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Superfund LDR Guide #6A (2nd Edition) Obtaining a Soil and Debris Treatability Variance for Remedial Actions

Office of Emergency and Remedial Response
Hazardous Site Control Division

Quick Reference Fact Sheet

The Office of Emergency and Remedial Response (OERR) issued a series of Superfund LDR Guides in July and December of 1989. This series included: *Overview of RCRA Land Disposal Restrictions (LDRs)* (Superfund LDR Guide #1); *Complying with the California List Restrictions* (Superfund LDR Guide #2); *Treatment Standards and Minimum Technology Requirements Under the LDRs* (Superfund LDR Guide #3); *Complying with the Hammer Restrictions Under the LDRs* (Superfund LDR Guide #4); *Determining When the LDRs are Applicable to CERCLA Responses* (Superfund LDR Guide #5); *Obtaining a Soil and Debris Treatability Variance for Remedial* (Superfund LDR Guide #6A) and *Removal* (Superfund LDR Guide #6B) *Actions;* and *Determining When the LDRs are Relevant and Appropriate to CERCLA Responses* (Superfund LDR Guide #7). Since the issuance of these guides, the Environmental Protection Agency, with cooperation from outside parties (e.g., environmental groups, industry representatives), has conducted an analysis of the potential impacts associated with applying the LDR treatment standards to Superfund and RCRA Corrective Action cleanups. As a result of these analyses, it was decided that the Agency will promulgate a third set of treatment standards (in addition to the wastewater and nonwastewater categories currently in effect) specifically for soil and debris wastes. In the interim, there is the presumption that CERCLA response actions involving the placement of soil and debris contaminated with RCRA restricted wastes will utilize a Treatability Variance to comply with the LDRs and that, under these variances, the treatment levels outlined in Superfund LDR Guide #6A will serve as alternative "treatment standards." **This guide (a revision to the original Superfund LDR Guide #6A) has been prepared to outline the process for obtaining and complying with a Treatability Variance for soil and debris that are contaminated with RCRA hazardous wastes until such time that the Agency promulgates treatment standards for soil and debris.**

BASIS FOR A TREATABILITY VARIANCE

When promulgating the LDR treatment standards, the Agency recognized that treatment of wastes to the LDR treatment standards would not always be possible or appropriate. In addition, the Agency recognized the importance of ensuring that the LDRs do not unnecessarily restrict the development and use of alternative and innovative treatment technologies for remediating hazardous waste sites. Therefore, a Treatability Variance process (40 CFR §268.44) is available to comply with the LDRs when a Superfund waste differs significantly from the waste used to set the LDR treatment standard such that:

- The LDR standard cannot be met; or
- The best demonstrated available technology (BDAT) used to set the standard is inappropriate for the waste.

Superfund site managers (OSCs, RPMs) should seek a Treatability Variance to comply with the LDRs when managing restricted soil and debris

Highlight 1: SOIL AND DEBRIS

Soil. Soil is defined as materials that are primarily of geologic origin such as sand, silt, loam, or clay, that are indigenous to the natural geologic environment at or near the CERCLA site. (In many cases, soil is mixed with liquids, sludges, and/or debris.)

Debris. Debris is defined as materials that are primarily non-geologic in origin, such as grass, trees, stumps, and man-made materials such as concrete, clothing, partially buried whole or empty drums, capacitors, and other synthetic manufactured materials, such as liners. (It does not include synthetic organic chemicals, but may include materials contaminated with these chemicals).

wastes (see **Highlight 1**) because the LDR treatment standards are based on treating less complex matrices of industrial process wastes (except for the dioxin standards, which are based on treating contaminated soil). A Treatability Variance does not remove the requirement to treat restricted soil and debris wastes. Rather, under a Treatability Variance, alternate treatment levels based on data from actual treatment of soil, or best management practices for debris, become the "treatment standard" that must be met.

COMPLYING WITH A TREATABILITY VARIANCE FOR SOIL AND DEBRIS WASTES

Soil Wastes

Once site managers have identified the RCRA waste codes present at the site, the next step is to identify the BDAT constituents of those RCRA waste codes and to divide these constituents into one of the structural/functional groups shown in column 1 of **Highlight 2**. After dividing the BDAT constituents into their respective structural/functional groups, the next step is to compare the concentration of each constituent with the **threshold concentration** (see column 3 of **Highlight 2**) and to select the appropriate concentration level or percent reduction range. If the concentration of the restricted constituent is less than the threshold concentration, the waste should be treated to within the concentration range. If the waste concentration is above the threshold, the waste should be treated to reduce the concentration of the waste to within the specified percent reduction range. Once the appropriate treatment range is selected, the third step is to identify and select a specific technology

Highlight 2: ALTERNATE TREATABILITY VARIANCE LEVELS AND TECHNOLOGIES FOR STRUCTURAL/FUNCTIONAL GROUPS

Structural Functional Groups	Concentration Range (ppm)	Threshold Concentration (ppm)	Percent Reduation Range	Technologies that achieved recommended effluent concentration guidance**
ORGANICS	**Total Waste Analysis/***	**Total Waste Analysis/***		
Halogenated Non-Polar Aromatics	0.5 – 10	100	90 – 99.9	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Dioxins	0.00001 – 0.05	0.5	90 – 99.9	Dechlorination, Soil Washing, Thermal Destruction
PCBs	0.1 – 10	100	90 – 99.9	Biological Treatment, Dechlorination, Soil Washing, Thermal Destruction
Herbicides	0.002 – 0.02	0.2	90 – 99.9	Thermal Destruction
Halogenated Phenols	0.5 – 40	400	90 – 99	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Halogenated Aliphatics	0.5 – 2	40	95 – 99.9	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Halogenated Cyclics	0.5 – 20	200	90 – 99.9	Thermal Destruction
Nitrated Aromatics	2.5 – 10	10,000	99.9 – 99.99	Biological Treatment, Soil Washing Thermal Destruction
Heterocyclics	0.5 – 20	200	90 – 99.9	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Polynuclear Aromatics	0.5 – 20	400	95 – 99	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Other Polar Organics	0.5 – 10	100	90 – 99	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
INORGANICS	**TCLP**	**TCLP**		
Antimony	0.1 – 0.2	2	90 – 99	Immobilization
Arsenic	0.30 – 1	10	90 – 99.9	Immobilization, Soil Washing
Barium	0.1 – 40	400	90 – 99	Immobilization
Chromium	0.5 – 6	120	95 – 99.9	Immobilization, Soil Washing
Nickel	0.5 – 1	20	95 – 99.9	Immobilization, Soil Washing
Selenium	0.005	0.05	90 – 99	Immobilization
Vanadium	0.2 – 20	200	90 – 99	Immobilization
Cadmium	0.2 – 2	40	95 – 99.9	Immobilization, Soil Washing
Lead	0.1 – 3	300	99 – 99.9	Immobilization, Soil Washing
Mercury	0.0002 – 0.0008	0.08	90 – 99	Immobilization

* *TCLP also may be used when evaluating waste with relatively low levels of organics that have been treated through an immobilization process.*

** *Other technologies maybe used if treatability studies or other information indicates that they can achieve the necessary concentration or percent-reduction range.*

that can achieve the necessary concentration or percent reduction. Column 5 of **Highlight 2** lists technologies that (based on existing performance data) can attain the alternative Treatability Variance levels.

During the implementation of the selected treatment technology, periodic analysis using the appropriate testing procedure (i.e., total waste analysis for organics and TCLP for inorganics) will be required to ensure the alternate treatment levels for the BDAT constituents requiring control are being attained and thus can be land disposed without further treatment.

Because of the variable and uncertain characteristics associated with unexcavated wastes, from which only sampling data are available, treatment systems generally should be designed to achieve the more stringent end of the treatment range (e.g., 0.5 for chromium, see column 2 of **Highlight 2**) to ensure that the treatment residuals from the most contaminated portions of the waste fall below the "no exceedance" levels (e.g., 6.0 ppm for chromium). Should data indicate that the treatment levels set through the Treatability Variance are not being attained (i.e., treatment residuals are greater than the "no exceedance" level), site managers should consult with EPA Headquarters.

Debris Wastes

Site managers should use the same process for obtaining a Treatability Variance described above for types of debris that are able to be treated to the alternate treatment levels (e.g., paper, plastic). However, for most types of debris (eg., concrete, steel pipes), which generally cannot be treated, site managers should use best management practices. Depending on the specific characteristics of the debris, these practices may include decontamination (eg., triple rinsing) or destruction.

OBTAINING A TREATABILITY VARIANCE FOR SOIL AND DEBRIS WASTES

Once it is determined that a CERCLA waste is a soil or debris, and that compliance with the LDRs will be required (i.e., the wastes contain restricted RCRA waste(s) and placement will occur), site managers should initiate the process of obtaining a Variance. For remedial actions this will involve: (1) documenting the intent to comply with the LDRs through a Treatability Variance in the FS Report; (2) announcing the intent to comply through a Treatability Variance in the Proposed Plan, and (3) granting of the Treatability Variance by the Regional Administrator or the

Highlight 3 - INFORMATION TO BE INCLUDED IN AN RI/FS TO DOCUMENT THE INTENT TO COMPLY WITH THE LDRs THROUGH A TREATABILITY VARIANCE FOR ON-SITE AND OFF-SITE CERCLA RESPONSE ACTIONS INVOLVING THE PLACEMENT OF SOIL AND DEBRIS CONTAMINATED WITH RESTRICTED RCRA WASTES

ON-SITE

- Description of the soil or debris waste and the source of the contamination;
- Description of the Proposed Action (e.g., "excavation, treatment, and off-site disposal");
- Intent to comply with the LDRs through a Treatability Variance; and
- For each alternative using a Treatability Variance to comply, the specific treatment level range to be achieved (see **Highlight 2** to determine these treatment levels).

OFF-SITE

For off-site Treatability Variances, the information above should be extracted from the RI/FS report and combined with the following information in a separate document:*

- Petitioner's name and address and identification of an authorized contact person (if different); and
- Statement of petitioner's interest in obtaining a Treatability Variance.

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* This document may be prepared after the ROD is signed (and Treatability Variance granted) but will need to be compiled prior to the first shipment of wastes (or treatment residuals) to the receiving treatment or disposal facility.

Assistant Administrator/OSWER when the ROD is signed.

FS Report

The FS Report should contain the necessary information (see **Highlight 3**) to document the intent to comply with the LDRs for soil and debris through a Treatability Variance. In the Detailed Analysis of Alternatives chapter of the FS Report, the discussion should specify the treatment level range(s) that the treatment technology would attain for each waste constituent restricted under the LDRs, as well as the Superfund primary contaminants of concern identified during the baseline risk assessment. In addition, under the Comparative Analysis of Alternatives section, when discussing the "Compliance with ARARs Criteria," site managers should indicate which alternatives will comply with the LDRs through the use of a Treatability Variance.

Proposed Plan

The intent to comply with the LDRs through a Treatability Variance for a particular alternative should be clearly stated in the Description of Alternatives section of the Proposed Plan. Because the Proposed Plan solicits public comment on all of the alternatives and not just the preferred option, the intent to obtain a Treatability Variance should be identified for every alternative for which a Variance would be used. This opportunity for public comment on the Proposed Plan fulfills the requirements for public notice and comment (off-site actions only) on the Treatability Variance as required in RCRA §268.44. Sample language for the Proposed Plan is provided in **Highlight 4**.

Highlight 4 - SAMPLE LANGUAGE FOR THE PROPOSED PLAN

Description of Alternatives section

This alternative will comply with the LDRs through a Treatability Variance under 40 CFR 268.44. This Variance will result in the use of [specify technology] to attain the Agency's interim "treatment levels/ranges" for the contaminated soil at the site (see Detailed Analysis of Alternatives Chapter of the FS Report for the specific treatment levels for each constituent).

Evaluation of Alternatives section, under "Compliance with ARARs"

The LDRs are ARARs for [Enter number] of [Enter total number of alternatives] remedial alternatives being considered [Enter number] of the [Enter total number of alternatives] alternatives would comply with the LDRs through a Treatability Variance.

Highlight 5: SAMPLE LANGUAGE FOR A RECORD OF DECISION

Description of Alternatives section:

This alternative will comply with the LDRs through a Treatability Variance for the contaminated soil and debris. The treatment level range established through a Treatability Variance that [Enter technology] will attain for each constituent as determined by the indicated analyses are [Example shown below]:

Barium	*0.1 - 40 ppm (TCLP)*
Mercury	*0.0002-0.008 ppm(TCLP)*
Vanadium	*0. 2 - 20 ppm (TCLP)*
TCE	*95-99.9% reduction (TWA)*
Cresols	*90-99% reduction (TWA)*

Record of Decision

A Treatability Variance is granted and becomes effective when the Record of Decision (ROD) is signed by the Regional Administrator or Assistant Administrator/OSWER. In the Description of Alternatives section, as part of the discussion of major applicable requirements associated with each remedial option, site managers should include a statement (as was done in the FS report) that a Treatability Variance will be used to comply with the LDRs, and list the treatment level range(s) that the selected technology will attain for each constituent. Sample language for the ROD is provided in **Highlight 5**.

In the Comparative Analysis section, under "Compliance with ARARs," site managers should indicate which of the alternatives will comply with the LDRs through a Treatability Variance. Under the Statutory Determination section (Compliance with ARARs), site managers should identify the

LDRs as an ARAR and indicate that a Treatability Variance is being used to comply.

Under some circumstances, the need to obtain a Treatability Variance may not be evident until after a ROD is signed. For example, previously undiscovered evidence may be obtained during a remedial design/remedial action (RD/RA) that the CERCLA waste contains a RCRA restricted waste and the LDRs are then determined to be applicable. In such situations, a site manager would need to prepare an explanation of significant differences (ESD) from the ROD and make it available to the public to explain the need for a Treatability Variance. In addition, unlike other ESDs that do not require public comment under CERCLA section 117(c), if the ESD involves granting a Treatability Variance, an opportunity for public comment would be required to fulfill the public notice and comment requirements for a Treatability Variance under 40 CFR §268.44.

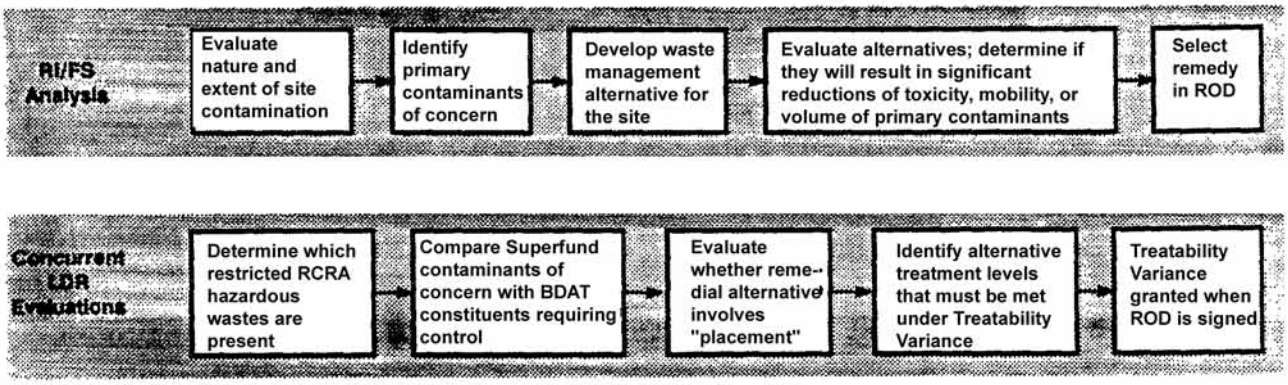
LDRs IN SUPERFUND ACTIONS

Because of the important role the LDRs may play in Superfund cleanups, site managers need to incorporate early in the RI/FS the necessary investigative and analytical procedures to determine if the LDRs are applicable for remedial alternatives that involve the "placement" of wastes.

When the LDRs are applicable, site managers should determine if the treatment processes associated with the alternatives can attain either the LDR treatment standards or the alternate levels that would be established under a Treatability Variance.

Site managers must first evaluate whether restricted RCRA waste codes are present at the site, identify the BDAT constituents requiring control, and compare the BDAT constituents with the Superfund primary constituents of concern from the baseline risk assessment. This process identifies all of the constituents for which remediation may be required. Once the viable alternatives are identified in the FS, site managers should evaluate those involving the treatment and placement of restricted RCRA hazardous wastes to ensure their respective technology process(es) will attain the appropriate treatment levels (i.e., either LDR treatment standard or Treatability Variance alternate treatment levels for soil and debris containing restricted RCRA hazardous wastes) and, in accordance with Superfund goals, reductions of 90 percent or greater for Superfund primary contaminants of concern. The results of these evaluations are documented in the Proposed Plan and ROD. An illustration of the integration of LDRs and Superfund is shown in **Highlight 6**. An example of the process for complying with a Treatability Variance for contaminated soil and debris is presented in **Highlight 7.**

Highlight 6: LDRs IN THE RI/FS PROCESS



Highlight 7: IDENTIFICATION OF TREATMENT LEVELS FOR A TREATABILITY VARIANCE

As part of the RI, it has been determined that soils in one location at a site contain F006 wastes and cresols (which site records indicate were an F004 waste). Arsenic also was found in soils at a separate location. The baseline risk assessment identified cadmium, chromium, lead, and arsenic as primary contaminants of concern. The concentration range of all of the constituents found at the site included:

Constituent	Total Concentration (mg/kg)	TCLP (mg/l)	Constituent	Total Concentration (mg/kg)	TCLP (mg/l)
Cadmium	2,270 - 16,200	120 - 146	Nickel	100 - 140	1 - 6.5
Chromium	3,160 - 4,390	30 - 56	Silver	1 - 3	---
Cyanides	80 - 150	1 - 16	Cresols	50 - 600	.25 - 4
Lead	500 - 625	2 - 12.5	Arsenic	800 - 1,900	3 - 9

Four remedial alternatives are being considered: (1) Low temperature thermal stripping of soil contaminated with cresols followed by immobilization of the ash; (2) Immobilization of the soil in a mobile unit; (3) In-situ immobilization; and (4) Capping of wastes. Each of these alternatives must be evaluated to determine if they will result in significant reduction of the toxicity, mobility, or volume of the waste; whether "placement" occurs; and, if "placement" occurs, whether the treatment will attain the alternative treatment levels established through a Treatability Variance for the BDAT constituents requiring control.

STEP 1: IDENTIFY THE RESTRICTED CONSTITUENTS

Because F006 and F004 wastes have been identified in soils at the site, the Superfund site manager must meet alternate treatment levels established through a Treatability Variance for the BDAT constituents. These constituents are: **Cadmium, Chromium, Lead, Nickel, Silver,** and **Cyanide** for F006 and Cresols for F004.

AND DIVIDE THE CONSTITUENTS INTO THEIR STRUCTURAL/FUNCTIONAL GROUPS (see Highlight 2):

All of the F006 constituents are in the **Inorganics** structural/functional group.
Cresols are in the **Other Polar Organic Compounds** structural/functional group.
In accordance with program goals, the preferred remedy also should result in the effective reduction (i.e., at least 90 percent) of all primary constituents of concern (i.e., **Cadmium, Chromium, Lead, and Arsenic**).

STEP 2: COMPARE THE CONCENTRATION THRESHOLD FOUND IN HIGHLIGHT 2 TO THE CONCENTRATIONS FOUND AT THE SITE AND CHOOSE EITHER THE CONCENTRATION LEVEL RANGE OR PERCENT REDUCTION RANGE FOR EACH RESTRICTED CONSTITUENT.

Constituent	Site Concentration	Threshold Concentration	Appropriate Range: Concentration	Appropriate Range: Percent Reduction	Range to be achieved (compliance analysis)
Cadmium	120 - 146 ppm	> 40 ppm		X	95-99.9 Percent Reduction (TCLP)
Chromium	30 - 56 ppm	< 120 ppm	X		0.5 - 6 ppm (TCLP)
Lead	2 - 12.5 ppm	< 300 ppm	X		0.1 - 3 ppm (TCLP)
Nickel	1 - 6.5 ppm	< 20 ppm	X		0.5 - 1 ppm (TCLP)
Cresols (Total)	50 - 600 ppm	> 100 ppm	X		90-99 Percent Reduction (TCLP)
Cresols (TCLP)	.25 - 4ppm			X	
Arsenic	3 - 9 ppm	< 10 ppm	X		0.27 - 1 ppm (TCLP)

STEP 3: IDENTIFY TREATMENT TECHNOLOGIES THAT MEET THE TREATMENT RANGES.

Highlight 2 lists the technologies that achieved the alternate treatment levels for each structural/functional group.
Because cresols are present in relatively low concentrations (assumed for the purposes of this etample), a TCLP may be used to determine if immobilization results in a sufficient reduction of mobility of this restricted RCRA hazardous waste. (Measures to address any volatilization of organics during immobilization processes will be necessary.)
Based on the results of treatability tests conducted at the site, immobilization also will result in the effective reduction in leachability (i.e., at least 90 percent) of arsenic, a Superfund primary contaminant of concern.

Alternative	Effective Reduction of Toxicity, Mobility, Volume?	"Placement?"	Meet Treatability Variance Alternate Levels?
1. Low temperature stripping/ Immobilization	Yes	Yes	Yes
2. Immobilization in mobile unit	Yes	Yes	Yes
3. In-situ immobilization	Yes (Mobility)	No (LDRs not ARARs)	---
4. Capping in Place	No	No (LDRs not ARARs)	---

STEP 4: PREPARE PROPOSED PLAN, OBTAIN COMMENTS

Highlight 4 provides sample language for the Proposed Plan that announces the intent to comply with the LDRs through a Treatability Variance.

STEP 5: PREPARE ROD

Highlight 5 provides sample language for a ROD signed for a site that will comply with the LDRs through a Treatability Variance