

# Fact Sheet on the Management of Dioxin Contaminated Soils

## Introduction

This fact sheet provides guidance on the proper management of dioxin-contaminated soils when carrying out the remedy selection process pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).<sup>1</sup> Regions should consider and evaluate proper management of dioxin-contaminated soils in a manner consistent with:

- CERCLA's overall remedy selection framework, including:
  - achieving protectiveness of human health and the environment,
  - compliance with applicable, or relevant and appropriate requirements [ARARs],
  - preference for treatment to the maximum extent practicable [MEP], and
  - adherence to the off-site rule;
- the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), including:
  - meeting programmatic expectations on restoring ground water to beneficial uses within a reasonable timeframe,
  - not relying exclusively on institutional controls [ICs], and
  - carrying out the nine criteria analysis;<sup>2</sup> and
- associated Superfund program guidance, including: *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*. OSWER 9200.1-23P; July 1999).<sup>3</sup>

---

<sup>1</sup> This document provides guidance to Regional staff regarding how the Agency intends to interpret and implement the NCP, which provides the blueprint for CERCLA implementation. However, this document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it cannot impose legally binding requirements on EPA, states, or the regulated community, and may not apply to a particular situation based upon the circumstances. Any decisions regarding a particular situation will be made based on the statute and the regulations, and EPA decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from the guidance, where appropriate.

<sup>2</sup> See 40 CFR 300.430(a). For example, 40 CFR 300.430(a)(1)(i) states "The national goal of the remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste." In addition, 40 CFR 300.430(a)(1)(iii)(A-F) includes the following statement: "EPA expects to use treatment to address the principal threats posed by a site, wherever practicable."

<sup>3</sup> See "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents" (OSWER 9200.1-23.p, July 1999.)

The CERCLA treatment to the MEP<sup>4</sup> requirement under Section 121(d) is a distinct requirement from Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (LDRs) and is not addressed in this fact sheet. A RCRA requirement (or site-specific determination) to treat or not to treat does not by itself constitute sufficient information to say that we have treated to MEP in accordance with CERCLA 121 CERCLA and the NCP (40 CFR 300.430(a)). Regions may also need to evaluate a number of additional factors concerning the proper management of dioxin-contaminated soils. This fact sheet also explores the potential relationship between dioxin-contaminated soils and the RCRA regulatory program, more specifically, the LDRs.

While this fact sheet's principle focus is the off-site management of soils, dioxin-contaminated soils may be managed either on site or off site in accordance with CERCLA, the NCP and Superfund guidance. This fact sheet highlights a number of guidance materials intended to help site managers determine whether dioxin-contaminated soils are best managed on or off site. Guidance materials that provide an overview of waste management materials, such as *Management of Remediation Waste Under RCRA* (October 1998; EPA 530-F-98-026, OSWER Memorandum) may be helpful in summarizing the requirements for compliance of off-site waste management. Under CERCLA and the NCP, on-site managed wastes are subject to ARARs, but are not subject to the non-substantive requirements, such as permitting. On the other hand, off-site waste management needs to comply with all substantive and non-substantive requirements of the applicable regulations.

---

<sup>4</sup> The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) focused the CERCLA 121(d) requirement to treat to the maximum extent practicable to wastes that are deemed a principal threat as noted as follows: "EPA expects that treatment will be the preferred means by which to address the principal threats posed by a site, wherever practicable. Principal threats are characterized as waste that cannot be reliably controlled in place, such as liquids, highly mobile materials (e.g., solvents), and high concentrations of toxic compounds (e.g., several orders of magnitude above levels that allow for unrestricted use and unlimited exposure). "(See 55 FR 8703, March 9, 1990)

## **RCRA Land Disposal Restrictions and Contaminated Soils**

### **General Applicability of LDRs to Contaminated Soils**

Contaminated soils are subject to LDRs, generally, when they contain a listed hazardous waste or exhibit a hazardous waste characteristic. However, on May 26, 1998, (63 FR 28556), EPA promulgated alternative treatment standards specific to contaminated soils. These standards were designed to encourage cost-effective cleanup of hazardous contaminated soils subject to LDRs and to address the unique characteristics of soils.<sup>5</sup> The 1998 standards require that contaminated soils be treated to either reduce concentrations of hazardous constituents by 90 percent or to meet hazardous constituent concentrations that are 10 x the universal treatment standard (UTS), whichever is greater. (This is typically referred to as 90 percent capped by 10 X UTS).<sup>6</sup>

If soil treatment achieves the 90 percent reduction standard or reduces individual constituent concentration to levels achieving the standard of 10X UTS, then further treatment is not required. Treatment for non-metals must achieve 90 percent reduction in total constituent concentrations. Treatment for metals must achieve 90 percent reduction as measured in leachate from the treated soils (testing according to the Toxicity Characteristic Leaching Procedure [TCLP]) when a metal stabilization treatment technology is used, and as measure in total constituent concentration when a metal removal technology is used.

For contaminated soils that also exhibit the characteristic of ignitability, reactivity, or corrosivity, Section 268.49(c)(2) requires that treatment must eliminate the hazardous property prior to land disposal.

A hazardous constituent is a regulated constituent specified in the treatment standard at 40 CFR 268.40, or it may be an underlying hazardous constituent (UHC). Any constituent that is listed in the UTS Table at Section 268.48, except for fluoride, selenium, sulfides, vanadium, and zinc, can be a UHC. When using the alternative soil treatment standard, all UHCs present at levels greater than 10 x UTS must be treated--regardless of whether the soils contain a listed waste or exhibits a characteristic when the soils are generated (i.e., excavated).<sup>7</sup>

Hazardous waste-contaminated soils added to 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; the alternative soil treatment standards cannot be used.

---

<sup>5</sup> Generators have the choice of using either the applicable universal treatment standards for the contaminated hazardous waste or the alternative soil treatment standards.

<sup>6</sup> As defined in section 268.2, "land disposal" means 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.

<sup>7</sup> For more information on appropriate use of knowledge of the waste, see EPA's *Waste Analysis at Facilities that Generate, Treat, Store, and Disposal of Hazardous Wastes: A Guidance Manual*, April 1994, available at <http://www.epa.gov/epaoswer/hazwaste/ldr/wap330.pdf>.

Determining whether or not LDRs apply to any given volume of contaminated soils can be complicated. To assist facility owner/operators or program implementers, it is important to understand the principles that govern LDR applicability for contaminated soils (see the May 26, 1998 final rule at 63 FR at 28617-18). These three principles state:

- Principle 1 - LDRs only attach to prohibited hazardous waste (or hazardous contaminated soils) when it is: (1) generated and (2) placed in a land disposal unit. If contaminated soils are not removed from the land, the LDRs do not apply. Similarly, if contaminated soils are removed from the land (i.e., generated) yet never placed in a land disposal unit, the LDRs do not apply, i.e., LDRs do not apply to contaminated soils *in situ* nor do they force contaminated soils to be excavated or removed.
- Principle 2 - Once a decision has been made to generate (i.e., excavate) and re-land dispose contaminated soils, LDRs generally only apply to contaminated soils that contain hazardous waste. The Agency considers soils to contain hazardous waste: (1) when it exhibits a characteristic of hazardous waste; and (2) when it is contaminated by listed hazardous wastes.<sup>8</sup>
- Principle 3 - Once LDRs attach to any given hazardous waste or volume of hazardous contaminated soils, the LDR treatment standards continue to apply until they are met. Contaminated soils subject to the LDRs may be treated to meet the waste-specific treatment standards at 40 CFR 268.40, or to meet the alternative soil treatment standards at 40 CFR 268.49. Once the treatment standards are met, treated characteristic waste may be disposed in a nonhazardous land disposal unit. For listed waste, the treated waste must be disposed in a RCRA Subtitle C land disposal unit.

Attachment A of this fact sheet provides specific examples on how to comply with the alternative RCRA LDR treatment standards for contaminated soils.

#### Determining Whether Contamination is Caused by a RCRA Characteristic or Listed Waste

- The regulations addressing the application of LDRs to soils exhibiting a characteristic of hazardous waste are relatively straightforward: such soils, when generated (i.e., excavated), are subject to the LDRs.
- For soils possibly contaminated with a listed waste, the identification process may become more complicated. In order to determine if given contaminated soils must comply with LDRs, one must know: (1) the origin of the material contaminating the soils (i.e., hazardous waste or not hazardous waste), (2) the date(s) the material was placed (i.e., before or after the effective date of the applicable land disposal prohibition), and (3) whether the soils still contain hazardous waste (i.e., a contained-in decision).

---

<sup>8</sup> The “contained-in principle” is the basis for EPA’s long-standing interpretation regarding application of the RCRA Subtitle C requirements to mixtures of contaminated media and hazardous wastes. Under the contained-in-policy, EPA requires that soil, although not waste itself, be managed as if it were hazardous waste if it contains hazardous waste or exhibits a characteristic of hazardous waste (63 FR at 28621, May 26, 1998). In practice EPA has applied the “contained-in principle” to refer to a process where a site-specific determination can be made that concentrations of hazardous constituents in any given volume of environmental media (e.g., soils) are low enough to determine that the media (e.g., soils) does not “contain” hazardous waste.

- Facility owner/operators and program implementers should make a good faith effort to determine if a material is contaminated by listed hazardous waste and ascertain the dates of placement. The Agency believes that by using available site- and waste-specific information, such as manifests, vouchers, bills of lading, sales and inventory records, storage records, sampling and analysis reports, site investigation reports, spill reports, inspection reports and logs, and enforcement orders and permits, these determinations may be made. However, if 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 a listed hazardous waste. Therefore, provided the material in question does not exhibit a characteristic of hazardous wastes, the RCRA hazardous waste requirements (including LDRs) do not apply (see 61 FR 18805, April 29, 1996).

#### Time of Waste Disposal and RCRA LDR Applicability

- The LDRs do not apply to soils contaminated with hazardous waste that were placed on the land before the effective dates of the applicable land disposal prohibitions. If the determination is made that the contaminating waste was placed on the land before the effective date, and if the soils are determined not to contain hazardous waste before they are removed from the land (i.e., excavated), then the soils can be managed as non-hazardous contaminated media and are not subject to LDRs (see 61 FR at 18805, April 29, 1996). Given the contained-in policy, the determination of whether LDRs apply and whether the waste still contains the hazardous waste will be critical to this decision.

#### Constituents Subject to Treatment Using the Alternative Soil Treatment Standards

- All contaminated soils subject to the LDRs (i.e., the contaminated soils either exhibit a hazardous waste characteristic or are contaminated with a RCRA listed waste and “contain” hazardous waste) must be treated to achieve the soils treatment standards for each UHC reasonably expected to be present in the soils at generation (i.e., excavation) when such constituents are initially found at concentrations greater than ten times UTS.
- In addition to treatment of all UHCs reasonably expected to be present in the soils at generation, soils exhibiting a hazardous waste characteristic must also be treated, in the case of toxicity characteristic (TC) soils, for the TC constituents, and in the case of ignitable, corrosive or reactive soils, for the applicable characteristic property.
- Generators of contaminated soils can reasonably apply knowledge of the likely contaminants present and use that knowledge to select the appropriate UHCs or classes of constituents for monitoring. This approach is consistent with those EPA typically takes in remedial programs, where the Agency emphasizes that remediation managers should focus investigations on constituents of concern and with regulations that allow generators to rely on knowledge to determine whether any given solid waste is hazardous.
- Finally, if using the alternative soil treatment standards, any treatment residues generated must also be treated to meet any other applicable LDR standards.

## Do I Have to Comply With RCRA LDRs?<sup>9</sup>

<b>If LDRs</b>	<b>And if LDRs</b>	<b>And if</b>	<b>Then you</b>
Applied to the listed waste when it contaminated the soil	Apply to the listed waste now	.....	Must comply with LDRs
Didn't apply to the listed waste when it contaminated the soil	Apply to the listed waste now	The soil is determined to contain the listed waste when the soil is first generated.	Must comply with LDRs
Didn't apply to the listed waste when it contaminated the soil	Apply to the listed waste now	The soil is determined not to contain the listed waste when the soil is first generated.	Needn't comply with LDRs. <sup>10</sup>
Didn't apply to the listed waste when it contaminated the soil	Don't apply to the listed waste now	.....	Needn't comply with LDRs

## Variations from the Soils Treatment Standards at Risk-Based Levels

- As part of the rule establishing alternative treatment standards for soils, EPA established a site-specific variance from the LDR treatment standards. The variance can be used when treatment to concentrations of hazardous constituents greater (i.e., higher) than those specified in the soils treatment standards minimizes short- and long-term threats to human health and the environment (See 40 CFR 268.44(h)). In this way, on a case-by case basis, risk-based LDR treatment standards approved through a variance process (see 40 CFR 268.44) could supersede the technology-based soils treatment standards. (The reader is referred to 40 CFR 268.44 for additional information on treatment variances and in particular those variances that pertain directly to contaminated soils.)
- The Agency is requiring that minimize threat variance determinations for contaminated soils be evaluated using the existing site-specific variance process set out in 40 CFR 268.44(h). Variances cannot be approved without the opportunity for public participation, including notice by appropriate means, opportunity for public comment and adequate explanation of an ultimate determination (see 63 FR at 28607 (May 26, 1998)).
- EPA anticipates that decisions about site-specific minimize threat variances will often be combined with decisions that soils no longer contains hazardous waste. Agency guidance on "contained-in" determinations is essentially the same as the requirements for site-specific risk-based minimize threat determinations (63 FR at 28607 (May 26, 1998). For that

<sup>9</sup> The reader is also referred to Attachment A which provides examples of applying the alternative LDR treatment standards for contaminated soils.

<sup>10</sup> This includes no requirement to dispose in a RCRA Subtitle C unit (see 63 FR 28618, May 26, 1998). Whether or not LDRs apply to contaminated soils is governed by a determination of whether any given volume of contaminated soils "contains" hazardous waste at its point of generation. If any given volume of soils is determined to contain hazardous waste at its point of generation, LDRs attach (principle 1 and 2, and therefore, the LDR treatment standards must be met prior to placement of such soils in a land disposal unit (principle 3). If any given volume of soils is determined not to contain hazardous waste at its point of generation, there is no hazardous waste to which a land disposal prohibition could attach and the soils thus, would not be prohibited from land disposal.

reason, EPA believes it will always be appropriate, though not required (see 63 FR at 28620 (May 26, 1998)) to combine a contained-in determination with a site-specific risk-based minimize threat variance. In these cases, EPA encourages program implementers and facility owners/operators to include information about the “contained-in” decision in the public notice of the variance.

- In cases where a site-specific minimize threat variance is combined with a decision that the soils no longer contain hazardous waste due to achieving the treatment standard imposed by the variance), the soils could be managed – including land disposed – without further control under RCRA Subtitle C. (see 63 FR at 28607 [May 26, 1998]).
- Site-specific determinations that threats are minimized cannot be based on the potential safety of land disposal units or engineered structures, such as liners, caps, slurry walls, or any other practice occurring after land disposal. (63 FR at 28607 (May 26, 1998)).

The reader is referred to Attachment B of this fact sheet for general information on the RCRA LDR program.

### **Applicability of RCRA LDRs to Dioxin Contaminated Soils**

Application of the same three LDR applicability principles will determine whether dioxin-contaminated soils are subject to RCRA’s LDR requirements. (LDRs may be applicable for waste disposed of on site or off site.)

- Principle 1 – LDRs only attach to dioxin-contaminated soils when they are: (1) generated (i.e., excavated) and (2) placed in a land disposal unit. If the dioxin-contaminated soils are not removed from the land, LDRs do not apply. Similarly, if dioxin-contaminated soils are removed from the land (i.e., generated) yet never placed in a land disposal unit, LDRs do not apply; that is, LDRs do not apply to dioxin-contaminated soils *in situ* and they do not require soils to be excavated or removed.<sup>11</sup> If contaminated soils are managed in an area of contamination (AOC), even if it is “removed from the land” within such an area, the soils would not be considered generated, and the LDR treatment requirements do not apply.
- Principle 2 - Once a decision has been made to generate (i.e., excavate) and re-land dispose the dioxin-contaminated soils, LDRs only apply to dioxin-contaminated soils that contain hazardous waste. The Agency considers dioxin-contaminated soils to contain hazardous waste: (1) when it exhibits a characteristic of hazardous waste; or (2) when it is contaminated with listed hazardous wastes.
  - If dioxin-contaminated soils do not exhibit a hazardous waste characteristic, LDRs do not apply.
  - If dioxin-contaminated soils cannot be linked through documentation to a listed waste, LDRs do not apply.

---

<sup>11</sup> Guidance on Demonstrating Compliance with the Land Disposal Restrictions (LDR) Alternative Soil Treatment Standard – Final Guidance. July 2002. EPA530-R-02-003. “Area of Contamination” (AOC) policy. 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 purpose of RCRA. This interpretation allows wastes to be consolidated or treated *in situ* within an AOC without triggering the land disposal restrictions or minimum technology requirements.

If it is determined that the dioxin-contaminated soils can be linked to any of the following waste codes, F020, F021, F022, F023, F026, F027, F028<sup>12</sup>, F032, F039, K043, K099, K174, and K178, LDRs may apply. These waste codes were either listed as hazardous because they contain “dioxins” or because “dioxins” are regulated constituents requiring treatment prior to land disposal under the LDR program (See Attachment B). If the dioxin-contaminated soils can be linked to a listed hazardous waste, determinations must then be made on whether (1) LDRs are applicable to the listed waste; and (2) whether the dioxin-contaminated soils contained the listed hazardous waste when they were first generated (i.e., excavated). If both these determinations are in the affirmative, LDRs apply.

- Principle 3 - Once LDRs attach to any dioxin-contaminated soils, LDR treatment standards continue to apply until they are met, unless a treatment variance is granted (40 CFR 268.44).

If the generated dioxin-contaminated soils are a characteristic hazardous waste, using the alternative soil treatment standards, the soils must be treated for the characteristic constituent, as well as any other underlying hazardous constituents reasonably expected to be present above 10 times the UTS (e.g., 10 ppb for the various dioxins and furans identified in 268.40.) After treatment is achieved, the contaminated soils may be disposed in a nonhazardous waste disposal unit.

If it is determined that the dioxin-contaminated soils are linked through documentation to a listed hazardous waste prohibited from land disposal and has been determined to contain the listed hazardous waste, then using the alternative soil treatment standards, the dioxin-contaminated soils must be treated for all UHCs reasonably expected to be present at levels above 10 times UTS. (Note: The requirement for listed hazardous waste to treat for all UHCs under the alternative soil treatment standards is a more comprehensive requirement than what is required for “as-generated” industrial listed hazardous waste found in 40 CFR 268.40, which only requires treatment for “regulated hazardous constituents” not all UHCs reasonably expected to be present (a requirement reserved only for characteristic wastes.)

Attachment C contains a list of RCRA hazardous wastes for which “dioxins” are regulated hazardous constituents requiring treatment under the RCRA LDR program.

---

<sup>12</sup> F028 is defined as residues resulting from the incineration or thermal treatment of soils contaminated with EPA hazardous waste F020, F021, F022, F023, F026 and F027. It is unclear whether soils contaminated with F028 would exist.



## **RCRA Requirements for Dioxin-Listed Wastes (F020-F023 and F026-F028)**

The Dioxin Listing Rule was promulgated on January 14, 1985 (50 FR 1987). This regulation designates certain wastes containing particular chlorinated dibenzo-p-dioxin (CDDs), chlorinated dibenzofurans (CDFs), and chlorinated phenols as acute hazardous waste. See RCRA hazardous waste listings F020-F023, F026-F028.

The rule also establishes stringent RCRA management standards for these wastes. The following criteria must be met in order to handle the listed dioxin-containing wastes:

- Land disposal facilities: - landfills, waste piles, surface impoundments and land treatment facilities must comply with the Part 264 requirements and additionally provide an acceptable waste management plan for the listed wastes ( see applicable standards in 40 CFR 264).

Hazardous waste combustion units – a hazardous waste combustor, as defined in 40 CFR 63.1201, must comply with standards for controlling emissions of hazardous air pollutants if it burns RCRA hazardous waste. These standards are codified in 40 CFR part 63, Subpart EEE. If a hazardous waste combustor elects to burn a dioxin-listed waste, Subpart EEE requires that the combustor achieve a (more stringent) destruction and removal efficiency (DRE) of at least 99.9999 percent. This requirement is codified in paragraph (c) for the applicable category of hazardous waste combustor in Sections 63.1216 through 63.1221. In addition, hazardous waste combustors are also subject to applicable requirements under 40 CFR parts 260 through 270. Attachment D of this fact sheet contains a list of commercial incinerators and landfills that are permitted and actively managing RCRA contaminated soils. While these facilities may not be specifically permitted to treat dioxin-contaminated soils, it provides a comprehensive list from which to identify potential treatment facilities.

## **Complying With the RCRA LDR Treatment Standard for Dioxin-Contaminated Soils**

Example 1 - Soils were contaminated with F020 waste. Based on sampling of the contaminated soils, it was determined that they contained 1.5 mg/kg of hexachlorodibenzofurans.

- *Waste-specific treatment standard.* The waste-specific treatment standard for hexachlorodibenzofurans in F020 waste is 0.001 mg/kg (nonwastewater).
- *Alternative soil treatment standards.* The alternative soil treatment standards mandate the reduction of hexachlorodibenzofurans in the soils by 90 percent or ten times the UTS, whichever is higher. Reduction of 1.5 mg/kg of hexachlorodibenzofurans in the soils by 90 percent would mean treating the contaminated soils to 0.15 mg/kg. The UTS for hexachlorodibenzofurans is 0.001 mg/kg (nonwastewater), so 10 times the UTS would be 0.01 mg/kg.
- A facility may treat the contaminated soils to meet the waste-specific treatment standard, or to meet the alternative soil treatment standards. In this particular case, the facility would likely select the alternative soil treatment standard of 0.15 mg/kg, since it is significantly higher than the waste-specific treatment standard of 0.001 mg/kg.

Example 2 - Soils were contaminated with F027 waste. Based on sampling of the contaminated soils, it was determined that they contained 100 mg/kg of pentachlorophenol.

- *Waste-specific treatment standard.* The waste-specific treatment standard for pentachlorophenol in F027 waste is 7.4 mg/kg (nonwastewater).
- *Alternative soil treatment standards.* The alternative soil treatment standards mandate the reduction of pentachlorophenol in the soils by 90 percent or ten times the UTS, whichever is higher. Reduction of 100 mg/kg of pentachlorophenol in the soils by 90 percent would mean treating the contaminated soils to 10 mg/kg. The UTS for pentachlorophenol is 7.4 mg/kg (nonwastewater), so 10 times the UTS would be 74 mg/kg.

A facility may treat the contaminated soils to meet the waste-specific treatment standard, or to meet the alternative soil treatment standards. In this particular case, the facility would likely select the alternative soil treatment standard of 74 mg/kg, since it is significantly higher than the waste-specific treatment standard of 7.4 mg/kg.

Attachment E of this fact sheet identifies LDR treatment standards for the specific dioxin-containing listed hazardous waste.

### **Disposal of Soils Containing Dioxin Not Subject to RCRA Requirements**

For soils that contain dioxin, but are not hazardous waste under RCRA or under state waste regulations, the following steps would apply:

- The dioxin-containing soils can be disposed of in any nonhazardous land disposal unit, including municipal or industrial landfills, that is permitted to accept the waste.
- For Superfund cleanups with off-site disposal, facilities accepting dioxin containing soils that are not hazardous waste must be in compliance with the off-site rule.
- In many cases, the contaminated soils will be sent to a Subtitle D landfill; however, there may be instances where, due to significant levels of dioxin in the soils, the decision is made to dispose of the contaminated soils in a Subtitle C landfill.

## ATTACHMENTS

## Attachment A

### Examples of Complying With the RCRA LDR Treatment Standard for Contaminated Soils

EXAMPLE 1 - Generator A is excavating soils mildly contaminated with wastewater treatment sludge F006. The sludge was land disposed before 1980. The soils do not exhibit a characteristic of hazardous waste and has been determined by an authorized state not to contain listed hazardous waste. The soils are not prohibited from land disposal. This is because, for LDR purposes, the point of generation is when the soils are first excavated from the land (principle 1)). Since no prohibited hazardous waste existed before that time (i.e., the contaminating waste was not prohibited) and the soils do not contain listed hazardous waste or exhibit a characteristic of hazardous waste at its point of generation, there is no hazardous waste to which a land disposal prohibition could attach (Principle 2).

EXAMPLE 2 - Generator B is excavating soils contaminated by leaks from a closing hazardous waste surface impoundment. The surface impoundment received listed hazardous waste K062 and characteristic hazardous waste D018. The surface impoundment stopped receiving K062 in 1987 and D018 in 1993. The soils do not exhibit a characteristic and has been determined by an authorized state not to contain listed hazardous waste. The soils are not prohibited from land disposal. This is because, for LDR purposes, the point of generation is when the soils are first excavated from the land (principle 1). Since no prohibited hazardous waste existed before that time and the soils do not contain listed wastes at their point of generation, there is no hazardous waste to which a land disposal prohibition could attach. (principle 2))

EXAMPLE 3 - Generator C is excavating soils contaminated with F024. F024 was land disposed after 1991, after it was prohibited from land disposal, and was not first treated to meet the applicable LDR treatment standards (i.e., it was illegally land disposed or accidentally spilled). Since the contaminating waste was prohibited from land disposal and the treatment standards were not achieved prior to land disposal, the LDR prohibition continues to apply to any soils contaminated by the waste (principle (3)) regardless of whether the soils “contain” hazardous waste when generated. The soils are prohibited from land disposal and, before land disposal, must be treated to meet applicable LDR standard or until a site-specific, risk-based minimized threat determination is made through the variance process.

EXAMPLE 4 - Generator D is excavating soils contaminated by an accidental spill of benzyl chloride, which, when discarded is P028 and are prohibited from land disposal. The accidental spill occurred yesterday. The contaminated waste was prohibited from land disposal and, since the treatment standards were not achieved prior to the accidental spill, the prohibition continues to apply to any soils contaminated by the waste (principle 3)). Thus, the soils are prohibited from land disposal and, before land disposal, must be treated to meet the applicable LDR treatment standards or until a site-specific, risk-based minimized threat determination is made through the variance process.

EXAMPLE 5 - Generator E is excavating soils contaminated by F004. The F004 waste was land disposed in 1984, prior to the effective date of an applicable land disposal prohibition; however, on **generation (excavation)**, the soils contain high concentrations of cresols, so that an authorized state determines they “contain” hazardous waste. The soils are prohibited from land disposal. Although the contaminating waste was not prohibited from land disposal at the time it was land disposed, since the soils contained hazardous waste at the point of generation, the land disposal prohibition attaches to the contaminated soils and must be treated to the LDRs or until a site-specific, risk-based minimized threat determination is made through the variance process (Principles (1), (2), and (3)).

**Attachment C**  
**RCRA Waste Codes with “Dioxins” as Regulated Hazardous Constituents Requiring Treatment as Part of the LDR Program<sup>13</sup>**

EPA Hazardous Waste No.	Hazardous Waste Description
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol.)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5-trichlorophenol.)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing Hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component.)
F028	Residues resulting from the incineration or thermal treatment of soils contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Waste and no other Hazardous Wastes retains its Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.)
K043	2,6-Dichlorophenol waste from the production of 2,4-D.
K099	Untreated wastewater from the production of 2,4-D.
K174	Wastewater treatment sludges from the production of ethylene dichloride or vinyl chloride monomer (including sludges that result from commingled ethylene dichloride or vinyl chloride monomer wastewater and other wastewater), unless the sludges meet the following conditions: (i) they are disposed of in a subtitle C or non-hazardous landfill licensed or permitted by the state or federal government; (ii) they are not otherwise placed on the land prior to final disposal; and (iii) the generator maintains documentation demonstrating that the waste was either disposed of in an on-site landfill or consigned to a transporter or disposal facility that provided a written

<sup>13</sup> These waste codes were either listed as hazardous because they contain “dioxins” or because “dioxins” are regulated constituents requiring treatment prior to land disposal under the LDR program

EPA Hazardous Waste No.	Hazardous Waste Description
	commitment to dispose of the waste in an off-site landfill. Respondents in any action brought to enforce the requirements of subtitle C must, upon a showing by the government that the respondent managed wastewater treatment sludges from the production of vinyl chloride monomer or ethylene dichloride, demonstrate that they meet the terms of the exclusion set forth above. In doing so, they must provide appropriate documentation (e.g., contracts between the generator and the landfill owner/operator, invoices documenting delivery of waste to landfill, etc.) that the terms of the exclusion were met
K178	Residues from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride-ilmenite process

Source: 40 CFR 261.31, 40 CFR 261.32, and 40 CFR 268.40..

## **Attachment B**

### **General Information about the Land Disposal Restrictions Program**

Under the authority of the Hazardous and Solid Waste Amendments of 1984 (HSWA), EPA developed the LDR program. The LDR program is codified at 40 CFR Part 268. Under Part 268, EPA has established treatment standards that dictate to what extent hazardous waste must be treated before it can be land disposed. EPA also has established minimum technical standards for managing restricted wastes, such as requirements for waste characterization and waste tracking (i.e., notifications/certifications).<sup>14</sup> In addition, EPA has established variances, case-by-case extensions to the effective date, and other mechanisms that provide flexibility in administering the LDR program.

The remainder of this attachment provides general information on:

- Waste-specific treatment standards;
- Alternative soil treatment standards;
- Notification, certification, and recordkeeping; and
- Variances, extensions, and exemptions.

This attachment only summarizes the particular provisions; refer to the specific statutory sections or specific regulatory requirements for details on meeting these particular requirements.

#### **Waste-Specific Treatment Standards**

LDR waste-specific treatment standards can be found at 40 CFR 268.40. These treatment standards can be either concentration levels for hazardous constituents that the waste must meet or treatment technologies that must be performed on the waste before it can be disposed. EPA bases the LDR treatment standards on the performance of available technologies that best minimizes the mobility or toxicity (or both) of the hazardous constituents, which is designated as the Best Demonstrated Available Technology (BDAT) for that waste.

When treatment standards are set as concentration levels, the regulated community may use any method or technology (except dilution) to meet that concentration level. However, when EPA designates a technology as a treatment standard, the regulated community must treat the waste with that specific technology (unless an equivalent treatment method variance is granted) in order to meet the treatment standard.

Both listed and characteristic hazardous wastes must meet the LDR treatment standards before they are eligible for land disposal. There are, however, some unique situations that arise when dealing with characteristic wastes (those with the letter “D” waste code designation) under the LDR Program. The treatment standards for characteristic hazardous wastes entail rendering the waste nonhazardous (i.e., de-characterizing the waste/removing the characteristic). However, characteristic hazardous wastes with UHCs have additional treatment requirements. UHCs are constituents that may not be the basis for a waste to exhibit a characteristic, but are reasonably expected to be in the waste **and can** pose hazards nonetheless. The UHCs must be treated in order to meet the contaminant-specific levels. These levels are referred to as the UTS levels, and are listed at 40 CFR 268.48. This is why some characteristic hazardous wastes that no longer exhibit a characteristic must still be treated to meet additional LDR

---

<sup>14</sup> Restricted waste is defined as hazardous waste that is prohibited from land disposal if applicable treatment standards are not met. (Land Disposal Restrictions: Summary of Requirements. United State Environmental Protection Agency. Offices of Solid Waste and Emergency Response and Enforcement and Compliance Assurance. EPA530-R-01-007. [www.epa.gov/osw](http://www.epa.gov/osw). Revised August 2001.)

requirements. Once such characteristic hazardous wastes have been de-characterized and treated to meet the UHCs, they can be disposed of in a nonhazardous waste land disposal unit.

### **Alternative Soil Treatment Standards**

Contaminated soils must be handled as hazardous waste if they contain a listed hazardous waste or if they exhibit a characteristic of hazardous waste. As with hazardous waste, land disposal of hazardous soil is prohibited until the soil has been treated to meet LDR treatment standards. These contaminated soils, due to either their large volume or unique properties, are not always amenable to the waste-specific treatment standards found at 40 CFR 268.40. Because of this, EPA promulgated alternative soil treatment standards at 40 CFR 268.49. The alternative soil treatment standards mandate the reduction of hazardous constituents in the soil by 90 percent or ten times the UTS, whichever is higher. Removal of the characteristic is also required if the soil is ignitable, corrosive, or reactive.

A facility may treat contaminated soils to meet the waste-specific treatment standard at 40 CFR 268.40, or to the alternative soil treatment standards at 40 CFR 268.49.

### **Notification, Certification, and Recordkeeping**

In order to properly track the hazardous waste that is generated, transported, treated, stored, and disposed of, EPA imposes certain LDR notification, certification, and recordkeeping requirements on generators and treatment, storage, and disposal facilities (TSDFs). LDR notifications inform the next waste handler whether the waste must be treated to meet the treatment standard or if it can be disposed of without treatment. When wastes do not need to meet a treatment standard, or already meet the standard, EPA requires the handler to sign a statement certifying such a claim.

- *Generators* must send a notification with the initial shipment of waste to each treatment, storage or disposal facility and keep a copy in their on-site files. If the waste, process, or receiving facility changes, another notification is required. The information that the notification must include varies according to the status of the waste. For example, the notification requirements will differ slightly if the waste meets its treatment standard or is subject to a national capacity variance. (40 CFR 268.7(a))
- *Treatment facilities* have to send similar notifications along with the shipment of the treated waste to disposal facilities and keep a copy in their on-site files. A certification normally accompanies this notification stating that the waste meets its treatment standards and may be land disposed. (40 CFR 268.7(b))
- *Disposal facilities* are the final link in the waste management chain. As a result, they have to test the waste residue that they receive to ensure that it meets the treatment standards. (40 CFR 268.7(c))

Each hazardous waste handler must comply with certain recordkeeping requirements for LDR notifications and paperwork. Generators, treatment facilities, and disposal facilities must keep copies of all LDR paperwork associated with the waste they ship or receive in their facility files for three years.

Characteristic wastes that are de-characterized subsequent to the point of generation (i.e., they become nonhazardous) are handled differently. Once a waste is de-characterized and has met LDR treatment standards, it can go to a RCRA subtitle D nonhazardous waste facility. Copies of these LDR notifications and certifications are sent to the EPA region or authorized state and placed in the facility's files rather than to the receiving subtitle D facility. However, this applies only to wastes that contain no listed hazardous wastes (some wastes may be listed and also exhibit a hazardous characteristic).



## Variations, Extensions, and Exemptions

The following variations, extensions, and exemptions allow wastes to be disposed of without meeting their respective treatment standards, or to be treated to a different standard:

- *National capacity variations (RCRA Section 3004(h)(2)).* When developing a treatment standard, EPA examines the available treatment capacity to determine whether it is sufficient to handle current and future waste management needs. If the Agency determines that nationally there is not enough capacity to treat a waste, EPA can extend the effective date of the waste's treatment standard for a maximum of two years. Wastes under a national capacity variance can be disposed of, without meeting the treatment standards, in landfills and surface impoundments that meet the minimum technical requirements. (Note: The national capacity variance applies when the Agency first promulgates the LDR treatment standards for the hazardous waste. Thus, this capacity variance would only apply for new hazardous waste.)
- *Case-by-case extensions (40 CFR 268.5).* A facility may petition EPA for a case-by-case extension to the national capacity variance to delay the effective date for one year, with a possible extension of an additional year of a waste's treatment standard, upon showing that capacity does not exist for that particular waste. Wastes granted case-by-case extensions can be disposed of without meeting the treatment standards in landfills and surface impoundments that meet the minimum technical requirements. (Note: The case-by-case extension applies after the national capacity variance expires, and may only be granted for one-year, with a possible extension of an additional year. Thus, this capacity variance would only apply for new hazardous wastes.)
- *No-migration variations (40 CFR 268.6).* No-migration variations apply to the disposal unit instead of to the waste, and allow wastes to be disposed of in the unit without meeting the treatment standards. To obtain a no-migration variance for a disposal unit, a facility must petition EPA and demonstrate that there will be no migration of the hazardous constituents from the unit for as long as the waste remains hazardous.
- *Variations from a treatment standard (40 CFR 268.44).* Variations from a treatment standard allow the regulated community to petition EPA and show that the required LDR treatment standard is not appropriate for their waste, or that the treatment standard is not achievable. If a variance is granted, EPA will specify an alternative treatment standard to meet.
- *Equivalent treatment method variations (40 CFR 268.42(b)).* Determinations of equivalent treatment allow the regulated community to petition EPA and demonstrate that a technology different from the required LDR treatment technology can achieve comparable results. If approved, the applicant can use the alternative treatment technology in place of the required technology.
- *Surface impoundment treatment exemptions (40 CFR 268.4).* Surface impoundment treatment exemptions allow the regulated community to petition EPA for permission to treat hazardous waste in surface impoundments. Under normal circumstances, owners and operators cannot place untreated hazardous waste on the land, even if it is in a land-based unit for treatment. Since many facilities use surface impoundments as a means of treating waste, the surface impoundment treatment exemption allows owners and operators to conduct such treatment under certain conditions. Surface impoundments treating waste under this exemption must comply with the double liner and minimum technical requirements, and provisions for the removal of sludges and treatment residues.

## Attachment D

### Commercial Hazardous Waste Incineration Facilities in the United States – Permitted and Actively Managing RCRA Contaminated Soils

EPA ID	Facility Name	Street Address	City	State	Zip Code	Phone	Contact/e-mail address
<b>EPA Region 5</b>							
ILD098642424	Veolia ES Technical Solutions LLC (Onyx Environmental Services)	7 Mobile Ave	Sauget	IL	62201	6182712804	Doug Harris
OHD048415665	Ross Incineration Services Inc.	36790 Giles Rd	Grafton	OH	44044-9586	4403662038	Eric Chokan, <a href="mailto:echokan@rossenvironmental.com">echokan@rossenvironmental.com</a>
OHD980613541	Heritage - WTI, Inc.	1250 Saint George St	East Liverpool	OH	43920	3303862167	John Audellas <a href="mailto:customerservice@heritage-wti.com">customerservice@heritage-wti.com</a>
<b>EPA Region 6</b>							
ARD006354161	Reynolds Metals Company	500 East Reynolds Rd	Arkadelphia	AR	71923	8702452720	Lyn Shepherd
ARD069748192	Clean Harbors El Dorado, LLC	309 American Circle	El Dorado	AR	71730	8708637173	Treasa Evans <a href="mailto:evans.treasa@cleanharbors.com">evans.treasa@cleanharbors.com</a>
TXD000838896	Veolia ES Technical Solutions LLC	Highway 73	Port Arthur	TX	77640	4097362821	Michelle Herman
TXD055141378	Clean Harbors Deer Park LP	2027 Battleground Rd	Deer Park	TX	77536	2819302300	Craig Elam
<b>EPA Region 7</b>							
MOD985798164	EBV Explosives Environmental Co. (ICI Explosives Environmental Co.)	3078 County Rd 180	Joplin	MO	64801	4147826366 6102983085	Dave Zoghby <a href="mailto:dave.zoghby@ebveec.com">dave.zoghby@ebveec.com</a>
NED981723513	Clean Harbors Environmental Services	2247 South Highway 71	Kimball	NE	69145	3082354012	Jared Hunsaker
<b>EPA Region 8</b>							
UTD981552177	Clean Harbors Aragonite LLC	11600 North Aptus Rd	Aragonite	UT	84209	4358848877	Melissa Scales <a href="mailto:scalesm@cleanharbors.com">scalesm@cleanharbors.com</a>

Sources: (1) EPA. RCRAInfo/Permit Module. Data current as of September 16, 2010; 2007 BR  
(2) Collaboration with EPA Regions and States.

## Commercial Hazardous Waste Landfill Facilities in the United States – Permitted and Actively Managing RCRA Contaminated Soils

Sources: (1) EPA. RCRAInfo/Permit Module. Data current as of September 16, 2010; 2007 BR; (2) Collaboration with EPA Regions and States.

EPA ID	Facility Name	Street Address	City	State	Zip Code	Phone	Contact/e-mail address
<b>EPA Region 2</b>							
NYD049836679	CWM Chemical Services, LLC	1550 Balmer Rd	Model City	NY	14107	7167548231	Michael Mahar
<b>EPA Region 4</b>							
ALD000622464	Chemical Waste Management	36964 Alabama Highway 17	Emelle	AL	35459	2056529721 8006525755	Mike Davis tscalabama@wm.com
<b>EPA Region 5</b>							
ILD000805812	Peoria Disposal Co Inc	4349 Southport Rd	Peoria	IL	61604	3096764893	Ron Welk <a href="mailto:rwelk@pdcare.com">rwelk@pdcare.com</a>
IND980503890	Heritage Environmental Services LLC	4370 W Cr 1275 N	Roachdale	IN	46172	7654352704	Winde Hamrick <a href="mailto:webmaster@heritage-enviro.com">webmaster@heritage-enviro.com</a>
MID048090633	EQ-The Environmental Quality Company, Wayne Disposal Inc	49350 N I94 Service Dr	Belleville	MI	48111	8005925489	EQ Customer Service <a href="mailto:customerservice@egonline.com">customerservice@egonline.com</a>
OHD045243706	Envirosafe Services of Ohio Inc	876 Otter Creek Rd	Oregon	OH	43616	4196983500 8005370426	Lisa Humphrey <a href="mailto:l.humphrey@envirosafeservices.com">l.humphrey@envirosafeservices.com</a>
<b>EPA Region 6</b>							
LAD000777201	Chemical Waste Management Lake Charles	7170 John Brannon Rd	Sulphur	LA	70665	3375835735	Chuck Grnat <a href="mailto:cgrant@wm.com">cgrant@wm.com</a>
LAD010395127	Clean Harbors Baton Rouge LLC	13351 Scenic Highway	Baton Rouge	LA	70807	2257781234	William J. Clark <a href="mailto:clarkwj@cleanharbors.com">clarkwj@cleanharbors.com</a>
OKD065438376	Clean Harbors Environmental Services Lone Mountain Facility	Route 2 Box 170	Waynoka	OK	73860	5806973500	Jay Adair
TXD069452340	US Ecology Texas Inc	3277 County Rd 69	Robstown	TX	78380	3613873518 ext.255	Cathy Sturow <a href="mailto:csturow@americanecology.com">csturow@americanecology.com</a>
TXD988088464	Waste Control Specialists LLC	1710 W State Highway 176	Andrews	TX	79714	8887892783	Linda Beach <a href="mailto:lbeach@westtexas.com">lbeach@westtexas.com</a>
<b>EPA Region 8</b>							
COD991300484	Clean Harbors Deer Trail LLC	108555 E Hwy 36	Deer Trail	CO	80105	9703862293	Jack Kehoe
UTD982598898	Energysolutions, Inc. (Envirocare)	U.S. Interstate 80, Exit 49 One Mile South of Clive	Grantsville	UT	84029	8016492000	Tye Rogers <a href="mailto:trogers@energysolutions.com">trogers@energysolutions.com</a>
UTD991301748	Clean Harbors Grassy Mountain, LLC	3 Miles East, 7 Miles North Knolls Exit 41, off I-80	Salk Lake City	UT	84122	4358848900	Shane Whitney whitney,shane@cleanharbors.com
<b>EPA Region 9</b>							
CAD000633164	Clean Harbors Westmorland, LLC	5295 South Garvey Rd	Westmorland	CA	92281	7603449400	Andrew Yadvish
CAD980675276	Clean Harbors Buttonwillow	2500 Lokern Rd	Buttonwillow	CA	93206	6617626200	Customer Service Department
CAT000646117	Chemical Waste Management, Inc.	35251 Old Skyline Rd	Kettleman City	CA	93239	5593869711	Customer Service
NVT330010000	US Ecology Nevada	Highway 95, 11 Miles South of Beatty	Beatty	NV	89003	8002393943 ext.129	Aarin Bermudez <a href="mailto:Abermudez@americanecology.com">Abermudez@americanecology.com</a>
<b>EPA Region 10</b>							
IDD073114654	US Ecology Idaho Inc Site B	20400 Lemley Rd	Grand View	ID	83624	8002741516	Kevin Trader
ORD089452353	Chemical Waste Management of the Northwest	17629 Cedar Springs Ln	Arlington	OR	97812	5414542643	Cal Palmer

**Attachment E**

**Land Disposal Restrictions Treatment Standards at 40 CFR 268.40 Applicable to EPA Waste Codes Associated with Dioxin**

Waste Code	Waste Description and Treatment/ Regulatory Subcategory	Regulated Hazardous Constituent		As-Generated Waste Treatment Standard	Alternative Soil Treatment Standard (10 times the UTS)
		Common Name	CAS Number	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code
F020, F021, F022, F023, F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of: (1) tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives, excluding wastes from the production of Hexachlorophene from highly purified, 2,4,5-trichlorophenol (F020); (2) pentachlorophenol, or of intermediates used to produce its derivatives (i.e., F021); (3) tetra-, penta-, or hexachlorobenzenes under alkaline conditions (i.e., F022); and from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of: (1) tri- or tetrachlorophenols, excluding wastes from equipment used only for the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol (F023); (2) tetra- penta, or hexachlorobenzenes under alkaline conditions (i.e., F026).	HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.001	0.01
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.001	0.01
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.001	0.01
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.001	0.01
		Pentachlorophenol	87-86-5	7.4	74
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.001	0.01
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.001	0.01
		2,4,5-Trichlorophenol	95-95-4	7.4	74
		2,4,6-Trichlorophenol	88-06-2	7.4	74
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component.)	2,3,4,6-Tetrachlorophenol	58-90-2	7.4	74
		HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.001	0.01
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.001	0.01
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.001	0.01
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.001	0.01
		Pentachlorophenol	87-86-5	7.4	74
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.001	0.01
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.001	0.01
		2,4,5-Trichlorophenol	95-95-4	7.4	74
2,4,6-Trichlorophenol	88-06-2	7.4	74		
2,3,4,6-Tetrachlorophenol	58-90-2	7.4	74		

Waste Code	Waste Description and Treatment/ Regulatory Subcategory	Regulated Hazardous Constituent		As-Generated Waste Treatment Standard	Alternative Soil Treatment Standard (10 times the UTS)
		Common Name	CAS Number	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code
F028	Residues resulting from the incineration or thermal treatment of soils contaminated with EPA Hazardous Wastes Nos. F020, F021, F023, F026, and F027.	HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.001	0.01
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.001	0.01
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.001	0.01
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.001	0.01
		Pentachlorophenol	87-86-5	7.4	74
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.001	0.01
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.001	0.01
		2,4,5-Trichlorophenol	95-95-4	7.4	74
		2,4,6-Trichlorophenol	88-06-2	7.4	74
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	2,3,4,6-Tetrachlorophenol	58-90-2	7.4	74
		Acenaphthene	83-32-9	3.4	34
		Anthracene	120-12-7	3.4	34
		Benz(a)anthracene	56-55-3	3.4	34
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	6.8	68
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	6.8	68
		Benzo(a)pyrene	50-32-8	3.4	34
		Chrysene	218-01-9	3.4	34
		Dibenz(a,h) anthracene	53-70-3	8.2	82
		2-4-Dimethyl phenol	105-67-9	14	140
Fluorene	86-73-7	3.4	34		

Waste Code	Waste Description and Treatment/ Regulatory Subcategory	Regulated Hazardous Constituent		As-Generated Waste Treatment Standard	Alternative Soil Treatment Standard (10 times the UTS)
		Common Name	CAS Number	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code
		Hexachlorodibenzo-p-dioxins	NA	0.001, or CMBST	0.01
		Hexachlorodibenzofurans	NA	0.001, or CMBST	0.01
		Indeno (1,2,3-c,d) pyrene	193-39-5	3.4	34
		Naphthalene	91-20-3	5.6	56
		Pentachlorodibenzo-p-dioxins	NA	0.001, or CMBST	0.01
		Pentachlorodibenzofurans	NA	0.001, or CMBST	0.01
		Pentachlorophenol	87-86-5	7.4	74
		Phenanthrene	85-01-8	5.6	56
		Phenol	108-95-2	6.2	62
		Pyrene	129-00-0	8.2	82
		Tetrachlorodibenzo-p-dioxins	NA	0.001, or CMBST	0.01
		Tetrachlorodibenzofurans	NA	0.001, or CMBST	0.01
		2,3,4,6-Tetrachlorophenol	58-90-2	7.4	74
		2,4,6-Trichlorophenol	88-06-2	7.4	74
		Arsenic	7440-38-2	5.0 mg/L TCLP	50 mg/L
		Chromium (Total)	7440-47-3	0.60 mg/L TCLP	6 mg/L

Waste Code	Waste Description and Treatment/ Regulatory Subcategory	Regulated Hazardous Constituent		As-Generated Waste Treatment Standard	Alternative Soil Treatment Standard (10 times the UTS)
		Common Name	CAS Number	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code
F039	(see 40 CFR 268.40 table, "Treatment Standards for Hazardous Wastes")				

Waste Code	Waste Description and Treatment/ Regulatory Subcategory	Regulated Hazardous Constituent		As-Generated Waste Treatment Standard	Alternative Soil Treatment Standard (10 times the UTS)
		Common Name	CAS Number	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code
K043	2,6-Dichlorophenol waste from the production of 2,4-D	2,4-Dichlorophenol	120-83-2	14	140
		2,6-Dichlorophenol	187-65-0	14	140
		2,4,5-Trichlorophenol	95-95-4	7.4	74
		2,4,6-Trichlorophenol	88-06-2	7.4	74
		2,3,4,6-Tetrachlorophenol	58-90-2	7.4	74
		Pentachlorophenol	87-86-5	7.4	74
		Tetrachloroethylene	127-18-4	6.0	60
		HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.001	0.01
		HxCDFs ( All Hexachlorodibenzofurans)	NA	0.001	0.01
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.001	0.01
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.001	0.01
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.001	0.01
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.001	0.01



Waste Code	Waste Description and Treatment/ Regulatory Subcategory	Regulated Hazardous Constituent		As-Generated Waste Treatment Standard	Alternative Soil Treatment Standard (10 times the UTS)
		Common Name	CAS Number	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code
K099	Untreated wastewater from the production of 2,4-D	HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.001	0.01
		HxCDFs ( All Hexachlorodibenzofurans)	NA	0.001	0.01
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.001	0.01
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.001	0.01
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.001	0.01
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.001	0.01
		2,4-Dichlorophenoxyacetic acid	94-75-7	10	100

Waste Code	Waste Description and Treatment/ Regulatory Subcategory	Regulated Hazardous Constituent		As-Generated Waste Treatment Standard	Alternative Soil Treatment Standard (10 times the UTS)
		Common Name	CAS Number	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code
K174	Wastewater treatment sludges from the production of ethylene dichloride or vinyl chloride monomer (including sludges that result from commingled ethylene dichloride or vinyl chloride monomer wastewater and other wastewater), unless the sludges meet the following conditions: (i) they are disposed of in a subtitle C or non-hazardous landfill licensed or permitted by the state or federal government; (ii) they are not otherwise placed on the land prior to final disposal; and (iii) the generator maintains documentation demonstrating that the waste was either disposed of in an on-site landfill or consigned to a transporter or disposal facility that provided a written commitment to dispose of the waste in an off-site landfill. Respondents in any action brought to enforce the requirements of subtitle C must, upon a showing by the government that the respondent managed wastewater treatment sludges from the production of vinyl chloride monomer or ethylene dichloride, demonstrate that they meet the terms of the exclusion set forth above. In doing so, they must provide appropriate documentation (e.g., contracts between the generator and the landfill owner/operator, invoices documenting delivery of waste to landfill, etc.) that the terms of the exclusion were met	1,2,3,4,6,7,8-Heptachlorodibenzo- <i>p</i> -dioxin (1,2,3,4,6,7,8-HpCDD)	35822-46-9	0.0025 or CMBST	0.025
		1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF)	67562-39-4	0.0025 or CMBST	0.025
		1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF)	55673-89-7	0.0025 or CMBST	0.025
		HxCDDs (All Hexachlorodibenzo- <i>p</i> -dioxins)	34465-46-8	0.001 or CMBST	0.01
		HxCDFs (All Hexachlorodibenzofurans)	55684-94-1	0.001 or CMBST	0.01
		1,2,3,4,6,7,8,9-Octachlorodibenzo- <i>p</i> -dioxin (OCDD)	3268-87-9	0.005 or CMBST	0.05
		1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	39001-02-0	0.005 or CMBST	0.05
		PeCDDs (All Pentachlorodibenzo- <i>p</i> -dioxins)	36088-22-9	0.001 or CMBST	0.01
		PeCDFs (All Pentachlorodibenzofurans)	30402-15-4	0.001 or CMBST	0.01
		TCDDs (All tetrachlorodibenzo- <i>p</i> -dioxins)	41903-57-5	0.001 or CMBST	0.01
TCDFs (All tetrachlorodibenzofurans)	55722-27-5	0.001 or CMBST	0.01		
	Arsenic	7440-36-0	5.0 mg/L TCLP	50 mg/L TCLP	

Waste Code	Waste Description and Treatment/ Regulatory Subcategory	Regulated Hazardous Constituent		As-Generated Waste Treatment Standard	Alternative Soil Treatment Standard (10 times the UTS)
		Common Name	CAS Number	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code
K178	Residues from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride-ilmentite process	1,2,3,4,6,7,8-Heptachlorodibenzo- <i>p</i> -dioxin (1,2,3,4,6,7,8-HpCDD)	35822-46-9	0.0025 or CMBST	0.025
		1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF)	67562-39-4	0.0025 or CMBST	0.025
		1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF)	55673-89-7	0.0025 or CMBST	0.025
		HxCDDs (All Hexachlorodibenzo- <i>p</i> -dioxins)	34465-46-8	0.001 or CMBST	0.01
		HxCDFs (All Hexachlorodibenzofurans)	55684-94-1	0.001 or CMBST	0.01
		1,2,3,4,6,7,8,9-Octachlorodibenzo- <i>p</i> -dioxin (OCDD)	3268-87-9	0.005 or CMBST	0.05
		1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	39001-02-0	0.005 or CMBST	0.05
		PeCDDs (All Pentachlorodibenzo- <i>p</i> -dioxins)	36088-22-9	0.001 or CMBST	0.01
		PeCDFs (All Pentachlorodibenzofurans)	30402-15-4	0.001 or CMBST	0.01
		TCDDs (All tetrachlorodibenzo- <i>p</i> -dioxins)	41903-57-5	0.001 or CMBST	0.01
		TCDFs (All tetrachlorodibenzofurans)	55722-27-5	0.001 or CMBST	0.01
		Thallium	7440-28-0	0.20 mg/L TCLP	2.0 mg/L TCLP

## Attachment F References

- USEPA; *RCRA Orientation Manual 2008: Resource Conservation and Recovery Act*, Section III: RCRA Subtitle C - Managing Hazardous Waste, Chapter 6: Land Disposal Restrictions; 2008. Available online at: <http://www.epa.gov/epawaste/inforesources/pubs/orientat/>, last accessed on August 2, 2010.
- USEPA, *Guidance on Demonstrating Compliance With the Land Disposal Restrictions (LDR) Alternative Soil Treatment Standards - Final Guidance*, EPA530-R-02-003, July 2001. Available online at: [http://www.epa.gov/wastes/hazard/tsd/ldr/soil\\_f4.pdf](http://www.epa.gov/wastes/hazard/tsd/ldr/soil_f4.pdf), last accessed on August 2, 2010.
- USEPA, RCRA Training Module "Introduction to United States Environmental Protection Agency Land Disposal Restrictions (40 CFR Part 268)," EPA530-K-05-013, September 2005. Available online at: <http://www.epa.gov/wastes/inforesources/pubs/hotline/training/ldr05.pdf>, last accessed on August 2, 2010.

