

DEVELOPMENT OF A TREATABILITY VARIANCE GUIDANCE DOCUMENT FOR U.S. DOE MIXED-WASTE STREAMS*

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ABSTRACT

In response to the U.S. Department of Energy's (DOE's) anticipated need for variances from the Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (LDRs), a treatability variance guidance document was prepared. The guidance manual is for use by DOE facilities and operations offices. The manual was prepared as a part of an ongoing effort by DOE-EH to provide guidance for the operations offices and facilities to comply with the RCRA (LDRs).

A treatability variance is an alternative treatment standard granted by EPA for a restricted waste. Such a variance is not an exemption from the requirements of the LDRs, but rather is an alternative treatment standard that must be met before land disposal. The manual, *Guidance For Obtaining Variance From the Treatment Standards of the RCRA Land Disposal Restrictions (1)*, leads the reader through the process of evaluating whether a variance from the treatment standard is a viable approach and through the data-gathering and data-evaluation processes required to develop a petition requesting a variance. The DOE review and coordination process is also described and model language for use in petitions for DOE radioactive mixed waste (RMW) is provided. The guidance manual focuses on RMW streams, however the manual also is applicable to nonmixed, hazardous waste streams.

OVERVIEW OF THE RCRA LAND DISPOSAL RESTRICTIONS

The RCRA LDRs have an effect on nearly all hazardous waste management activities. The LDRs set treatment standards, which must be met before land disposal, for RCRA hazardous wastes. These standards are based on EPA's evaluation of the effectiveness of treatment technologies in treating RCRA hazardous wastes. The treatment technologies evaluated are the Best Demonstrated Available Technologies (BDAT) as defined and determined by EPA. The wastes are grouped into "Waste Treatability Groups" for the purposes of evaluating treatment effectiveness and establishing standards. EPA sets the standards, expressed as either a concentration of hazardous constituents that cannot be exceeded in the waste, or as a treatment technology that must be used to treat the waste before land disposal. There are several types of variances, exemptions, or extensions provided for in the LDR regulatory framework. These include:

"No migration exemptions" for land disposal units that demonstrate that there will be no migration of waste from

the unit as long as the waste remains hazardous.

- "Case-by-case extensions" for owner/operators that demonstrate that compliant treatment is not available and that they are pursuing developing the capacity for compliant treatment.
- "Variances" from the treatment standard, where the owner/operator demonstrates that because of the physical or chemical characteristics of the waste, the technology that EPA used to develop the LDR is not appropriate for the waste.

DOE STATUS

The DOE has been evaluating the effect of the LDRs on their radioactive mixed-waste management activities as a part of their effort to both: 1) comply with the RCRA LDRs, and 2) safely manage radioactive wastes that are generated. In some cases, the treatment technologies used by EPA in establishing the LDR treatment standard are not appropriate for the radioactive mixed waste because of the potential for radionuclide exposure during treatment of the

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waste. This specific scenario is addressed in the manual developed for DOE.

CONTENTS OF THE MANUAL

The manual provides an overview of the LDRs and LDR compliance alternatives. A flowchart is provided to aid the reader in evaluating the LDR compliance alternatives for specific scenarios. The DOE internal review and coordination process used for preparing and submitting a petition to EPA is described. The processes for evaluating whether a variance is a viable approach, and for gathering the necessary information for the petition are explained in the manual and summarized in this paper. (See Fig. 1.)

Types of Variances and Their Applicability

Before discussing the process for determining whether a variance is possible, the differences between the two types of standards and the two types of variances should be clarified. LDRs have been established by EPA as either a maximum concentration of hazardous constituents in the waste stream, or as a BDAT that must be used to treat the waste. Standards are set as technologies where EPA has identified only one BDAT being used in treating the waste.

For wastes subject to performance-based standards, the petition for a variance from the standard is a treatability variance. This type of petition must demonstrate that the waste is "significantly different" from the waste used by EPA to develop the standard. On the other hand, for wastes subject to technology-based standards, there are two types of variances that may apply. If the waste is not treated using the technology specified in the standard, a variance is required. If an equivalent level of treatment is provided, an equivalent treatment variance may be appropriate. The petition for an equivalent treatment variance must demonstrate that equivalent treatment is provided and that the proposed treatment technology meets EPA's criteria for an acceptable treatment technology. If an equivalent level of treatment is not provided, then a treatability variance is required demonstrating that the waste is significantly different from the waste used by EPA to establish the standard.

Evaluating Whether the Petition is a Viable Approach

The following discussion describes the process for determining whether a petition for a variance from the treatment standards is a viable approach and the process of developing the petition. This discussion addresses wastes that are subject to performance-based standards. (The manual addresses wastes that are subject to performance-based standards, technology-based standards, and both types of standards.)

First, the applicable Land Disposal Restriction must be identified. The generating facility is responsible for evaluating the waste stream and determining the applicable EPA

Hazardous Waste Number or waste code. Based on the waste code, the waste treatability group can then be identified as well as the applicable LDR. The characterization data on the untreated waste stream should be evaluated to determine whether the waste is indeed restricted from land disposal. That is, if the waste already meets the standard, further treatment to reduce the levels of RCRA hazardous constituents is not required. If the concentrations of the hazardous constituents are above the concentrations specified in the standard, then the waste must be treated before to land disposal. If the waste is being treated, a sample of the treated waste (treatment residue) should be obtained and analyzed to determine whether the treated waste meets the treatment standard. If so, a variance is not required (for a waste subject to a performance-based standard). If the treatment standard is not met in the existing treatment process, the generator must determine whether the waste is significantly different from the waste used by EPA in their development of the LDR standard.

In the manual, two premises have been presented, either of which may be used to establish that the waste is significantly different from the waste used by EPA to establish the standard:

1. The waste cannot be treated to meet the applicable treatment levels.
2. The technology used to establish the treatment level is not appropriate for the waste.

The first premise involves evaluating treatability data using EPA's BDAT to show that the waste cannot be treated to the levels specified in the standard. The second premise involves a revisiting of EPA's definitions of "best," "demonstrated," and "available" for selecting the technology that was used to establish the standard.

For RMW that would not be safely managed by EPA's BDAT, the key lies in the definition of available. Available is defined by EPA as:

- The technology does not present greater total risk than land disposal.
- The technology must be commercially available.
- The technology must provide "substantial treatment." (2)

EPA will not grant a treatability variance simply because commercially available BDAT is not available for the treatment of radioactive mixed waste. However, where the BDAT is inherently unsafe (*with respect to exposure levels*) when applied to RMW and could not feasibly be redesigned to ensure safety, then a variance could be justified.

If it is found that the waste is significantly different from the waste used by EPA to develop the standard, a petition

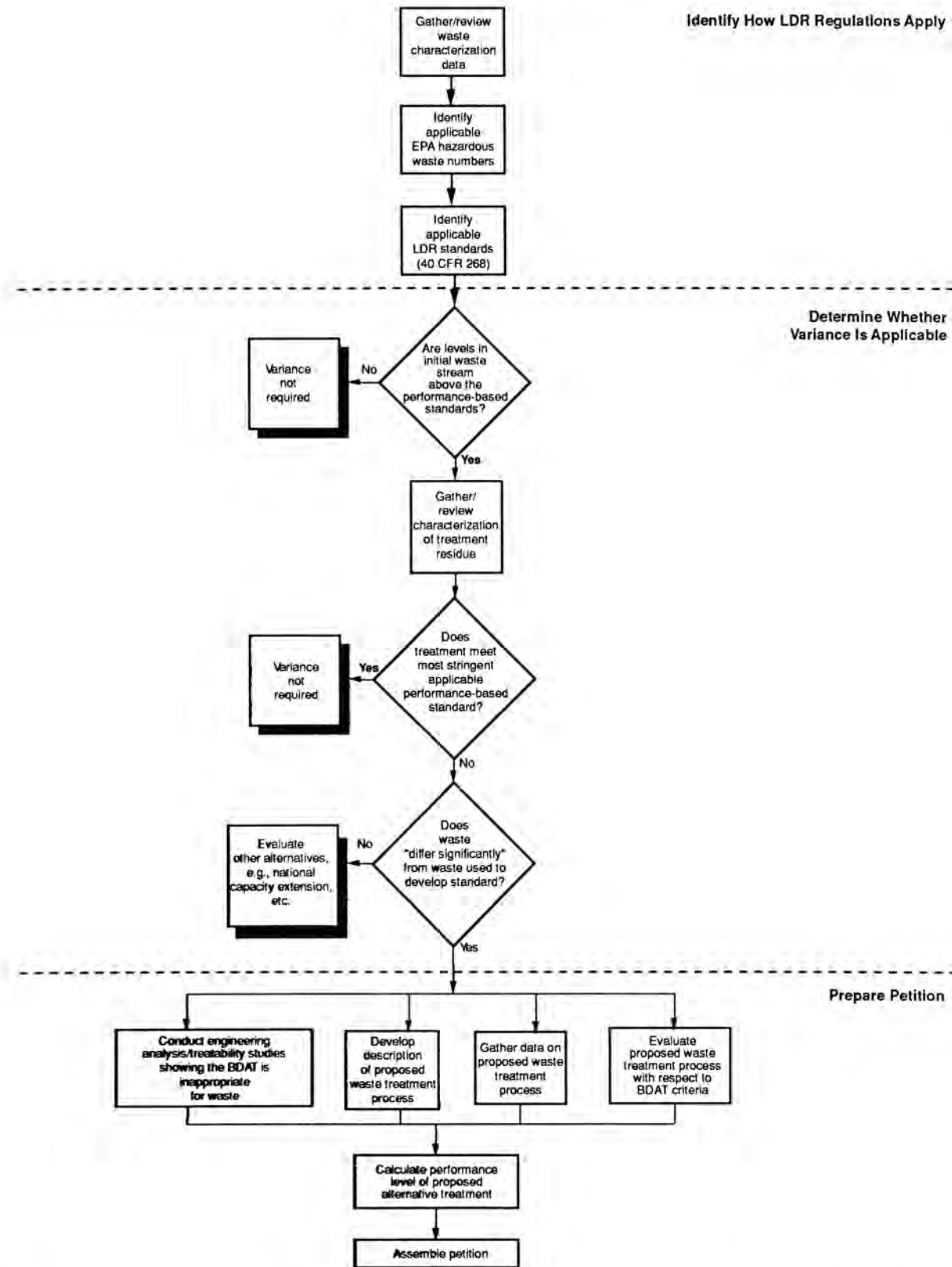


Fig. 1. Petition Development and Information-Gathering Process for Waste Subject to Performance-Based Standards.

should be considered a viable approach and should be pursued.

Developing the Petition

Guidance is provided in the manual for the description of the waste generation process, waste treatment process, and data required to support either type of petition. It merits mention that EPA has specific guidance for gathering data to support establishing the treatment standards. As the treatability variance petition proposes an alternative treatment standard, this guidance should also be used for gathering the data on which the petition will be based. The EPA guidance is the *Generic Quality Assurance Project Plan for Land Disposal Restrictions Program* (3). Also, the *Methodology for Developing Best Demonstrated Available (BDAT) Treatment Standards* is a very useful tool in developing the petition (4).

The key elements in the petition are the following:

- Demonstration that the waste cannot be treated to the standard using the technology that EPA used to develop the standard. This may be provided by the results of treatability studies or by an engineering or chemical evaluation of the waste characteristics.
- Demonstration that the waste is significantly different.
- Demonstration that the proposed method of treatment meets the BDAT criteria.
- Proposed alternative treatment standard (variance) developed using statistical methods specified by EPA. These include the Z-score statistical method, the ANOVA method, and the calculation of the variability factor (2).
- Quality Assurance/Quality Control information on the data used to develop the alternative treatment standard (3).

SUMMARY

DOE has prepared guidance for the development of the petition for a variance from the treatment standards for DOE RMW streams. This guidance provides the user with a step-by-step approach for evaluating whether a treatability variance is possible, for gathering the data required for the petition, and for preparing the petition. Model language is provided in the manual for use in DOE petitions. The guidance manual is available to DOE operations offices and facilities through DOE-EH.

CURRENT STATUS OF RCRA LDRS FOR RMW

In November of 1989, U.S. EPA proposed a 2-year National Capacity Extension for radioactive mixed waste. If the regulations are promulgated as proposed, this would mean that DOE radioactive mixed-waste streams will become subject to the RCRA LDRs on May 8, 1992.

REFERENCES

1. U.S. DEPARTMENT OF ENERGY, *Guidance For Obtaining Variances From the Treatment Standards of the RCRA Land Disposal Restrictions* (1989).
2. U.S. ENVIRONMENTAL PROTECTION AGENCY, "Hazardous Waste Management System: Land Disposal Restrictions; Final Rule," *Federal Register*, Vol. 51, No. 216, Part II (7 Nov. 1986): 40572-40654.
3. U.S. ENVIRONMENTAL PROTECTION AGENCY, *Generic Quality Assurance Project Plan for Land Disposal Restrictions Program*, EPA 530/SW-87-011 (1987).
4. U.S. ENVIRONMENTAL PROTECTION AGENCY, *Methodology for Developing Best Demonstrated Available (BDAT) Treatment Standards*, EPA 530/SW-89-017L (1988).