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EPA

Superfund LDR Guide #3

Treatment Standards and Minimum Technology Requirements Under Land Disposal Restrictions (LDRs)

CERCLA section 121(d)(2) requires that Superfund response actions comply with other environmental laws that are applicable or relevant and appropriate requirements (ARARs). A potential ARAR for CERCLA responses is the Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDRs) established under the Hazardous and Solid Waste Amendments (HSWA). The LDRs prohibit the land disposal of restricted RCRA hazardous wastes unless these wastes meet treatment standards specified in 40 CFR Part 268, meet the minimum technology requirements during a national treatment capacity extension, or satisfy the requirements of one of the other available compliance options (i.e., Treatability Variance, Equivalent Treatment Method Petition, No Migration Petition, or Delisting). **This guide summarizes the types and effective dates of treatment standards and outlines how to comply with the treatment standards and the minimum technology requirements set during national capacity extensions**. More detailed guidance on Superfund compliance with the LDRs is being prepared by the Office of Solid Waste and Emergency Response (OSWER).

TYPES OF TREATMENT STANDARDS

EPA has established treatment standards under the LDRs on the basis of the best demonstrated available technology (BDAT) rather than risk-based or health-based standards. "Best" is defined as that technology which offers the greatest reduction (based on a statistical analysis) of toxicity, mobility, or volume of the waste. To be "demonstrated," a treatment technology must be demonstrated to work at a full-scale level (i.e., technologies available only on a pilot-or bench-scale are not considered demonstrated). To be "available," a treatment technology must be commercially available.

Within this framework, the Agency has established three types of LDR treatment standards:

- Concentration levels -- which must be attained before the wastes or treatment residuals may be land disposed;
- Specified technologies -- which must be applied to the waste before the residuals may be land disposed; and
- No land disposal -- which prohibits land disposal of certain restricted hazardous wastes.

Concentration Levels

The majority of the LDR treatment standards promulgated to date are concentration levels. For wastes with treatment standards expressed as concentrations, any technology that can achieve the required levels may be used unless the technology is otherwise prohibited (i.e., the BDAT used by EPA to set the standards need not be used).

To establish a concentration level(s) for a specific waste code (e.g., K062), the Agency selects a subset of the hazardous constituents found in the waste (known as "BDAT constituents") and sets treatment standards for each of these constituents. Although these wastes may contain additional constituents, only the treatment standards for the "BDAT constituents" must be met before the wastes can be land disposed. The residues from treatment of an originally listed waste (e.g., ash, scrubber water) are also listed RCRA hazardous wastes (because of the "derived from" rule), and therefore, also are prohibited from land disposal unless they meet treatment standards for the waste code(s) of the original listed waste(s) from which they derive.

EPA has promulgated separate standards for wastewaters and nonwastewaters for treatment standards expressed as concentration levels. For LDRs, wastewaters normally are defined as wastes containing less than one percent total organic carbon (TOC) and less than one percent total suspended solids. All other materials (including soil and debris) are classified as nonwastewaters, except for F001-F005 wastes, for which only the TOC is used to define wastewaters.

Concentrations of BDAT constituents in solid residues from treatment must not exceed the

nonwastewater concentrations. Similarly, the concentration of BDAT constituents in wastewaters from treatment (e.g., incineration scrubber water) must not exceed the wastewater concentrations. **Highlight 1** provides an example of standards expressed as concentration levels for K062 waste.

Highlight 1 - TREATMENT STANDARDS FOR K062 WASTE*

Constituent	Treatment Standard Total Waste (mg/kg)	Treatment Standard TCLP- (mg/l)
Nonwastewater		
Total Chromium	NA	0.094
Lead	NA	0.37
Wastewater		
Total Chromium	0.32	NA
Nickel	0.44	NA
Lead	0.04	NA

C K062 waste is spent pickle liquor generated by the steel finishing operations of facilities whin the iron and steel industry.

Specified Technologies

If a treatment standard is promulgated as a specified technology, that technology must be used to treat the waste unless an Equivalent Treatment Method Petition is approved by the Administrator. To be granted, such a petition must demonstrate that the alternative technology achieves an equivalent measure of performance. For example, the Agency has set the treatment standard for California list PCB wastes containing greater than 500 ppm PCBs as thermal destruction. These wastes must be incinerated to 99.9999 percent destruction and removal efficiency (DRE) under the LDRs before the ash from treatment may be land disposed unless a Petition allowing an equivalent treatment method is granted.

No Land Disposal

EPA sets a standard of no land disposal when, after examining available data, the Agency has determined that: the waste can be totally recycled (e.g., on-site, closed loop recycling); the waste is not currently being land disposed; the waste is no longer generated; or no residuals are anticipated from the use of the BDAT.

Although certain wastes may no longer be generated or land disposed, these wastes may still be found at Superfund sites. EPA has amended most of these waste codes, however, to apply only to wastes generated from the process described in the listing description and disposed of after the effective date of the prohibition (see 54 FR 18836, May 2, 1989). Therefore, CERCLA wastes ordinarily would not be subject to these standards.

COMPLYING WITH LDR TREATMENT STANDARDS

There are two types of tests for evaluating compliance that may be required, depending on how the treatment standards are promulgated: the **Total Waste Analysis (TWA)** measures the total concentration levels of the hazardous constituents in the waste or treatment residuals; and the **Toxicity Characteristic Leaching Procedure (TCLP)** measures concentration levels in the waste extract as a result of the TCLP test.

The TWA test generally is used for organic constituents when a removal or destruction technology is the BDAT. The TCLP generally is used for inorganics when an immobilization BDAT is the basis for the standard. However, the TCLP is also used for the solvent- and dioxin-containing waste LDR treatment standards and TWA is used for metals when BDAT is based on metals recovery. Site managers (OSCs and RPMs for on-site treatment and disposal actions) or treatment facilities (for off-site disposal actions) must test wastes after treatment and before land disposal to determine if the LDR treatment standards are met.

TREATMENT STANDARDS IN EFFECT FOR RCRA HAZARDOUS WASTES

Once a determination that the LDRs are ARARs has been made (see Superfund LDR guide #5), site managers must determine which of the specific LDR restrictions are in effect for their waste(s) of concern. If the Agency has promulgated a treatment standard for a restricted RCRA hazardous waste, either the LDR treatment standards or the minimum technology requirements will be in effect. If EPA has not set a treatment standard for a restricted RCRA hazardous waste, either the soft or hard hammer provisions will be in effect (see Superfund LDR Guide #4). The Agency has promulgated treatment standards for the following wastes:

Solvent-Containing RCRA Hazardous Waste

For solvent-containing RCRA hazardous wastes (F001-F005), EPA has promulgated treatment standards expressed as concentration levels. Unlike most of the treatment standards for wastes containing organic constituents, the standards for the F001-F005 wastes are expressed as TCLP concentrations (40 CFR 268.41).

Dioxin-Containing RCRA Hazardous Wastes

Dioxin-containing wastes (F020-F023 and F026-F028), include chlorinated dibenzo-p-dioxins (CDDs), chlorinated dibenzofurans (CDFs), and chlorophenols. The treatment standards expressed as concentration levels are based on incineration of contaminated soil. Because current analytical methods cannot measure the concentration levels attainable by the BDAT, EPA set the treatment standards at the practical detection limits (i.e., 1 ppb) for most wastes. These standards are also based on a TCLP analysis (40 CFR 268.41).

Although the LDR treatment standards for dioxin-containing wastes are concentration levels, the dioxin-listing rule (50 FR 1978) requires special management standards for certain types of units:

- Incineration in accordance with 40 CFR 264.343 and 40 CFR 265.352;
- Thermal treatment to 99.9999 percent DRE in accordance with 40 CFR 265.383; or
- Tank treatment, in accordance with 40 CFR 264.200.

Highlight 2 describes the LDR restrictions in effect for solvent- and dioxin-containing RCRA hazardous wastes.

California List Hazardous Wastes

The California list rule established specified technologies as the treatment standards for certain California list wastes. Specifically, California list PCB and halogenated organic compound (HOC) wastes (except dilute HOC wastewaters) must be incinerated or burned in high-efficiency boilers or industrial furnaces. **Highlight 3** provides the LDR restrictions in effect for California list wastes.

First Third Wastes

The First Third scheduled wastes include those listed wastes that are intrinsically hazardous or are high-volume wastes. EPA promulgated treatment standards expressed as concentration levels and no land disposal based on TWA and TCLP for certain First Third wastes on August 17, 1988. First Third wastes that do not have promulgated treatment standards are restricted under the "soft hammer" provisions. **Highlight 4** describes the LDR restrictions in effect for certain First Third wastes for which the Agency has set treatment standards.

MINIMUM TECHNOLOGY REQUIREMENTS THAT APPLY DURING A NATIONAL CAPACITY EXTENSION

If during the promulgation of treatment standards the Agency determines that insufficient treatment capacity exists, the Agency may grant a national capacity extension for a period of up to two years. During the extension period, if wastes are to be land disposed in surface impoundments or landfills, the units must comply with the RCRA Subtitle C minimum technology requirements (i.e., double liner, leachate collection system, and ground-water monitoring) under RCRA 3005(j)(2) or (j)(4) or the receiving units must have a retrofitting waiver under RCRA 3004(o)(2) or 3005(j) to be considered equivalent to the minimum technology requirements.

Highlight 2 - EFFECTIVE DATES AND LDR RESTRICTIONS FOR SOLVENTS AND DIOXINS

TYPE OF RESTRICTED RCRA HAZARDOUS WASTE	TREATMENT STANDARD EFFECTIVE DATE	LDR RESTRICTIONS IN EFFECT AS OF NOVEMBER 8, 1998
F001 to F005 (spent solvent-containing wastes)	November 8, 1986 or November 8, 1988*	Treatment standards as concentration levels (TCLP)
F020 to F023, F026 to F028 (dioxin-containing wastes)	November 8, 1988	Treatment standards as concentration levels (TCLP)
Soil and debris contaminated with solvent/dioxin NOT from CERCLA/RCRA corrective actions	November 8, 1988	Treatment standards as concentration level (TCLP)
Soil and debris contaminated with solvent/dioxin from CERCLA/RCRA corrective actions	November 8, 1990	Minimum technology requirements if disposed of in landfill or surface impoundment

* Soil and debris contained with solvent-containing wastes were granted a statutory two-year extension to November 8, 1988. All other solvent-containing wastes became restricted on November 8, 1986.

Highlight 3 - EFFECTIVE DATES AND LDR RESTRICTIONS FOR CALIFORNIA LIST WASTES [a/]

TYPE OF RESTRICTED RCRA HAZARDOUS WASTE	TREATMENT STANDARD EFFECTIVE DATE	LDR RESTRICTIONS IN EFFECT AS OF NOVEMBER 8, 1998
California list PCBs	July 8, 1987	Treatment standards as specified technology(ies)
Liquid and non-liquid HOCs	November 8, 1988	Treatment standards as specified technology(ies)
Soil and debris contaminated with HOC NOT from CERCLA/RCRA corrective actions	July 8, 1989	Minimum technology requirements if disposed of in landfill or surface impoundment
Soil and debris contaminated with HOCs from CERCLA/RCRA corrective actions	November 8, 1990	Minimum technology requirements if disposed of in landfill or surface impoundment

[a/] See Superfund LDR Guide #4 for soft and hard hammer restrictions in effect for remaining California list wastes

National capacity extensions for several types of wastes currently are in effect under the LDRs. For example, soil and debris from CERCLA and RCRA corrective actions that are contaminated with solvent, dioxin, and California list wastes have received an extension until November 8, 1990. All soil and debris contaminated with First Third wastes for which the BDAT is based on solids incineration have received an extension until August 8, 1990. Land disposal of wastes subject to national capacity extensions in units other than surface impoundments and landfills (e.g., waste piles, land treatment units) is not subject to the minimum technology requirements during such an extension.

Highlight 4 - EFFECTIVE DATES AND LDR RESTRICTIONS FOR CERTAIN FIRST THIRD WASTES [a/]

TYPE OF RESTRICTED RCRA HAZARDOUS WASTE	TREATMENT STANDARD EFFECTIVE DATE	LDR RESTRICTIONS IN EFFECT AS OF NOVEMBER 8, 1998
First Third wastes (not otherwise accounted for)[b/]	August 8, 1988	Treatment standards as concentration levels (TWA and TCLP) and (for a few waste codes) "no land disposal"
Soil and debris contaminated with First Third wastes for which BDAT is other than solids incineration	August 8, 1988	Treatment standards as concentration levels (TWA and TCLP) and "no land disposal"
Soil and debris contaminated with First Third wastes for which BDAT is solids incineration	August 8, 1990	Minimum technology requirements if disposed of in landfill or surface impoundment

[a/] See Superfund LDR Guide #4 for soft and hard hammer restrictions in effect for First Third wastes.

[b/] Except K048-K052 and K071, which were granted a two-year extension until August 8, 1990.