

**VARIANCE ASSISTANCE DOCUMENT:  
LAND DISPOSAL RESTRICTIONS TREATABILITY VARIANCES &  
DETERMINATIONS OF EQUIVALENT TREATMENT**

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## TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION .....	1-1
1.1 Introduction and Purpose .....	1-1
1.2 Determination of Equivalent Treatment .....	1-3
1.3 Treatability Variance .....	1-3
1.4 Organization.....	1-4
2.0 LDR VARIANCE PETITION CONTENTS .....	2-1
2.1 Administrative Information .....	2-1
2.1.1 Submission of Completed Applications .....	2-1
2.1.2 Identifying Information .....	2-2
2.2 Background Information .....	2-2
2.3 Petition Development and Information Gathering Process .....	2-3
2.3.1 Identification of Applicable Waste Codes .....	2-4
2.3.2 Identification of Applicable LDR Standards .....	2-4
2.3.3 Characterization of Initial Wastestream and Treatment Residuals .....	2-4
2.3.4 Conduct Engineering Evaluation Showing that Either the Treatment Standard Cannot be Met or the BDAT Used to Develop the Standard is not Appropriate for the Waste .....	2-8
2.3.5 Description of Waste Generation Process .....	2-9
2.3.6 Description of Current Waste Treatment Process .....	2-9
2.3.7 Description of Proposed Waste Treatment Process .....	2-10
2.3.8 Gather Data on Proposed Waste Treatment Process .....	2-10
2.3.9 Evaluation of the Proposed Waste Treatment Process with Respect to BDAT Criteria .....	2-13
3.0 PETITION REVIEW PROCESS .....	3-1
3.1 Receipt of Variance .....	3-1
3.2 Preliminary Review .....	3-1
3.3 In-Depth Review .....	3-2
3.4 Public Notice and Comment .....	3-3
3.5 Notification of Final Decision .....	3-4
4.0 BIBLIOGRAPHY .....	4-1

## LIST OF APPENDICES

	<u>Page</u>
Appendix A    List of Applicable RCRA Regulations .....	A-1
Appendix B    List of Applicable BDAT Background Documents .....	B-1

## 1.0 INTRODUCTION

### 1.1 Introduction and Purpose

The Hazardous and Solid Waste Amendments of 1984 (HSWA), require the Environmental Protection Agency (EPA) to promulgate regulations restricting the land disposal of untreated hazardous waste. This effort is generally referred to as the Land Disposal Restrictions (LDR) program. The LDR program identifies levels or methods of treatment that substantially reduce the toxicity of a waste or the likelihood of migration of hazardous constituents from the waste. These levels or LDR standards come in two basic forms:

- Numerical standards expressed as the concentration of hazardous constituents in the residuals from treatment, and
- Technology-specific standards that require the use of a specific technology.

Both types of LDR standards are based on the performance of the Best Demonstrated Available Technology (BDAT).

The land disposal restrictions are effective immediately upon promulgation unless the Agency grants a national variance based on the lack of available BDAT treatment capacity. If EPA determines that adequate BDAT treatment capacity is not available, HSWA allows EPA to establish an alternative effective date based on the earliest date when adequate capacity will be available, but in no case longer than 2 years. These national capacity variance determinations are made on a national level and do not require any type of petition or application from affected generators.

In addition to national capacity variances, case-by-case capacity extensions are also available. (See 40 CFR 268.5.) Case-by-case extensions require generators to file a petition demonstrating "...that a binding contract has been entered into to construct or otherwise provide alternative capacity that cannot reasonably be made available by the effective date due to circumstances beyond the applicant's control" (51 FR 40579, November 7, 1986). In addition, there are 6 other demonstrations required for case-by-case extensions to an effective date. (See 40 CFR 268.5.) National and case-by-case capacity variances are designed for cases where the waste, presumably, can be treated to meet the LDR standard, but where insufficient BDAT capacity exists. These variances, therefore, provide temporary relief only from the *effective date* of the LDR standards, not from the standards themselves.

In addition to capacity extensions, generators can obtain a variance from the LDR standards through a "no migration petition." (See 40 CFR 268.6.) No migration petitions must demonstrate that there will be no migration of hazardous constituents from the disposal unit (e.g., landfill, underground injection well, surface impoundment) for as long as the waste remains hazardous. These petitions are wastestream **and** disposal unit specific and, if granted, exempt the wastestream/disposal unit combination from the LDR standards (specifically, Subpart C of 40 CFR 268).

Consequently, national capacity variances, case-by-case capacity variances, and "no migration petitions" are not applicable to wastes that cannot meet the LDR standard. To handle cases where the waste cannot meet the LDR standards, EPA has established equivalent treatment and treatability variance procedures. These two types of variances correspond to the two basic

types of LDR standards. Determination of equivalent treatment applies to LDR standards expressed as a specific technology; a treatability variance applies to numerical LDR standards.

The purpose of this Document is to assist petitioners in submitting complete applications for either determination of equivalent treatment or a treatability variance (for process wastes only). This Document describes the two types of variances and discusses the situations to which they apply. It also discusses the required contents for each type of petition and provides an overview of EPA's petition review process.

## **1.2 Determination of Equivalent Treatment**

As mentioned above, a determination of equivalent treatment applies to technology-specific LDR standards (i.e., those requiring the use of a specific technology as opposed to a numerical standard). The requirements for determination of equivalent treatment petitions (also referred to as equivalency petitions) are contained in 40 CFR 268.42(b).

Successful equivalency petitions must demonstrate that the proposed alternative treatment technology can achieve a measure of performance equivalent to that of the BDAT technology. Petitions must also demonstrate that the proposed treatment system is in compliance with Federal, State, and local requirements and is protective of human health and the environment.

In general, EPA has established technology-specific standards for only wastes that contain certain hazardous constituents that cannot be routinely or accurately measured using EPA analytical techniques. Consequently, equivalency is normally judged on a qualitative rather than quantitative basis. Section 2.3.5 of this document presents EPA's general rationale in evaluating these petitions.

## **1.3 Treatability Variance**

Treatability variances may be granted for wastes that have LDR standards that are expressed as concentrations of hazardous constituents in the waste or waste extract (i.e., a numerical standard). The requirements for treatability variance petitions are contained in 40 CFR 268.44.

In order to be granted, treatability petitions must demonstrate that the waste of concern cannot be treated to the specified levels because its physical or chemical properties differ significantly from the waste used to establish the LDR standard.

Treatability variances may be generic or site-specific. A generic variance can result in the establishment of a new treatability group and a corresponding LDR treatment standard that applies to **all** wastes that meet the criteria of the new waste treatability group (55 FR 22526, June 1, 1990). A site-specific variance may be granted administratively and may be considered a non-rulemaking that applies only to a specific wastestream from a specific facility.

## **1.4 Organization**

Section 2 of this Document describes the required contents of both a determination of equivalent treatment petition and a treatability variance petition. Section 3 provides an overview of EPA's process for reviewing the petitions, and Section 4 provides a list of references.

## **2.0 LDR VARIANCE PETITION CONTENTS**

### **2.1 Administrative Information**

LDR variance petitions should be submitted in accordance with 40 CFR 260.20. (See Appendix A-1.) In addition, determination of equivalent treatment petitions must also satisfy the requirements 40 CFR 268.42(b), and treatability variance petitions must comply with 40 CFR 268.44. The requirements of these regulations are explained in the following paragraphs.

#### **2.1.1 Submission of Completed Applications**

One copy of the completed petition should be sent by certified mail to:

The Administrator  
U.S. Environmental Protection Agency  
401 M Street, S.W.  
Washington, D.C. 20460

An additional copy marked "Treatability Variance" or "Determination of Equivalent Treatment" should be sent by certified mail to:

Chief, Waste Treatment Branch  
Office of Solid Waste (5302-W)  
U.S. Environmental Protection Agency  
401 M Street, S.W.  
Washington D.C. 20460

Petitions containing Confidential Business Information (CBI) should be sent double wrapped with "Treatability Variance" or "Determination of Equivalent Treatment" and "Confidential Business Information" marked clearly only on the inner envelope. The contents of the petition should be marked in accordance with the requirements of 40 CFR Part 2.

#### **2.1.2 Identifying Information**

Both types of petitions must contain the petitioner's name and address, and the name, address, and EPA identification number of the facility generating the waste. The name and telephone number of the facility contact should also be provided.

### **2.2 Background Information**

According to 40 CFR 260.20(b)(3), both types of petitions should include a description of the proposed action. The type of variance requested (i.e., treatability or determination of

equivalent treatment) should also be clearly stated.

Petitions, per 40 CFR 260.20 (b)(2), must include a statement of the petitioner's interest in the proposed action (i.e., why the petitioner is seeking the variance). This statement should discuss the specific LDR standard from which a variance is requested and the technology upon which that standard is based (i.e., BDAT). At this point, the petitioner should also present the rationale for the variance request. This rationale should discuss why the waste of concern cannot be treated to the specified levels for treatability variance requests, or by the specified methodology for determinations of equivalent treatment. The petition should also discuss the specifics of the proposed equivalent treatment.

In addition, per 40 CFR 268.44(c), petitions must include the following statement signed by the petitioner or an authorized representative:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this petition and all attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

### **2.3 Petition Development and Information Gathering Process**

This section details the information needed to accurately and completely prepare a variance petition or a determination of equivalent treatment petition. These subsections are applicable to both variance petitions and determination of equivalent treatment. The following is a list of the subsections that discuss the key components of these petitions:

- 2.3.1 Identification of Applicable Waste Codes
- 2.3.2 Identification of Applicable LDR Standards
- 2.3.3 Characterization of Initial Wastestream and Treatment Residuals
- 2.3.4 Conduct Engineering Evaluation
- 2.3.5 Description of Waste Generation Process
- 2.3.6 Description of Current Waste Treatment Process
- 2.3.7 Description of Proposed Waste Treatment Process
- 2.3.8 Gather Data on Proposed Waste Treatment Process
- 2.3.9 Evaluation of the Proposed Waste Treatment Process with Respect to BDAT Criteria

#### **2.3.1 Identification of Applicable Waste Codes**

The petition should identify and discuss the waste code or codes that apply to the wastestream.

### 2.3.2 Identification of Applicable LDR Standards

After the applicable EPA hazardous waste code(s) have been identified, the applicable treatment standard should be determined. Note that the LDR program defines wastewaters as those wastes that contain less than 1 percent total organic carbon [TOC] by mass and less than 1 percent total suspended solids [TSS]. Nonwastewaters are defined as those wastes that contain greater than or equal to 1 percent TOC, or greater than or equal to 1 percent TSS. (See 55 FR 22537, June 1, 1990.)

If the wastestream is represented by more than one waste code, the waste must meet the LDR standards for all applicable waste codes. If the LDR standards overlap for any hazardous constituents (i.e., if two applicable waste codes have a different LDR standards for the same hazardous constituents), the more stringent standard applies. See 40 CFR 268.9(a). Information on treatment standards may also be obtained from the RCRA Docket for specific rulemakings and by contacting the RCRA/Superfund hotline at 1-800-424-9346.

### 2.3.3 Characterization of Initial Wastestream and Treatment Residuals

The initial wastestream should be characterized to determine if the wastestream meets the applicable LDR without requiring treatment. If the treatment standard can be achieved, no treatability variance is necessary. The effective date for the LDR standard should also be checked. The characterization of the treatment residuals should include concentrations of appropriate BDAT constituents.

### 2.3.4 Conduct Engineering Evaluation Showing that Either the Treatment Standard Cannot be Met or the BDAT Used to Develop the Standard is not Appropriate for the Waste

An engineering evaluation should be conducted demonstrating that the specified technology is inappropriate for the waste or that the treatment standard cannot be met.

For example, if a waste has a significantly different matrix from that of the waste used to develop the standard, an engineering analysis should show the effects of the matrix on the treatment process. This analysis could be based on sound engineering principles or on actual bench-scale data developed specifically to determine if the waste can be treated to the treatment standard. The bench-scale data must demonstrate that the technologies used to establish the standard are not applicable or are ineffective in meeting the standard for this waste matrix.

Another example is a waste with radioactive components that, if treated by the BDAT, would significantly increase the risk to human health and the environment. For this waste, the engineering evaluation should show that using the BDAT would pose a greater total risk than disposal. The evaluation must describe the potential exposure levels encountered by personnel operating the process and the health risk related to those exposure levels.

### 2.3.5 Description of Waste Generation Process

The waste generation process should be described for both the treatability variance and determination of equivalent treatment petitions. This description should include the feed materials generating the waste and the generation rate. The potential variability in the waste generation process and subsequent variations in the waste characteristics should also be described. A

detailed description of the chemical and physical processes generating the waste should be provided if user knowledge is the basis for waste characterization. Further, for either type of petition, the waste generation rate should be presented using the average monthly, maximum monthly, and/or annual generation rates of the waste.

#### 2.3.6 Description of Current Waste Treatment Process

If the petitioner's current waste treatment system differs from the process proposed in the petition, the current system should be described, including process design and treatment and disposal practices. This description should be developed for both determination of equivalent treatment petitions and variance petitions.

#### 2.3.7 Description of Proposed Waste Treatment Process

For both types of petitions, the proposed waste treatment process should be described including the process design, physical equipment, chemical reagents, control systems, design criteria, and operating conditions. The process description should include specifications demonstrating that the facility is well designed and well operated. In order to determine if a treatment technology is applicable to a particular wastestream, EPA considers all parameters and characteristics associated with a hazardous waste that could affect selection of the technology. EPA uses Waste Characteristics Affecting Performance (WCAPs) and Parameters Affecting Treatment Selection (PATs) to judge the performance of technologies and to determine if they are well designed and well operated for the waste of concern. EPA's list of PATs is shown on Table 1. The petition should also demonstrate that the facility is equipped to handle all constituents of concern, as well as nonhazardous constituents that could affect the system's performance in treating hazardous constituents.

The description should address compliance with applicable Federal, State, and local requirements, including how the system may be regulated (i.e., Subpart X, state air emission standards).

#### 2.3.8 Gather Data on Proposed Waste Treatment Process

The petitioner should include data from the proposed treatment process. For generic petitions, data should be collected from all affected facilities [51 FR 40606, November 7, 1986]. Samples must be collected for the waste to be treated and the treatment residue and appropriate operating parameters recorded. These data will be reviewed by EPA with respect to the achievability of the BDAT treatment standard and for making a determination of equivalent treatment.

Table 1. List of Parameters Affecting Treatment Selection (PATS)

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- BDAT list metals content
  - BDAT list organics content
  - Content of other BDAT list constituents (e.g., sulfides and fluorides)
  - Biological oxygen demand (BOD)
  - BTU content
  - Presence of complexed metals
  - Cyanide content
  - Filterable solids content
  - Oil and grease content
  - Oxidation state
  - pH
  - Total organic carbon (TOC) content
  - Total organic halides (TOX) content
  - Viscosity
  - Water content
  - Selectivity value
  - Sublimation temperature
  - Ash fusion temperature
-

Any sampling data collected should include:

- Dates of sampling and testing;
- Operating conditions at the time of sampling;
- A description of the methodologies and equipment used to obtain representative samples;
- A description of the sample handling techniques, including techniques used for extraction, containerization, and preservation of the samples; chain-of-custody procedures; sample identification and marking procedures; and recordkeeping and reporting procedures;
- A description of the tests performed;
- Test results; and
- A description of the QA/QC measures for waste analysis and treatment.

To compare the performance of the proposed waste treatment process to the BDAT, the treatment residues should be analyzed for total concentration in the waste, or concentration in the waste extract, or both, as required by the applicable treatment standard. The waste and treatment residue should be analyzed using the analytical methods specified in SW-846.

#### *Quality Assurance/Quality Control (QA/QC) Procedures*

Data on concentrations in treated waste must be adjusted for accuracy using recovery factors specific to the laboratory tests used. (Additional information may be found in the Final BDAT Background Document for Quality Assurance/Quality Control Procedures and Methodology.) Data from more than one facility (generic petitions) must be compared to verify that the performance levels are not significantly different, as described in this background document. The applicant may evaluate these data by means of analysis of variance (ANOVA).

QA/QC procedures assure that the LDR standards are based on well-documented data from samples that have been properly collected and analyzed and are, therefore, of known quality. Matrix analytical detection limits must be determined for the untreated wastes and for each treatment residual sample. Key data quality indicators for BDAT treatment standards include: precision, accuracy, representativeness and comparability.

- Precision is defined in terms of relative percent difference of the matrix spike and the matrix spike duplicate, while accuracy is defined in terms of percent recovery of laboratory matrix spikes.

- Representativeness refers to the selection of appropriate sampling locations and procedures. The goal is to obtain representative matched data pairs of the untreated matrix and treatment residues so that the performance of the treatment can be evaluated.
- Comparability is achieved by using consistent sampling and analytical procedures. For example, grab samples should be compared to grab samples, and composite samples to composite samples. The collection of matched data pairs should take into account the retention time of the treatment process. The samples should be analyzed using the same analytical techniques, and the analytical data should be reported in the same units for each test.

### 2.3.9 Evaluation of the Proposed Waste Treatment Process with Respect to BDAT Criteria

The proposed treatment process should be consistent with EPA's criteria for determining BDAT. In other words, the treatment should be protective of human health and the environment, and it should provide substantial treatment. The following is a summary of EPA's criteria for determining BDAT. (Additional information with respect to EPA criteria for determining BDAT may be found in the BDAT Methodology Document.)

- (1) The technology must be "demonstrated." A BDAT must be used in a full-scale operation. Where EPA does not identify any facilities treating specific wastes from a particular group, it may "transfer" a finding of demonstrated treatment by comparing the parameters that affect treatment of the target waste group to parameters for other waste groups for which demonstrated treatment is known.
- (2) The technology must be "available." Available is defined by EPA as follows:
  - The technology does not present greater total risk to human health and the environment than land disposal.
  - The technology is commercially available.
  - The technology provides "substantial treatment," which means it substantially diminishes the toxicity of a waste or substantially diminishes the likelihood of migration of hazardous constituents from the waste. EPA judges substantial treatment on a case-by-case basis.
- (3) The technology must be "best" based on effectiveness of treatment. Economic factors are not considered. When more than one technology is identified as demonstrated and available, the treatment data from the technologies are statistically compared (i.e., Analysis of Variance) to determine if the technologies provide statistically different levels of treatment and, if so, which technology is "best."

## **3.0 PETITION REVIEW PROCESS**

### **3.1 Receipt of Variance**

Following receipt of the petition, it is assigned to an EPA reviewer within the Waste Treatment Branch of the Office of Solid Waste. EPA will send a letter to the petitioner acknowledging receipt of the petition.

### **3.2 Preliminary Review**

The preliminary review of the petition consists primarily of a completeness check to determine what, if any, additional data EPA requires to evaluate the merit of the petition. Section 2 of this document discusses in detail the information that is required for EPA to review a variance petition. This section presents a summary list of the necessary information that is required of variance petitions. Note that submittal of incomplete variance petitions may result in EPA requesting additional information from the petitioner [40 CFR 268.44(d)], thus delaying the petition review process. In summary, the contents of a complete variance petition are as follows:

- Identification of Applicant
- Statement of Petitioner's Interest in the Proposed Variance
- Description of the Waste
  - Waste generation/description of process generating the waste
  - Waste characterization
  - Waste generation rate
  - Description of current waste treatment process
- Discussion of the Proposed Waste Treatment Process
  - Description of the proposed process for treating the waste/description of the design and operating parameters to determine if the system is well designed and well operated, etc.
- Characterization of the Treatment Residues
  - Corresponding untreated and treated data should be provided and TCLP and/or total concentration data where appropriate
- Documentation of Data Collection
  - Discussion of sampling and analysis procedures used
  - Analytical methodologies used

- QA/QC measures
- Engineering evaluation demonstrating that the BDAT is inappropriate or the standard cannot be met
- Certification Statement
  - A certification statement must be signed attesting to the truthfulness of the petition

### **3.3 In-Depth Review**

Following the receipt of any additional requested data, the petition undergoes a thorough engineering review. This review considers the same information as the preliminary review, but concentrates on evaluating the technical merit of the data and information submitted, rather than its completeness.

After the in-depth engineering review, a preliminary decision to grant or deny the petition is made.

### **3.4 Public Notice and Comment**

For generic variance petitions or site-specific variance petitions that have generic applicability or effect, EPA will give public notice in the **Federal Register** of the intent to approve or deny a petition and provide an opportunity for public comment<sup>1</sup>. Upon the written request of any interested person or at the discretion of the Administrator, EPA may hold a public hearing to consider oral comments on the proposed decision (public hearings are not normally a routine step in the petition review process). Written requests for a hearing must state the issues to be raised and explain why written comments will not suffice (40 CFR 260.20(d)).

RCRA does not preclude the option of granting variances to those site-specific petitions that have no generic applicability or effect, through a "non-rulemaking" procedure (i.e., grant of variance through an administrative process). In such cases, the vehicle for public notification will be determined on a case-by-case basis. Public notification, however, will usually be through existing public participation vehicles such as permit applications or modifications, or CERCLA Remedial Investigation/Feasibility Study documents. In cases where such opportunities do not exist, EPA will provide public notice through publication in local newspapers, by radio broadcast, or by other media (53 FR 31200, August 17, 1988).

After the 30-day comment period, EPA will analyze all public comments received and prepare a comment response document, a final background document (incorporating any changes based on comments), and a final administrative record. These documents are then placed in the public docket. For site-specific variances, EPA will usually provide for public notice and comment (as a matter of public policy) prior to granting a non-rulemaking variance.

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<sup>1</sup>EPA may also notify petitioners directly of its intent to deny a petition to allow the petitioner the opportunity to withdraw the petition, thus avoiding a formal denial procedure.

### **3.5**                    **Notification of Final Decision**

Notification of EPA's final decision on a petition for variance from the LDR treatment standards will be published in the **Federal Register** as an amendment to the treatment standards in 40 CFR 268 Subpart D if the variance is generic in nature. For determinations of equivalent treatment and site-specific variances, the petitioner will be notified by mail.

## 4.0 BIBLIOGRAPHY

U.S. Department of Energy. Environmental Guidance Division. Obtaining Variances from the Treatment Standards of the RCRA Land Disposal Restrictions. Washington, D.C.: DOE, 1990.

U.S. Environmental Protection Agency. Office of Solid Waste. Treatment Technology Background Document EPA, 1990.

U.S. Environmental Protection Agency. Office of Solid Waste. Final BDAT Background Document for Quality Assurance/Quality Control Procedures and Methodology NTIS # PB-92-149277, October, 1991.

U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Test Methods for Evaluating Solid Waste (SW-846. Third Edition). Washington, D.C.: EPA, 1986.

Appendix A: List of Applicable Regulations

40 CFR Part 2 - CBI Information

40 CFR Part 260.20 - Rulemaking Petitions

40 CFR Part 261 - Identification and Listing of Hazardous Waste

Subpart A - General

Subpart B - Criteria for Identifying the Characteristics of Hazardous Waste  
and for Listing Hazardous Wastes

Subpart C - Characteristics of Hazardous Waste

Subpart D - List of Hazardous Wastes

Appendices

40 CFR Part 268 - Land Disposal Restrictions

Subpart A - General

Subpart B - Schedule for Land Disposal Prohibitions and Establishment of  
Treatment Standards

Subpart C - Prohibition on Land Disposal

Subpart D - Treatment Standards

Subpart E - Prohibition on Storage

Appendices

## Appendix B: List of BDAT Background Documents

Include:

List of Waste-code specific Treatment Technology Background Documents

BDAT Background Document for Quality Assurance/Quality Control Procedures and Methodology, U.S. EPA, October 23, 1991.

Guidebook for Quality Assurance/Quality Control Procedures for Submission of Data for the Land Disposal Restrictions Program, U.S. EPA, July 3, 1991.

(These Background Documents are available from: (1) the U.S. EPA RCRA Docket located at Crystal Gateway One, 1235 Jefferson Davis Highway, First Floor, Arlington VA, 22202, (703) 603-9230; and (2) The National Technical Information Center (NTIS) located at 5285 Port Royal Road, Springfield, Virginia 22161, telephone number (703) 487-4600.)