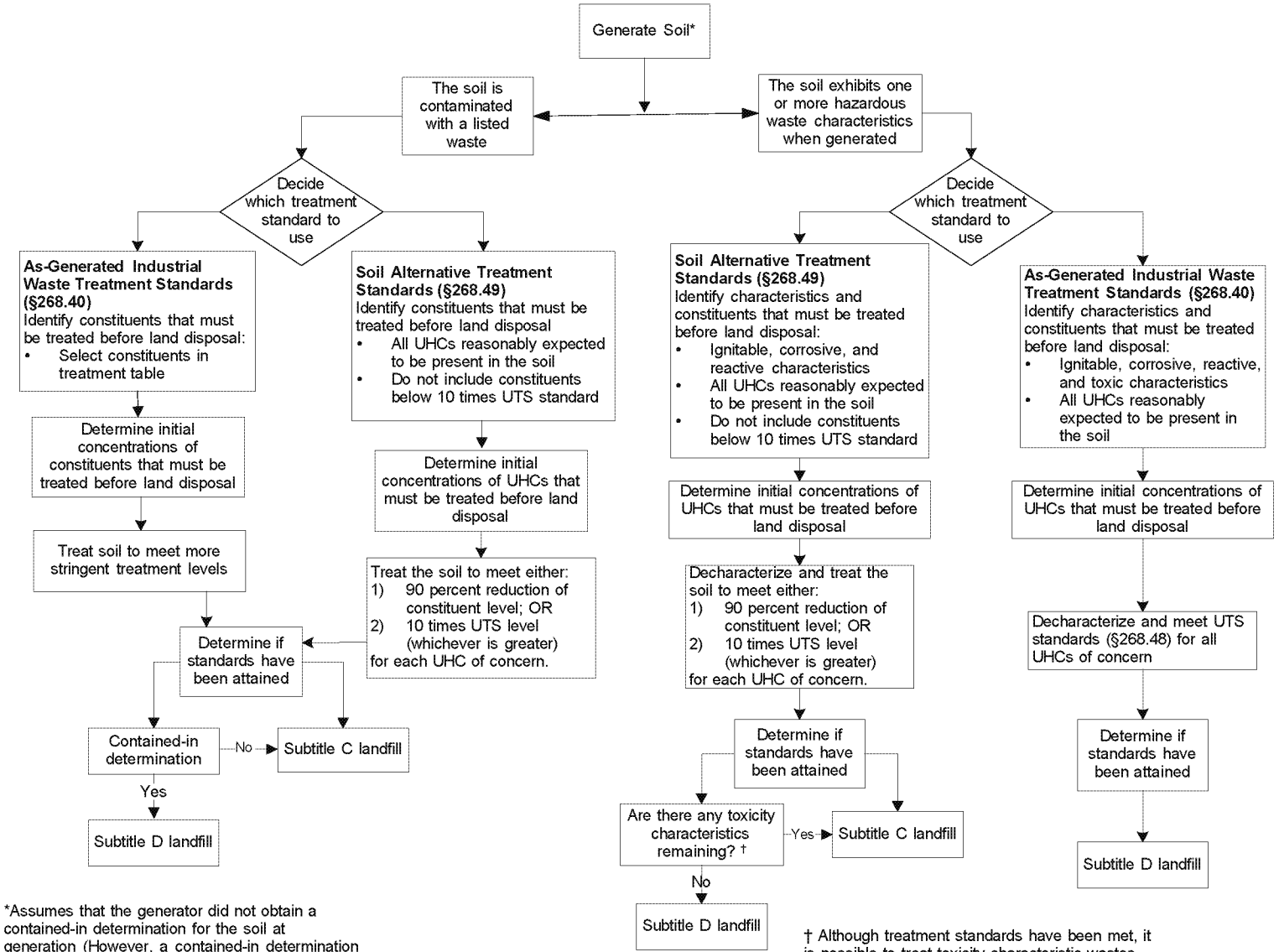
Figure 4-2. Alternative Soil Treatment Standards



*Assumes that the generator did not obtain a contained-in determination for the soil at generation (However, a contained-in determination can be obtained at any point between generation and disposal)

† Although treatment standards have been met, it is possible to treat toxicity characteristic wastes without eliminating the hazardous waste characteristic.

4.5 What Is the Alternative Treatment Standard for Lab Pack Wastes (40 *CFR* 268.42(c))?

We established alternative treatment standards for certain hazardous wastes packaged in lab packs. A lab pack consists of small containers of wastes overpacked in a larger container. Lab packs may be incinerated with no requirement to measure compliance with waste concentration levels, provided they do not contain any of the wastes listed in 40 *CFR* Part 268, Appendix IV (see Figure 4-3). Residues from incineration of any lab pack containing arsenic, barium, cadmium, chromium, lead, selenium, or silver must meet the treatment standards for the these TC metals found in the table of Universal Treatment Standards at 40 *CFR* 268.48.

Figure 4-3. Wastes Prohibited From Lab Packs

Waste Code	Description/Common Name
D009	Mercury
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirsonium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process.
K003	Wastewater treatment sludge from the production of molybdate orange pigments
K004	Wastewater treatment sludge from the production of zinc yellow pigments
K005	Wastewater treatment sludge from the production of chrome green pigments
K006	Wastewater treatment sludge from the production of chrome oxide green pigments
K062	Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry
K071	Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used
K100	Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting
K106	Wastewater treatment sludge from the mercury cell process in chlorine production
P010	Arsenic acid (H_3AsO_4)
P011	Arsenic oxide (AsO_5), Arsenic pentoxide
P012	Arsenic oxide (AsO_3), Arsenic trioxide
P076	Nitric oxide
P078	Nitrogen dioxide
U134	Hydrofluoric acid
U151	Mercury

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V. OTHER PROHIBITIONS

5.1 What Is the Purpose of this Chapter?

There are three different prohibitions that help to provide the framework for the LDR regulations. The first and most fundamental prohibition is the prohibition against land disposal of untreated hazardous wastes. This prohibition is the basic premise of LDR requirements. It was discussed in Chapter 3.

This chapter focuses on the two other prohibitions that are essential to the LDR program: the dilution prohibition and the storage prohibition. The dilution prohibition prevents wastes from being diluted as a way to avoid meeting the LDR treatment standards. The storage prohibition ensures that wastes are not accumulated indefinitely as a means to delay compliance with the LDR treatment standards. These prohibitions cease to apply once a waste is treated to meet its waste-specific treatment standards.

5.2 What Is the Dilution Prohibition (40 *CFR* 268.3)?

The LDR dilution prohibition states that you cannot in any way dilute a hazardous waste as a substitute for adequate treatment. The dilution prohibition implements 3004(m) of RCRA, which requires that hazardous constituents be destroyed, removed, or immobilized before land disposal.

The dilution prohibition serves two main purposes: to ensure the actual treatment of hazardous constituents; and to ensure that wastes are treated appropriately. Dilution is not permitted when it is used to avoid meeting an applicable treatment standard or effective date. We refer to this as "impermissible dilution."

Impermissible dilution can occur under a number of circumstances. The most obvious is when solid wastes are added to a waste to reduce the concentration or to

Impermissible Dilution can occur if a waste is improperly treated. For example, biological treatment does not effectively remove toxic metals from wastes. Therefore, wastes with treatment standards for metals could be impermissibly diluted if managed in biological treatment systems that provide no additional treatment (i.e., immobilization) for the metals.

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hide the presence of hazardous constituents.

In one case, EPA decided that treating the lead in spent foundry sand with iron filings constituted impermissible dilution, because the waste was treated by an ineffective method. A treatment method is ineffective when it does not destroy, remove, or permanently immobilize hazardous constituents.

Wastes that are aggregated or mixed as a part of a legitimate treatment process, and are subsequently diluted as a result, are not considered to be impermissibly diluted under LDR.

Figure 5-1 presents a flowchart showing the decision-making steps in determining whether dilution is, or is not, permissible.

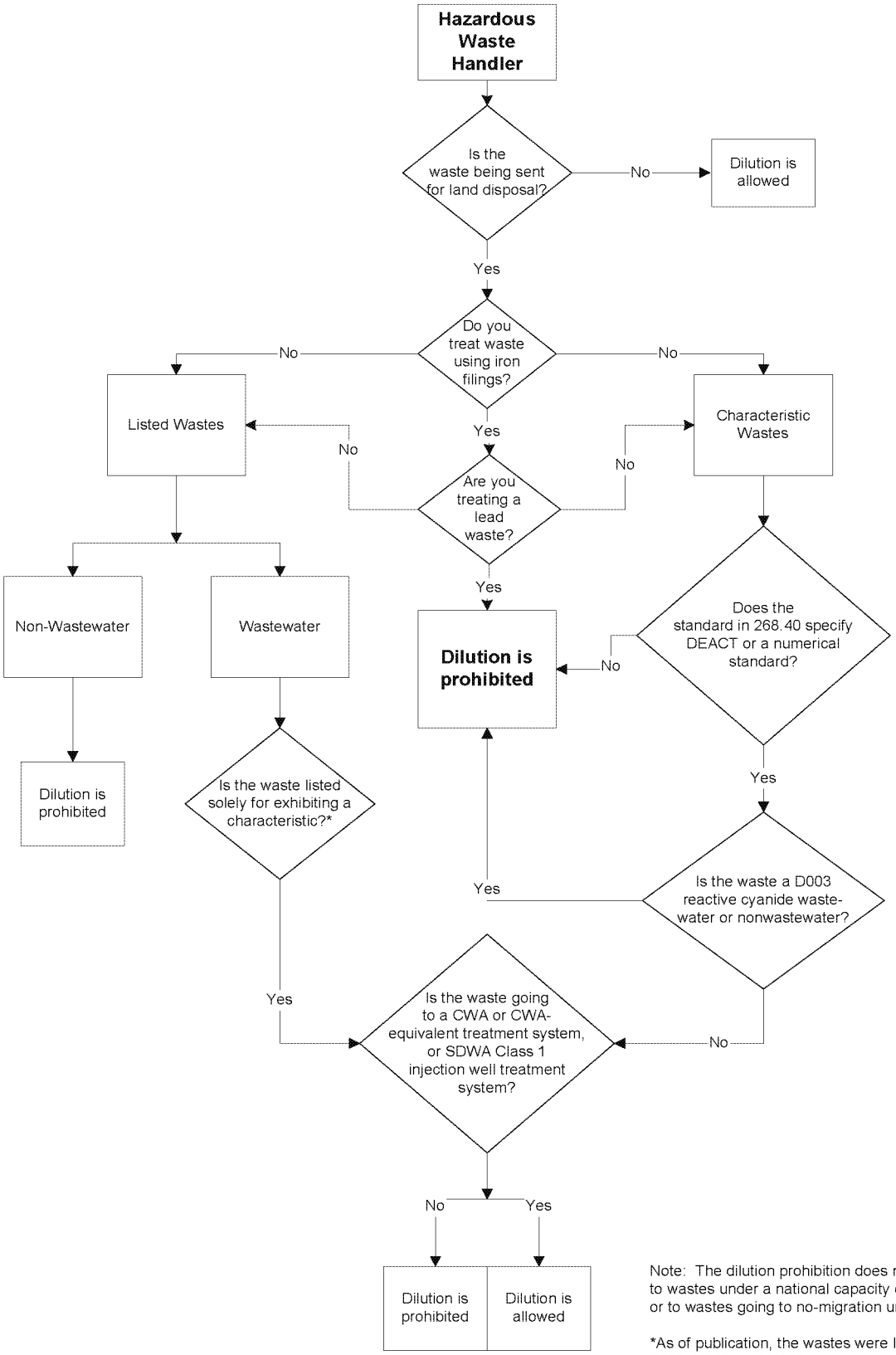
5.2.1 When Is the Dilution of Characteristic Wastes Permissible?

Dilution is permissible under the following circumstances:

- the waste is not entering a land disposal unit;
- a treatment standard has not been established for a newly listed or identified waste (*Note: as of the date of publication all listed and characteristic hazardous wastes had established treatment standards)*;
- the waste is placed in a land disposal unit that has an approved no migration petition;
- the waste is F003, K047, U002 or characteristic waste (except High TOC D001, D003 reactive cyanide, or D012–D017 wastewater) being sent to a Class I SDWA underground injection well;
- the waste is F003, K047, U002 or characteristic (except High TOC D001, D003 reactive cyanide, or D012–D017 wastewater) being sent to a CWA or CWA-equivalent system;

CWA equivalent treatment includes:
- biological treatment for organics
- alkaline chlorination
- precipitation/sedimentation of metals
- reduction of chromium
- any other treatment technology demonstrated to perform equally or better than these technologies.

Figure 5-1. Dilution Decision Chart



Note: The dilution prohibition does not apply to wastes under a national capacity extension or to wastes going to no-migration units.

*As of publication, the wastes were limited to F003, K047, and U002.

- contaminated soil is incidentally consolidated within the area of contamination during cleanup and pretreatment/preparation for treatment (e.g., sizing, blending, where legitimate);

- the waste is combusted and meets the specified criteria discussed in section 5.2.2.

Any dilution of hazardous wastes occurring outside the scope of these circumstances may be considered impermissible dilution.

5.2.2 When Is the Combustion of Metal-Bearing Waste Permissible?

Combustion of inorganic or metal-bearing wastes can be another form of impermissible dilution. We consider the releases of these metal and inorganic constituents into the air or the residual ash to be dilution. Combustion of any of the hazardous wastes listed in Appendix XI of Part 268 is not permitted unless the wastes meet one or more of the following criteria (*provided it is not otherwise specifically prohibited from combustion*):

- at the point of generation or after treatment, the wastes contain hazardous organic constituents or cyanide at levels exceeding the constituent-specific universal treatment standards in 40 *CFR* 268.48; **or**

- the wastes consist of organic, debris-like materials (e.g., wood, paper, plastic, or cloth) contaminated with inorganic metal-bearing hazardous wastes; **or**

- at the point of generation, the wastes have a heating value greater than or equal to 5000 BTU per pound; **or**

- the wastes are cogenerated with wastes for which combustion is a required treatment; **or**

- the waste is subject to Federal and/or state requirements necessitating a reduction in organics or biological agents; **or**

- the wastes contain greater than 1 percent total organic carbon (TOC).

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If a waste does not meet one or more of these criteria, performing combustion would result in impermissible dilution of the waste. Appendix XI to Part 268 lists the metal-bearing wastes prohibited from dilution in a combustion unit.

5.3 What Is the Storage Prohibition (40 *CFR* 268.50)?

It is permissible under RCRA to temporarily store prohibited hazardous wastes. Storage of prohibited wastes is only allowed to accumulate a sufficient volume of waste to facilitate proper treatment, recovery, or disposal of that waste. If you generate the waste, you are subject to restrictions on accumulation time and other general requirements under 40 *CFR* 262.34 and 40 *CFR* 268.50(a)(1) while such waste is in storage. If you own or operate a TSDF, you are subject to marking and labeling requirements for restricted wastes in storage (40 *CFR* 268.50(a)(2)) in addition to any unit specific operating requirements in Parts 264 or 265.

We believe that a storage limit of up to one year generally provides sufficient time for you to accumulate enough waste to facilitate proper recovery, treatment, or disposal. However, we recognize that under some circumstances you may require storage time beyond the one-year limit and will allow you to store hazardous wastes subject to the LDR program for greater than one year.

For storage periods less than or equal to one year, the burden is on us to demonstrate that you are out of compliance with the storage provisions. If you need to store hazardous waste for a period beyond one year, you are not required to submit any notification to EPA. However, in the event of an enforcement action, the burden of proof to justify that such storage is necessary to facilitate proper recovery, treatment, or disposal lies with you.

> If storage exceeds one year, then you bear the responsibility to prove that the storage is necessary to facilitate proper recovery, treatment, or disposal.

5.3.1 What Are the Conditions for Storing PCB Wastes?

A special case under this section of LDR pertains to the storage of PCB-containing liquid wastes (40 *CFR* 268.50(f)). If you store liquid waste containing PCBs at a concentration of 50 parts per million (ppm) or higher, the storage cannot exceed one year for any reason. Furthermore, you are subject to additional regulation under the Toxic Substances Control Act (TSCA).

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In a related, but separate issue, we are temporarily deferring the requirement that PCBs be considered a UHC when they are present in soils that exhibit the Toxicity Characteristic for metals. Please see Section 4.4.11 for more details.

VI. RECORDKEEPING REQUIREMENTS

6.1 What Is the Purpose of this Chapter?

Chapter 6 discusses recordkeeping requirements for the LDR program. This chapter helps you determine which records to prepare, submit, and keep at your facility.

6.2 What Are the General Notification and Recordkeeping Requirements?

Both generators and TSDFs that manage wastes subject to LDR must comply with notification, certification, waste analysis, and recordkeeping requirements. These requirements were put in place to allow EPA to track wastes from generation to final disposal. The notification and recordkeeping requirements are found in 40 *CFR* 268.7.

- 40 *CFR* 268.7(a) contains the requirements for generators;
- 40 *CFR* 268.7(b) contains the requirements for treaters; and
- 40 *CFR* 268.7(c) contains the requirements for disposal facilities.

There are also special requirements for characteristic hazardous wastes found in 40 *CFR* 268.9 (See Section 6.8).

The following sections summarize the waste analysis and recordkeeping practices that are required of generators and owners or operators of TSDFs.

6.3 What Are the Generator's Responsibilities?

For each hazardous wastestream generated, it is the generator's responsibility to determine if the waste is subject to the LDR rules. Based on information gained from testing the waste or an extract of the waste, you should characterize your wastestreams by knowing the following:

- all applicable EPA hazardous waste codes (40 *CFR* 261.21–24 and 40 *CFR* 261.31–33);

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- the presence of regulated hazardous in listed wastes;
- for characteristic wastes, the presence of underlying hazardous constituents (for wastes which specify "and meet 268.48" in the treatment standard);
- for soils managed under the alternative soil treatment standards, the presence of underlying hazardous constituents;
- whether the waste is a wastewater or non-wastewater; and
- the relevant treatment standards specified at 40 *CFR* 268.40 (Treatment Standards for Hazardous Wastes table). See Chapter 3 for information on determining treatment standards.

Alternatively, you can determine if a waste is restricted based solely on knowledge of the waste. If you rely solely on knowledge of a waste to draw a conclusion regarding its status under the program, then you must maintain on-site all supporting documentation upon which this conclusion was based (40 *CFR* 268.7(a)(5)).

How a waste is generated and managed will impact the notification and certification requirements under LDR. Figure 6-1 represents a checklist for generator notification and certification which highlights the major regulatory requirements.

What Are the Notification Requirements for Listed Wastes That Require Further Treatment?

If you send the listed waste off-site for further treatment in order to comply with the LDR treatment standards, you must prepare a one-time notice to accompany the initial waste shipment. The one-time notice must include the following:

- the EPA hazardous waste and manifest numbers;
- for F001–F005 and F039 wastes, a list of constituents to be monitored;
- the treatability group and subcategory, if applicable; and
- any available waste analysis data.

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Figure 6-1. Generator LDR Notification Requirements Checklist

Required Information	Waste Does Not Meet Treatment Standard (§268.7(a)(2))	Waste Does Meet Treatment Standard (§268.7(a)(3))	Waste is Exempt From LDR (e.g., extension or variance) (§268.7(a)(4))	The Waste Is Treated With Alternative Treatment Standards For Lab Packs (§268.7(a)(9))
EPA hazardous waste numbers and manifest number of first shipment.	✔	✔	✔	✔
Provide a statement indicating that the waste is not prohibited from land disposal.			✔	
Indicate that the waste is subject to the LDRs. Identify the individual constituents of concern for F001–F005, F039, and underlying hazardous constituents in characteristic waste, unless the waste will be treated and monitored for all constituents.	✔	✔		
Include the applicable wastewater or nonwastewater category (see 268.2(d) and (f)) and subdivisions within a waste code based on waste-specific criteria (e.g., D003 reactive cyanide).	✔	✔		
Provide waste analysis data (when available).	✔	✔	✔	
Specify the date upon which the waste will become subject to the LDRs (e.g., the date the national capacity extension ends).			✔	
For hazardous debris treated with the alternative treatment technologies of 268.45, list the contaminants which are subject to treatment and indicate that these contaminants are being treated to comply with 268.45.	✔		✔	
For contaminated soil subject to LDRs as provided in 268.49(a), the constituents subject to treatment as described in 268.49(d), and the following statement: This contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristic of hazardous waste and [is subject to/complies with] the soil treatment standards as provided by §268.49(c) or the universal treatment standards.	✔	✔		
A certification statement is needed (see applicable section in 268.7(a) for exact wording)		✔		✔

*If all constituents will be treated and monitored, there is no need to list them all in the LDR notice.

The notification must be sent to the treatment facility and a copy should be kept in your generator file. A new notice would need to be sent to the receiving facility if any changes were made to the process which generates the waste, the character or composition of the waste, or the receiving facility.

What Are the Notification and Certification Requirements for Wastes Already Meeting the Treatment Standard?

If the waste meets the applicable treatment standards, you, as the generator, must send a one-time notification and certification statement with the initial waste shipment. The notice must include the same information as discussed for wastes that do not meet the treatment standard. A certification statement written in accordance with 40 *CFR* 268.7(a)(3) must be signed and accompany the waste. The certification statement indicates that the waste meets the required treatment standards. The notification and certification statements must be sent to the disposal facility, and a copy of both forms should be kept in your generator file.

What Are the Requirements for Wastes That Are Treated On-Site?

Under federal regulations, you may treat hazardous wastes generated on-site in accumulation units such as tanks, containers, and containment buildings that are subject to 40 *CFR* 262.34. If this treatment is being performed in order to meet the LDR treatment standard, you must develop and follow a written waste analysis plan that describes the treatment method used to comply with the treatment standard as required under 40 *CFR* 268.7(a)(5). For guidance on waste analysis plan development, see *Waste Analysis at Facilities that Treat, Store, or Dispose of Hazardous Waste* available from the RCRA Call Center or on the EPA Home Page (http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#manuals). The waste analysis plan must be kept on-site and made available to inspectors when requested. When wastes treated on-site are shipped off-site for disposal, you must comply with the generator notification and certification requirements of 40 *CFR* 268.7(a)(3) for wastes which meet their treatment standards prior to shipment off-site. This notice must accompany the first shipment of waste and be retained in the your generator files.

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6.4 What Are the Special Recordkeeping Requirements for Characteristic Wastes (40 *CFR* 268.9)?

Once a characteristic waste has been treated to meet its applicable treatment standards, it is no longer subject to Subtitle C regulation and thus no longer needs to be managed at a hazardous waste TSDF. Such wastes are typically sent for disposal at Subtitle D facilities. We were concerned that if generators or TSDFs were to send LDR notifications along with such waste shipments, it could cause confusion because Subtitle D facilities are unaccustomed to paperwork required for hazardous wastes. For this reason, we developed special notification requirements for characteristic wastes that have been treated and are no longer regulated hazardous wastes. In these cases the facility that "decharacterizes" the waste and treats it to meet any applicable LDR treatment standards must submit a one-time notice to the EPA region or their state agency instead of to the disposal or other management facility. The notification must also be placed in the facility's files and must include the following information:

- the name and address of the receiving facility; and
- a description of the waste, including hazardous waste codes, treatability groups and subcategories, and any underlying hazardous constituents.

The facility also must prepare a certification statement in accordance with 40 *CFR* 268.7(b)(5) to accompany the notification. Both certification and notification statements must be updated if there are any changes to the waste or receiving facility. Such changes must be submitted to the appropriate EPA region or state agency on an annual basis.

Keep in mind that all shipments of the waste up until the point that it is no longer subject to Subtitle C regulation (until it no longer exhibits any hazardous waste characteristics) are subject to the applicable notification provisions of 40 *CFR* 268.7.

For example, if you, as a generator, were to treat a characteristic waste in its accumulation tank such that the waste met all applicable LDR treatment standards, you would only need to submit the one-time notice to the appropriate EPA region or state agency in accordance with 40 *CFR* 268.9, along with the

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certification statement, prepared in accordance with 40 *CFR* 268.7(b)(5). These records would also need to be placed in your on-site files.

What are the Requirements for Wastes that Are Exempt from LDR?

If the waste is subject to a case-by-case extension, a no-migration petition, or if the effective date has not yet passed for a waste subject to a national capacity variance, it is still subject to the LDR notification requirements. As a generator of exempted wastes, you must complete a one-time notification. The notification must include the following:

- the EPA hazardous waste codes and manifest number;
- a statement that the waste is not prohibited from land disposal;
- any available waste analysis data; and
- the date the waste will become subject to LDR.

Copies of the notification must be sent to the disposal facility and placed in your generator file.

Even if the waste is exempt from Subtitle C regulation (and, therefore, not subject to LDR) because you have determined that the waste is excluded from the definition of solid or hazardous waste, a one-time notification must still be maintained in your file as required by 40 *CFR* 268.7(a)(7). This notification must include a statement regarding the generation of the waste, the exclusion or exemption from Subtitle C regulation, and the final disposition of the waste. This notification requirement will primarily be triggered under circumstances where no other LDR notification or certification requirements apply, such as:

- when wastes are discharged to Publicly Owned Treatment Works (POTWs);

- when wastes are discharged under National Pollutant Discharges Elimination System (NPDES) permits; and

- when characteristic wastes are diluted and then discharged to a Clean Water Act (CWA), CWA-equivalent, or Class I Safe Drinking Water Act (SDWA) system.

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What Are the Responsibilities for Small Quantity Generators Operating Under Tolling Agreements?

If you are a small quantity generator who reclaims wastes through a tolling agreement pursuant to 40 *CFR* 262.20(e), you are subject to LDR notification requirements. You are required to submit a one-time notice and certification statement in accordance with 40 *CFR* 268.7(a)(10). You must retain on-site, in your files, a copy of the notification, certification, and tolling agreement for at least three years after termination or expiration of the agreement. The three-year recordkeeping period is automatically extended during enforcement actions or when requested by EPA.

6.5 What Are the Notification and Certification Requirements for Lab Packs?

Lab packs that will be treated according to the alternative treatment standards in 40 *CFR* 268.42(c) require specific notification and certification. (See Section 4.4 for discussion of lab pack treatment standards). The one-time notice you send to the treatment facility must indicate only the hazardous waste codes and manifest number. If the lab pack contains characteristic hazardous wastes, underlying hazardous constituents do not need to be determined if the lab pack is being treated under the alternative treatment standards. The notification must also be accompanied by your certification, written in accordance with 40 *CFR* 268.7(a)(9), to indicate that the waste complies with the treatment standards. Copies of both the notification and certification statements must be sent to the treatment facility and kept in your generator files.

6.6 What Are the Notification and Certification Requirements for HTMR Wastes?

Under 40 *CFR* 261.3(c)(2)(ii)(C), nonwastewater F006, K061, and K062 residues generated from high temperature metals recovery (HTMR) are excluded from hazardous waste regulations provided they meet the specified criteria (See Section 4.3 for discussion of HTMR treatment standards). As a generator using this exclusion, you must prepare a one-time notification and certification as specified in the exclusion. The notification must include such information as:

- the name and address of the receiving facility;

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- the EPA hazardous waste codes and treatability group; and
- the treatment standards applicable to the waste.

You must sign a certification statement as specified in 40 *CFR* 261.3(c)(2)(ii)(C)(2). Copies of the notification and certification must be retained in your files and another copy must be sent to the appropriate EPA region or authorized state. These items must be updated if the process generating the waste or the receiving facility changes. Such updates are required to be submitted to the state or region only on an annual basis.

6.7 What Are the Notification Requirements for Hazardous Debris?

When hazardous debris is treated by using extraction or destruction alternative treatment technologies, the debris is no longer a hazardous waste provided it does not exhibit a characteristic (See Section 4.1 for discussion of Alternative Debris Treatment Standards). Hazardous debris can also be excluded from hazardous waste regulation through a contained-in determination. Under either circumstance, your claim that hazardous debris is exempt from regulation must include a one-time notice in accordance with 40 *CFR* 268.7(d). The one-time notification must be submitted to the region or authorized state and include information such as:

- the name and address of the receiving facility;
- a description of the hazardous debris as initially generated, including the applicable hazardous waste codes; and
- if applicable, the technology used to treat the debris.

Hazardous debris that has been treated through extraction or destruction is excluded from hazardous waste regulation. However, the owner or operator of the treatment facility must keep records regarding any inspections, evaluations, and analyses of the treated debris used to certify compliance. Records must also be kept of any information pertaining to the operating parameters of the treatment process. Additionally, each shipment of treated debris must include a certification statement from the treatment facility operator certifying compliance with the alternative treatment standards.

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For hazardous debris treated through immobilization, the applicable notification and certification provisions under 40 *CFR* 268.7(a) apply.

6.8 What Are the Notification and Certification Requirements for Contaminated Soils?

Contaminated soil subject to the land disposal restrictions must comply with the same recordkeeping requirements as other wastes subject to LDR (See Section 4.2 for Alternative Soil Treatment Standards). As a generator of a hazardous soil, you must comply with the applicable provisions of 40 *CFR* 268.7(a) and include a certification statement to be sent with the initial waste shipment and retained in your files certifying that the soil does not contain a listed hazardous waste and does not exhibit a hazardous characteristic.

Once a characteristic soil is treated to remove its hazardous characteristic, it is no longer subject to Subtitle C regulation (however, it could require further treatment if underlying hazardous constituents are present at the point of generation at levels 10 times UTS). If characteristic soil has been treated so it is no longer hazardous, but still requires treatment, special notification requirements for treated characteristic wastes (found at 40 *CFR* 268.9(d)) allow you to send a one-time notice to the EPA region or your state agency, instead of the Subtitle D disposal facility. This notification must be placed in the generator's files and include the following information:

- the name and address of the receiving facility; and
- a description of the waste including hazardous waste codes, treatability groups and subcategories, and any underlying hazardous constituents.

As a generator, you must also prepare a certification statement in accordance with 40 *CFR* 268.7(b)(5) to accompany the notification. Both the certification and notification statements must be updated if there are any changes to your waste or the receiving facility. Such changes must be submitted to the appropriate EPA region or state agency on an annual basis.

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6.9 What Are the Recordkeeping Requirements for Treatment and Disposal Facilities?

The notification and recordkeeping requirements for treatment facilities (excluding generators treating on-site that are subject to 40 *CFR* 268.7(a) requirements) are outlined in 40 *CFR* 268.7(b). In order to certify that wastes meet the LDR standards, treatment facilities must test the wastes. Such tests must be performed as set forth in the facility's waste analysis plan, which all TSDFs are required to have (see 40 *CFR* 264/265.13). If, as a treatment facility, you ship the treated waste off-site for disposal, you must file a one-time notification in accordance with 40 *CFR* 268.7(b)(3)(ii) that must include the following information:

- the hazardous waste codes;
- the hazardous constituents in F001–F005 and F039 and the underlying hazardous constituents in characteristic wastes;
- the treatability group; and
- any waste analysis data.

The notification must be accompanied by a certification statement in accordance with 40 *CFR* 268.7(b)(4) to certify that your wastes meet the treatment standards. Copies of both the notification and certification must be maintained in your files and must be updated if the waste or receiving facility changes.

Treatment facilities that ship wastes or residues from waste treatment off-site for further treatment must comply with the notification and certification requirements for generators in 40 *CFR* 268.7(a).

If you are a disposal facility, you also have LDR recordkeeping requirements that are outlined under 40 *CFR* 268.7(c). These requirements help us to ensure that wastes are being properly managed from cradle-to-grave. If you are a disposal facility, you must ensure that the wastes you receive are in compliance with the LDR regulations. This is done through testing the waste according to the specifications outlined in your waste analysis plan. You also are required to maintain records on-site of all the notifications and certifications received from both generators and treaters.

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VII. VARIANCES, EXTENSIONS, AND EXEMPTIONS

7.1 What Is the Purpose of this Chapter?

Chapter 7 describes the variances, extensions, and exemptions under the LDR program that may apply to the waste you are managing. In the LDR program, six provisions allow for delays or exemptions from the application of treatment standards and other LDR requirements. The six provisions are:

- National Capacity Variance (40 *CFR* 268.30–268.39)
- Case-by-Case Extension (40 *CFR* 268.5)
- Treatability Variance (40 *CFR* 268.44)
- Equivalent Method Variance (40 *CFR* 268.42(b))
- No-Migration Petition (40 *CFR* 268.6)
- Surface Impoundment Exemption (40 *CFR* 268.4 and 40 *CFR* 268.14)

7.2 What Is a National Capacity Variance (40 *CFR* 268.30–268.39)?

A national capacity variance is provided when EPA determines that sufficient treatment capacity for certain hazardous wastes is not available on a nationwide basis. The variance extends the effective date of the waste's treatment standard until the earliest date when treatment capacity is expected to be available, with a maximum of a two-year extension.

Wastes benefitting from a national capacity variance are allowed to be land disposed without meeting treatment standards. Appendix VII of 40 *CFR* Part 268 lists the LDR effective dates for all hazardous waste covered by the LDR program. This section of the regulations should be consulted to determine if a waste is subject to a national capacity variance.

> If waste subject to a capacity variance is disposed in a landfill or surface impoundment, the unit must be in compliance with certain minimum technological requirements (40 *CFR* 268.5(h)(2)), unless it is a newly regulated unit in compliance with 40 *CFR* 268.14.

The recordkeeping requirements for LDR exempt wastes, discussed in section 6.2, apply to wastes subject to a capacity variance.

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7.3 When Is a Case-by-Case Extension Granted (40 *CFR* 268.5)?

In site-specific cases where adequate treatment capacity for a specific waste cannot reasonably be made available by the effective date of prohibition, one can petition EPA for an extension of the effective date on a case-by-case basis. EPA may grant a case-by-case extension of up to one year, renewable only once, for one additional year.

According to 40 *CFR* 268.5, to be considered for a case-by-case extension you must demonstrate that:

- you have made a good faith effort to locate adequate treatment capacity (and no such capacity is available nationwide);
- you have entered into a binding contract to construct or otherwise provide adequate capacity;
- such capacity cannot be made available by the prohibition's effective date due to circumstances beyond your control;
- the capacity being contracted for is sufficient to manage the entire quantity of waste subject to the application;
- a detailed schedule is provided outlining how and when alternative capacity will be available;
- you have arranged for adequate capacity to manage the waste during an extension and disclosed the site locations; and
- any surface impoundment or landfill used to manage the wastes during the extension period must meet minimum technological requirements (MTRs), including groundwater monitoring in compliance with 40 *CFR* 268.5(h)(2).

The recordkeeping requirements for LDR exempt wastes, discussed in section 6.2, apply.

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7.4 What Is a Variance From the Treatment Standard (40 *CFR* 268.44)?

If you are a generator or treatment facility whose wastes cannot be treated to achieve the established treatment standards, or for which treatment standards are not appropriate, you may petition EPA for a variance from the treatment standard (treatability variance). Wastes that may be eligible for a variance include unique wastes, remediation wastes, wastes formed by inadvertent mixing, or wastes that otherwise are different in physical or chemical properties from those wastes used to set the treatment standards. A treatment variance does not exempt your wastes from treatment, but rather establishes an alternative LDR treatment standard.

In order for us to grant a treatability variance for wastes other than remediation waste or contaminated soils, you must successfully demonstrate that the treatment standard for the waste in question is either unachievable or inappropriate:

What do "unachievable" and "inappropriate" mean when considering a treatability variance?

Unachievable – physical or chemical properties of your waste differ significantly from waste evaluated by EPA to establish treatment standards, and your waste cannot be treated to meet standards.

Inappropriate – treatment may be feasible, but is either not appropriate, suitable, or practical from a technical or environmental standpoint. For remediation wastes only, inappropriate also can mean that the treatment standard discourages aggressive remediation.

"Unachievable" Treatability Variance. To demonstrate that a treatment standard is unachievable, you must demonstrate not only that the waste is significantly different from the waste we evaluated in setting the treatment standards, but also that the waste cannot be treated to meet the specified levels.

"Inappropriate" Treatability Variance. To demonstrate that a treatment standard is inappropriate, you must demonstrate that the imposition of the treatment standard, while technically possible, remains unsuitable or impractical from a technical or environmental standpoint. An example of this circumstance is when a treatment standard would result in combustion of large amounts of mildly contaminated soil or wastewater. The same reasoning could apply when media is contaminated with metal contaminants and also contains low levels of organic contaminants. In such a case, it may be inappropriate to require combustion treatment of the organic contaminants both because it may be inappropriate to

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combust media generally and because it may be inappropriate to combust wastes where metals are the most significant hazardous constituents.

For remediation waste only, the imposition of the LDR treatment standard also can be considered "inappropriate" if the standard results in a net environmental detriment by discouraging aggressive remediation. An example of this situation might be when a facility must remediate an area, and is reviewing whether to legally leave waste in place undisturbed or excavate, thereby triggering treatment to standards based on the LDR treatment standard, which can be cost-prohibitive. In these circumstances, a treatment variance can provide an intermediate option of more aggressive remediation, which may include substantial treatment of the removed waste before disposal of that treatment residue — a net environmental benefit over leaving untreated waste in place. This situation often occurs when LDR treatment would require that wastes be treated to achieve constituent concentrations that fall below protective site-specific cleanup levels, increasing remediation costs by forcing additional treatment of excavated wastes. In these instances, EPA has indicated that consideration of a treatment variance is typically warranted (because imposition of the otherwise applicable treatment standard would discourage aggressive remediation and is, therefore, inappropriate) and that, if a variance is approved, protective, site-specific cleanup levels may be used as alternative LDR treatment standards.

To receive a treatability variance, you must collect and analyze a sufficient number of samples to accurately characterize your waste. In addition, you should investigate and report on pretreatment steps that could improve the effectiveness of treatment. We may request additional information and waste samples to determine whether or not to approve a variance. Finally, you should explain why the treatment standard is not achievable for the waste. We will provide notice to the public on our intention to either grant or deny a variance and will consider public comments in our final decision. In granting a variance, we will establish a new treatability group for that waste and set a new treatment standard if the variance has generic applicability. If the variance is site-specific, we will set a new treatment standard that will apply only to that waste at that single facility.

Prior to the establishment of the alternative treatment standards for contaminated soils, we presumed that the treatability variance usually would apply to hazardous contaminated soils. This was based on our assumption that the treatment standards for "as-generated" wastes were generally unachievable or inappropriate for wastes

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in a soil matrix. However, now that we have developed treatment standards specifically for contaminated soils, this presumption no longer exists. Regardless, variances are still available for contaminated soils. For example, a soil may not be able to be treated to meet the alternative soil treatment standards using one of the technologies we considered in establishing the alternative soil standards. In other cases the soil treatment method may present an unacceptable risk to workers and, therefore, be considered inappropriate. In both of these cases a treatability variance could be sought.

An additional variance exists specific to contaminated soil. Under 40 *CFR* 268.44(h)(3) and 268.44(h)(4), variances from otherwise applicable LDR treatment standards, including the alternative standards for soils, may be approved if it is determined that compliance with the treatment standard would result in treatment beyond the point at which short- and long-term threats to human health and the environment are minimized. A determination can also be made that compliance with the treatment standard would result in treatment consistent with the natural background levels for the site where the contaminated soil will be disposed. This allows a site-specific, risk-based determination to supersede the technology-based LDR treatment standards under certain circumstances, thus allowing regulators to align cleanup levels and treatment levels. Alternative land disposal restriction treatment standards established through site-specific risk-based minimize threat variances (discussed in this section) should be within the range of values the Agency generally finds acceptable for risk-based cleanup levels. Decisions to grant or deny these variances will be made by EPA Regions or authorized states. The soil alternative treatment standards are discussed in more detail in Chapter 4.

For further guidance, refer to the following documents:

- A memorandum entitled, "*Use of Site-Specific Land Disposal Restriction Treatability Variances Under 40 CFR 268.44(h) During Cleanups*" (Available from the RCRA Call Center or on the EPA Home Page at http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#memos.)

- *Variance Assistance Document: Land Disposal Restrictions Treatability Variances & Determinations of Equivalent Treatment* (available from the RCRA Call Center or on the EPA Home Page at http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#variance.

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7.5 When Is a Determination of Equivalent Treatment Variance Granted (40 *CFR* 268.42(b))?

For some restricted wastes, EPA expressed treatment standards as a specified treatment method rather than as the constituent concentration levels in the waste. These wastes must be treated using the specified technology in order to comply with the LDR standards. In some situations, however, EPA will allow alternative treatment methods to be used in place of the required technology as long as the method can be demonstrated to be equivalent to the specified treatment standard.

Recommended Documentation for Treatability Variances
(The petition regulations are found at 40 *CFR* 260.20)

- The petitioner's name, address, and statement of interest in obtaining a treatability variance.
- The name, address, and EPA identification number of the waste generator, including the name and phone number of the plant contact.
- A description of the process(es) and feed materials involved in the generation of the waste and an evaluation of whether they may produce a waste that is not covered by the demonstration.
- A waste description, including the same characteristics that EPA used to develop the BDAT—this information can be obtained from the appropriate EPA BDAT background document. (These documents are listed on page 40636 of the November 7, 1986 *Federal Register,* page 31210 of the August 17, 1988 *Federal Register,* and page 26646 of the June 23, 1989 *Federal Register.* Similar lists of documents are available for the other major LDR rules through the RCRA Call Center or on the EPA home page at http://www.epa.gov/epaoswer/hazwaste/ldr/publications.html). Estimates of the average and maximum monthly and annual quantities of waste covered by the demonstration are also required.
- A description of the system used to treat the waste (e.g., process design and operating conditions) and an explanation of why the treatment standards are not achievable or why they are based on the inappropriate technology for treating the waste.
- A description of any other treatment systems investigated by the petitioner (if any), the treatment system believed by the petitioner to be appropriate for the waste, and the concentrations in the treatment residue (or TCLP extract of the treatment residue) that can be achieved by using the preferred treatment technique.
- Descriptions of all sampling, sample handling, sample preparation, and test methods used to obtain data indicating that the treatment standards are not achievable (sampling and testing dates must also be submitted).
- A certification that all of the information submitted in the petition is accurate is required.

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To make this demonstration, you must submit an application to the EPA Administrator demonstrating that the alternative treatment method can achieve a measure of performance comparable to the specified technology. EPA will provide notice to the public on their intention to either grant or deny a variance. Comments received will be considered in EPA's final decision. If the application is approved, wastes treated by the alternative method can be land-disposed without further treatment.

7.6 When Is a No-Migration Variance Granted (40 *CFR* 268.6)?

Under certain circumstances EPA will allow wastes to be placed in land disposal units without first meeting their treatment standards. If a petitioner can demonstrate that hazardous constituents will not migrate from a unit at concentrations greater than Agency-approved health-based levels, EPA will grant a no-migration variance. A no-migration variance may be granted for up to 10 years, not to exceed a date beyond the term of the unit's permit. The regulatory relief issued under a no-migration variance applies only to the unit and wastes specified in the petition.

The petition must include a description of the disposal unit, the disposal unit site, and other components outlined in 40 *CFR* 268.6(a). The petition must also meet the environmental sampling and waste analysis criteria at 40 *CFR* 268.6(b). Additionally, each petition must include a monitoring plan, as outlined in 40 *CFR* 268.6(c)(1)–(5). The monitoring plan must include, among other things, a description of the media to be monitored, the location of monitoring stations, and the specific constituents that will be monitored. The monitoring plan must verify continued compliance with the conditions of the variance. All subsequent changes to the conditions at the unit must be reported to EPA according to 40 *CFR* 268.6(e) stipulations.

7.7 When Is a Surface Impoundment Exemption Granted (40 *CFR* 268.4 and 40 *CFR* 268.14)?

Under LDR there are two exemptions established for surface impoundments. The first exemption, found at 40 *CFR* 268.4 allows wastes to be placed in surface impoundments for treatment in the impoundment without first meeting the LDR

> Evaporation of hazardous constituents cannot be used as the principal method of treatment.

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treatment standards. In order to qualify for this exemption the unit must meet the following conditions:

- representative samples must be taken of the wastes in the surface impoundments to determine if they meet the applicable treatment standards;

- liquid and solid treatment residuals not meeting their treatment standards must be removed from the surface impoundment annually; the removed residues must then be treated to meet the applicable standards before being disposed and may not be placed in another surface impoundment; and

- the facility must keep all records concerning such sampling and removal of wastes.

The surface impoundment also must be designed in accordance with specified criteria outlined in 40 *CFR* 268.4(a)(3), including the minimum technological requirements (MTRs), such as a double liner, leachate collection system, and groundwater monitoring system. Surface impoundments operating under a waiver, or exempted from the retrofit requirements, must be equipped with one liner, show no evidence of leaking, be located more than one-quarter mile from an underground source of drinking water, and be in compliance with applicable groundwater monitoring requirements.

If you are the owner or operator of surface impoundments and are seeking an exemption for treatment of prohibited wastes, you must certify to the EPA Regional Administrator under 40 *CFR* 268.4(a)(4) that the impoundment meets MTRs and must submit a copy of the facility's revised waste analysis plan that outlines methods for representative sampling and proper testing, frequency of removal, and methods for removal of restricted residuals.

The second exemption for surface impoundments is found at 40 *CFR* 268.14. This exemption applies only in situations where a nonhazardous waste surface impoundment is storing a waste that then becomes newly subject to RCRA requirements. Since these wastes are newly regulated, RCRA regulations require these surface impoundments either to be closed or upgraded to meet MTRs within four years. The exemption in 40 *CFR* 268.14 allows for the owner or operator of newly regulated surface impoundments to continue managing prohibited wastes

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without complying with MTRs for a period of up to four years before upgrading or closing the unit. In order to achieve this exemption the unit must be in compliance with the applicable groundwater monitoring provision under Part 40 *CFR* 265 Subpart F within 12 months of the promulgation of the new hazardous listing or characteristic. If the surface impoundment continues to treat prohibited wastes after the four years period, it must then be in compliance with 40 *CFR* 268.4.

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VIII. SPECIAL ISSUES

8.1 What Is the Purpose of this Chapter?

Chapter 8 provides in-depth discussion of the two most frequently asked questions about the LDR program — hazardous waste point of generation and site remediation issues.

8.2 What Is the Point of Generation?

According to RCRA regulations, when a waste is generated, you must make two critical determinations:

(1) identify whether the waste is hazardous; and

(2) if so, identify whether the waste is prohibited under the Land Disposal Restriction (LDR) program (40 *CFR* 262.11 and 40 *CFR* 268.1).

The requirement, therefore, is that the hazardous waste identification and LDR determinations must be made at the point where the waste is first generated (also known as the "point of generation"). The point of generation is usually defined as the point at which a generator first determines that a material is no longer useful (or the point at which the generator decides to discard the material). However, under 40 *CFR* 261.4(c), hazardous waste is not generated from product or raw material tanks, transport vehicles, vessels and pipelines, manufacturing process units, or associated non-waste-treatment-manufacturing units until:

- it exits the unit; or
- the hazardous waste remains in the unit more than 90 days after the unit ceases to be operated for manufacturing, or for storage or transportation of product or raw materials.

Due to the complicated nature of some hazardous waste generating systems, it can be difficult to determine the precise point at which a hazardous waste is generated.

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If a waste is hazardous, you, as the generator, must make a second determination at the point of generation concerning LDR applicability (See 40 *CFR* 268.1). Any hazardous waste with a treatment standard designated in the 40 *CFR* 268.40 table is restricted at the point of generation. If your restricted waste is destined for land disposal (as defined in 40 *CFR* 268.2), it must be treated prior to disposal, unless the waste is exempt under 40 *CFR* 268.1.

We have made the following clarifications in *Federal Registers* or guidance:

- **Surface Impoundments/Sludges** — Hazardous waste sludges can be generated within an active surface impoundment unit, potentially subjecting the unit to Subtitle C RCRA regulation. Sludges are generated at the moment of deposition at the bottom of the unit. Deposition is defined as a condition where there has been at least a temporary cessation of lateral particle movement.

- **Commingling** — Where a waste stream will eventually be commingled with other waste streams, the Agency generally requires waste identification and LDR determination to be made at the point the waste is generated, prior to the commingling, even if the commingling occurs within a pipe (except in a totally enclosed treatment system). One exception to this rule is that the point of generation for tank cleanouts occurs at the end of the rinseouts in the receiving rinsate tank, even though the first rinse is likely to be of higher concentration than the other rinses.

> The **commingling** interpretation applies only to tank cleanouts where one vessel is receiving the rinse waters from all the washouts. If the residues are collected in separate tanks or containers between rinses, then the point of generation occurs after each batch.

- **Change in Treatability Group Principle for Characteristic Wastes** — For characteristic wastes, each change in treatability group constitutes a new point of generation. LDR prohibitions remain attached to the initial waste as long as the waste remains within the same treatability group after treatment. Thus, for

> **Treatability groups** are broad classifications of waste for which different treatment standards apply. They include wastewaters, nonwastewaters, and soils.

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example, if a characteristic wastewater is treated and a non-wastewater sludge is generated from the treatment process, the prohibition for the wastewater does not automatically apply to the sludge. The resulting sludges constitute a new point of generation and thus require a new hazardous waste and LDR determination.

Rinsate and Residues from the Storage or Pretreatment of D001 High-TOC (Total Organic Carbon) Hazardous Wastes — According to treatment standards, the D001 high-TOC nonwastewaters (i.e., 10 percent or greater TOC) must be treated by recovery of organics or combustion in a RCRA-permitted combustion unit. Several regulatory interpretations affect the status of residues and rinsate from these wastes:

1) After pretreating D001 high-TOC hazardous waste by filtering or decanting the waste and separating it into a liquid and a solid phase, the liquid phase continues to exhibit the D001 high-TOC characteristic, and the solid phase no longer exhibits the characteristic. The Agency has determined that the solid phase from the pretreatment step constitutes a new point of generation and thus can be handled as nonhazardous waste, as long as the remaining liquids are destined for treatment in compliance with the required treatment methods.

2) Since the TOC levels continue to cause the liquid phase waste to be classified as a nonwastewater for the purposes of the LDR program (see the definition of wastewater under 40 *CFR* 268.2), there is no change in treatability group for sludges or residues derived from wastewater treatment units. In situations where small amounts of the D001 high-TOC liquids are inadvertently placed in wastewater treatment systems, the Agency has determined that the resulting sludges still represent a change in treatability group and thus a new point of generation.

3) Once a storage tank is emptied of D001 high-TOC hazardous waste, the tanks are often rinsed to clean the

Intermediate Steps — For treatment residuals that appear only at intermediate steps of a treatment train, there is no obligation to determine UHCs or to determine whether the residual is itself characteristic. The determination of whether a new hazardous waste is generated is made at the completion of the treatment process.

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tanks. We view the rinsate from an "empty" tank to be a newly generated wastewater and thus the high TOC ignitable treatment standards do not attach, unless the wastewater continues to exhibit the D001 high-TOC characteristic.

- **Toxicity Characteristic Metal Constituents Concentrated During Treatment** — During certain treatment processes, metal constituents may be concentrated in the residual above the toxicity characteristic level. We regard generation of a new characteristic treatment residual as being a new point of generation for LDR purposes. In accordance with treatment standards, this newly-formed hazardous waste would have to be treated to below the characteristic, and any underlying hazardous constituents (UHCs) would have to be treated to at or below their UTS levels. For example, D007 chromium waste with a significant quantity of organics is incinerated, but contains trace quantities of lead. The lead levels before incineration are below UTS levels (and are thus not UHCs according to 40 *CFR* 268.2(i)). The resulting ash is no longer characteristic for chromium, but lead is now present in the ash above the toxicity characteristic level for D008 lead. Since the treatment residuals are themselves characteristic due to a new property (in this example, lead), then the treater must make a new determination of the UHCs present — either through knowledge or additional testing. See section 3.4.1 for more detail about the your obligation to treat UHCs that concentrate above the UTS level during treatment.

- **Recycling/Residues** — Residues remaining in a recycling unit are considered a newly generated waste. This interpretation is made in reference to the applicability of generator standards. For the purposes of accumulation, since the residues are newly generated, they can be stored for accumulation for 90 or 180 days following generation without requiring a RCRA permit (40 *CFR* 262.34).

8.3 Site Remediation Issues

When we first developed treatment standards for hazardous wastes, the Agency based the standards on the wastes as they were first generated. Therefore, treatment standard methods and levels were all based on the form and matrix of the waste that were generated straight out of industrial processes. We soon

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realized, however, that wastes can be generated in many different forms during remediation operations. Soils, debris, sludges, and contaminated materials can all be generated during remediation and qualify as hazardous waste. We found that, in many cases, the treatment standards were so technology-intense that operators of remediation operations sought to leave the waste in place, rather than remediating and treating the contaminated materials prior to disposal in a hazardous waste protective landfill. We decided that it would be far more desirable to provide some relief from the LDR regulations to provide incentives to perform the remediation and significantly reduce the environment and health risks associated with the contamination. The following regulations and guidance were issued, at least in part, to assist with remediation:

- Soil and Debris Alternative Treatment Standards (Discussed in Section 4.1 for Debris and 4.2 for Soil);
- Treatability Variances (Discussed in Section 7.4);
- Area of Contamination Policy;
- Corrective Action Management Units; and
- Temporary Units.

In what is typically referred to as the area of contamination (AOC) policy, EPA interprets RCRA to allow certain discrete areas of generally dispersed contamination to be considered RCRA units (usually landfills). Because an AOC is equated to a RCRA land-based unit, consolidation and *in situ* treatment of hazardous waste within the AOC do not create a new point of hazardous waste generation for purposes of RCRA. This interpretation allows wastes to be consolidated or treated *in situ* within an AOC without triggering land disposal restrictions or minimum technology requirements.

Area of Contamination (AOC)
EPA equates a discrete area of generally dispersed contamination to a RCRA unit. An AOC is a RCRA unit where contamination is contiguous and of similar nature, but not necessarily homogenous. For more information, the most recent EPA guidance is a March 25, 1996 EPA letter titled, "Use of the Area of Contamination Concept During RCRA Cleanups." (Available from the RCRA Call Center, or http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#memos.)

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Contaminated soil can also be managed onsite through the use of a corrective action management unit (CAMU) and temporary unit (TU). This allows an area of land at a facility to be designated a CAMU and receive remediation wastes without triggering LDR standards or minimum technological requirements (MTRs). Under the CAMU rule, EPA and authorized states may develop and impose site-specific design, operating, closure, and post-closure requirements for CAMUs in lieu of minimum technological requirements for land-based units. Although there is a strong preference for use of CAMUs to facilitate treatment, remediation waste placed in approved CAMUs does not have to meet LDR treatment standards. CAMUs must be approved by EPA or an authorized state and designated in a permit or corrective action order.[1]

The main differences between CAMUs and the AOC policy are that when a CAMU is used, waste may be treated *ex situ* and then placed in a CAMU, CAMUs may be located in uncontaminated areas at a facility, and wastes may be consolidated into CAMUs from areas that are not contiguously contaminated. None of these activities are allowed under the AOC policy, which, as discussed above, covers only consolidation and *in situ* management techniques carried out within an AOC.

For further guidance, refer to the following documents:

- A memorandum entitled, "*Use of Site-Specific Land Disposal Restriction Treatability Variances Under 40 CFR 268.44(h) During Cleanups,*" (Available from the RCRA Call Center or on the EPA Home Page at http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#memos.)
- *Variance Assistance Document: Land Disposal Restrictions Treatability Variances & Determinations of Equivalent Treatment*. (available from the RCRA Call Center or on the EPA Home Page at http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#variance.)
- For more information about AOCs and CAMUs, as well as other topics pertaining to remediation, refer to the memorandum entitled,"*Management of Remediation Wastes Under RCRA,*" October 14, 1998, in Appendix C.

[1]On August 22, 2000 (65 *FR* 51080), EPA proposed amendments to the CAMU standards. If finalized, the proposed amendments would modify the types of waste that may be managed in CAMUs, the design standards that apply to CAMUs, the treatment requirements for wastes placed in CAMUs, information submission requirements for CAMU applications, responses to releases from CAMUs, and public participation requirements for CAMU decisions. However, the CAMU would still be exempt from LDR and MTR standards.

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IX. HISTORICAL CONTEXT

9.1 What Is the Purpose of this Chapter?

Chapter 9 provides a historical context to the LDR program because it may be helpful to understand how this program evolved and why certain provisions in the LDR program were promulgated.

9.2 HSWA Mandate

When the Hazardous and Solid Waste Amendments (HSWA) to RCRA were passed in 1984, Congress added a new Land Disposal Restriction program to the RCRA framework. The statute at section 3004(m) required that the EPA promulgate treatment standards for hazardous waste to substantially diminish the toxicity or mobility of hazardous wastes so that short- and long-term threats to human health and the environment are minimized. In response, we developed a series of rulemakings under the LDR Program setting forth standards for treatment of hazardous wastes destined for land disposal.

9.3 Early Rulemakings

Under HSWA, we were required to promulgate land disposal restriction treatment standards by May 8, 1990 for all wastes listed or identified as hazardous at the time of the amendments. To achieve this, Congress created a time frame for the implementation of treatment standards for all wastes which were in existence prior to HSWA. This time frame consisted of initial rulemakings to account for highly hazardous or wide-spread wastes, and a three-part schedule to address the remaining wastes by certain deadlines. The rulemakings that made up the three-part schedule are commonly called the "thirds." The rules are referred to as follows:

- the Solvents and Dioxins rule;
- the California List rule;
- the First Third rule;
- the Second Third rule; and
- the Third Third rule.

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9.4 The Phases

For wastes identified or listed as hazardous *after* the 1984 amendments, we were to promulgate land disposal restriction treatment standards within six months of the date that the listing or identification became final. We did not meet the latter requirements and, subsequently, were sued by the Environmental Defense Fund (EDF). In a signed consent decree in *EDF v. EPA*, we agreed to a schedule for completing land disposal restrictions treatment standards for the remaining hazardous wastes.

In a separate court action, we were sued by Chemical Waste Management (*CWM v. EPA*) on existing treatment standards for characteristic waste (established in the Third Third rule). In its decision, the court ruled that characteristic wastes must be treated to address the possible existence of underlying hazardous constituents. This ruling originally applied to both land disposal of characteristic hazardous waste and management in a land-based system regulated under the Clean Water Act (CWA) or the Safe Drinking Water Act (SDWA).

Combined, these two court cases had a massive impact on the LDR program. *EDF v. EPA* established an aggressive schedule for completion of outstanding land disposal restriction treatment standards. *CWM v. EPA* forced us to reconsider existing treatment standards for characteristic wastes and to develop new approaches for the management of wastewaters in land-based units. In response to these two court decisions, we promulgated four different rulemakings (or phases) between 1991 and 1998.

On March 26, 1996, only days before the Phase III rule was published as final, President Clinton signed into law the Land Disposal Program Flexibility Act of 1996. This law changed the portion of *CWM vs. EPA* requiring treatment of underlying hazardous constituents for characteristic wastes in CWA, Clean Water Act-equivalent, and SDWA Class I injection well systems that use land based units.

With completion of the Phase IV final rule, we have now established a treatment standard for all listed and newly identified hazardous wastes. For wastes that are listed after the Phase IV rulemaking, we will now promulgate an LDR treatment standard with the listing decision.

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9.5 Historical Research

You may be performing historical research for a number of reasons. The most common reason is that you may be researching a site with historical contamination (perhaps under a RCRA corrective action or Superfund action), and you need to know whether the waste was disposed in compliance with the LDR regulations at the time of disposal. In this case (or in a similar scenario), the easiest reference point is in the regulations: 40 *CFR* Part 268, Appendix VII, contains all LDR effective dates for all surface disposed listed wastes as of the final LDR Phase IV rulemaking. 40 *CFR* Part 268, Appendix VIII, contains all LDR effective dates for underground injection wastes as of the final LDR Phase IV rulemaking. This information is organized by waste code. (For detailed information about Phase IV effective dates, see an EPA guidance memorandum from Elizabeth A. Cotsworth to RCRA Senior Policy Advisors, Regions I–X, "Phase IV Land Disposal Restrictions Rule — Clarification of Effective Dates," October 19, 1998, available from the RCRA Call Center or on the EPA Home Page at http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html#memos.)

Alternatively, you may be performing detailed historical research about a regulation, regulatory interpretation or about the formation of a treatment standard. In this case, you will need to consult the *Federal Registers* that were published to implement the LDR program and associated docket materials. It is often helpful to revisit past *Federal Registers* when trying to understand the development of provisions in the regulations. It is important to note, however, that over time significant changes have been made to the LDR program and in some instances the information contained in past rulemakings may no longer be applicable. The following list is a compilation in chronological order of the major *Federal Registers* which promulgated the LDR regulations. For an exhaustive list of *Federal Registers* that promulgated the LDR regulations, see the EPA home page at http://www.epa.gov/epaoswer/hazwaste/ldr/rules.html or contact the RCRA Call Center. Most *Federal Registers* from 1993 to present are available on-line at the address shown above. If you do not have access to the Internet or you would like to order a hard copy of any of the *Federal Registers*, please contact the RCRA Call Center (at (800) 424-9346 or (703) 412-9810 in the Washington, DC metropolitan area).

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Figure 9-1. Land Disposal Restrictions Regulation *Federal Registers*

Date	*Federal Register*[1]	Contents
January 14, 1986	51 *FR* 1602	Proposed LDR Framework
May 28, 1986	51 *FR* 19305	Provides Implementation Schedule
November 7, 1986	51 *FR* 40636	Solvents and Dioxins Rule
December 11, 1986	51 *FR* 44714	"California List Wastes" Proposed Rule
June 4, 1987	52 *FR* 21014	Corrections to November 7, 1986 Rule
July 8, 1987	52 *FR* 25787	"California List Wastes" (halogenated wastes, certain metal-bearing wastes, polychlorinated biphenyls (PCBs), and cyanide and corrosive wastes)
April 8, 1988	53 *FR* 11742	"First Third" Wastes Proposed Rule: Part One
May 17, 1988	53 *FR* 17578	"First Third" Wastes Proposed Rule: Part Two
July 26, 1988	53 *FR* 28118	Underground Injection Control (UIC): Solvents and Dioxins
August 16, 1988	53 *FR* 30908	UIC: California List and some "First Third" Wastes
August 17, 1988	53 *FR* 31211	"First Third" Wastes
Jan. 11, 1989	54 *FR* 1058	"Second Third" of Scheduled Hazardous Wastes: Proposed Rule
February 27, 1989	54 *FR* 18266	Amendment to Schedule for Multisource Leachate
May 2, 1989	54 *FR* 18837	Amendments to "First Third" Rule
June 14, 1989	54 *FR* 25422	UIC: "Second Third" Wastes
June 14, 1989	54 *FR* 25422	UIC: "Third Third" Wastes
June 23, 1989	54 *FR* 26647	"Second Third" Wastes
September 6, 1989	54 *FR* 36970	Corrections to August 17, 1988 and May 2, 1989 "First Third" Rules
November 22, 1989	54 *FR* 48372	"Third Third" Wastes Proposed Rule
February 26, 1990	55 *FR* 6640	LDR, Response to Court Remand
March 29, 1990	55 *FR* 11798	Toxicity Characteristic Revisions: Final Rule
June 1, 1990	55 *FR* 22520	"Third Third" Wastes and Characteristic Wastes (D001–D017)
June 13, 1990	55 *FR* 23935	Corrections to September 6, 1989 Rule
January 31, 1991	56 *FR* 3876	"Third Third" and Characteristic Wastes Technical Correction Notice
April 12, 1991	56 *FR* 15020	LDR Regulation of Electric Arc Furnace Dust (K061): Proposed Rule
May 30, 1991	56 *FR* 24444	LDR, Treatment Standards for Newly Identified Wastes and Debris: Advance Notice of Proposed Rulemaking
August 19, 1991	56 *FR* 41164	LDR, Regulation of Electric Arc Furnace Dust (K061): Final Rule
August 29, 1991	56 *FR* 42730	Enforcement of Storage Prohibitions, Policy Statement
October 24, 1991	56 *FR* 55160	LDR, Newly Identified Hazardous Wastes and Contaminated Soil, Advance Notice of Proposed Rulemaking
January 9, 1992	57 *FR* 958	"Phase I" LDRs Proposed Rule
February 4, 1992	57 *FR* 4172	LDR Surface Impoundment Retrofitting Deadline: Proposed Rule
March 6, 1992	57 *FR* 8086	"Third Third" and Characteristic Waste Second Technical Correction Notice
May 15, 1992	57 *FR* 20766	LDR Contaminated Debris Generic Case-By-Case Extension: Notice to Approve
May 26, 1992	57 *FR* 22024	LDR DOE Mixed Waste Extension: Notice of Proposed Decision to Grant
June 26, 1992	57 *FR* 28628	LDR Case-By-Case Extension (for lead-bearing hazardous materials): Notice to Approve
July 20, 1992	57 *FR* 31962	Stay of March 6, 1992 Technical Amendment for UIC
August 11, 1992	57 *FR* 35940	LDR "No Migration" Variances (interpretation): Proposed Rule
August 18, 1992	57 *FR* 37194	"Phase I" LDRs: Newly Listed Hazardous Waste and Debris
October 20, 1992	57 *FR* 47772	LDR Generic Case-by-Case Capacity Variance for Hazardous Soils: Approval

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Date	*Federal Register*[1]	Contents
March 17, 1993	58 *FR* 14317	"Third Third" rule: suspends portions of the March 6, 1992 technical amendment regarding reactive sulfide and reactive cyanide wastes
May 14, 1993	58 *FR* 28506	Renewal of Capacity Variance for Hazardous Debris
May 24, 1993	58 *FR* 29860	"Third Third" Wastes Emergency Rule for D001 and D002 Wastes
September 14, 1993	58 *FR 48092*	"Phase II" LDRs Proposed Rule
March 8, 1994	59 *FR* 10788	LDR, Phase II–Newly Identified Wastes and Contaminated Soil: Clarification
April 20, 1994	59 *FR* 18813	Enforcement Policy on Storage of Mixed Wastes, Policy Statement
May 27, 1994	59 *FR* 27546	LDR Clarification of the Dilution Prohibition and Combustion of Metal-Bearing Wastes: Notice of Availability
September 19, 1994	59 *FR* 47980	LDR Testing and Monitoring Activities: Final Rule Correction of August 31, 1993 *FR* notice
September 19, 1994	59 *FR* 47982	"Phase II" LDRs: Universal Treatment Standards and TC Organic Wastes
January 3, 1995	60 *FR* 242	"Phase II" LDRs: Technical Amendments
March 2, 1995	60 *FR* 11702	"Phase III" LDRs Proposed Rule
August 22, 1995	60 *FR* 43654	"Phase IV" Proposed LDRs: Issues Associated With Clean Water Act Equivalency, and Treatment Standards for Wood Preserving and TC Metal Wastes
October 25, 1995	60 *FR* 54645	"Phase IV": Proposed Rule Correction
November 20, 1995	60 *FR* 57747	Identification and Listing of Petroleum Refining Wastes: Proposed Rule
January 25, 1996	61 *FR* 2338	"Phase IV" LDRs Proposed Supplemental Rulemaking on Mineral Processing Wastes
April 8, 1996	61 *FR* 15565	"Phase III" Final LDRs: Decharacterized Wastewaters, Carbamate Wastes, and Spent Potliners
April 8, 1996	61 *FR* 15660	"Phase III" LDRs: Partial Withdrawal
April 29, 1996	61 *FR* 11804	HWIR Media Proposed Rule
May 10, 1996	61 *FR* 21417	"Phase IV" LDRs: Notice of Data Availability
April 30, 1996	61 *FR* 19117	"Phase III" LDRs: Technical Correction Notice
June 28, 1996	61 *FR* 33680	"Phase III" LDRs: Technical Correction Notice
July 10, 1996	61 *FR* 36419	"Phase III" LDRs: Technical Correction Notice
August 16, 1996	61 *FR* 43924	Carbamate Wastes Final Rule
January 14, 1997	62 *FR* 1992	LDR Extension of the K088 Capacity Variance: Final Rule
February 19,1997	62 *FR* 7502	LDR Correction of Tables: Final Rule Reaction to November 1, 1996 Court Decision *Dithiocarbamate Task Force v. EPA*
March 5, 1997	62 *FR* 10004	"Phase IV" LDRs: Notice of Data Availability
May 12, 1997	62 *FR* 25998	"Phase IV" Final LDRs: Wood Preserving Wastes
May 12, 1997	62 *FR* 26041	"Phase IV" Second Supplemental Proposal
June 17, 1997	62 *FR* 32973	Carbamate Production Wastes, Vacates Listing and Treatment Standard: Final Rule
July 14, 1997	62 *FR* 37694	"Phase III" Emergency Extension of the K088 National Capacity Variance: Final Rule
August 28, 1997	62 *FR* 45568	"Phase III" Second Emergency Revision of Treatment Standards for Wastes From Carbamate Production: Immediate Final Rule
November 10, 1997	62 *FR* 60465	"Phase IV" LDRs: Notice of Data Availability
December 5, 1997	62 *FR* 64504	Clarification of Standards for Hazardous Waste LDR Treatment Variances
May 26, 1998	62 *FR* 28555	"Phase IV" Final LDRs
June 8, 1998	63 *FR* 31266	"Phase IV" LDRs: Technical Correction Notice
August 4, 1998	63 *FR* 41536	"Phase III" K088: Notice of Data Availability
August 6, 1998	63 *FR* 42110	Identification and Listing of New Petroleum Refining Wastes: Final Rule
August 31, 1998	63 *FR* 46332	LDR Hazardous Waste Recycling, Zinc Micronutrient Fertilizer: Final Rule
September 4, 1998	63 *FR* 47410	"Phase III" Emergency Revision of Treatment Standards for Carbamates: Final Rule

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Date	*Federal Register*[1]	Contents
September 24, 1998	63 *FR* 51254	Treatment Standards for Spent Aluminum Potliners (K088), Final Rule
May 11, 1999	63 *FR* 25409	"Phase IV" LDRs: Technical Correction Notice
May 28, 1999	64 *FR* 28949	Potential Revisions to the LDR Mercury Treatment Standards: Advance Notice of Proposed Rulemaking (ANPRM)
July 23, 1999	64 *FR* 40192	Identification and Listing of Dye and Pigment Wastes: Proposed Rulemaking
July 25, 1999	64 *FR* 46475	Identification and Listing of Chlorinated Aliphatics Production Wastes: Proposed Rule
July 27, 1999	64 *FR* 40534	Potential Revisions to the LDR Mercury Treatment Standards: ANPRM, Extension of Comment Period
October 20, 1999	64 *FR* 56469	"Phase IV" LDRs: technical correction notice to the May 11, 1999 *Federal Register* Notice
February 16, 2000	65 *FR* 7809	Deferral of Phase IV Standards for PCB's as a UHC in Soil: Proposed Rule
June 19, 2000	65 *FR* 37932	LDR Reinvention Advance Notice of Proposed Rulemaking
July 12, 2000	65 *FR* 42937	LDR Treatment Standards for Spent Aluminum Potliners (K088) and Regulatory Classification of Vitrification Units: Proposed Rule

[1] *Federal Register* (*FR*) citations (*e.g.*, 51 *FR* 19305) are read Volume 51 *Federal Register* page number 19305.

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Appendix A

Glossary of Terms

GLOSSARY OF TERMS

Some of the following definitions have been expanded to clarify the regulatory definitions. For the exact definition, please refer to the regulations at 40 CFR 260.10, 40 CFR 268.2, and 40 CFR 270.2.

Authorized State: means a State which has been approved or authorized by EPA under 40 CFR Part 271, The Requirements for Authorization of State Hazardous Waste Programs (see definition under 40 CFR 270.2).

California List: Effective July 8, 1987, this rule prohibited disposal (except by deep well injection) of California List wastes. California List wastes are liquid and nonliquid hazardous wastes containing HOCs above 1,000 ppm, and liquid hazardous wastes containing PCBs above 50 ppm, certain toxic metals above specified statutory concentrations, or corrosive liquid wastes that have a pH level below 2. This list is based on regulations developed by the California Department of Health Services. The treatment standards promulgated by the California list rule were superceded by the Phase IV rule, except for PCBs in soil. Please see the promulgating *Federal Register* for more details (65 *FR* 81373; December 26, 2000)

Certification: A written statement of professional opinion and intent signed by an authorized representative that acknowledges an owner or operator's compliance with applicable LDR requirements. Certifications are required for treatment surface impoundment exemption requests, applications for case-by-case extensions to an effective date, no-migration petitions, and waste analysis and recordkeeping provisions applicable to any person who generates, treats, stores, or disposes of hazardous wastes. The information referenced by the certification must be true, accurate, and complete and there are significant penalties for submitting false information, including fine and imprisonment.

Clean Water Act-equivalent System: A wastewater treatment system that engages in CWA-equivalent treatment before ultimate land disposal.

Clean Water Act-equivalent Treatment: Biological treatment for organics, alkaline chlorination or ferrous sulfate precipitation for cyanides, precipitation/sedimentation for metals, reduction of hexavalent chromium, or other treatment technology that can be demonstrated to perform equally or better than these technologies.

Containment Building: A completely enclosed hazardous waste management unit with self-supporting walls; floors of sufficient strength to support the structure, the waste, and heavy equipment and personnel; secondary containment; a liquid collection system; and fugitive dust controls.

Deactivation: Treatment of a characteristic hazardous waste to remove ignitability, corrosivity, or reactivity.

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Debris: Solid material exceeding a 60 mm particle size that is intended for disposal and that is: a manufactured object; or plant or animal matter; or natural geologic material. However, the following materials are not debris: any material for which a specific treatment standard is provided in 40 *CFR* Subpart D, Part 268, namely lead acid batteries, cadmium batteries, and radioactive lead solids; process residuals such as smelter slag and residues from the treatment of waste, wastewater, sludges, or air emission residues; and intact containers of hazardous waste that are not ruptured and that retain at least 75 percent of their original volume. A mixture of debris that has not been treated to the standards provided by 40 *CFR* 268.45 and other material is subject to regulation as debris if the mixture is comprised primarily of debris, by volume, based on visual inspection.

Extraction Procedure Toxicity Test: The Extraction Procedure Toxicity Test (EP Tox Test) is used to determine the toxicity characteristic of a waste. It has is now been largely replaced by the TCLP.

Facility: All contiguous land and structures or other appurtenances and improvements on the land, used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (*e.g.*, one or more landfills, surface impoundments, or combinations of them).

First Third Rule: Effective August 8, 1988, this rule prohibited the land disposal of 62 wastes and set restrictions on 121 others. It regulates some of the F-coded wastes such as bath solutions from electroplating processes, some of the K-coded wastes such as acetonitrile production wastes, and some of the P- and U-coded wastes, which are discarded commercial chemical products, such as formaldehyde.

Hazardous and Solid Waste Amendments (HSWA): Amendment to RCRA in 1984, that minimizes the Nation's reliance on land disposal of hazardous waste by, among other things, requiring EPA to evaluate all listed and characteristic hazardous wastes according to a strict schedule to determine which wastes should be restricted from land disposal.

Hazardous Constituent: Constituents listed in 40 *CFR* Part 261, Appendix VIII.

Hazardous Debris: Debris (see definition of debris) that contains a hazardous waste listed in 40 *CFR* Part 261, Subpart D or that exhibits a characteristic of hazardous waste identified in 40 *CFR* Part 261, Subpart C. Any deliberate mixing of prohibited hazardous waste with debris that changes its treatment classification (i.e., from waste to hazardous debris) is not allowed under the dilution prohibition in 40 *CFR* 268.3.

Hazardous Waste: Waste that because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

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Hazardous Waste Code: The number assigned by EPA to each hazardous waste listed in 40 *CFR* Part 261, Subpart D, and to each characteristic waste identified in 40 *CFR* Part 261, Subpart C.

Inorganic Metal-Bearing Waste: A waste for which EPA has established treatment standards for metal hazardous constituents, and which does not otherwise contain significant organic or cyanide content as described in 40 *CFR* 268.3(b)(1), and is specifically listed in 40 *CFR* Part 268, Appendix XI.

Lab Pack: A lab pack is an overpack container, usually a steel or fiber drum, containing small quantities of chemicals of the same hazardous class.

Land Disposal: Placement in or on the land, except in a corrective action management unit or staging pile, and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave, or placement in a concrete vault or bunker intended for disposal purposes.

Land Disposal Restrictions: Prohibit the land disposal of hazardous wastes into or on the land unless EPA finds that it will not endanger human health and the environment. EPA must develop levels or methods of treatment that substantially diminish the toxicity of the waste or the likelihood that hazardous constituents will migrate from the waste that must be met before the waste is land disposed. Strict statutory deadlines were imposed on EPA to regulate the land disposal of specific hazardous wastes, concentrating first on the most harmful. EPA has met all of the congressionally-mandated dates.

Nonwastewaters: Wastes that contain greater than or equal to 1 percent by weight total organic carbon (TOC) and greater than or equal to 1 percent by weight total suspended solids (TSS).

Notification: When restricted wastes are being shipped offsite for treatment, storage, disposal, or are managed onsite, EPA has established a tracking system that requires that notifications and certifications be sent to the receiving facility or, if applicable, to EPA or the appropriate EPA representative. These requirements are outlined in 40 *CFR* 268.7.

Phase I LDR Rule: Finalized on August 18, 1992, this rule prohibits land disposal of newly listed or identified wastes and establishes alternative treatment standards for hazardous debris.

Phase II LDR Rule: Finalized on September 19, 1994, This final rule promulgates treatment standards and effective dates for the toxicity characteristic organic wastes, coke by-products, and chlorotoulenes (D018-D043). This rule also promulgates Universal Treatment Standards.

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Phase III LDR Rule: Finalized on April 8, 1996, this final rule sets treatment standards and effective dates for wastes generated in the production of carbamate pesticides and aluminum potliners. In addition, the rule revises treatment standards for hazardous wastes displaying the reactivity characteristic so that the characteristic is removed and underlying hazardous constituents are treated. The rule also states that combustion of inorganic wastes may be a violation of the dilution prohibition.

Phase IV LDR Rule: Finalized on May 26, 1998, this final rule promulgates LDR treatment standards and effective dates for metal bearing-wastes, including those generated by mineral processing operations. The rule revises 12 metal Universal Treatment Standard constituents. The rule also defines which secondary materials from mineral processing are considered to be wastes and potentially subject to the LDRs. In addition, the rule sets alternative standards for contaminated soil. The rule also excludes shredded circuit boards used in recycling operations as well as specific wood preserving wastewaters from the definition of solid wastes.

Polychlorinated Biphenyls: Halogenated organic compounds defined in accordance with 40 *CFR* 761.3.

Resource Conservation and Recovery Act (RCRA): The Resource Conservation and Recovery Act of 1976 regulates hazardous waste generation, storage, transportation, treatment, and disposal. This Act was amended on November 8, 1984. The 1984 amendments, called HSWA, significantly expanded the scope and requirements of RCRA.

Restricted Waste: Hazardous waste that is prohibited from land disposal if applicable treatment standards are not met.

Second Third Rule: Effective June 8, 1989, this rule established treatment standards for 67 additional wastes and for the F-coded wastes not addressed in the First Third rulemaking. Besides specifying BDAT treatment standards, this rule expressed treatment standards as concentrations measured in the treatment residues or required specific treatment methods (such as incineration) for some wastes.

Soil: unconsolidated earth material composing the superficial geologic strata (material overlying bedrock), consisting of clay, silt, sand, or gravel size particles as classified by the U.S. Natural Resources Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made up primarily of soil by volume based on visual inspection. Any deliberate mixing of prohibited hazardous waste with soil that changes its treatment classification (i.e., from waste to contaminated soil) is not allowed under the dilution prohibition in 40 *CFR* 268.3.

Solvents and Dioxins Rule: Effective November 7, 1986, this rule prohibited further land disposal (except by deep well injection) of spent solvent wastes with EPA Hazardous Waste codes F001-F005, and dioxin wastes with hazardous waste codes F020-F023 and F026-F028, and required that these wastes be treated prior to land disposal.

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Subtitle C Facility: Hazardous wastes regulated under Subtitle C of RCRA are directed to Subtitle C treatment, storage, and disposal facilities (TSDFs).

Subtitle D Facility: Nonhazardous solid wastes regulated under Subtitle D of RCRA are directed to Subtitle D disposal facilities.

Third Third Rule: Effective May 8, 1990, this fifth and final rulemaking pursuant to the Congressionally- mandated dates, set treatment standards and imposed restrictions on 344 listed wastes and all characteristic wastes. Two-thirds of the listed wastes have treatment standards expressed as concentrations in the treated wastes, while the remaining wastes have treatment standards expressed as specific technologies.

Tolling Agreement: A tolling agreement is a contract between a small quantity generator and a recycling facility that arranges for collection and reclamation of a specified waste and for redelivery of regenerated material at a specified frequency.

Toxicity Characteristic Leaching Procedure (TCLP): Introduced in the November 7, 1986 Solvents and Dioxins rule, this testing procedure was specifically initiated for evaluation of the solvent- and dioxin-containing wastes. The Agency requires that when a waste extract is tested the TCLP is used to determine whether a waste requires treatment. Additionally, the TCLP is used to determine whether a waste is hazardous and serves as a monitoring technique to determine whether a treated waste meets the applicable waste extract treatment standard.

Treatment Standards: Concentration-based numerical levels or methods of treatment for constituents in hazardous waste, as shown in 40 *CFR* Part 268.

Underlying Hazardous Constituent: Any constituent listed in 40 *CFR* 268.48, Table UTS--Universal Treatment Standards, except vanadium, fluoride, selenium, sulfides, and zinc, 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.

Universal Treatment Standards: A single list of over 200 constituents for which LDR treatment standards have been developed. UTS standards apply to underlying hazardous constituents in decharacterized wastes and to constituents for which treatment standards are applicable in listed hazardous wastes.

Wastewaters: Wastes that contain less than 1 percent by weight total organic carbon (TOC) and less than 1 percent by weight total suspended solids (TSS).

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Appendix B

Regional Enforcement Contacts

REGIONAL ENFORCEMENT CONTACTS

EPA Region 1 (CT, MA, ME, NH, RI, VT)
Environmental Protection Agency
RCRA Technical Unit
1 Congress St., Suite 1100
Boston, MA 02114-2023
http://www.epa.gov/region01/
Phone: (617) 918-1111
Fax: (617) 565-3660
Toll free within Region 1: (888) 372-7341

EPA Region 2 (NJ, NY, PR, VI)
Environmental Protection Agency
RCRA Compliance Branch
290 Broadway
New York, NY 10007-1866
http://www/epa.gov/region02/
Phone: (212) 637-3000
Fax: (212)637-3526

EPA Region 3 (DC, DE, MD, PA, VA, WV)
Environmental Protection Agency
RCRA Compliance and
Enforcement Branch
1650 Arch Street
Philadelphia, PA 19103-2029
http://www/epa.gov/region03/
Phone: (215) 814-5000
Fax: (215) 814-5103
Toll free: (800) 438-2474
Email: r3public@epa.gov

EPA Region 4 (AL, FL, GA, KY, MS, NC, SC, TN)
Environmental Protection Agency
RCRA Enforcement and
Compliance Branch
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, GA 30303-3104
http://www.epa.gov/region04/
Phone: (404) 562-9900
Fax: (404) 562-8174
Toll free: (800) 241-1754

EPA Region 5 (IL, IN, MI, MN, OH, WI)
Environmental Protection Agency
RCRA Enforcement and
Compliance Branch
77 West Jackson Street
Chicago, IL 60604-3507
http://www.epa.gov/region05/
Phone: (312) 353-2000
Fax: (312) 353-4135
Toll free within Region 5: (800) 621-8431

EPA Region 6 (AR, LA, NM, OK, TX)
Environmental Protection Agency
Hazardous Waste Enforcement Branch
1445 Ross Avenue
Dallas, TX 75202-2733
http://www.epa.gov/region06/
Phone: (214) 665-2200
Fax: (214) 665-7113
Toll free within Region 6: (800) 887-6063

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EPA Region 7 (IA, KS, MO, NE)
Environmental Protection Agency
RCRA Enforcement Section
901 North 5th Street
Kansas City, KS 66101
http://www.epa.gov/region07/
Phone: (913) 551-7003
Toll free: (800) 223-0425

EPA Region 8 (CO, MT, ND, SD, UT, WY)
Environmental Protection Agency
RCRA Program Management Unit
999 18th Street, Suite 500
Denver, CO 80202-2466
http://www.epa.gov/region08/
Phone: (303) 312-6312
Fax: (303) 312-6339
Toll free: (800) 227-8917
Email: r8eisc@epa.gov

EPA Region 9 (AZ, CA, HI, NV)
Environmental Protection Agency
State Programs and Compliance Branch
75 Hawthorne Street
San Francisco, CA 94105
http://www.epa.gov/region09/
Phone: (415) 744-1305
Fax: (415) 744-2499

EPA Region 10 (AK, ID, OR, WA)
Environmental Protection Agency
RCRA Compliance Unit
1200 Sixth Avenue
Seattle, WA 98101
http://www.epa.gov/region10/
Phone: (206) 553-1200
Fax: (206) 553-0149
Toll free: (800) 424-4372

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Appendix C

Management of Remediation Wastes Under RCRA Memorandum

October 14, 1998

MEMORANDUM

SUBJECT: Management of Remediation Waste Under RCRA

TO: RCRA/CERCLA Senior Policy Managers
Regional Counsels

FROM: Timothy Fields, Jr., Acting Assistant Administrator for
Solid Waste and Emergency Response ***/signed/***

Steven A. Herman, Assistant Administrator for
Enforcement and Compliance Assurance ***/signed/***

Rapid clean up of RCRA corrective action facilities and Superfund sites is one of the Agency's highest priorities. In this context, we often receive questions about management of remediation waste under the Resource Conservation and Recovery Act (RCRA). To assist you in successfully implementing RCRA requirements for remediation waste, this memorandum consolidates existing guidance on the RCRA regulations and policies that most often affect remediation waste management. We encourage you to work with the regulations, policies and approaches outlined in this memorandum to achieve our cleanup goals as quickly and efficiently as possible.

Note that not all remediation wastes are subject to RCRA Subtitle C hazardous waste requirements. As with any other solid waste, remediation wastes are subject to RCRA Subtitle C only if they are listed or identified hazardous waste. Environmental media are subject to RCRA Subtitle C only if they contain listed hazardous waste, or exhibit a characteristic of hazardous waste. These distinctions are discussed more completely below.

The information in this memo is divided into three categories: information on regulations and policies that apply to all remediation waste; information on regulations and policies that apply only to contaminated media; and, information on regulations and policies that apply only to contaminated debris. Most of the references cited in this memo are available over the Internet. The Federal Register notices published after 1994 are available at www.access.gpo.gov/nara; the guidance memos and other EPA documents are available at www.epa.gov/correctiveaction. Federal Register notices and other documents are also available through the RCRA/CERCLA hotline: in Washington D.C., call (703) 412-9810; outside Washington D.C., call (800) 424-9346; and hearing impaired call (800) 553-7672. The hotline's hours are Monday - Friday, excluding

Federal holidays, 8:00 - 5:00, eastern standard time. Many EPA guidance memos and other documents may also be obtained through the RCRA/CERCLA hotline fax-back system. To obtain a list of documents available over the fax-back system, and fax-back system code numbers, call the RCRA/CERCLA hotline at the numbers listed above.

I hope this information will assist you as you continue to make protective, inclusive, and efficient cleanup decisions. If you have additional questions or require more information, please contact Robert Hall or Greg Madden, of our staffs, on (703) 308-8484 or (202) 564-4229 respectively.

Regulations and Policies that Apply to All Remediation Wastes

Area of Contamination Policy. In what is typically referred to as the area of contamination (AOC) policy, EPA interprets RCRA to allow certain discrete areas of generally dispersed contamination to be considered RCRA units (usually landfills). Because an AOC is equated to a RCRA land-based unit, consolidation and *in situ* treatment of hazardous waste within the AOC do not create a new point of hazardous waste generation for purposes of RCRA. This interpretation allows wastes to be consolidated or treated *in situ* within an AOC without triggering land disposal restrictions or minimum technology requirements. The AOC interpretation may be applied to any hazardous remediation waste (including non-media wastes) that is in or on the land. Note that the AOC policy only covers consolidation and other in situ waste management techniques carried out within an AOC. For *ex situ* waste management or transfer of wastes from one area of contamination to another, see discussion of corrective action management units, below.

The AOC policy was first articulated in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). See 53 FR 51444 for detailed discussion in proposed NCP preamble; 55 FR 8758-8760, March 8, 1990 for final NCP preamble discussion. See also, most recent EPA guidance, March 13, 1996 EPA memo, "Use of the Area of Contamination Concept During RCRA Cleanups."

Corrective Action Management Units (CAMUs). The corrective action management unit rule created a new type of RCRA unit – a Corrective Action Management Unit or CAMU -- specifically intended for treatment, storage and disposal of hazardous remediation waste. Under the CAMU rule, EPA and authorized states may develop and impose site-specific design, operating, closure and post-closure requirements for CAMUs in lieu of MTRs for land-based units. Although there is a strong preference for use of CAMUs to facilitate treatment, remediation waste placed in approved CAMUs does not have to meet LDR treatment standards.

The main differences between CAMUs and the AOC policy (discussed above) are that, when a CAMU is used, waste may be treated *ex situ* and then placed in a CAMU, CAMUs may be located in uncontaminated areas at a facility, and wastes may be consolidated into CAMUs from areas that are not contiguously contaminated. None of these activities are allowed under the AOC policy, which, as discussed above, covers only consolidation and *in situ* management techniques carried out within an AOC.

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CAMUs must be approved by EPA or an authorized state and designated in a permit or corrective action order. In certain circumstances, EPA and states (including states that are not authorized for the CAMU regulations) may use other mechanisms to approve CAMUs. See, 58 FR 8677, February 16, 1993; appropriate use of RCRA Section 7003 orders and comparable state orders is discussed below and in an EPA guidance memo from J. Winston Porter to EPA Regional Administrators, "RCRA Permit Requirements for State Superfund Actions," November 16, 1987, OSWER Directive 9522.00-2. In addition, as appropriate, CAMUs may be approved by EPA as an applicable or relevant and appropriate requirement during a CERCLA cleanup using a record of decision or by an authorized state during a state cleanup using a CERCLA-like authority and a similar state document. See, e.g., 58 FR 8679, February 16, 1993. An opportunity for the public to review and comment on tentative CAMU approvals is required by the regulations when CAMUs are approved using permitting procedures and as a matter of EPA policy when CAMUs are approved using orders. EPA recommends that, whenever possible, remediation project managers combine this public participation with other public involvement activities that are typically part of remediation. For example, public notice of tentative approval of a CAMU could be combined with public notice of a proposed plan under CERCLA.

The CAMU rule is currently subject to litigation; however, the suit has been stayed pending promulgation of the final HWIR-Media regulations. Although EPA proposed to withdraw CAMUs as part of the HWIR-Media proposal, the Agency now intends to retain the CAMU rule. The Agency encourages approval of CAMUs when they are appropriate given the site-specific conditions.

The CAMU regulations are at 40 CFR 264.552, promulgated February 16, 1993 (58 FR 8658). The differences between CAMUs and AOCs are discussed in more detail in the March 13, 1996 EPA guidance memo, "Use of the Area of Contamination Concept During RCRA Cleanups."

Corrective Action Temporary Units (TUs). Temporary units, like corrective action management units, are RCRA units established specifically for management of hazardous remediation waste. The regulations for temporary units (TUs) were promulgated at the same time as the regulations for corrective action management units. The CAMU regulations established land-based units for treatment, storage and disposal of remediation waste; the TU regulations established non-land based units for treatment and storage of hazardous remediation waste. Under the TU regulations, EPA and authorized states may modify existing MTR design, operating and closure standards for temporary tank and container units used to treat and store hazardous remediation waste. Temporary units may operate for one year, with an opportunity for a one year extension.

Like CAMUs, temporary units must be approved by EPA or an authorized state and designated in a permit or corrective action order. In certain circumstances, EPA and states (including states that are not authorized for the TU regulations) may use other mechanisms to approve TUs. See, 58 FR 8677, February 16, 1993; appropriate use of RCRA Section 7003 orders and comparable state orders is discussed below and in an EPA guidance memo from J. Winston Porter to EPA Regional Administrators, "RCRA Permit Requirements for State Superfund Actions," November 16, 1987, OSWER Directive 9522.00-2. In addition, as appropriate, TUs may be approved by EPA as an applicable or relevant and appropriate

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requirement during a CERCLA cleanup using a record of decision or by an authorized state during a state cleanup using a CERCLA-like authority and a similar state document. Placement of waste in tanks or containers, including temporary units, is not considered land disposal. Therefore, waste does not have to be treated to meet LDR treatment standards prior to being placed in a TU. Of course, LDRs must be met if hazardous remediation wastes are eventually land disposed, for example, after they are removed from the TU; however, if treatment in a TU results in constituent concentrations that comply with applicable land disposal restriction treatment standards, no further treatment prior to land disposal is required as a condition of the LDRs.

An opportunity for the public to review and comment on tentative TU approvals is required by the regulations when TUs are approved using permitting procedures and as a matter of EPA policy when TUs are approved using orders. As with CAMUs, EPA recommends that whenever possible, remediation project managers combine this public participation with other public involvement activities that are typically part of remediation. For example, public notice of tentative approval of a temporary unit could be combined with public notice of a proposed plan under CERCLA.

The TU regulations are at 40 CFR 264.553, promulgated February 16, 1993 (58 FR 8658).

Determination Of When Contamination is Caused by Listed Hazardous Waste. Where a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste but cannot make such a determination because documentation regarding a source of contamination, contaminant, or waste is unavailable or inconclusive, EPA has stated that one may assume the source, contaminant or waste is not listed hazardous waste and, therefore, provided the material in question does not exhibit a characteristic of hazardous waste, RCRA requirements do not apply. This approach was first articulated in the Proposed NCP preamble which notes that it is often necessary to know the source of a waste (or contaminant) to determine whether a waste is a listed hazardous waste under RCRA[1] and also notes that, "at many CERCLA sites no information exists on the source of the wastes." The proposed NCP preamble goes on to recommend that the lead agency use available site information such as manifests, storage records and vouchers in an effort to ascertain the sources of wastes or contaminants, but that when this documentation is not available or inconclusive the lead agency may assume that the wastes (or contaminants) are not listed RCRA hazardous wastes. This approach was confirmed in the final NCP preamble. See, 53 FR 51444, December 21, 1988 for proposed NCP preamble discussion; 55 FR 8758, March 13, 1990 for final NCP preamble discussion.

This approach was also discussed in the HWIR-Media proposal preamble, 61 FR 18805, April 29, 1996, where it was expanded to also cover dates of waste disposal – i.e., if, after a good faith effort to determine dates of disposal a facility owner/operator is unable to make such a determination because documentation of dates of disposal is unavailable or inconclusive, one may

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[1] Listing determinations are often particularly difficult in the remedial context because the listings are generally identified by the sources of the hazardous wastes rather than the concentrations of various hazardous constituents; therefore, analytical testing alone, without information on a waste's source, will not generally produce information that will conclusively indicate whether a given waste is a listed hazardous waste.

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assume disposal occurred prior to the effective date of applicable land disposal restrictions. This is important because, if hazardous waste was originally disposed of before the effective dates of applicable land disposal restrictions and media contaminated by the waste are determined not to contain hazardous waste when first generated (i.e., removed from the land, or area of contamination), the media are not subject to RCRA requirements, including LDRs. See the discussion of the contained-in policy, below.

Site Specific LDR Treatment Variances. The regulations for site-specific LDR treatment variances allow EPA and authorized states to establish a site-specific LDR treatment standard on a case-by-case basis when a nationally applicable treatment standard is unachieveable or inappropriate. Public notice and a reasonable opportunity for public comment must be provided before granting or denying a site-specific LDR treatment variance. EPA recommends that remediation project managers combine this public involvement with other public involvement activities that are typically part of remediation. Regulations governing site-specific LDR treatment variances are at 40 CFR 268.44(h), promulgated August 17, 1988 (53 FR 31199) and clarified December 5, 1997 (62 FR 64504). The most recent EPA guidance on site-specific LDR treatment variances, which includes information on establishing alternative LDR treatment standards, is in the January 8, 1997 guidance memo, "Use of Site-Specific Land Disposal Restriction Treatability Variances Under 40 CFR 268.44(h) During Cleanups."

In 1996, EPA revised its policy on state authorization for site-specific LDR treatment variances and began encouraging states to become authorized to approve variances. See, HWIR-Media proposal, 61 FR 18828 (April 29, 1996).

On May 26, 1998, EPA promulgated additional site-specific land disposal restriction treatment variance opportunities specific to hazardous contaminated soil. These opportunities are discussed below.

Treatability Studies Exemption. The term "treatability study"as defined at 40 CFR 260.10 refers to a study in which a hazardous waste is subjected to a treatment process to determine: (1) whether the waste is amenable to the treatment process; (2) what pretreatment (if any) is required; (3) the optimal process conditions needed to achieve the desired treatment; (4) the efficiency of a treatment process for a specific waste or wastes; or, (5) the characteristics and volumes of residuals from a particular treatment process. Under regulations at 40 CFR 261.4(e) and (f), hazardous wastes managed during a treatability study are exempt from many RCRA Subtitle C requirements. The regulations limit the amount of waste that may be managed under an exempt treatability study to, generally, 1000 kg of hazardous waste or 1 kg of acutely hazardous waste per study. For contaminated environmental media, the volume limit is, generally, 10,000 kilograms of media that contain non-acutely hazardous waste and 2,500 kilograms of media that contain acutely hazardous waste per study. There are also limits on the types and lengths of studies that may be conducted under the exemption and record keeping and reporting requirements. Regulations governing treatability studies are at 40 CFR 261.4(e) and (f), associated preamble discussions at 52 FR 27290 (July 19, 1988) and 59 FR 8362 (February 18, 1994).

Exemption for Ninety Day Accumulation. Management of hazardous waste in tanks, containers, drip pads and containment buildings does not constitute land disposal. In addition,

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EPA has provided an exemption for generators of hazardous waste which allows them to accumulate (i.e., treat or store) hazardous waste at the site of generation in tanks, containers, drip pads or containment buildings for up to ninety days without RCRA interim status or a RCRA permit. Accumulation units must meet applicable design, operating, closure and post-closure standards. Because putting hazardous waste in a tank, container, drip pad or containment building is not considered land disposal, LDR treatment standards do not have to be met before putting waste in such units. LDRs must be met if hazardous wastes are eventually land disposed, for example, after they are removed from the accumulation unit; however, if treatment in an accumulation unit results in constituent concentrations that comply with applicable land disposal restriction treatment standards, no further treatment prior to land disposal is required as a condition of the LDRs. The exemption for ninety-day accumulation is found in regulations at 40 CFR 262.34; associated preamble discussion is at 51 FR at 10168 (March 24, 1986).

Permit Waivers. Under CERCLA Section 121(e), no Federal, state or local permit is required for on-site CERCLA response actions. EPA has interpreted CERCLA Section 121(e) to waive the requirement to obtain a permit and associated administrative and procedural requirements of permits, but not the substantive requirements that would be applied through permits.[2]

In addition, on a case-by-case basis, where there may be an imminent and substantial endangerment to human health or the environment, EPA has broad authority to require corrective action and other appropriate activities under RCRA Section 7003. Under RCRA Section 7003, EPA has the ability to waive both the requirement to obtain a permit and the substantive requirements that would be imposed through permits. When EPA uses RCRA Section 7003, however, the Agency seldom uses RCRA Section 7003 to waive substantive requirements. In rare situations where substantive requirements are waived, the Agency would impose alternative requirements (e.g, waste treatment or storage requirements) as necessary to ensure protection of human health and the environment. EPA may issue RCRA Section 7003 orders at, among other sites, facilities that have been issued RCRA permits and facilities that are authorized to operate under RCRA interim status. In discussing the use of 7003 orders, where other permit authorities are available to abate potential endangerments, EPA generally encourages use of those other permit authorities (e.g., 3005(c)(3) omnibus permitting authority) rather than RCRA Section 7003. Similarly, if RCRA Section 3008(h) or RCRA Section 3013 authority is available, EPA generally encourages use of these authorities rather than RCRA Section 7003. If permit authorities or non-RCRA Section 7003 enforcement authorities are inadequate, cannot be used to address the potential endangerment in a timely manner, or are otherwise inappropriate for the potential endangerment at issue, use of RCRA Section 7003 should be considered. See, "Guidance on the Use of Section 7003 of RCRA," U.S. EPA, Office of Enforcement and Compliance Assurance, October 1997.

In 1987, EPA issued guidance indicating that RCRA-authorized states with state waiver authorities comparable to CERCLA 121(e) or RCRA Section 7003 could use those state waiver authorities to waive RCRA requirements as long as the state did so in a manner no less stringent than that allowed under the corresponding Federal authorities. These waivers are most often

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[2] Note that, under certain circumstances, substantive requirements may be waived using CERCLA. See the ARAR waiver provisions at 40 CFR 300.430(f)(1)(ii)(C).

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used, as are the Federal waivers, to obviate the need to obtain a RCRA permit, rather than to eliminate substantive requirements. See, EPA guidance memo from J. Winston Porter to EPA Regional Administrators, "RCRA Permit Requirements for State Superfund Actions," November 16, 1987, OSWER Directive 9522.00-2.

Exemption from 40 CFR Part 264 Requirements for People Engaged in the Immediate Phase of a Spill Response. Regulations at 40 CFR 264.1(g)(8) provide that people engaged in treatment or containment activities are not subject to the requirements of 40 CFR part 264 if the activities are carried out during immediate response to: (1) a discharge of hazardous waste; (2) an imminent and substantial threat of a discharge of hazardous waste; (3) a discharge of a materials which, when discharged, becomes a hazardous waste; or, (4) an immediate threat to human health, public safety, property or the environment from the known or suspected presence of military munitions, other explosive material, or an explosive device. This means that, during the immediate phase of a spill response, hazardous waste management activities do not require hazardous waste permits (or interim status) and hazardous waste management units used during immediate response actions are not subject to RCRA design, operating, closure or post-closure requirements.

Of course, if hazardous waste treatment activities or other hazardous waste management activities continue after the immediate phase of a spill response is over, all applicable hazardous waste management and permitting requirements would apply. In addition, if spills occur at a facility that is already regulated under 40 CFR part 264, the facility owner/operator must continue to comply with all applicable requirements of 40 CFR Part 264 Subparts C (preparedness and prevention) and D (contingency plan and emergency procedures). See regulations at 40 CFR 260.1(g) and associated preamble discussion at 45 FR 76626 (November 19, 1980). See also, Sept. 29, 1986 memo from J. Winston Porter (EPA Assistant Administrator) to Fred Hansen interpreting the 40 CFR 264.1(g) regulations.

Changes During Interim Status to Comply with Corrective Action Requirements. Under regulations at 40 CFR 270.72(a)(5), an owner or operator of an interim status facility may make changes to provide for treatment, storage and disposal of remediation wastes in accordance with an interim status corrective action order issued by EPA under RCRA Section 3008(h) or other Federal authority, by an authorized state under comparable state authority, or by a court in a judicial action brought by EPA or an authorized state. These changes are limited to treatment, storage and disposal of remediation waste managed as a result of corrective action for releases at the facility in question; however, they are exempt from the reconstruction ban under 40 CFR 270.72(b). Under this provision, for example, EPA could approve a corrective action management unit for treatment of remediation waste using a 3008(h) order (or an authorized state could approve a CAMU using a similar state authority), even if that unit would otherwise amount to "reconstruction." Of course, units added at interim status facilities in accordance with this provision must meet all applicable unit requirements; for example, in the case of a CAMU, the CAMU requirements apply. See, regulations at 40 CFR 270.72(a)(5) promulgated March 7, 1989 and associated preamble discussion at 54 FR 9599.

Emergency Permits. In the event of an imminent and substantial endangerment to human health or the environment, EPA, or an authorized state, may issue a temporary emergency permit for treatment, storage or disposal of hazardous waste. Emergency permits may allow treatment,

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storage or disposal of hazardous waste at a non-permitted facility or at a permitted facility for waste not covered by the permit. Emergency permits may be oral or written. (If oral, they must be followed within five days by a written emergency permit.) Emergency permits must specify the hazardous wastes to be received and managed and the manner and location of their treatment, storage and disposal. Emergency permits may apply for up to ninety days, but may be terminated at any point if EPA, or an authorized state, determines that termination is appropriate to protect human health or the environment. Emergency permits must be accompanied by a public notice that meets the requirements of 40 CFR 124.10(b), including the name and address of the office approving the emergency permit, the name and location of the hazardous waste treatment, storage or disposal facility, a brief description of the wastes involved, the actions authorized and the reason for the authorization, and the duration of the emergency permit.

Emergency permits are exempt from all other requirements of 40 CFR part 270 and part 124; however, to the extent possible and not inconsistent with the emergency situation, they must incorporate all otherwise applicable requirements of 40 CFR part 270 and parts 264 and 266.

See, regulations at 40 CFR 270.61, originally promulgated as 40 CFR 122.27 on May 19, 1987 (45 FR 33326). EPA has also written a number of letters interpreting the emergency permit regulations, see, for example, November 3, 1992 letter to Mark Hansen, Environmental Products and Services Inc., from Sylvia Lowrance, Director Office of Solid Waste (available in the RCRA Permit Policy Compendium).

Temporary Authorizations at Permitted Facilities. Under regulations at 40 CFR 270.42(e), EPA, or an authorized state, may temporarily authorize a permittee for an activity that would be the subject of a class two or three permit modification in order to, among other things, facilitate timely implementation of closure or corrective action activities. Activities approved using a temporary authorization must comply with applicable requirements of 40 CFR part 264. Temporary authorizations are limited to 180 days, with an opportunity for an extension of 180 additional days. To obtain an extension of a temporary authorization, a permittee must have requested a class two or three permit modification for the activity covered in the temporary authorization. Public notification of temporary authorizations is accomplished by the permittee sending a notice about the temporary authorization to all persons on the facility mailing list and to appropriate state and local governments. See regulations at 40 CFR 270.42, promulgated on September 28, 1988, and associated preamble at 53 FR 37919.

Regulations and Policies that Apply to Contaminated Environmental Media Only

Contained-in policy. Contaminated environmental media, of itself, is not hazardous waste and, generally, is not subject to regulation under RCRA. Contaminated environmental media can become subject to regulation under RCRA if they "contain" hazardous waste. As discussed more fully below, EPA generally considers contaminated environmental media to contain hazardous waste: (1) when they exhibit a characteristic of hazardous waste; or, (2) when they are contaminated with concentrations of hazardous constituents from listed hazardous waste that are above health-based levels.

If contaminated environmental media contain hazardous waste, they are subject to all applicable RCRA requirements until they no longer contain hazardous waste. EPA considers

contaminated environmental media to no longer contain hazardous waste: (1) when they no longer exhibit a characteristic of hazardous waste; and (2) when concentrations of hazardous constituents from listed hazardous wastes are below health-based levels. Generally, contaminated environmental media that do not (or no longer) contain hazardous waste are not subject to any RCRA requirements; however, as discussed below, in some circumstances, contaminated environmental media that contained hazardous waste when first generated (i.e., first removed from the land, or area of contamination) remain subject to LDR treatment requirements even after they "no longer contain" hazardous waste.

The determination that any given volume of contaminated media does not contain hazardous waste is called a "contained-in determination." In the case of media that exhibit a characteristic of hazardous waste, the media are considered to "contain" hazardous waste for as long as they exhibit a characteristic. Once the characteristic is eliminated (e.g., through treatment), the media are no longer considered to "contain" hazardous waste. Since this determination can be made through relatively straightforward analytical testing, no formal "contained-in" determination by EPA or an authorized state is required. Just like determinations about whether waste has been adequately decharacterized, generators of contaminated media may make independent determinations as to whether the media exhibit a characteristic of hazardous waste. In the case of media that are contaminated by listed hazardous waste, current EPA guidance recommends that contained-in determinations be made based on direct exposure using a reasonable maximum exposure scenario and that conservative, health-based, standards be used to develop the site-specific health-based levels of hazardous constituents below which contaminated environmental media would be considered to no longer contain hazardous waste. Since this determination involves development of site-specific health-based levels, the approval of EPA or an authorized state is required.

In certain circumstances the, RCRA land disposal restrictions will continue to apply to contaminated media that has been determined not to contain hazardous waste. This is the case when contaminated media contain hazardous waste when they are first generated (i.e., removed from the land, or area of contamination) and are subsequently determined to no longer contain hazardous waste (e.g., after treatment), but still contain hazardous constituents at concentrations above land disposal restriction treatment standards. It is also the case when media are contaminated as a result of disposal of untreated (or insufficiently treated) listed hazardous waste after the effective date of an applicable LDR treatment requirement. Of course, if no land disposal will occur (e.g., the media will be legitimately recycled) the LDR treatment standards do not apply. In addition, contaminated environmental media determined not to contain any waste (i.e., it is just media, it does not contain solid or hazardous waste) would not be subject to any RCRA Subtitle C requirements, including the LDRs, regardless of the time of the "contained-in" determination.

The contained-in policy was first articulated in a November 13, 1986 EPA memorandum, "RCRA Regulatory Status of Contaminated Groundwater." It has been updated many times in Federal Register preambles, EPA memos and correspondence, see, e.g., 53 FR 31138, 31142, 31148 (Aug. 17, 1988), 57 FR 21450, 21453 (May 20, 1992), and detailed discussion in HWIR-Media proposal preamble, 61 FR 18795 (April 29, 1996). A detailed discussion of the continuing requirement that some soils which have been determined to no longer contain hazardous waste (but still contain solid waste) comply with land disposal treatment standards can be found in the

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HWIR-Media proposal preamble, 61 FR 18804; the September 15, 1996 letter from Michael Shapiro (EPA OSW Director) to Peter C. Wright (Monsanto Company); and the preamble to the LDR Phase IV rule, 63 FR 28617 (May 26, 1998).

Note that the contained-in policy applies only to environmental media (soil, ground water, surface water and sediments) and debris. The contained-in policy for environmental media has not been codified. As discussed below, the contained-in policy for hazardous debris was codified in 1992.

RCRA Section 3020(b) Exemption for Reinjection of Contaminated Ground Water. Under RCRA Section 3020(a), disposal of hazardous waste into or above a formation that contains an underground source of drinking water is generally prohibited. RCRA Section 3020(b) provides an exception for underground injection carried out in connection with certain remediation activities. Under RCRA Section 3020(b), injection of contaminated ground water back into the aquifer from which it was withdrawn is allowed if: (1) such injection is conducted as part of a response action under Section 104 or 106 of CERCLA or a RCRA corrective action intended to clean up such contamination; (2) the contaminated ground water is treated to substantially reduce hazardous constituents prior to reinjection; and, (3) the response action or corrective action will, on completion, be sufficient to protect human health and the environment. Approval of reinjection under RCRA Section 3020(b) can be included in approval of other cleanup activities, for example, as part of approval of a RCRA Statement of Basis or CERCLA Record of Decision. See, RCRA Section 3020(b), established as part of the 1984 HSWA amendments. See also, OSWER Directive 9234.1-06, "Applicable of Land Disposal Restrictions to RCRA and CERCLA Ground Water Treatment Reinjection Superfund Management Review: Recommendation No. 26," November 27, 1989.

LDR Treatment Standards for Contaminated Soils. On May 26, 1998, EPA promulgated land disposal restriction treatment standards specific to contaminated soils.[3] These treatment standards require that contaminated soils which will be land disposed be treated to reduce concentrations of hazardous constituents by 90 percent or meet hazardous constituent concentrations that are ten times the universal treatment standards (UTS), whichever is greater. (This is typically referred to as 90% capped by 10xUTS.) For contaminated soil that exhibits a characteristic of ignitable, reactive or corrosive hazardous waste, treatment must also eliminate the hazardous characteristic.

The soil treatment standards apply to all underlying hazardous constituents[4] reasonably expected to be present in any given volume of contaminated soil when such constituents are found at initial concentrations greater than ten times the UTS. For soil that exhibits a characteristic of toxic, ignitable, reactive or corrosive hazardous waste, treatment is also required for: (1) in the case of the toxicity characteristic, the characteristic constituent; and, (2) in the case of ignitability,

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[3] This rule, which also addresses a number of non-soil issues, has been challenged by a number of parties. To date, the parties have filed non-binding statements of issues only; however, based on those statements, it appears that, with the exception of the requirement that PCBs be included as an underlying hazardous constituent which has been challenged for both soil and non-soil wastes, the soil treatment standards are not included in the challenges.

[4] Except fluoride, selenium, sulfides, vanadium and zinc.

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reactivity or corrosivity, the characteristic property. Although treatment is required for each underlying hazardous constituent, it is not necessary to monitor soil for the entire list of underlying hazardous constituents. Generators of contaminated soil can reasonably apply knowledge of the likely contaminants present and use that knowledge to select appropriate underlying hazardous constituents, or classes of constituents, for monitoring. As with the LDR treatment standards for hazardous debris (discussed below), generators of contaminated soil may use either the applicable universal treatment standards for the contaminating hazardous waste or the soil treatment standards.

See, soil treatment standard regulations at 40 CFR 268.49, promulgated May 26, 1998 and associated preamble discussion at 63 FR 28602-28622.

Note that the soil treatment standards supersede the historic presumption that an LDR treatment variance is appropriate for contaminated soil. LDR treatment variances are still available for contaminated soil, provided the generator can show that an otherwise applicable treatment standard (i.e., the soil treatment standard) is unachieveable or inappropriate, as discussed above, or can show that a site-specific, risk-based treatment variance is proper, as discussed below.

Site-Specific, Risk-Based LDR Treatment Variance for Contaminated Soils. On May 26, 1998, EPA promulgated a new land disposal restriction treatment variance specific to contaminated soil. Under 40 CFR 268.44(h)(3), variances from otherwise applicable LDR treatment standards may be approved if it is determined that compliance with the treatment standards would result in treatment beyond the point at which short- and long-term threats to human health and the environment are minimized. This allows a site-specific, risk-based determination to supersede the technology-based LDR treatment standards under certain circumstances.

Alternative land disposal restriction treatment standards established through site specific, risk-based minimize threat variances should be within the range of values the Agency generally finds acceptable for risk-based cleanup levels. That is, for carcinogens, alternative treatment standards should ensure constituent concentrations that result in the total excess risk to an individual exposed over a lifetime generally falling within a range from 10^{-4} to 10^{-6}, using 10^{-6} as a point of departure and with a preference for achieving the more protective end of the risk range. For non-carcinogenic effects, alternative treatment standards should ensure constituent concentrations that an individual could be exposed to on a daily basis without appreciable risk of deleterious effect during a lifetime; in general, the hazard index should not exceed one (1). Constituent concentrations that achieve these levels should be calculated based on a reasonable maximum exposure scenario -- that is, based on an analysis of both the current and reasonable expected future land uses, with exposure parameters chosen based on a reasonable assessment of the maximum exposure that might occur; however, alternative LDR treatment standards may not be based on consideration of post-land disposal controls such as caps or other barriers.

See, regulations at 40 CFR 268.44(h)(4), promulgated May 26, 1998 and associated preamble discussion at 63 FR 28606-28608.

Regulations and Policies that Apply Only to Debris

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LDR Treatment Standards for Contaminated Debris. In 1992, EPA established land disposal restriction treatment standards specific to hazardous contaminated debris. The debris-specific treatment standards established by these regulations are based on application of common extraction, destruction, and containment debris treatment technologies and are expressed as specific technologies rather than numeric criteria. As with the contaminated soil treatment standards discussed earlier, generators of hazardous contaminated debris may choose between meeting either the debris treatment standards or the numerical treatment standard promulgated for the contaminating hazardous waste. See, regulations at 40 CFR 268.45, promulgated August 18, 1992, and associated preamble discussion at 57 FR 37194 and 27221.

Interpretation that Debris Treated to the LDR Debris Treatment Standards Using Extraction or Destruction Technologies no Longer Contain Hazardous Waste. With the land disposal restriction treatment standards for hazardous contaminated debris, in 1992, EPA determined that hazardous debris treated to comply with the debris treatment standards using one of the identified extraction or destruction technologies would be considered no longer to contain hazardous waste and would, therefore, no longer be subject to regulation under RCRA, provided the debris do not exhibit any of the hazardous waste characteristics. This "contained-in determination" is automatic; no agency action is needed. Note that this automatic contained-in determination does not apply to debris treated to the debris treatment standards using one of the identified immobilization technologies. See, regulations at 40 CFR 261.3(f) and treatment standards at Table 1 of 40 CFR 268.45, promulgated August 18, 1992, and associated preamble discussion at 51 FR 37225.

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Appendix D

Recommended Technologies to Achieve Deactivation of Characteristics

Recommended Technologies to Achieve Deactivation of Characteristics in 40 *CFR* 268.42

The treatment standard for many subcategories of D001, D002, and D003 wastes as well as for K044, K045, and K047 wastes are listed in 40 *CFR* 268.42 as "Deactivation to remove the characteristics of ignitability, corrosivity, and reactivity." EPA has determined that many technologies, when used alone or in combination, can achieve this standard. The following appendix presents a partial list of these technologies, utilizing the five letter technology codes established in 40 *CFR* 268.42, Table 1. Use of these specific technologies is not mandatory and does not preclude direct reuse, recovery, and/or the use of other pretreatment technologies, provided deactivation is achieved and these alternative methods are not performed in units designated as land disposal.

Waste code/subcategory	Nonwastewaters	Wastewaters
D001	RORGS INCIN CHOXD BIODG	n.a. WETOX
D001 Ignitable Liquids based on 261.21(a)(1)-Ignitable Wastewater Subcategory (containing ≤1% TOC)	n.a	RORGS INCIN WETOX CHOXD BIODG
D001 Compressed Gases based on 261.21(A)(3)	RCGAS INCIN FSUBS ADGAS fb. INCIN ADGAS fb. (CHOXD; or CHRED)	n.a.
D001 Ignitable Reactives based on 261.21(a)(2)	WTRRX CHOXD CHRED STABL INCIN	n.a.

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Waste code/subcategory	Nonwastewaters	Wastewaters
D001 Ignitable Oxidizers based on 261.21(a)(4)	CHRED	CHRED
	INCIN	INCIN
D002 Acid Subcategory based on 261.22(a)(1) with pH less than or equal to 2	RCORR	NEUTR
	NEUTR	INCIN
	INCIN	
D002 Alkaline Subcategory based on 261.22(a)(1) with pH greater than or equal to 12.5	NEUTR	NEUTR
	INCIN	INCIN
D002 Other Corrosives based on 261.22(a)(2)	CHOXD	CHOXD
	CHRED	CHRED
	INCIN	INCIN
	STABL	
D003 Water Reactives based on 261.23(a)(2), (3), and (4)	INCIN	n.a.
	WTRRX	
	CHOXD	
	CHRED	
D003 Reactive Sulfides based on 261.23(a)(5)	CHOXD	CHOXD
	CHRED	CHRED
	INCIN	BIODG
D003 Explosives based on 261.23(a)(6), (7), and (8)	INCIN	INCIN
	CHOXD	CHOXD
	CHRED	CHRED
		BIODG
		CARBN
D003 Other Reactives based on 261.23(a)(1)	INCIN	INCIN
	CHOXD	CHOXD
	CHRED	CHRED
		BIODG
		CARBN

Waste code/subcategory	Nonwastewaters	Wastewaters
K044 Wastewater treatment sludges from the manufacturing and processing of explosives	CHOXD . . . . . . CHRED . . . . . . INCIN	CHOXD CHRED BIODG CARBN INCIN
K045 Spent carbon from the treatment of wastewaters containing explosives	CHOXD . . . . . . CHRED . . . . . . INCIN	CHOXD CHRED BIODG CARBN INCIN
K047 Pink/red water from TNT operations	CHOXD . . . . . . CHRED . . . . . . INCIN	CHOXD CHRED BIODG CARBN INCIN

Note: 'n.a.' stands for 'not applicable'; 'fb.' stands for 'followed by.'

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