applies to any rule that: (1) Is determined to be ''economically significant'' as defined under E.O. 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency. These proposed findings are not subject to E.O. 13045 because they do not involve decisions intended to mitigate environmental health or safety risks.

D. Executive Order 13084

Under Executive Order 13084, Consultation and Coordination with Indian Tribal Governments, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.'' Today's proposed findings do not significantly or uniquely affect the communities of Indian tribal governments. Accordingly, the requirements of section 3(b) of E.O. 13084 do not apply to this rulemaking.

E. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to conduct a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and small governmental jurisdictions. These proposed findings will not have a significant impact on a substantial number of small entities for the reasons set forth in section VI.B. above. Therefore, because these proposed findings do not create any new requirements, I certify that they will not have a significant economic impact on a substantial number of small entities. Moreover, due to the nature of the Federal-State relationship under the Clean Air Act, preparation of flexibility analysis would constitute Federal inquiry into the economic reasonableness of state action. The Clean Air Act forbids EPA to base its actions concerning SIPs on such grounds. *Union Electric Co.,* v. *U.S. EPA*, 427 U.S. 246, 255–66 (1976); 42 U.S.C. 7410(a)(2).

F. Unfunded Mandates

Under Section 202 of the Unfunded Mandates Reform Act of 1995 (''Unfunded Mandates Act''), signed into law on March 22, 1995, EPA must prepare a budgetary impact statement to accompany any proposed or final rule that includes a Federal mandate that may result in estimated annual costs to State, local, or tribal governments in the aggregate; or to private sector, of $100 million or more. Under Section 205, EPA must select the most cost-effective and least burdensome alternative that achieves the objectives of the rule and is consistent with statutory requirements. Section 203 requires EPA to establish a plan for informing and advising any small governments that may be significantly or uniquely impacted by the rule.

EPA has determined that the proposed findings do not include a Federal mandate that may result in estimated annual costs of $100 million or more to either State, local, or tribal governments in the aggregate, or to the private sector for the reasons set forth in section IV.B. above. Accordingly, no additional costs to State, local, or tribal governments, or to the private sector, result from these actions.

List of Subjects

40 CFR Part 52

Environmental protection, Air pollution control, Hydrocarbons, Intergovernmental relations, Nitrogen oxides, Ozone, Volatile organic compounds.

40 CFR Part 81

Environmental protection, Air pollution control, National parks, Wilderness areas.

Authority: 42 U.S.C. 7401 *et seq.*

Dated: June 7, 2000.

Felicia Marcus,

Regional Administrator, Region IX.

[FR Doc. 00–15391 Filed 6–16–00; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 268

[FRL–6718–8]

RIN 2050–AE53

Land Disposal Restrictions: Advance Notice of Proposed Rulemaking

AGENCY: Environmental Protection Agency.

ACTION: Advance notice of proposed rulemaking.

SUMMARY: The Environmental Protection Agency (EPA) is giving advance notice of issues and potential directions we are considering for improving the Land Disposal Restrictions (LDR) program for treating hazardous waste under the Resource Conservation and Recovery Act (RCRA). These issues and directions arise from a number of internal and external sources, including the participants at two LDR roundtable meetings. We are requesting comments on all of these issues, directions, and options. In some cases we are requesting additional data that will allow us to better evaluate possible changes to the LDR regulations.

DATES: To make sure we consider your comments we must receive them by September 18, 2000.

ADDRESSES: If you wish to comment on this advanced notice of proposed rulemaking (ANPRM), you must send an original and two copies of the comments referencing Docket Number F–2000–LRRP–FFFFF to: RCRA Docket Information Center, Office of Solid Waste (5305G), U.S. Environmental Protection Agency Headquarters (EPA HQ), Ariel Rios Building, 1200 Pennsylvania Avenue, N.W., Washington, DC 20460, or (2) if using special delivery, such as overnight express service. Hand deliveries of comments should be made to the Arlington, VA address listed below. You may also submit comments electronically by sending electronic mail through the Internet to: rcra-docket@epamail.epa.gov. You should identify comments in electronic format with the docket number F–2000–LRRP–FFFFF. You must submit all electronic comments as an ASCII (text) file, avoiding the use of special characters or any type of encryption. If you do not submit comments electronically, EPA is asking prospective commenters to voluntarily submit one additional copy of their comments on labeled personal computer diskettes in ASCII (text) format or a word processing format that can be converted to ASCII (text). It is essential to specify on the disk label the word processing software and version/edition as well as the commenter's name. This will allow EPA to convert the comments into one of the word processing formats utilized by the Agency. Please use mailing envelopes designed to physically protect the submitted diskettes. EPA emphasizes that submission of diskettes is not mandatory, nor will it result in any advantage or disadvantage to any commenter.

You should not submit electronically any confidential business information (CBI). You must submit an original and two copies of CBI under separate cover to: RCRA CBI Document Control Officer, Office of Solid Waste (5305W), U.S. Environmental Protection Agency Headquarters (EPA HQ), Ariel Rios Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

You may view public comments and supporting materials in the RCRA Information Center (RIC), located at Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, VA. The RIC is open from 9 am to 4 pm Monday through Friday, excluding federal holidays. To review docket materials, we recommend that you make an appointment by calling 703–603–9230. You may copy up to 100 pages from any regulatory document at no charge. Additional copies cost $ 0.15 per page. (For info on accessing paper and/or electronic copies of the document, see the **SUPPLEMENTARY INFORMATION** section).

FOR FURTHER INFORMATION CONTACT: For general information, call the RCRA Hotline at 1–800–424–9346 or TDD 1–800–553–7672 (hearing impaired). Callers within the Washington Metropolitan Area must dial 703–412–9810 or TDD 703–412–3323 (hearing impaired). The RCRA Hotline is open Monday–Friday, 9 am to 6 pm, Eastern Standard Time. For more information on specific aspects of this ANPRM, contact Josh Lewis at 703–308–7877, lewis.josh@epa.gov, or write him at the Office of Solid Waste (5302W), U.S. Environmental Protection Agency Headquarters (EPA HQ), Ariel Rios Building, 1200 Pennsylvania Avenue, N.W., Washington, DC 20460.

SUPPLEMENTARY INFORMATION: The index and selected supporting materials are available on the Internet. Follow these instructions to access the information electronically: WWW:http://www.epa.gov/epaoswer/osw/hazwaste.htm#ldr

The official record for this action will be kept in the paper form. Accordingly, EPA will transfer all comments received electronically into paper form and place them in the official record which will also include all comments submitted directly in writing. The official record is the paper record maintained at the RIC listed in the **ADDRESSES** section at the beginning of this document.

Formal comment responses are not typically required following an ANPRM. However, EPA is considering the preparation of a comment response document. In the event that EPA prepares such a document, EPA's responses will be placed in the official record. EPA will not immediately reply to commenters other than to perhaps seek clarification of electronic comments that may be garbled in transmission or during conversion to paper form, as discussed above.

Glossary of Acronyms

AEA—Atomic Energy Act
ALARA—As Low As Reasonably Achievable
BDAT—Best Demonstrated Available Technology
BRS—Biennial Reporting System
CWA—Clean Water Act
DET—Determination of Equivalent Treatment
DOE—Department of Energy
ETC—Environmental Technology Council
HDPE—High Density Polyethylene
HWIR—Hazardous Waste Identification Rule
HSWA—Hazardous and Solid Waste Amendments
HTMR—High Temperature Metals Recovery
LDR—Land Disposal Restrictions
LDRite—LDR Innovative Technology Evaluation
MSWL—Municipal Solid Waste Leachate
NPDES—National Pollutant Discharge Elimination System
NRC—Nuclear Regulatory Commission
PBT—Persistent, Bioaccumulative, and Toxic
RCRA—Resource Conservation and Recovery Act
RTHRM—Thermal Recovery (LDR Specified Treatment Method)
STABL—Stabilization (LDR Specified Treatment Method)
TC—Toxicity Characteristic
TCLP—Toxicity Characteristic Leaching Procedure
TOC—Total Organic Carbon
UHC—Underlying Hazardous Constituent
UTS—Universal Treatment Standard
WMNP—Waste Minimization National Plan

Table of Contents

I. General Information

A. What Is the LDR Program?

In 1984, Congress created EPA's Land Disposal Restrictions (LDR) program. The LDR program ensures that toxic constituents present in hazardous waste are properly treated before the hazardous waste is land disposed. The LDR program has developed technology-based treatment standards that all hazardous wastes must meet before they can be placed in a landfill. These standards help minimize short-term and long-term threats to human health and the environment.

B. What Is the Purpose of This LDR ANPRM?

In this Advance Notice of Proposed Rulemaking (ANPRM), EPA is giving advance notice of issues and potential directions we are considering for improving the LDR program for treating hazardous waste under the Resource Conservation and Recovery Act (RCRA). We want to ensure that the LDR program is minimizing threats to human health and the environment in the most appropriate way. By appropriate we mean: (1) Environmentally protective; (2) cost-effective; (3) flexible for implementors and the regulated community; and (4) clear and enforceable.

C. What Has Led Up to This ANPRM?

We interviewed representatives from EPA Headquarters, EPA Regions, States, and LDR experts in the regulated community and in environmental groups. These representatives identified problems, issues, and possible improvements to the LDR program. Next, we examined the recommendations made at the 1993 LDR roundtable [1] to identify promising implementation ideas that have not been addressed. Finally, we conducted site visits with nine generators and treatment facilities to get first-hand knowledge of LDR implementation.

Through initial scoping activities described above, public comments submitted on past LDR proposed rules, public inquiries made to the Waste Treatment Branch, general experience working on LDR issues, and a second LDR roundtable held in 1998, we have compiled the issues, options, and directions listed and discussed below.

D. What Issues Does This ANPRM Discuss?

This ANPRM presents several issues, options, and directions that could potentially lead to changes in the LDR regulations. Below is a list of issues that we are considering in this notice.

(1) Ways for the LDR program to encourage the use of source reduction and recycling.

(2) Ways for the LDR program to encourage innovative treatment technologies and to incorporate these technologies into the LDR program.

(3) The long-term effectiveness of stabilization treatment for hazardous metal wastes. In particular, we are looking at whether metal constituents leach out of stabilized wastes over time and whether alternative approaches to evaluating the effectiveness of treatment by immobilization technologies exist.

(4) Whether to develop treatment standards for additional constituents of concern (*e.g.,* metals) in listed solvent wastes.

(5) Whether better ways exist to ensure the treatment standards for reactive wastes are adequately protective.

(6) Ways to allow public input into EPA's decision on requests for Determinations of Equivalent Treatment.

(7) The appropriate regulatory response regarding the treatment

[1] On January 13–14, 1993 EPA convened a roundtable to discuss potential improvements to the LDR program. The discussion topics included monitoring, administrative requirements/regulations, and treatment standards. Based on the discussions at the roundtable and our follow-up study of the issues from the roundtable, we made a number of changes to the LDR program. One of the changes involved the establishment of a single universal treatment standard (UTS) for most LDR-regulated constituents in wastewaters and nonwastewaters. The UTS eliminated situations in which a common constituent found in multiple wastes carried different numerical treatment standards (see 59 FR 47982, September 19, 1994).

standards for hazardous debris and, in particular, look at whether macroencapsulation is the most appropriate treatment for debris contaminated primarily with organic compounds.

(8) Whether to establish treatment standards for incineration ash to reduce paperwork burden and possibly reduce analytical costs associated with the carry through of multiple waste codes.

(9) Whether to establish targeted treatment standards for radioactive mixed waste (*i.e.,* wastes that are both hazardous under RCRA and radioactive) and consider other instances when it might be appropriate to establish methods of treatment rather than concentration limits to avoid radiological risks associated with compliance monitoring.

E. Who Will These Issues Affect?

They potentially affect all those who are subject to the land disposal restrictions as well as implementors of the LDR program.

F. How Will This ANPRM Impact Small Businesses and State Programs?

Because we are not proposing any new regulations in this notice, this ANPRM will not impact small businesses. We will, however, be mindful of the impact that any potential changes may have, and we are requesting comment on the potential costs and benefits to small businesses should revisions be made to the LDR program as described in this ANPRM. Suggestions on ways we might mitigate any adverse effects would also be welcome.

We will also be cognizant of the impact of any proposed revisions to the LDR program on State programs, and we encourage comments on this subject.

G. Will Any Potential Changes Arising From This ANPRM Be More Stringent Than Current Requirements?

It is premature to say at this point. Some of the possible changes may be more stringent, such as potentially regulating metal constituents in solvent wastes. Other potential changes may provide some relief to the regulated community, such as the possible establishment of tailored treatment standards for mixed wastes.

H. When Will Any Potential Changes to the Current LDR Regulations Take Effect?

Our time frame for action in part depends on your comments and suggestions. We will thoroughly review your comments and suggestions to determine their feasibility, and any potential changes in the regulations will be proposed in future rulemakings.

I. How Do the Issues Presented in This ANPRM Relate to Other Recent EPA Notices?

This ANPRM includes some issues that affect other recently released EPA notices. The following is a list of these notices, including a brief description of each notice and how it relates to this ANPRM:

(1) ANPRM on potential revisions to the LDR mercury treatment standards (64 FR 28949, May 28, 1999)—gives advance notice of EPA's comprehensive reevaluation of the treatment standards for mercury-bearing hazardous wastes as well as various options, issues, and data needs related to potential revisions to the mercury treatment standards. One of the options the mercury ANPRM discusses is the possibility of adding a subcategory to the LDR treatment standards for high mercury subcategory wastes that are also radioactive. See the section entitled ''Should EPA Establish Tailored Treatment Standards for Mixed Wastes?'' in this notice for more information.

(2) Office of Solid Waste Burden Reduction Project Notice of Data Availability (64 FR 32859, June 19, 1999)—solicits comment on burden reduction options. See the section entitled ''Is EPA Doing Anything in this Rule to Decrease Paperwork Burden?'' in this notice for further information.

(3) Hazardous Waste Identification Rule (HWIR) proposed rule (64 FR 63381, November 19, 1999). HWIR contains two important areas of overlap with the RCRA LDR program. First, HWIR is requesting comment on whether HWIR exemption levels should ''cap'' existing technology-based LDR standards, where the exemption levels would be less stringent than the current LDR values. If a waste contains only constituents with ''capped'' LDR values, it would satisfy LDR requirements and become exempt from the definition of hazardous waste for all other purposes once the other requirements of the HWIR exemption were satisfied. Second, if a listed waste is below the HWIR exemption concentrations where the waste is ''first'' generated (the point where a waste first meets the listing description) and the waste meets all the other requirements of the HWIR exemption, then a hazardous waste would never really be ''generated'' and the LDR requirements would not attach to the waste. In contrast, once a listed waste is generated and managed, the LDR requirements would attach, and the waste would need to meet LDRs before being disposed.

II. Customer Service

A. How Can You Influence EPA's Thinking on This ANPRM?

In developing this ANPRM, we tried to address the concerns and viewpoints of a wide variety of stakeholders. Your comments will help us improve this ANPRM. We invite you to provide different views on options we describe, new approaches we have not considered, new data on how the options we describe may affect you, or other relevant information. We welcome your views on all aspects of this ANPRM and in particular on the items described in the ''Request for comment'' subsection found at the end of each preamble section. Your comments will be most effective if you follow the suggestions below:

- Explain your views as clearly as possible and why you feel that way.
- Provide solid technical and cost data to support your views. If you are going to submit technical data, make sure that it has been quality assured/quality controlled (QA/QC).
- If you estimate potential costs, explain how you arrived at the estimate.
- Tell us which parts you support, as well as those you disagree with.
- Provide specific examples to illustrate your concerns.
- Offer specific alternatives.
- Refer your comments to specific sections of the ANPRM, such as the units or page numbers of the preamble, or the regulatory sections.
- Make sure to submit your comments by the deadline in this notice.
- Be sure to include the name, date, and docket number with your comments.

III. How Can the LDR Program Further Encourage Source Reduction and Recycling?

A. What Does This Section of the ANPRM Discuss?

This section asks the question: How can the LDR program further encourage source reduction and recycling? We request from you, the general public, (1) comments on the Agency's ideas to encourage source reduction and recycling; and (2) other suggestions on how this program can further encourage source reduction and recycling while meeting the Agency's policy objectives and legal standards.

B. Why Do We Want to Further Encourage Source Reduction and Recycling?

One objective of the Resource Conservation and Recovery Act

(RCRA)—the major hazardous waste statute—is to minimize the generation of hazardous waste and the land disposal of hazardous waste by encouraging process substitution, materials recovery, properly conducted recycling and reuse, and treatment (see RCRA § 1003(a)(6)). To further this objective, the Agency has set as goals of its Waste Minimization National Plan [2] (WMNP) to:

(1) Reduce, as a nation, the presence of the most persistent, bioaccumulative, and toxic (PBT) chemicals [3] in RCRA hazardous wastes 10 percent by the year 2000, and at least 50 percent by the year 2005 (from a 1991 baseline);

(2) Promote source reduction (and recycling where RCRA PBT chemicals cannot be reduced at the source) over treatment and disposal technologies; and

(3) Avoid the transfer of RCRA PBT chemicals across environmental media.

Consistent with the goals of RCRA and the WMNP, we are seeking ideas on how the LDR program can better or more directly encourage the reduction or elimination of hazardous waste generation through source reduction and recycling. Your comments and suggestions will help us reach our ultimate goal of incorporating source reduction and recycling processes as integral parts of our LDR program.

C. What Are Our Ideas?

(1) To Encourage Source Reduction: Set a Two-Part LDR Treatment Standard

We are considering the usefulness and appropriateness of a two-part LDR treatment standard for wastes when we are revising hazardous waste treatment standards (such as with mercury hazardous wastes) and when we are setting treatment standards for newly listed hazardous wastes. The first part would be the establishment of a traditional standard, developed from data based on the best demonstrated available treatment technologies. This is essentially the way we set treatment standards today. The second and novel part would be to simultaneously develop an alternative standard that facilities could elect to use instead of the first, more traditional standard. This alternative standard would involve installing source reduction-oriented process changes that would reduce either the volume of waste produced or the concentration of the hazardous constituent in the wastes or both. We would develop incentives to encourage companies to comply with the alternative standard to move up the RCRA hierarchy.[4] For example, if the alternative standard is elected, then as an incentive we could extend the effective date for a revised treatment standard beyond the traditional 90 days to allow time to implement the new process. We would determine the length of such an extension as we further develop our ideas.

This source reduction treatment standard option is similar to a Pollution Prevention Compliance Option [5] developed for characteristic wastewaters injected into Class I nonhazardous injection wells in the LDR Phase III rule. Under this alternative, mass reductions can be achieved by removing hazardous constituents from any of the waste streams that are going to be injected, and these reductions in mass loadings can be accomplished by means of source reduction (*i.e.,* equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control), recycling, or conventional treatment. This regulation along with others promulgated in the Phase III rule were superseded when the Land Disposal Program Flexibility Act of 1996 was signed. This statutory provision allows the land disposal of formerly characteristic wastewaters so long as they are not hazardous at the point they are land disposed.

(2) To Encourage Source Reduction for Wastes With Existing Treatment Standards: Establish a New Basis for Granting Treatment Variances

We are considering adding a new basis for granting treatment variances. This new basis would allow facilities to petition for an alternative LDR treatment standard based on installing source reduction-oriented process changes. The petitioner would have to demonstrate the specific environmental benefits gained from the incorporation of the source reduction processes. This variance basis may lead to better overall environmental results (for example by reducing the amount of hazardous waste generated, by reducing the toxic constituent concentrations in the hazardous waste, or both).

(3) To Encourage recycling: (a) set Recycling as a Treatment Method for Certain Wastes or (b) Include Recycling as an Alternative Treatment Option for Certain Wastes

We have developed a treatment standard for each hazardous waste code. Each treatment standard is either a set of maximum numerical concentration levels for the constituents in the waste, or a specified treatment technology. See 40 CFR 268.40(a). For seven waste codes,[6] the treatment standards specifically require recycling. For example, RLEAD, or recovery of lead, is the required technology for the lead acid battery subcategory of D008 characteristic lead wastes. For seven other waste codes,[7] the treatment standards include recycling as one of the treatment options. For example, in addition to STABL (stabilization), RTHRM (thermal recovery) is a specified treatment technology for P015, beryllium dust.

We would like to revisit the standards that specify a recycling technology and investigate whether they are effective. If they are effective, we would consider adding recycling as a treatment method for other waste streams that have recoverable levels of constituents. For example, we could revise the LDR treatment standards for K171-spent hydrotreating catalyst from petroleum refining operations and K172-spent hydrorefining catalyst from petroleum refining operations to require either metals recovery for vanadium and nickel or to include metals recovery as a treatment option to the current concentration-based standards. On the other hand, if problems exist with the current recycling requirements, we would consider making useful adjustments as warranted.

[2] See Waste Minimization National Plan, USEPA, 1994, EPA530–R–94–045.

[3] PBT chemicals exhibit varying degrees of three properties: Persistent (P) chemicals do not readily breakdown in the environment; bioaccumulative (B) chemicals are not easily metabolized and can accumulate in human or ecological food chains through consumption or uptake; toxic (T) chemicals may be hazardous to human health or the environment in a variety of ways, depending on the chemical and the organism that is exposed. (63 FR 60332, November 9, 1998)

[4] In 1990, Congress passed the Pollution Prevention Act (PPA), in which they set forth the hierarchy of waste management options: Source reduction, recycling, treatment, disposal.

[5] Pollution Prevention Compliance Option developed and finalized in the LDR Phase III rules (Proposal 60 FR 11702, March 2, 1995 and Final 61 FR 15566, April 8, 1996).

[6] The seven waste codes that specify recycling as the treatment standard are D006—cadmium containing batteries, D008—lead acid batteries, D009—high mercury subcategory of mercury-bearing wastes, K069—emission control dust/sludge from secondary lead smelting non-calcium sulfate high lead subcategory, P015—beryllium dust, P087—osmium tetroxide, and P113—thallic oxide.

[7] The seven waste codes that include recycling as one of the specified treatment standard options are D001—high total organic carbon (TOC), D001—high TOC ignitable characteristic liquids, P115—thallium (I) sulfate, U214—thallium (I) acetate, U215—thallium (I) carbonate, U216—thallium (I) chloride, and U217—thallium (I) nitrate).

D. What Incentives Would There Be To Choose Source Reduce and Recycle?

As previously mentioned, one potential incentive we would consider is extending the effective date of the revised treatment standard beyond the traditional 90 days if we set an alternative two-part LDR treatment standard and you chose the source reduction part of the standard. We may also consider providing other types of incentives.

One potentially positive outcome if we look into setting recycling as a treatment method is that we could investigate whether any recycling residues should remain hazardous wastes.

We solicit your comments on additional incentives that could be provided.

E. What Potential New Requirements Would You Have To Satisfy?

One potential avenue we could elect is to revise the treatment standards to encourage source reduction and recycling. Therefore, you might be subject to a revised set of treatment standards. In addition, for the treatment standards based on source reduction-oriented processes, we would consider requiring new administrative requirements such as contracts, milestones, or progress reports. These requirements would help us keep track of your implementation of source reduction processes at your facility.

F. How Could These Suggested Actions Affect Current Regulations?

As a result of your comments and suggestions, some of the LDR treatment standards could change, while others might not. If we make regulatory changes, such as revising the treatment standards, then the treatment standards table at 40 CFR 40 CFR 268.40 may have additional subcategories. For example, the lead acid battery subcategory of D008 characteristic lead wastes would not be changed so long as it remains environmentally beneficial to recover lead. We might choose to further subcategorize the general D008 characteristic lead wastes category into high and low categories. This new categorization could be based on the total lead concentration of the waste. We would then require a recycling treatment method for the high subcategory lead waste, while the low subcategory lead waste would remain subject to a numerical treatment standard.

Also, we could make the LDR regulations more industry-specific for characteristic wastes. For example, we could set tailored source reduction and recycling-based treatment standards for arsenic characteristic wastes generated by the wood preserving industry. These are just a few of the impacts the Agency's potential actions could have on current regulations. At this early stage, we cannot completely anticipate the potential impacts various actions could have on current regulations. We solicit your comments on potential impacts.

G. Could There Be Non-Regulatory Changes?

Our findings from this notice may or may not result in regulatory changes. We may instead choose to publish a guidance document with our findings and recommendations. Your comments and suggestions would help us to determine whether you would be more inclined to implement the ideas on your own using guidance or whether regulatory requirements would be needed to effect a change in your LDR compliance strategies.

H. Request for Comment

Your comments and suggestions would help us to assess the feasibility of our ideas and where they could be most sensibly applied. Specifically, we request comment on (1) setting a two-part LDR standard; (2) establishing a new basis for granting treatment variances that sets alternative standards based on source reduction-oriented processes; and (3) setting or including recycling as a treatment method for certain wastes.

Also, we would like comment on the best way to begin our efforts on encouraging source reduction and recycling. Should we start with a pilot project for source reduction and another for recycling? Do you know of any industries or waste codes that would be good candidates? Should we focus on waste codes or industries? Should we select those industries generating persistent, bioaccumulative, toxic chemicals? Should we target our efforts by volume of waste generated or focus on wastes that are generated by a significant number of generators? Should we target those wastes where a technology, such as stabilization, may not effectively treat a waste? What criteria should we use to assess recycling technologies? What criteria should we use to assess source reduction-oriented processes? What criteria should we use to establish a baseline for measuring the source reduction-oriented processes?

Also, please include any other ideas on how the LDR program can further encourage source reduction and recycling. You should provide us with a detailed description of your idea, including process parameters, key limitations, time frame for implementation, company's corporate rate of return requirements, viable markets for the recycled product and if possible the potential industries or hazardous waste streams to which your idea could be applied. For any source reduction or recycling technology information that you submit, please include analytical performance data, if available. We will review your ideas and possibly develop further those ideas which are most feasible. Our next steps possibly could include either proposing those ideas in a future proposed rulemaking (if regulatory changes are required) or publishing a resource document.

IV. How Can The LDR Program Encourage The Use of Innovative Waste Treatment Technologies?

A. What Is the LDR Innovative Technology Evaluation (LDRite) Program?

EPA's LDR program wants to explore how best to open the door to new and innovative waste treatment technologies that protect the environment and efficiently manage hazardous waste. Our venue for doing this will be under the aegis of a project we call LDR Innovative Technology Evaluation, or LDRite. This project has two basic near-term objectives—first, to help technology developers understand how their treatment systems could fit into the LDR waste treatment program and, second, to identify the most promising avenue for evaluating innovative waste treatment technologies—either formally or informally—that could help to further minimize threats to human health and the environment. Ultimately, we hope that LDRite will encourage the development of innovative waste treatment technologies that will offer us feasible regulatory alternatives to the technologies currently used to establish LDR treatment standards.

1. Why Develop LDRite at This Time?

Before a hazardous waste is land disposed, organic and inorganic constituents of concern as well as hazardous waste characteristics (such as ignitability, corrosivity, reactivity) must meet standards that sufficiently minimize threats to human health and the environment. Our program accomplishes these goals by establishing technology-based treatment standards for hazardous wastes destined for land disposal. These LDR treatment standards are based on the performance of best demonstrated available treatment (or BDAT) technologies[8] and specify either numerical concentration-based performance standards or specified methods of treatment.[9]

LDR treatment standards are currently based mainly on two dominant treatment technologies: incineration of organics and stabilization of metals. We recognize that the two technologies used to develop our treatment standards are quite traditional in character, which by itself is not necessarily a disadvantage and may reflect an expectable interplay between technical capability and economics. However, the field of hazardous waste treatment and recycling technologies is not static, and new technologies are being developed continually.

For a number of reasons that we may understand and for others that we now may not, our historical experience in being able to incorporate technology innovations and evolutions into the LDR treatment standards has been quite limited. For example, the 1984 Hazardous Solid Waste Amendment to RCRA required EPA, in essence, to prohibit virtually all hazardous wastes from land disposal unless the waste first meets treatment standards established by EPA. In the 1984 Amendments, Congress gave us strict and tight deadlines for developing this myriad of treatment standards. It was not until May 26, 1998, some 14 years and over a dozen rulemakings later, that EPA concluded this task when we adopted the so-called Phase IV LDR rulemaking. See 63 FR 28556. Because of the sheer magnitude of this effort, our ability to search out, support, and incorporate innovative or non-traditional technologies were significantly constrained.

Now, with the completion of the rulemakings needed to implement the 1984 Amendments, we are in a better position to:

- Reassess BDAT technological frameworks used to establish the treatment standards to see if they still coincide with recent technology innovations,
- As appropriate, rethink earlier technical and policy decisions in light of recent and ongoing developments in the hazardous waste management field, and
- Refocus efforts to provide customer-oriented resources that help ensure hazardous waste destined for land disposal is managed in the most acceptable manner.

2. What Are LDRite's Goals?

In pursuing these overall LDR goals, LDRite will create an environment more conducive to technology developers in the hazardous waste treatment arena by:

- Identifying the knowledge barriers that technology developers may encounter in looking at our RCRA waste treatment regulatory program,
- Taking concrete steps to ensure that the technology developers better understand the avenues by which EPA can learn about and evaluate their technologies; and ultimately
- Providing a well-defined process through which we may be able to incorporate improvements in waste treatment technology into our LDR program.

As another potential benefit of the LDRite project, we would hope that innovative treatment and recycling technologies would also offer economic, cost-saving alternatives to hazardous waste facilities that need to be in compliance with our LDR treatment standards. Finally, we wish to build upon the successes of existing programs for technology innovation, such as the Environmental Technology Verification (http://www.epa.gov/etv) and the Small Business Innovative Research (http://www.epa.gov/ncerqa/sbir) programs. These are described in detail below. One of the key questions to be discussed between stakeholders and EPA is whether these programs offer as yet unrealized opportunities for technology developers to have an impact on the RCRA LDR treatment standards program or whether LDRite needs to be focused in a different manner.

3. What Is An Innovative Technology for the Purposes of the LDRite Program?

We will generally consider a treatment technology to be innovative when:

- An existing BDAT technology is applied to a ''new'' hazardous waste stream[10] and successfully treats or recycles this waste stream to meet or exceed existing treatment standards;
- An existing BDAT technology is modified and successfully treats or recycles hazardous waste streams (''new'' and ''old'') to meet or exceed existing treatment standards; or
- A new technology is developed to treat or recycle a hazardous waste stream to levels that meet or exceed existing treatment standards.

The criteria used to define innovative technologies are meant to be general and non-exclusionary. Our intention is not to create narrow windows of opportunity but rather to provide a framework to understand our use of this term for LDR purposes in a fairly broad and unrestrictive way.

B. Who Could Be Affected by LDRite?

This renewed emphasis on innovative technology development could affect any of the many entities that currently manage hazardous waste. We expect, however, that a partnership-oriented effort will provide positive impacts for everyone involved. For instance, as a hazardous waste:

- Generator you might choose an ''alternative'' innovative technology to manage your hazardous waste at lower cost,
- Treater you might adopt a more cost effective treatment process, and
- Innovative technology developer you might now have a way to further develop, refine, or market your technology.

LDRite therefore has the potential to provide a platform from which we can

---

[8] The legislative history accompanying the 1984 Hazardous Solid Waste Amendment (HSWA) to RCRA states that a hazardous waste treatment method should be ''the best that has been demonstrated to be achievable.'' It also notes that Congress' intent is ''to require utilization of available technology'' and not a ''process which contemplates technology-forcing standards'' (Vol. 130 Cong. Rec. S9178 (daily edition, July 25, 1984)). The evident intent is to base treatment standards on the best technologies commonly in use and thus reasonably available to any generator. LDR treatment standards are generally based on the performance of the ''best demonstrated available technology,'' or BDAT. This approach involves identifying applicable treatment systems for individual wastes or for groups of wastes; determining whether these systems are ''demonstrated'' to achieve acceptably low effluent contaminant concentrations; and, determining if they are ''available'' commercially. For more information on this process, see the Final Best Demonstrated Available Technology (BDAT) Document for Quality Assurance/Quality Control Procedures and Methodology, USEPA, October 23, 1991.

[9] Generally, we prefer to set concentration-based treatment standards rather than technology-based treatment standards. Concentration-based treatment standards potentially offer the regulated community greater flexibility when developing and implementing hazardous waste compliance strategies. To meet concentration-based standards, waste treaters may use any technology method to treat their hazardous waste, as long as they comply with the numerical treatment standard. When complying with technology-based treatment standards, however, treaters must treat the waste using the established technology. EPA intended the numeric-based standards to encourage development of innovative waste treatment technologies. We realize, however, that more incentives may be necessary.

[10] When determining applicable treatment technologies, wastes (i.e., waste streams or waste codes) may be clustered into so-called ''treatability'' groups that have similar parameters which affect treatment success. These parameters can include physical state, water content, presence of similar hazardous and nonhazardous contaminants, organic content, heat content, pH, etc. Information on the waste characteristics of the treatability group are used to determine the applicable treatment technologies. The term ''new'' refers to a waste stream that a BDAT technology did not treat when LDR treatment standards were originally developed. The term ''old'' refers to a waste stream that was originally treated by BDAT technology used to develop the standard.

establish a solid understanding and common path forward with many types of stakeholders.

C. What Should You Expect From LDRite?

We intend this preamble to lay out our LDRite objectives and also some potential avenues by which a greater use of innovative technologies in the RCRA waste treatment program could be achieved. We expect to engage in an open dialogue with technology developers, generators, treaters, disposers, federal and state agencies, and the public. We encourage you to comment on the objectives of LDRite, the suggestions and avenues that we identify below, and to add your ideas on how best to develop the LDRite project. We emphasize that, if our plans to move forward can be improved or even significantly redirected, we are willing to look closely at all suggestions in this regard. We hope to pool our thoughts and resources with yours, and to generate the most promising ways the LDR program and LDRite can encourage innovative technologies that protect the environment and that efficiently and economically manage hazardous waste.

In an attempt to jump start your thinking and to elicit the most meaningful comments on this ANPRM, we are identifying below some steps that could be taken in the near future. Again, we emphasize that these steps are open to full discussion and can be modified or changed by your comments. Currently, EPA is looking into:

• Developing a ''match-making'' database system for the Internet—This database would allow innovative technology developers an opportunity to present their technologies (*e.g.*, the type of waste the technology can treat, any available test data, etc.). Hazardous waste generators and treaters would also have a resource to research viable alternative treatment technologies using waste code and hazardous constituent information. One possibility is to expand an existing system, the Remediation and Characterization Innovative Technologies (REACH IT) database. The general vendor information provided for each technology could include:

Vendor name
Technology type
Trade name
Vendor address
Contact name and phone number
Patent and trademark information
Scale of technology (bench, pilot, or full)
The type of waste the technology could treat

• Linking current EPA technology advancement programs with innovative technology developers—These programs would help developers verify technology performance or finance technology development. Currently, the Environmental Technology Verification (ETV) program provides a mechanism for third-party verification of innovative technology performance. The Small Business Innovative Research (SBIR) program makes' awards to small firms for research and development of cutting-edge technologies.

Of course, our ultimate step would be to modify current LDR treatment standards to incorporate or encourage the use of innovative technologies. We expect the LDRite project to illuminate ways in which this could be done in an effective and efficient manner. This is particularly important because pursuing a rulemaking effort to change LDR regulatory standards for waste treatment is a resource-intensive and time-consuming endeavor that cannot be undertaken lightly, especially in this era of constrained resources.

D. What Shouldn't You Expect From LDRite?

We want to encourage development and promotion of innovative technology to meet environmental goals and standards. EPA cannot, however, commercially endorse specific technologies or promote specific companies even if they are acceptable or promising. Rather, we more appropriately set performance criteria and allow the regulated community flexibility in selecting among technologies.

E. How Will EPA Ensure That Innovative Technologies Are Environmentally Protective?

EPA's mission is to protect human health and the environment. We want to encourage innovative technologies that promote the most effective and efficient protection of the environment possible. If current treatment technologies provide the best possible hazardous waste management option, then we would have significant difficulty changing our current LDR treatment standards absent a corresponding and substantial benefit (perhaps promoting greater source reduction).

However, we want to keep pace with new technological advancements in the hazardous waste management field and to find opportunities to stimulate this field, whether they be regulatory or non-regulatory. One starting point, it would seem, is to make sure that technology developers understand how they could fit into the RCRA LDR regulatory development process. A clearly articulated and developer-friendly innovative technology evaluation process could help in this regard. As noted earlier, we will be examining how well other existing technology evaluation programs could serve the specific interest at issue here—keeping the RCRA LDR treatment program current with waste treatment technology development. On the other hand, we do not need to be constrained by the parameters of those programs, especially if they serve needs that differ from ours. For example, selecting a remediation technology for a particular site of contamination may present a different set of considerations than developing nationally applicable LDR treatment standards for a given set of hazardous constituents. We hope to be able to identify both areas of commonality with and areas of difference from other existing programs.

F. Will EPA Fund Innovative Technology Development Under LDRite?

The answer at this time is no. However, the following programs are designed to facilitate the development of new technologies in a variety of ways:

• The Environmental Technology Verification program (http://www.epa.gov/etv): ETV verifies the performance of commercial-ready technologies through the evaluation of objective and quality-assured data so that potential purchasers and permitters are provided with an independent and credible assessment of what they are buying and permitting. The ETV program is operated by EPA's Office of Research and Development and was created to substantially accelerate the entrance of environmental technologies into the domestic and international marketplace. EPA has selected ''verification partners'' to oversee and conduct the technology verification activities. These partners work with EPA technology experts and a variety of public and private stakeholders to develop procedures for verifying technology performance. For each technology verified, the partner develops a test plan, in conjunction with the developer, and the test is conducted by an independent third party. Following the test, a verification statement of 3–5 pages is issued by EPA, along with a data report.

• Small Business Innovative Research (http://www.epa.gov/ncerqa/sbir): For developers of technologies at the early stages of development and testing, EPA's SBIR program makes awards to small firms for research and development of cutting-edge technologies. The SBIR program is intended to spawn commercial ventures that improve our environment and quality of life, create jobs, increase productivity and economic growth, and improve the international competitiveness of the U.S. technology industry. Over the past decade, dozens of innovative technologies and processes have emerged from this program. A number of these have moved quickly from ''proof of concept'' to commercialization. In other cases, companies are still seeking the start-up capital or other support needed to achieve commercialization of their technologies.

G. Request for Comment

We recognize that the current regulatory environment, including the LDR treatment standards, may create unintentional barriers to innovative technology development in the hazardous waste arena. We want to know how you perceive this. Please tell us what part(s) of the LDR program you think inhibit innovative technology development and use, and what new initiatives would be beneficial in light of the goals and objectives set out above. For instance, you should think about the following points in preparing your comments:

- How can EPA help encourage innovative technology development via the LDR program, particularly with respect to what technology developers do or don't understand about the LDR program and the BDAT process by which our technology-based standards are developed from actual performance data?
- Will a ''match-making'' database system on the Internet facilitate the use of innovative technologies, and if so, what technology data should be included?
- Which existing EPA programs (*e.g.,* ETV, SBIR) or parts of those programs would be useful in evaluating innovative technologies in the context of the LDR national treatment standards and of the BDAT concept that underlies these standards?
- Do technology developers have sufficiently detailed information on hazardous waste streams and the current cost of treatment to determine the most promising markets for new technologies? If not, what type of information is missing or hard to find for the developers?
- Are there ways, either formal or informal, in which we could better ensure that the hazardous waste treatment program evolves along with advancements in the hazardous waste treatment industry?
- How can the LDR program more effectively move up the hierarchy of hazardous waste management in conjunction with encouraging innovative technologies?

We encourage you to submit your insights on areas within the LDR program that can potentially serve as vehicles to encourage innovative technology development. Your input will help us adjust, as appropriate, certain aspects of our program to encourage innovative technologies.

If you have developed a technology that effectively reclaims, recycles, or treats regulated constituents in hazardous waste streams, please let us know. Information on your technology will keep us up-to-date on new treatment options. You might also want to examine technologies we have identified to treat specific waste streams in EPA's Treatment Technology Background Document, January 1991. This may help you to demonstrate how your technology outperforms a technology used to establish a current LDR treatment standard.

V. Issues Regarding the Effectiveness of Various Stabilization Practices Used to Immobilize Metal Wastes

A. Background on LDR Treatment Standard Program

1. How Have Treatment Standards Been Established?

The 1984 Hazardous and Solid Waste Amendments (HSWA) require that treatment standards must substantially diminish the toxicity or mobility of hazardous waste, so that short- and long-term threats to human health and the environment are minimized. (RCRA Section 3004(m)(1), 42 U.S.C. 6924(m)(1)). We interpret long-term threats to be the residual hazards of a waste that will continue even after treatment, disposal, and the ultimate capping of the filled landfill cell. With regard to metals, treatment should impart a lasting measure of immobility to the metals of concern.

Under EPA's LDR program, we have established treatment standards to implement the RCRA 3004(m) requirements. As mentioned in an earlier section of this notice, we have established two types of treatment standards: (1) a numerical concentration-based treatment limit for each constituent of concern, or (2) a method of treatment that must be used to treat a particular constituent or group of constituents. In either case, the treatment standard is based on a technology determined to be the ''Best Demonstrated Available Technology'' or BDAT.

2. What Improvements Have Been Made to the LDR Program?

''Our goal is to make the entire federal government both less expensive and more efficient * * * we intend to redesign, reinvent, to reinvigorate the entire national government. [11]

Over the last seven years, we have worked hard to find ways to improve the effectiveness of our work while still protecting human health and the environment. We believe that great strides have been made. One of our biggest LDR accomplishments has been the establishment of Universal Treatment Standards (UTS) (59 FR 47982, September 19, 1994). This effort greatly simplified both compliance and enforcement with the LDRs without sacrificing protection of the environment or human health. The rule replaced multiple concentration levels for the same constituent across the LDR treatment standards with a uniform set of levels for each constituent. Another improvement to the program was the creation of alternative treatment standards for debris contaminated with hazardous waste (57 FR 37221, August 18, 1992). These treatment standards were tailored to address the specific problems encountered when manufactured objects, plant or animal matter, or natural geologic material (*e.g.,* cobbles and boulders) become contaminated with a hazardous waste and are subsequently subject to LDR requirements.

However, our work is not done. We remain committed to making quality improvements that will further improve the overall effectiveness and efficiency of the LDR program. Last July, EPA began implementation of a new set of administrative reforms, known as the RCRA Cleanup Reforms. These reforms are designed to achieve faster, more efficient cleanups at RCRA sites that treat, store, or dispose of hazardous waste and that have the potential for environmental contamination. The reforms are our comprehensive effort to address the key impediments to cleanups, maximize program flexibility, and spur progress toward a set of ambitious national cleanup goals.

We are committed to ensuring that the LDR program incorporates these goals within its regulatory and policy framework. We have identified areas that need to be examined more carefully and we are working towards finding solutions to areas that may affect the accelerated and effective cleanups at corrective action sites. Progress has already been made. Early on we realized

[11] President Bill Clinton's remarks announcing the National Performance Review, March 3, 1993.

that the treatment standards promulgated for as-generated waste would not always be achievable or appropriate for soil contaminated with hazardous waste and that the development of less stringent treatment standards was needed (59 FR 47980, September 19, 1994). In May 1998, we promulgated alternative treatment standards for contaminated soils subject to LDR. (See 63 FR 28556, May 26, 1998). The alternative soil standards provide the flexibility needed for achieving our cleanup goals. In the future, any additional revisions to the LDR program must be evaluated thoroughly to ensure that protection of human health and the environment is maintained and that efforts to facilitate cleanups are not compromised.

B. Background on Treatment Standards for Metal-Bearing Hazardous Waste

1. What Are the Metal-Bearing Wastes We Regulate in the LDR Program?

In EPA's LDR program, we regulate two different types of metal-bearing wastes: ''listed'' wastes with metals as regulated constituents; and ''characteristic'' metal wastes, which are regulated because they contain significant concentrations of mobile metal(s).[12]

Listed metal-bearing wastes are identified with a U, P, F, or K designation *and* contain one or more of the 14 metal constituents of concern identified in 40 CFR 268.40. Regulated metal constituents of concern are antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc.[13]

Characteristic metal wastes, identified as D004–D011, are defined as characteristic because the concentration of the toxic metal in the waste equals or exceeds a specified leachate concentration that is known to be a threat to human health and the environment. For example, a waste designated as ''D008'' is a waste which leaches lead at a concentration of 5 mg/L or greater using the Toxicity Characteristic Leaching Procedure (TCLP). The other RCRA characteristic metals are arsenic (D004), barium (D005), cadmium (D006), chromium (D007), mercury (D009), selenium (D010), and silver (D011). Since May 1990, characteristic metal wastes have had to undergo some type of treatment prior to land disposal.[14]

2. How Were the Treatment Standards for Metals Established?

For metal-bearing wastes, we developed numerical, concentration-based treatment standards based on performance data from two BDAT technologies: High temperature metals recovery (HTMR) and stabilization.[15] We compared the performance of the two technologies and promulgated numerical treatment standards based on the higher of the calculated treatment standards to allow for waste variability and detection limit difficulties (63 FR 28561, May 26, 1998). By setting a standard as a numerical concentration limit, as opposed to a method of treatment, any type of treatment technology other than impermissible dilution can be used to achieve the standard (40 CFR 268.3).

Please note that the discussion in this part of the notice refers primarily to as-generated process waste. A specific discussion of how this issue may or may not relate to the alternative treatment standards for soil and debris is not presented, but we welcome comments on this subject.

3. Relevant Treatment-Related Definitions

As mentioned earlier, an array of treatment technologies are capable of immobilizing metals in hazardous waste. For regulatory purposes, however, the LDR program has only defined two immobilization technologies: stabilization and macroencapsulation.[16] Other technologies that perform immobilization functions are discussed in EPA's Treatment Technology Background Document[17] and the descriptions used in that document will be followed in today's discussion. Other practices, however, have not been defined to date by EPA. We discuss these practices today in narrative form with as much detail as possible to accurately describe the process.

The following terms are used in the notice. Definitions printed in italics are regulatory terms (in 40 CFR 260.10 or 40 CFR 268.42) while the terms in standard typeface are not. We encourage you to provide us with any changes to the non-regulatory terms you think would be helpful. We are not, however, taking comment on the regulatory terms at this time. Additionally, you may submit information on any terms that we have neglected to present.

Definitions of Selected Terms

Treatment—means any method, technique or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

Immobilization—A broad class of technologies that reduces the solubility or leachability of the metal in the waste prior to land disposal. These technologies are designed to fix in place or position a metal constituent or constituents in a waste using physical, chemical or biological means so as to render such waste non-hazardous or less hazardous.

Encapsulation—A family of processes wherein high-solids nonwastewaters are mixed with an organic polymeric substance or with asphalt. Mixtures are

[12] If the metal concentration is high enough, the waste may be characteristically hazardous for that metal. See the characteristic levels in 40 CFR 261.24. If the waste is characteristic for other reasons (*e.g.,* organically toxic, corrosive, ignitable, or reactive) but not due to the metals, then a lesser concentration of metals may cause them to be subject to LDR standards as ''underlying hazardous constituents (UHCs).''

[13] A treatment standard for zinc has been established only for K061 waste. Zinc is not regulated in any other RCRA hazardous waste. Similarly, vanadium is a regulated constituent only in P119, P120,K171, and K172 wastes. Although zinc, vanadium, fluoride, and sulfide have UTS levels, they are not UHCs. However, EPA has required that some wastes meet UTS for these constituents because reaching these levels is additional evidence that treatment is effective.

[14] The Third Third Rule (55 FR 22520, June 1, 1990) required that characteristic metal wastes be treated to the characteristic level before disposal. Prior to that date, metal characteristic waste could be disposed in hazardous waste land disposal units without prior treatment. The recent Phase IV Rule (63 FR 28556, May 26, 1998) required that these same wastes now meet the more stringent UTS listed at 40 CFR 268.48 before land disposal.

[15] See '' Land Disposal Restrictions For Third Third Scheduled Wastes: Final Rule,'' 55 FR 22520, June 1, 1990; ''Land Disposal Restrictions Phase II—Universal Treatment Standards, and Treatment Standards for Organic Toxicity Characteristic Wastes and Newly Listed Wastes: Final Rule,'' 59 FR 47980, September 19, 1994; and ''Land Disposal Restrictions Phase IV: Final Rule Promulgating Treatment Standards for Metal Wastes and Mineral Processing Wastes; Mineral Processing Secondary Materials and Bevill Exclusion Issues; Treatment Standards for Hazardous Soils, and Exclusion of Recycled Wood Preserving Wastewaters: Final Rule,'' 63 FR 28556, May 26, 1998.

[16] Regulatory definitions for stabilization and macroencapsulation (40 CFR 268.42) have been developed as part of the LDR program because for some RCRA hazardous waste codes a method of treatment has been set as the treatment standard. When a method of treatment is set, one must use the treatment defined in 40 CFR 268.42. However, if a numerical concentration-based treatment standard has been set, compliance with this standard can be achieved using any type of treatment other than impermissible dilution as defined in 40 CFR 268.3.

[17] The Treatment Technology Background Document, USEPA, January 1991 can be found in the RCRA docket supporting this rule.

then allowed to cure into a solid mass prior to disposal.

Macroencapsulation—Macroencapsulation with surface coating materials such as polymeric organics (*e.g.,* resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Macroencapsulation specifically does not include any material that would be classified as a tank or container according to 40 CFR 260.10.

Neutralization—Means treatment with the following reagents (or waste reagents) or combinations of reagents: (1) Acids; (2) bases; or (3) water (including wastewaters) resulting in a pH greater than 2 but less than 12.5 as measured in the aqueous residuals.

Precipitation—Chemical precipitation of metals or other inorganics as insoluble precipitates of oxides, hydroxides, carbonates, sulfides, sulfates, chlorides, fluorides, or phosphates. The following reagents (or waste reagents) are typically used alone or in combination: (1) Lime (*i.e.,* containing oxides and/or hydroxides of calcium and/or magnesium); (2) caustic (*i.e.,* sodium and/or potassium hydroxides); (3) soda ash (*i.e.,* sodium carbonate); (4) sodium sulfide; (5) ferric sulfate or ferric chloride; (6) alum; or (7) sodium sulfate. Additional floculating, coagulation or similar reagents/ processes that enhance sludge dewatering characteristics are not precluded from use.

Solidification—Techniques that encapsulate the waste, forming a solid material of high structural integrity, and does not necessarily involve a chemical interaction between the contaminants and the solidifying additives.

Stabilization—Stabilization with the following reagents (or waste reagents) or combination of reagents: (1) Portland cement; or (2) lime/pozzolans (*e.g.,* fly ash and cement kiln dust)—this does not preclude the addition of reagents (*e.g.,* iron salts, silicates, and clays) designed to enhance the set/cure time and/or compressive strength, or to overall reduce the leachability of the metal or inorganic.

Vitrification—A process involving the dissolution of waste at high temperatures with hazardous constituents incorporated into a glass or a glass-like matrix.

C. Our Questions About the Metal Treatment Standards

Even though metals are land disposed within current regulatory requirements, their toxic properties make it imperative that they remain immobilized long after disposal, even after current land disposal cells have long ceased operation. Long-term stability of metal constituents in a land disposal environment is therefore a primary objective when determining the type of immobilization technology to be used.

Our goals in this notice are to scrutinize specific immobilization activities as they pertain to metal bearing wastes, and also to:

(1) Gather additional information on techniques currently being used to immobilize metals in both listed and characteristic wastes;

(2) Identify additional cost-effective ways, if any, beyond current compliance testing by which both short-term and long-term effectiveness of immobilized waste can be assured; and

(3) Solicit comment, information, and data on the observations, issues, and questions we present in this notice. In particular, we would like comments on alternative approaches to evaluating the effectiveness of treatment by immobilization technologies. We would also like comment on the amount of immobilization of metal-contaminated soils that takes place at corrective action sites and whether the points raised in this notice could adversely effect current efforts to encourage and facilitate cleanups.

D. Current Treatment Processes Used for the Immobilization of Metal Waste

1. Categories of Treatment Processes Used to Meet the Standards for Metal Wastes

In meeting the numerical treatment standards, facilities generally employ two different categories of treatment processes for hazardous wastes containing metals: (1) Removal technologies that separate and recover metals contained in the hazardous waste for some type of reuse; and (2) Immobilization technologies that physically or chemically reduce the solubility or leachability of metals in the hazardous waste prior to land disposal.

Removal technologies include treatments such as acid leaching, filtration, high temperature metals recovery (HTMR), ion exchange, and retorting. These technologies are generally conducted on wastes with metal concentrations greater than 1%. The choice of any one of these removal technologies is governed by the properties of the metal to be recovered as well as the actual physical and chemical characteristics of the waste itself.[18] All of these technologies can be highly effective in the recovery of metals when properly applied.

Immobilization technologies are those technologies that reduce the solubility or leachability of the metal in the waste prior to land disposal. They do not remove the metal from the waste. Immobilization technologies typically promote physical and/or chemical changes within the waste to render the metals significantly less mobile and more resistant to leaching. Vitrification, macroencapsulation, and stabilization are examples of immobilization technologies. Usually, a metal-containing waste is treated with one of these technologies when the metal cannot be recovered or the concentration of the metal in the waste is too low to use a removal technology. In certain situations, however, the application of a removal technology can also require additional treatment of the residual (*e.g.,* slag generated from high temperature metals recovery) by some type of immobilization. This type of immobilization is also the subject of this notice.

2. Immobilization

As discussed above, immobilization is defined as a broad class of treatment methods designed to fix in place or position metal constituent(s) in a waste. To ensure treatment of a regulated constituent, any immobilization practice must impart a physical, chemical, or biological change to the metal or waste to render the waste non-hazardous or less hazardous. A variety of treatment technologies fall within the category of immobilization and are applicable to metal waste treatment.

Analyses conducted for the LDR Phase IV rule suggest that treatment with cement or lime/pozzolans as well as other reagents (*i.e.,* ''stabilization'' as defined in 40 CFR 268.42) is the primary method of immobilization for the treatment of metal-bearing wastes.[19] In the Phase IV final rule (63 FR 28556, May 26, 1998), we identified stabilization as the BDAT for metal wastes, and it is therefore the basis (along with HTMR) of our current numerical treatment standards for metals.

3. Details on Stabilization

The basic principle of stabilization is that leachable metals in a waste are immobilized. For stabilization, this occurs following the addition of reagents, such as Portland cement, and other chemicals. Metal leachability is

[18] Of course, a facility's individual choice of removal over immobilization will also involve non-technical considerations, such as economics.

[19] See the capacity and economic analyses for the Phase IV metal treatment standards which can be found in the Phase IV final rule docket (docket number F–98–2P4F–FFFFF).

reduced by the formation of a lattice structure and chemical bonds that bind the metals in the solid matrix, and thereby limit the amount of metal constituents that can be leached when water or a mild acid solution comes into contact with the treated waste material. Stabilization is most effective when the waste metal is in its least soluble state, thereby decreasing the potential for leaching. Pretreatment may be required to chemically reduce or oxidize the metal to a lower solubility state and achieve maximum stabilization performance. For example, hexavalent chromium is much more soluble and more difficult to stabilize than trivalent chromium.

The two principal stabilization processes used are cement-based and lime/pozzolan-based processes. Stabilization processes can be modified through the use of additives, such as silicates, that control curing rates, reduce permeability, and enhance the immobilization properties of the solid material. Portland cement is a mixture of powdered oxides of calcium, silica, aluminum and iron produced by kiln burning of material rich in calcium and silica at high temperatures (*i.e.,* 1400–1500°C). When the anhydrous powder is mixed with water, hydration occurs and the cement begins to set. The chemistry involved is complex because many different reactions occur depending on the composition of the cement mixture.

As the cement begins to set, a colloidal gel of indefinite composition and structure is formed. Over time, the gel swells and forms a matrix composed of thin, interlacing, densely packed silicate fibrils. Constituents present in the waste (*e.g.,* dissolved metals and hydroxides and carbonates of various metals) are incorporated into the interstices of the cement matrix. The high pH of the cement mixture (*i.e.,* pH of 9–12) can keep some metals in the form of insoluble hydroxide and carbonate salts. It has been hypothesized that metal ions may also be incorporated into the crystal structure of the cement matrix. Oxoanionic metals (metals that form negative ions with oxygen), like arsenic and selenium, and divalent metals, like lead and cadmium, may not be as insoluble at high pHs.

Pozzolan, which contains finely divided, noncrystalline silica (*e.g.,* fly ash or components of cement kiln dust), is a material that is not itself cementitious, but becomes so upon the addition of lime. Metals in the waste are converted to insoluble silicates or hydroxides and are incorporated into interstices of the binder matrix, thereby inhibiting leaching.[20]

4. Determining What Type of Stabilization Is Appropriate

In determining whether a particular stabilization treatment will meet the LDR treatment standards, several technical and practical considerations are relevant. For example, the following waste properties influence whether stabilization will be appropriate and effective long-term treatment for a waste: (1) Concentration of fine particulates; (2) the concentration of oil and grease; (3) the concentration of organic compounds; (4) the concentration of oxidizing, halide, sulfate and chloride compounds; (5) the solubility of the metal compound(s); and (6) other waste matrix constituents.[21]

Equally important is an examination of the design and operation of the stabilization process itself. To determine the effectiveness of a particular stabilization process, the following parameters need to be assessed: (1) The amount and type of stabilizing agent and additives; (2) the degree of mixing; (3) the residence time; (4) the stabilization temperature and humidity; and (5) the form of the metal compound. Optimization of all these factors (and perhaps others) can be necessary for effective treatment to occur.

Because of these numerous technical and practical factors, it is obvious that effective metal stabilization is not a simple matter. Adding to this complexity are additional vagaries associated with the environmental conditions of the disposal site into which the stabilized metal matrix will be placed.[22] For these reasons, we think an inquiry into current field practices and metal waste disposal sites is warranted to determine whether our current regulations and industry's current compliance practices are still minimizing threats to human health and the environment by substantially diminishing the toxicity of the waste or substantially reducing the likelihood of migration of metal constituents from the waste.

E. Specific Metal Treatment Issues of Interest

1. Stabilization Reagents—Why Are They a Metal Treatment Issue?

The term stabilization is often used loosely in practice to refer to techniques that chemically reduce the hazard potential of a waste by converting the contaminants into less soluble, mobile, or toxic forms, either temporarily or permanently. The physical nature and handling characteristics of the waste are not necessarily changed. Some of these practices, while called stabilization, may not coincide with the concept of permanent treatment used by the Agency in the LDR program and discussed earlier in this notice.

Stabilization, as per our regulatory definition, is a distinct treatment process defined primarily by the use of Portland cement or lime/pozzolans under specific operational conditions. Conversely, the term stabilization, as more broadly used in practice, can encompass the use of myriad other reagents including lime, cement kiln dust, phosphates, clay, modified clays, sulfide, activated carbon, and ferrous sulfate that can be used individually or in combination. Such reagents are intended to chemically alter the speciation of the metals to decrease solubility or aid subsequent treatment steps. Issues may therefore arise regarding the performance of various practices nominally regarded by industry as stabilization.

For example, questions regarding actual chemical reactions occurring during treatment can emerge when long-term effectiveness is considered. In the Phase IV rule, the Agency codified the principle that the addition of iron metal in the form of fines, filings, or dust for the purpose of achieving a treatment standard for lead is ''impermissible dilution'' under 40 CFR 268.3(d) (63 FR 28566, May 26, 1998). We determined that this waste management practice, deemed stabilization by at least one industry, did not minimize threats posed by the land disposal of lead-containing hazardous waste. Specifically, we found that no chemical or pozzolanic reactions from the iron dust or filings occurred, and standard chemistry showed that metals, such as lead, were not bound into a non-leachable matrix when using iron dust or filings as a stabilizing agent. (See 63 FR 28566–69)

This instance, as well as other anecdotal information, has raised the issue of appropriate use of stabilization

[20] For additional information on immobilization technologies, see the Treatment Technology Background Document, USEPA, January 1991, which is in the docket supporting this notice. See also ''Solidification/Stabilization and its Application to Waste Materials,'' EPA/530/R–93/012, June 1993.

[21] See ''Handbook for Stabilization/Solidification of Hazardous Wastes,'' EPA/540–2–86/001, Table 2–7, June 1986.

[22] The environment of the disposal facility may affect the long-term immobilization of metals in stabilized waste (*e.g.,* the pH of the material in the disposal unit, buffering capacity, redox state, infiltration/rainfall rate, freeze/thaw potential.)

reagents in general. EPA is concerned that reliance may be currently placed on technologies that only temporarily immobilize the hazardous metals in as-generated waste through the addition of solubility-modifying or pH-adjusting chemicals, which may enable the treated waste to pass the TCLP compliance test *but* do not actually immobilize the metals over the long term. Consequently, the choice of reagent can raise a question as to whether the mandate established by HSWA of minimizing short-term and long-term threats to human health and the environment is being satisfied.

We therefore wish to inquire further about the use of reagents other than Portland cement and lime/pozzolans—such as phosphate- and silica-based reagents—and whether actual treatment occurs in a manner that in fact minimizes short-term and long-term threats to human health and the environment. It may well be that, upon closer scrutiny, use of these other reagents is, in fact, acceptable treatment for as-generated wastes under the LDR program. On the other hand, it is possible that, in some cases, the only effect of the reagent and stabilization process on the metal waste has been to show temporary immobility under the Agency's performance measure, the TCLP test conditions, prior to land disposal.

The Agency's hypothesis is that reagents used in immobilization technologies differ in their ability to provide effective long-term treatment of metals in the treated waste. We have the following questions:

• What is the extent of the difference in immobilization technologies?

• Do certain immobilization technologies and reagents lose their ability to immobilize metals after land disposal has occurred?

• Alternatively, does the Agency's treatment measure, the TCLP, differ from actual management conditions to the degree that metals are never effectively mobilized under disposal conditions?

Concerns about long-term stability and the waste's increase in volume also have been factors in past determinations of BDAT. For example, in the determination of the BDAT for arsenic wastes, volume increase, particularly with ferric co-precipitation, resulted in the selection of a different type of treatment technology as BDAT (55 FR 22552, June 1, 1990). Data obtained during the development of the standards demonstrated that significantly high reagent to waste ratios would be required to maintain arsenic stability under alkaline pH conditions.[23]

We also wish to raise another concern about the use of treatment reagents that may impact operations beyond just those associated with stabilization. Reagents can also be used in a variety of other treatment settings, for example, as metal precipitation agents for incinerator scrubber water. At least one reagent being used in this context is itself a hazardous constituent, dithiocarbamate. This may not be a matter of concern in some situations since the point of compliance with LDR treatment standards for any underlying hazardous constituent is at the point of placement on the land.

However, two scenarios may result in hazardous treatment reagents being placed on the land without being subject to testing for compliance with LDR standards. The first is when the reagent contains a hazardous constituent that is not identified as an underlying hazardous constituent in the original characteristic waste. The second is when the reagent contains a hazardous constituent that is not a regulated constituent for a listed waste.

Similar to the issue regarding stabilization reagents that is discussed above, we are inquiring whether the use of reagents containing hazardous constituents is consistent with the short-term and long-term protection of human health and the environment, at least when LDR compliance does not take into account the levels of those constituents that are being placed on the land. We, of course, recognize the engineering value that these constituents may provide in a waste treatment train. Thus, we are particularly interested in comment on the levels of total and leachable hazardous constituent reagents being placed on the land and whether additional attention to this issue is warranted from the standpoint of treatment efficacy and protection of human health and the environment.

2. What Is the Importance of Waste to Reagent and Water to Reagent Ratios During Metal Treatment?

Along with the selection of treatment reagents, the waste to reagent ratio is a critical performance parameter for effective stabilization to take place. Sufficient stabilizing material is necessary to facilitate the proper chemical reactions that allow for the binding of the waste constituents of concern (*i.e.,* metals) into a treated matrix, making them less susceptible to leaching. The ratio of water to stabilizing agent (including water in the waste) is also important, impacting the strength and permeability characteristics of the stabilized material. Too much water will cause low strength; too little will make mixing difficult and, most importantly, may not allow the chemical reactions that bind the metals to be fully completed.

We wish to inquire how reagent to waste ratios are being handled in practice during waste treatment operations. The use of excessive amounts of reagents (*i.e.,* over treatment) may not be an appropriate or effective waste management practice, either from a technical or an economic standpoint. Excessive use of reagents can also lead to questions of impermissible dilution, *i.e.,* whether concentration-based treatment standards are being met simply through physical dilution of the constituents, by the addition of inordinate amounts of reagent, in lieu of actual treatment involving chemical reactions between the reagent and the waste constituent. We request information on the waste to reagent ratios found in today's treatment operations in the field.

Similarly, the amount of water used to facilitate the reaction is equally important and is an area of our inquiry. Certain practices, apparently, forego the use of any water to initiate a chemical reaction between the reagents and the waste. Thus, prior to the TCLP compliance test, the chemical reaction between the reagents and the waste does not occur. By definition, regulatory treatment also has not occurred in this instance. We request information on how much water is typically used to facilitate stabilization reactions. We also request information on practices that do not use water at all prior to the compliance test.

3. How Well is Long-Term Immobilization Being Achieved?

Absent long-term studies on the stability of metal wastes in disposal units and in light of potential issues on the selection of reagents, we wish to inquire further about the long-term effectiveness and environmental benefits of certain immobilization technologies. The TCLP is the current compliance test, but this test was not specifically developed to be a performance measure of chemical precipitation procedures, of the long-term effectiveness of chemical additions, or of the potential for formation of toxic degradation products from added chelating agents. In

[23] Final Best Demonstrated Available Technology (BDAT) Background Document for K031, K084, K101, K102, Characteristic Arsenic Wastes (D004), P and U Wastes Containing Arsenic and Selenium listing Constituents, USEPA, May 1990, page 4–9.

addition, flocculating agents such as dithiocarbamates, which form toxic complexes (detrimental to aquatic ecosystems) and has the potential to degrade to toxic carbon disulfide, are not precluded from use by existing regulation. These situations need to be further studied and evaluated by the Agency particularly in respect to the long-term effectiveness of the various treatment methods.

As a preliminary step, we evaluated landfill leachate collection system data from 161 landfill cells operated by Waste Management, Inc. across the nation.[24] The Waste Management, Inc. landfills receive predominately hazardous wastes. However, some sites receive only sanitary wastes, or a combination of sanitary and industrial wastes. We also evaluated data from the Reynolds Metals Company's facility in Gum Springs, Arkansas and Envirosafe Services of Ohio's facility in Oregon, Ohio.

About 28% of the landfill cells from which we obtained data have actual leachate measurements in excess of the levels that would identify the leachates as characteristic hazardous wastes. Among the toxic metals, arsenic and cadmium have been most frequently observed at hazardous concentrations on both a total and dissolved constituent basis. In the long-term, these actual leachate concentrations suggest that significant groundwater contamination may result after the eventual failure of liners and other containment controls. Logic suggests that if compliance with the minimized threat standards were being achieved, leachate levels in excess of hazardous characteristic levels should not be observed in wastes that have met treatment standards before land disposal. However, actual disposal conditions may differ from those projected from the TCLP, and in part due to the influence of typical site-specific conditions.

At Envirosafe's industrial waste landfill, which accepts predominantly stabilized K061 waste, high arsenic, cadmium, and zinc leachate levels were found. Similarly, arsenic and fluoride were observed at significant levels and pH was quite high in the leachate from the Reynolds' monofill receiving treated K088 waste (although fluoride and cyanide levels are significantly lower than leachate levels from untreated K088 wastes).

Table 1 indicates the very limited and incomplete data currently in hand from these three sources. Although the TCLP is based on total metals analysis, we have provided both dissolved and total metal concentrations data in this table as reported in the data sources. Depending on how the metals analyses were conducted, total levels reported may not be directly comparable to the TCLP, as particulates may have been entrained in the samples. This could cause total metals analyses to show more metals than would leach if the tests were conducted in compliance with TCLP QA/QC protocols.

TABLE 1.—OBSERVATION OF LANDFILL LEACHATE PROPERTIES [a]

Parameter		Number of cells	Number of cells >TCLP	Percentage of Cells >TCLP	Maximum leachate concentration (mg/L)
pH		213	5 (>12.5)	2.8	13.1
			1 (<2.5)		1.81
Arsenic	Dissolved	80	9	11.3	120
	Total	152	29	19.1	1610
Barium	Dissolved	66	0	0	9.7
	Total	91	0	0	43.8
Cadmium	Dissolved	85	9	10.5	790
	Total	153	14	9.1	800
Chromium	Hexavalent	29	1	2.7	5.2
	Dissolved	73	2	3.4	9.1
	Total	161	12	7.5	102
Lead	Dissolved	84	1	1.2	8.9
	Total	125	5	4	72
Mercury	Dissolved	125	0	0	0.05
	Total	152	7	4.6	2.3
Selenium	Dissolved	90	1	1.1	12
	Total	157	6	3.8	5.2
Silver	Dissolved	79	0	0	0.05
	Total	120	0	0	0.42
Total Number of Individual cells with metals data.			46	[b] 28.2	

[a] Landfills operated by Waste Management, Inc. receive hazardous, sanitary, and mixtures of hazardous and sanitary wastes.
[b] Calculation based on 163 cells with some metals data.

A recent study published by researchers at California's Department of Toxic Substances Control[25] found that the leachate concentrations of metals that form oxoanionic species (*e.g.*, antimony, arsenic, molybdenum, selenium, and vanadium) in several leach tests (including the TCLP) did not always correlate closely with leachate concentrations obtained with actual municipal solid waste leachate (MSWL). For arsenic, molybdenum, and selenium the concentration levels in the leachate from the TCLP test were lower than the actual constituent concentrations found in the leachate extracted by the MSWL. For other metals, TCLP produced results approximately the same as the MSWL leachate results.

The Agency has initiated additional research focused on understanding the aspects of these tests (including the effects of pH and the chelating effects of the acetate and citrate used in the leach solutions) that can lead to over-or under prediction of results. In addition to our

[24] The data originally complied by Dr. Robert D. Gibbons of the University of Illinois at Chicago for Waste Management, Inc. is available in the docket for this notice.

[25] See Environmental Science & Technology, Vol. 32 No. 23, pp. 3825–3830, December 1, 1998.

own work, we wish to inquire further. We seek data and comment on metals in leachate from landfill cells, including the amounts of metal being disposed, the stabilization process used (and all key parameters such as reagent to waste ratios), and disposal conditions (*i.e.*, waste pH, landfill leachate pH, amount of water infiltration, and cap integrity). We would also like leachate metals data from groundwater wells downgradient of the landfills, and any data on groundwater pH and groundwater net alkalinity over time. To date, we have only limited information on the specific wastes and associated treatment for individual landfill cells.

F. Potential Changes Based on These Concerns

Below is a discussion of several approaches and areas in which we need additional information. We request comments on these approaches (individually or in combination) and data in support of your views, as well as any other information that addresses the issues and concerns identified in the preceding sections. Note that we are only asking for comments and information on these possible approaches, and that there are presently no plans to change the current LDR program as it pertains to metal treatment. If, however, proposed changes were to be developed, we would have to evaluate how any proposed changes would affect, if at all, the alternative treatment standards for soil and debris. Also, note that the primary focus of this notice is on as-generated process waste. We do, however, encourage comments on how any of these approaches could possibly affect the rapid cleanup of RCRA corrective action sites and CERCLA sites.

1. Restricted Disposal

Heavy metals are generally toxic and certain metals (*i.e.*, arsenic, selenium, and mercury) can be chemically altered (*e.g.*, methylated by bacteria) into even more toxic and mobile species. To help insure the long-term immobility of metals, control of disposal conditions for the treated waste is an avenue to explore. Current regulations allow characteristic metal wastes to be disposed in nonhazardous waste landfills once the characteristic constituent(s), and any UHCs, meet UTS (40 CFR 268.40 and 40 CFR 268.44).[26] To ensure disposal in more controlled conditions, one approach would be to confine disposal of these metal-bearing wastes to Subtitle C hazardous waste units, although, as just noted, this would significantly alter current rules regarding disposal of decharacterized waste.

Furthermore, it may be appropriate to consider the pH of the waste and the landfill. It may be necessary to prohibit the disposal of a waste if it would cause the mobilization of hazardous constituents in the wastes that were previously disposed in the landfill. It may also be necessary to prohibit such a waste if the existing landfill conditions may cause the waste's toxic constituents to be mobilized. For example, mercury sulfide has been shown to be mobilized in the presence of excess sulfides in alkaline conditions.[27] To maintain the long-term stability of these wastes, wastes that could create such conditions would have to be excluded from the disposal site, and the waste itself may have to be further treated to remove excess sulfides from the waste.

2. Specified Treatment Technologies

Another approach could be a limitation of allowable treatment technologies for metal-bearing wastes. By specifying more definitively the types of treatment allowed for metal as-generated wastes, we would no longer have concentration-based numerical treatment standards but specified methods of treatment. For example, if a treatment standard were based on stabilization using Portland cement as BDAT, we would specify that this is the only treatment reagent and process that could be used. The Agency is hesitant to implement this type of option, as we prefer to retain numerical, concentration-based standards.

Retention of a performance-based approach, however, may require the development of additional testing requirements and land disposal standards based on these new tests if we conclude that long-term effectiveness of stabilization is not being achieved under current industry practices. Potentially, performance criteria could also be required to demonstrate adequate treatment by a specified technology.

3. pH Controls

To achieve long-term stability and immobility of metal-bearing wastes, extreme pH conditions must be avoided. In certain situations, extremely alkaline wastes have not provided long-term treatment, but provided the appearance of treatment during compliance testing with the TCLP. In another example, arsenate species must be maintained between pH 3.0 and pH 8.0 under oxidizing conditions or arsenic species will be mobile in groundwater.[28] Therefore, if arsenic-bearing materials are disposed with materials or reagents that are highly alkaline or acidic, then the potential for groundwater contamination would be greatly enhanced. Maintaining metal-bearing waste residuals between a pH 5.0 and pH 8.0 would help maintain immobility of such arsenic-bearing wastes, but may be unsuitable for other wastes.

4. Demonstration of Waste Stability Over a pH Range

Current regulations only require that wastes be tested under one set of conditions. Because of the range of conditions that exist in landfill cells, a demonstration at a number of pH values covering the expected range of conditions could be required. Protocols may be developed that determine analyte solubility over the pH range. Compliance could be based in part on the solubility curve obtained from four parallel extractions using deionized water with nitric acid or sodium hydroxide. The extraction conditions could be as proposed by one group of researchers: [29]

At a liquid to solids ratio of 5

- If natural pH<5, then pH = 7, 9;
- If natural pH is between 5 and 9, then pH = 5, 7, 9;
- Extraction at natural pH.
- At a liquid to solids ratio of 0.5
- If natural pH>9, then pH = 5, 7, natural.

More pH conditions could also be required for the construction of the apparent solubility curve as a function of pH, or extrapolated for each constituent using the above procedure. Mobility in the expected pH range of disposal above numerical limits could be prohibited. Again, we seek comment and data on the viability of such an option.

G. Request for Comment

We desire long-term data for wastes treated by various technologies. We prefer actual field performance data, but we may be able to use bench

[26] Note that, even if these wastes no longer exhibit a characteristic, they cannot be land disposed anywhere until they satisfy LDR requirements. *Chemical Waste Management* v. *EPA,* 976 F.2d 2 (D.C. Cir. 1992).

[27] H. Lawrence Clever, Susan A. Johnson, and M. Elizabeth Derrick, The Solubility of Mercury and Some Sparingly Soluble Mercury Salts in Water and Aqueous Electrolyte Solutions, J. Phys. Chem. Ref. Data, Vol. 14, No. 3, 1985, page 652.

[28] Arsenic-Chemical Behavior and Treatment, David B. Vance. Can be found in the docket to today's notice and at http://flash.net/~nm2the4/arsenicart.htm.

[29] Leaching Test Protocols; David Kosson, Andrew Garrabrants, Florence Sanchez, and Urshila Gulgule, Rutgers University, March 1999. Can be found in the docket to today's notice.

performance data, with initial and later characterization with standard leach protocols.

We specifically request data from the landfill operators, including leachate collection system metal concentrations and pH, process descriptions, and associated treatability/performance testing data. As with any data submittal to EPA, well-documented Quality Assurance/Quality Control (QA/QC) is critical to the Agency in evaluating and assessing the credibility of the data.

We also seek your comments on the potential actions discussed herein that we could take to ensure that stabilization and immobilization practices are properly used to treat metal wastes. We want to make sure that threats to human health and the environment are minimized by the long-term stability and immobilization of metals in RCRA hazardous waste.

VI. Re-examination of the Spent Solvent (F001–F005) Treatment Standards

A. What is EPA Considering With Respect to the Treatment Standards for Spent Solvents?

The classification of waste as an F001–F005 spent solvent waste is based upon two criteria: The concentration of the solvent in the virgin solvent mixture, and how the solvent is used. The virgin solvent must have been comprised of any solvent mixture or blend which contains at least, in total, 10% by volume of one or more listed solvents. See the F001–F005 listing descriptions (40 CFR 261.31). Also, the solvent must be ''spent'' and have been used for its ''solvent'' properties. A solvent is considered ''spent'' when it ''has been used and as a result of contamination can no longer serve the purpose for which it was produced without further processing.'' [30]

In this section, we are revisiting the LDR treatment standards applicable to F001–F005 spent solvents to investigate whether we should require treatment of some (*i.e.,* metals) or all hazardous constituents to their universal treatment standards (UTS) before land disposal. This section includes spent solvent characterization information, a discussion of the current solvent treatment standards, and a description of one option for revising the spent solvent regulations. A second related inquiry, which we discuss in another section of this ANPRM, is to add an F040 incinerator ash waste code with corresponding treatment standards. This ash code would presumably address the underlying hazardous constituents in the treatment residuals from the incineration of spent solvents.

B. Why Is There a Need To Reexamine the Spent Solvent Treatment Standards?

When we established the treatment standards for listed solvent wastes in 1986, we did not also adopt treatment standards for metals or other hazardous constituents (*e.g.*, organics other than those listed in the Table in 40 CFR 268.40). Therefore, under the current regulations, if a listed solvent waste is not also characteristic (*i.e.*, the waste is not classified as any of the waste codes D001-D043), then treaters only have to treat the regulated constituents specified in the LDR table in 40 CFR 268.40. This means that they do not have to treat other hazardous constituents to the UTS levels set forth in the 40 CFR 268.48 UTS table. Thus, the potential exists for some solvent wastes that contain other hazardous constituents above UTS to be treated only for the organics listed in the LDR table in 40 CFR 268.40. The treatment residuals would then be land disposed with these other hazardous constituents still above UTS. Note that a waste that exhibits a characteristic must be treated for underlying hazardous constituents (UHCs) prior to land disposal, so this same potential does not exist for listed spent solvents that are also characteristic wastes.[31]

EPA typically does not require treatment of other hazardous constituents in listed wastes because in the listing and in the development of the treatment standards we have determined all of the hazardous constituents which are likely to be present.[32] In these investigations, however, we have not accounted for the fact that solvents can mobilize, and therefore become contaminated with, significant concentrations of the other hazardous constituents they contact. Therefore, we are investigating whether we need to regulate metals and other hazardous constituents in F001–F005 spent solvent wastes to better protect human health and the environment.

C. How Does EPA Regulate Spent Solvents?

Spent solvents are listed hazardous wastes carrying the waste codes F001–F005. Thirty-two solvents are listed in the table in 40 CFR 268.40. Thirty of these solvents have numerical treatment standards for the solvent itself; the other two, 2-Nitropropane and 2-Ethoxyethanol, have specified treatment technologies.

Currently, an F001–F005 waste is required to be treated for UHCs only if the waste is characteristic. As noted above, if the solvent waste is not characteristic, then it may be disposed with other hazardous constituents above UTS levels and still be in compliance with the LDR regulations. Two scenarios exist where a spent solvent may have a hazardous constituent above a concentration of concern to EPA (in both scenarios, assume that the waste does not exhibit a characteristic):

(1) The constituent is a toxicity characteristic (TC) metal or organic, and concentration is less than TC level, but above UTS.

(2) The constituent is not a TC metal or organic, but concentration is above UTS.

D. What Are the Characteristics of Spent Solvents and How Do Generators and Treaters Manage Them?

Nonwastewater spent solvents are usually either organic liquids or still bottoms from the recovery of F001–F005 spent solvents. The main technology for effectively treating the solvents is some form of combustion. Treaters must then ensure (typically via testing) that the incinerator ash complies with the treatment standards for the regulated solvent constituents in 40 CFR 268.40. If the ash is itself characteristic, most likely for metals, it is regarded as a newly-generated waste and must be further treated to meet not only the treatment standard for the characteristic but also the UTS levels for any UHCs that are present.

Nonwastewaters can also be derived from treating F001–F005 wastewaters. These nonwastewaters will typically be a sludge that could have concentrated levels of metals, and therefore exhibit a characteristic. If the nonwastewater does exhibit a characteristic, that characteristic, and any UHCs, must be treated.

Wastewater forms of F001–F005 are also generated. Most wastewaters are ''derived-from'' (*i.e.*, they are generated

[30] See the Memo from Michael Shapiro, USEPA, to the Hazardous Waste Management Division Directors, USEPA Regions I-X, March 24, 1994, for further clarification on the definition of spent material.

[31] If a waste is both listed and characteristic, and one of the regulated constituents in the listing is also the basis for the characteristic, 40 CFR 268.9(b) states that the listed waste code will operate in lieu of the standard for the characteristic provided the treatment standard for the listed waste includes a treatment standard for the constituent that causes the waste to exhibit the characteristic. Otherwise, the waste must meet the treatment standards for all applicable listed and characteristic codes. For example, consider a K100 waste with cadmium and chromium at levels above UTS but below characteristic levels, and lead above characteristic level. This waste would be classified as both K100 and D008. Since K100 is listed for cadmium, chromium, and lead, these three constituents must be treated to UTS. However, none of the other UHCs that may be present need to be treated to UTS.

[32] See the analyses in the BDAT Background Documents for each listed waste.

from the treatment, storage or disposal of listed hazardous wastes, and therefore remain hazardous wastes). See 40 CFR 261.3(c)(2). Examples include wastewaters contaminated with an F001–F005 solvent, scrubber waters from combustion units, and cooling waters from distillation units or strippers that get contaminated with solvents. Since most wastewaters are eventually co-mingled with other plant wastewaters, it is likely that other waste codes (and treatment standards) also apply. However, because many wastewaters are treated and discharged under National Pollutant Discharge Elimination System (NPDES) permits with no land disposal in the treatment train, the LDRs never apply to them (*i.e.*, they are restricted wastes, but not prohibited wastes, since they are not land disposed).

E. What Are the Levels of Metal Constituents in F001–F005?

The ''Best Demonstrated Available Technology (BDAT) Background Document for F001–F005 Spent Solvents,'' November 1986, presents nine data sets on incinerator ash from the combustion of hazardous wastes, including spent solvents. The data show that metal concentrations in the incinerator ash are mostly below UTS levels. There are no instances in which the metal concentration is above the TC level, and only two cases in which the metal concentration is above the UTS but below TC levels. One of these two instances is for lead and the other is for chromium.

Although this background document suggests that metals are not ubiquitous in treated wastes that contain spent solvents, more current information from the 1995 Biennial Reporting System (BRS) shows that often an F001–F005 waste stream is also characteristic for one of the metals. A preliminary review of the 1995 BRS shows that about 20% of the F001–F005 waste streams also carry at least one of the characteristic metal codes (*i.e.*, D004–D011), with about 15% carrying two or more characteristic metal codes. Lead and chromium are the metals that are most frequently present; each is found in about 15% of the spent solvent waste streams.

This information is informative but not necessarily dispositive. Although the BRS provides a general idea of how much hazardous waste is generated, we want to point out three issues with respect to the F001–F005 BRS data. One is that the BRS does not include actual metal concentrations in the waste streams, even though the waste streams are reported as characteristic for metal. Thus, it is very difficult to accurately estimate the range of metal concentrations found in spent solvent wastes, except through making assumptions that may or may not reflect reality. Nevertheless, because these data show that about 20% are reported as characteristic for metals, one could draw an inference that metals are present in these and potentially other spent solvent waste streams at levels that warrant further investigation.

A second issue is that the BRS does not provide any information on other recognized toxic metals that, by themselves, would not render a spent solvent characteristic. These metals include antimony, beryllium, nickel, and thallium, each of which appear on the list of hazardous constituents in Appendix VIII of Part 261. Thus, we cannot estimate from the BRS the extent that these metals may be present or in what concentrations.

Finally, although 20% of the spent solvents waste streams also have a characteristic metal code (and therefore require treatment of all UHCs reasonably expected to be present), we do not know the metal concentrations in the other 80% of the waste streams. This raises at least the potential for these streams to have metal concentrations above UTS. For all of these reasons, we are interested in a more complete characterization of metal constituents and concentrations in F001–F005 spent solvents and we invite data and detailed comments on this subject.

F. How Might We Change the Regulations?

Although the previous section focused solely on metals in spent solvents, we are more generally concerned about all hazardous constituents in spent solvents. As was alluded too earlier, solvent wastes are generated in a wide variety of settings and are prone to contamination with almost any hazardous constituent (depending upon where the solvents were used) since one of the main purposes of solvents is to mobilize whatever they come in contact with.

To ensure that all hazardous constituents in treated solvent wastes are at concentrations that reflect BDAT and minimize threats to human health and the environment, we are asking for comment on whether we should require treatment of all other hazardous constituents (or possibly just metals) in spent solvent wastes to UTS levels (see 40 CFR 268.48). This regulatory change would essentially adopt the same LDR regime for these listed solvent wastes as for characteristic wastes.

In extending this concept to F001–F005 spent solvents, we may need only to focus on metals since treatment via high temperature combustion would likely destroy all organics and the only remaining compounds of concern from the original spent solvent waste would be metals. However, as noted above, we are interested in comment on whether any technical or implementation considerations exist that would lead to requiring treatment of all hazardous constituents, not just metals, that are present in the F001–F005 wastes.

A second approach is to develop a new waste code (F040) for incinerator ash, and not to focus our attention on hazardous constituents in the original F001–F005 spent solvent waste that is going to high temperature combustion. We discuss the need for an ash waste code in this ANPRM in the section titled ''Should EPA Establish Special Categories of Waste Residuals?'' Since many solvent nonwastewaters are combusted, metal concentrations in spent solvents could be adequately controlled by the treatment standards for the ash waste code. As noted in this other section in more detail, we seek comment on the various advantages and disadvantages of this approach.

G. Request for Comment

We are seeking comment on all aspects of the potential changes to the F001–F005 waste codes. In particular, we would like comments and information on the following:

(1) F001–F005 characterization data, both before and after treatment (including total and TCLP metal concentrations);

(2) The need for a change to the current spent solvent regulations. What information can you provide on the current treatment practices for F001–F005 solvent wastes?

(3) If a change is necessary, which regulatory option do you prefer? We specifically invite comment on the option described in Section F, and on the addition of an F040 waste code for incinerator ash. Would treatment standards for the F040 waste code ensure that spent solvents are properly treated and disposed? We are also interested in other options you may prefer.

(4) What are the possible impacts of changing the regulations? Would there be a substantial increase/decrease in the amount of required sampling and analyses? Are there any capacity considerations that need to be analyzed?

VII. Reactive Wastes: Possible Revisions to Treatment Standards

A. What Is EPA's General Concern?

The LDR treatment standards for reactive wastes require that the waste no longer exhibit the characteristic of reactivity, but do not require destruction of the agents in the wastes that cause the waste to be reactive. Also, certain members of the regulated community have expressed uncertainty in how to evaluate wastes for reactivity, either before or after treatment, and have requested guidance. The Agency is therefore asking whether this type of guidance is generally needed and also whether the LDR treatment standards for these reactive wastes need to be revised to more effectively minimize long-term threats to human health and the environment.

B. What Are Reactive Wastes?

40 CFR 261.23 defines wastes having the characteristics of reactivity (classified as D003 wastes) as those that have any one of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating;
(2) It reacts violently with water;
(3) It forms potentially explosive mixtures with water;
(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment;
(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment;
(6) It is capable of detonation or explosive reaction if subjected to a strong initiating source or heated under confinement;
(7) It is readily capable of detonation, explosive decomposition or reaction at standard temperature and pressure;
(8) It is a forbidden explosive as defined in 49 CFR 173.51, a Class A explosive as defined in 49 CFR 173.53, or a Class B explosive as defined in 49 CFR 173.88.[33]

Several listed wastes are also considered reactive: K044, K045 and K047, wastes from the manufacture and processing of explosives. These wastes were listed solely for reactivity, and contain a number of explosive components which, if improperly managed, could pose a substantial hazard.[34]

C. What Are the Existing LDR Treatment Standards for Reactive Wastes?

The treatment standard for the reactive wastes, other than the cyanide subcategory wastes, is deactivation, abbreviated in the 40 CFR 268.40 treatment table as ''DEACT.'' DEACT requires only that the wastes must be treated to remove the characteristic prior to land disposal. The constituent that originally caused the waste to exhibit reactivity is not specifically required to be destroyed or separately treated. In addition to DEACT, explosives, water reactives, and other reactives subcategory D003 characteristic wastes must be treated to meet universal treatment standards (UTS) for any underlying hazardous constituents (UHCs) reasonably expected to be present in the waste.[35] See Table 2 for the list of the treatment standards.

TABLE 2.—TREATMENT STANDARDS FOR REACTIVE WASTES

Waste code	Waste description	Nonwastewater treatment standard
D003	reactive sulfides subcategory	DEACT.
	explosives subcategory	DEACT and meet 268.48 standards.
	unexploded ordnance and other explosive devices which have been the subject of an emergency response.	DEACT.
	other reactives subcategory	DEACT and meet 268.48 standards.
	water reactive subcategory	DEACT and meet 268.48 standards.
	reactive cyanides subcategory	590 mg/kg total, 30 mg/kg amenable.
K044	wastewater treatment sludges from the manufacturing and processing of explosives.	DEACT.
K045	spent carbon from the treatment of wastewater containing explosives.	DEACT.
K047	pink/red water from TNT operations	DEACT.

D. Are There Specific Reactive Subcategories That Merit Attention?

Yes. Several subcategories of reactive characteristic wastes appear in our LDR regulations. We are most interested in the waste subcategories that require only DEACT as the treatment standard. Two key issues exist in particular. First, where other, non-reactive hazardous constituents are expected to exist, these constituents may warrant individual treatment attention. Our current treatment standards do not always require this to occur. Table 2 illustrates how DEACT is specified for each subcategory of D003 wastes (with the exception of the reactive cyanides subcategory) and for K044, K045 and K047. UHCs or other hazardous constituents expected to be present (known as regulated constituents in listed wastes) are only included in the treatment standards for the following wastes: D003 explosives, other reactives, and water reactives subcategories.

Second, DEACT does not require treatment (destruction) of the constituent causing the waste to be reactive, but rather allows any method (including dilution in the case of Clean Water Act, or CWA, systems) to be used to remove the characteristic of reactivity. In the preamble to the Third Third Rule (55 FR 22552, June 1, 1990), EPA noted that it had selected deactivation because technologies exist that can remove the characteristic, and that the general standard would allow

[33] References to 49 CFR in 40 CFR 261.23 to explosive classes have been subsequently renamed and renumbered since the promulgation of 40 CFR 261.23. See 55 FR 52617, December 21, 1990. Definition of forbidden explosives is now found at 49 CFR 173.53, and definition of Class A and B explosives are found at 49 CFR 173.50. See also 49 CFR 173.53 to compare old and new hazard class names.

[34] Listing Background Document, USEPA, 1980, page 651, which is in the docket for this notice.

[35] When managed in CWA/CWA-equivalent/Class I SDWA systems, explosives, other reactives, and water reactive wastes may be diluted to remove the characteristic, without consideration of underlying constituents.

the regulated community flexibility to use whichever treatment technology that best fits the type of waste; see also *Chemical Waste Management* v. *EPA,* 976 F.2d 2, 18 (D.C. Cir. 1992), where the court upheld the deactivation standard for wastes identified because they exhibit the characteristic of reactivity.

Current regulations provide, at 40 CFR 268 Appendix VI, recommended technologies for the treatment of water reactive, reactive sulfide, explosive, other reactive subcategories of D003 characteristic wastes, and K044, K045 and K047 listed wastes. Again, these technologies are not required.

By not requiring a technology that destroys or permanently treats the characteristic causing the reactivity, we lack a means to measure whether a waste or waste constituent is still reactive over the long term. This becomes a concern, for example, when many of the listed and characteristic explosive subcategory reactive wastes are simply kept moist to make it safer to handle them. Because ''DEACT'' is narratively defined in section 261.23, wetting of material may be treatment in the short term, but is not necessarily a permanent treatment. The definition of ''DEACT'' has been implemented in practice to include wetting, even though it may be only temporarily effective. Furthermore, generators have in some cases determined that their wastes when wetted are not reactive and not subject to treatment standards even though explosive residues may form through evaporation. This raises the question about the timing of a determination of compliance (in this case, removal of a characteristic) with uncertain future events that may significantly change the nature of the waste.

E. Request for Comment

We are requesting comment on the possibility of modifying the treatment standards. One option would be to include a requirement to destroy the reactive constituents in the waste. Possible technologies include chemical oxidation (CHOXD); chemical reduction (CHRED); biodegradation (BIODG); or combustion (CMBST). These are some of the technologies recommended in 40 CFR 268 Appendix VI. We are also requesting comment on the possibility of adding the requirement to treat UHCs for the characteristic subcategories for which that requirement does not already exist and, in the case of the listed reactive wastes, to require treatment of specific hazardous metals which are also expected to be present.

We are also requesting data identifying the wastes, waste volumes, current treatment, and any additional treatment costs associated with alternative treatments that might better treat these wastes.

VIII. Public Input Into Decisions on Determinations of Equivalent Treatment (DETs)

At the 1998 LDR roundtable, we heard from environmental groups that we should allow the public to comment on Determinations of Equivalent Treatment (DET) granted under 40 CFR 268.42(b). The underlying concern is that the public has no voice in the decision making process that may have an impact on hazardous waste treatment in their own communities.

A. What Are DETs and What Is the Current System of Considering DET Petitions?

A DET is a variance that may be granted for a hazardous waste at a particular site for which the LDR treatment standard is a required method of treatment. It is based upon a demonstration to EPA that another treatment technology performs as well as the one required under the LDR treatment standard. If it is granted, the alternative technology becomes the treatment standard that must be used on that waste at a particular site.

Currently, the regulated community petitions EPA for a DET. These petitions generally contain data to show that the alternative treatment method provides a measure of performance equivalent to the one established as the treatment standard. These petitions also contain information on the facility generating the waste, the volume of the waste, where it is disposed, and other information relevant to the petition. We consider the petition and data, and then grant or deny the request in writing based upon its technical merits. We then inform the petitioner of our decision.

Under EPA's current regulations, public participation is not required in the process of evaluating a DET petition. In contrast, public participation is required for a related process involving treatment variances (see 40 CFR 268.44(e)). Under this process, we give public notice in the **Federal Register** of our intent to grant or deny the treatment variance and then again of our final decision. The treatability variances granted under 40 CFR 268.44(e) are very similar to DETs in that they establish alternative treatment standards for a waste. They differ from DETs in that they are granted in cases when the treatment standard is expressed as concentration levels rather than required methods of treatment, and the substantive grounds for granting treatment variances are different from those for DETs.

B. Is A Regulatory Change Needed?

We have recently begun publishing DETs in the **Federal Register** with a comment period without a regulatory change.[36] We are considering whether also to change the regulations at 40 CFR 268.42(b) to require EPA to seek public comment on most DET requests.[37] Public comment would be solicited on EPA's draft decision to grant or deny the DET request. Public comments could be solicited through such vehicles as the **Federal Register**, for instance, or other outlets such as local newspapers. We expect most comments would address the merits of the proposed technology for the waste in question. The comments received would then be factored into EPA's final decision. The written final decision could be announced in the **Federal Register** or other vehicle such as a local newspaper.

C. Request for Comment

We solicit comments on the need for a regulation regarding public participation in the DET process, and on whether EPA's current practice is sufficient. Furthermore, we solicit information on the length of time that would be appropriate for public participation, and the media vehicles that should be used to solicit comments. Is there a need for different public participation requirements than for treatment variances? Are there any disadvantages to the increased public participation, other than time delays for issuing the variance?

IX. Should EPA Revise the Macroencapsulation Alternative Treatment Standard for Hazardous Debris?

In a petition for rulemaking (available in the docket for this ANPRM), filed on December 16, 1998, the Environmental Technology Council (ETC), the National Association of Chemical Recyclers, and the Cement Kiln Recycling Coalition request EPA to amend the alternative treatment standards for hazardous debris to restrict the use of macroencapsulation for debris contaminated with significant amounts of organic hazardous constituents. ETC is particularly focused on the effectiveness of using high density

[36] See 64 FR 51540, September 23, 1999 for an example of a proposed DET in the **Federal Register**.

[37] EPA would reserve the option to waive this requirement if, in our judgement, delay would result in significant damage to human health and the environment.

polyethylene vaults for macroencapsulating hazardous debris.

A. What Are the Alternative Treatment Standards for Hazardous Debris?

On August 12, 1992, EPA promulgated alternative treatment standards for hazardous debris (57 FR 37195). Hazardous debris is defined as debris that either contains a listed hazardous waste, or exhibits a characteristic of hazardous waste (see 40 CFR 268.2(h)). The alternative treatment standards for hazardous debris are listed in the table at 40 CFR 268.45.

The 17 treatment technologies listed in 40 CFR 268.45 are divided into three categories: extraction, destruction, and immobilization. The extraction and destruction technologies are designed to separate the debris from its contaminant(s). Because debris treated by one of these types of technologies is considered clean, such debris can then be disposed of in a subtitle D landfill. The immobilization technologies do not separate the debris from its contaminants, and therefore debris treated using an immobilization technology must be disposed of in a subtitle C landfill.[38] The three immobilization technologies are macroencapsulation, microencapsulation, and sealing. Microencapsulation involves grinding up the debris and stabilizing it in a reagent. Sealing involves application of a coating material to the debris.

Macroencapsulation, the standard which is at issue, involves placing the debris in an inert jacket of material (such as a steel drum) to prevent leaching. If the macroencapsulation standard is used, the performance standard, which states that the encapsulating material must be resistant to degradation by the debris and any contaminants on the debris, must be met before the debris can be land disposed.

B. What is an HDPE Vault?

On June 15, 1995, three years after promulgation of the debris rule, Chemical Waste Management, Inc. (CWM) sent a letter to EPA in which they described their macroencapsulation process and asked whether it met the requirements of 40 CFR 268.45 (the letter and EPA's response are available in the docket for this ANPRM). CWM described their process as follows:

* * * a jacket of inert inorganic material is placed around hazardous debris, which is then placed in a high density polyethylene (HDPE) vault. An inert jacketing material (like cement) is then placed around the debris, the lid of the vault secured, and the vault is placed in a subtitle C landfill.

We had not considered this type of technology when developing the macroencapsulation standard. However, we determined in our response letter to CWM that this process meets the definition of macroencapsulation for hazardous debris. We also stated in our response that merely placing hazardous debris in a container, unless the container is made of a noncorroding material such as stainless steel, does not meet performance standard for macroencapsulation. We think that use of the cement (or other stabilizing material) is critical to meeting the design and operating standard for macroencapsulation. Without the stabilizing agent, no guarantee exists that the encapsulating material would be resistant to the debris contaminants.

C. What Is the Issue With the HDPE Vaults?

Because macroencapsulation is an immobilization technology, no removal or reduction of hazardous constituents is required. Therefore, debris placed into an HDPE vault could potentially have significant amounts of a contaminant.

The technical support document for the debris rule did not include a description of the HDPE vault as this method did not come to our attention until after the August 19, 1992 rule was published. The June 15, 1995 CWM letter did not include enough information that would have been required for a background document. Therefore, there has not been an extensive discussion about the effectiveness of the HDPE vaults. HDPE is a material that can be dissolved by even small amounts of solvents. The performance standard for macroencapsulation is clear in that the encapsulating material should be resistant to the debris and its contaminants. When hazardous debris contaminated with a significant amount of an organic solvent is placed in an HDPE vault, and if there is no stabilizing reagent, then theoretically the HDPE could dissolve from exposure to solvents. In this case, the performance standard for macroencapsulation has not been met. This is, in fact, improper treatment of a hazardous waste.

As pointed out in the ETC petition, the debris proposed rule (57 *FR* 958, January 9, 1992) originally stated that macroencapsulation was not appropriate for organic constituents. The technical support document for the proposed rule stated that macroencapsulation is not expected to be effective on organic compounds. The final debris rule may appear to some to be less restrictive than the proposal in that it does not contain the same prohibitive language. This is not the case. The table of alternative debris standards in the proposed rule was merely simplified for the final rule. ETC alleges in its petition that we did not place any contaminant restrictions on the macroencapsulation standard in the final rule as a result of the simplification of the table and that we meant to restrict macroencapsulation to inorganic debris only. This is also not true.

The response to comment's document for the final rule addresses the change in the alternative treatment standards table. We stated that the final rule did not prohibit encapsulation of any specific debris type because the design and operating parameters and the performance standards were sufficient to ensure effective treatment of hazardous debris using encapsulation. Basically, we regard the performance standards as thorough enough to prevent inappropriate treatment. The technical support document for the final rule mentions that certain situations, such as using organic polymer encapsulants to encase organic solvents, would obviously not meet the performance standard. We therefore find no compelling reason to propose a revision to the current macroencapsulation standard in today's notice. However, the use of HDPE vaults to macroencapsulate debris was not considered in the final rulemaking, and we are taking this opportunity to open the issue for comment.

D. Request for Comment

ETC is requesting that we amend the macroencapsulation standard to restrict it to "metal-bearing hazardous waste" only, and refer to the list of 43 listed and 8 characteristic wastes found in Appendix XI of 40 CFR 268. We are taking comment on this ETC option. We are also soliciting data on macroencapsulated debris and the effectiveness of HDPE vaults and any other options you may have.

We are also soliciting comment on restricting the use of the macroencapsulation standard for other types of wastes. Debris contaminated with a waste that has a specified method can be treated with one of the

[38] The exception to this is characteristic debris. If characteristic debris which has been immobilized no longer displays the characteristic, it can be disposed in a Subtitle D landfill.

alternative debris standards.[39] We are today taking comments on whether this is appropriate.

We are also considering restricting the use of the macroencapsulation standard for certain types of debris. Some debris types lend themselves to other alternative treatment technologies. Cloth contaminated with a hazardous organic substance, for instance, could be more effectively treated by combustion. We suspect that the macroencapsulation standard is used because it is easier and less costly, but this may not foster the most effective method of treatment. We had hoped that the macroencapsulation standard would be used only when other, more effective methods of treatment could not. We are today taking comment on whether the macroencapsulation standard should be restricted to just inorganic debris contaminated with inorganic constituents that cannot be otherwise treated. This is more restrictive than the ETC option.

X. Should EPA Establish a Special Category for Incineration Ash?

A. What Are We Considering for Incineration Ash?

Listed hazardous wastes carry the EPA hazardous waste codes of the as-generated waste from generation to ultimate land disposal. These waste codes are required to be placed on the LDR notification, which is the required LDR paperwork that accompanies the waste from the generator to the treatment, storage, or disposal facility and provides information about the waste so that the correct LDR treatment standards are met. In addition, some states require waste codes to be placed on the hazardous waste manifest, the RCRA tracking paperwork that accompanies hazardous wastes from generation to disposal. Facilities are also required to report information about their waste, including waste codes, to the Biennial Reporting System (BRS).

Because several listed hazardous wastes may be treated together in an incinerator or other incineration device, a large number of waste codes could be required on the LDR notification, the manifest, and reported to the BRS with respect to the thermal treatment residues (*i.e.,* the ash). We have heard from the regulated community that the tracking of multiple codes is burdensome and that a single waste code for incinerator ash would simplify paperwork and compliance monitoring. A single waste code could make it easier to track wastes on the manifest, especially in the event of a spill. A single waste code could also make completing the BRS much simpler, and could assist EPA in interpreting those BRS data. Therefore, we are considering establishing a waste code for incineration ash. It would likely be similar to the waste code established several years ago in the Third Third rule for multi-source leachate, F039 (55 FR 22619, June 1, 1990).

B. What Are the Approaches We Are Considering for Regulating Incineration Ash?[40]

Our initial thinking is that the incinerator ash waste code would encompass ash resulting from the incineration of more than one hazardous waste containing organic constituents, including organic toxicity wastes (D012–D043) and wastes with greater than 1% total organic carbon. The current definition of combustion, found in Table 1 at 40 CFR 268.42, includes high temperature organic destruction technologies in units such as incinerators, boilers, or industrial furnaces operated in accordance with the requirements of 40 CFR 264–265, Subparts O; or Part 266, Subpart H and potentially in other units operated in accordance with similar technical operating requirements (perhaps Subpart X). We solicit comments on whether an ash waste code should be for wastes that are incinerated, or whether ash from these other combustion units should thus be included. If we do include ash waste from such combustion devices, we solicit data on whether there are significant differences in the ash, and whether hazardous constituents partition into different types of residues, from these different incineration units. If differences do exist, should we regulate the ash from these different units accordingly? In addition, we solicit comments on whether the incineration ash waste code should be defined as the incineration of more than one hazardous waste containing organic constituents, including organic toxicity wastes (D012–D043) and wastes with greater than 1% total organic carbon, or whether it should be defined in some other way.

If we were to establish a new waste code for incinerator ash, the ash would almost certainly be considered a new point of generation since the incineration unit will significantly alter the physical and chemical composition of, and the hazards associated with, the original waste. This is not to say that the toxicity of the original wastes has been completely removed. Rather, the composition and nature of the waste have changed to the point that the hazards posed by the incinerator ash are likely to be significantly different than the original waste, and the subsequent management and handling that would be environmentally warranted for incinerator ash could be significantly different from those for the original waste.

Because hazardous constituents in incineration ash derive potentially from any of the hazardous wastes, our treatment standard should account for this possibility. One approach is to regulate all of the potential hazardous constituents that may be present. Subjecting the ash to the Universal Treatment Standards (UTS) would accomplish this goal. Under this approach, the ash would have to be evaluated for all UTS constituents, be treated if necessary to meet the UTS levels, and the resulting treatment residue would be placed in a hazardous waste (Subtitle C) landfill. Like the underlying philosophy for F039, however, it is unnecessary and wasteful to monitor constituents that are not present (55 FR 22620, June 1, 1990). Therefore, one modification to the approach outlined above would make the treater only responsible for meeting the treatment standards for those constituents specified in their permit waste analysis plan, which would be negotiated on a site-specific basis.

C. How Should the Dioxin Waste Codes Be Regulated?

One approach would be to exclude ash derived from listed dioxin-containing wastes F020–F023 and F026–F027 from any incineration ash code that we might develop. This would parallel the approach taken for F039, where dioxin-containing waste codes are not eligible for the more generic F039 classification. The ash would therefore continue to be classified and regulated as F020–F023 and F026–F027 wastes, the waste codes from which the ash is derived. Ash derived from soils contaminated with these waste codes would continue to be classified as F028. The reasoning behind continuing to

[39] For "debris-like" material with a specified method, such as K109, the specified method must be used.

[40] In the context of the Hazardous Waste Identification Rule (HWIR), the Chemical Manufacturers Association (CMA) suggested a different approach to regulating combustion ash. The CMA approach would exempt residues from the combustion of listed hazardous waste from the derived-from rule. The residues would then only be hazardous if they exhibit one of the hazardous waste characteristics of 40 CFR 261.3. We took comment on the CMA approach in the HWIR proposed rule (64 FR 63381, November 19, 1999). We will closely examine any comments we receive in response to that proposal, but we are not addressing nor soliciting additional comment on the CMA approach in this notice.

regulate the ash as a dioxin-containing waste code would be that these listed dioxin wastes are acutely hazardous and warrant special management standards (55 FR 22620, June 1, 1990). In addition, restrictions could be imposed that more explicitly prohibit mixing these dioxin wastes with other wastes to escape from more stringent management standards.

Another approach would be to allow these dioxin-containing waste codes to be eligible for the incinerator ash waste code. In looking at whether this approach can be justified, we would consider the potential for dioxin-listed waste in the feed stream to cause elevated dioxin levels in the incinerator bottom ash and collected particulate matter. Although the Agency's incinerator regulations minimize stack emissions of dioxins (see 64 FR 52528, September 30, 1999), the regulations do not explicitly minimize dioxin levels in bottom ash. There are no ash burn-out requirements, for example. However, dioxins are not thermally stable and, as a practical matter, dioxins in the waste feed are easily destroyed in an incinerator's combustion chamber. Therefore, dioxin levels in incinerator bottom ash from burning dioxin-listed waste should be no higher than dioxin levels in the ash from burning other non-dioxin wastes. To further evaluate this issue, we will need data on dioxin concentrations in ash from burning both dioxin-containing waste codes and from burning other non-dioxin wastes.

Similarly, our current incinerator regulations do not minimize dioxin levels in collected particulate matter. Because dioxins are so thermally unstable, it could be argued that waste particles entrained in the combustion gas are not likely to contain dioxins and that any dioxins found in the collected particulate matter result from post-combustion formation, which is not related to dioxin levels in the waste feed.

We are, therefore, interested in comment and data on whether the incineration of dioxin-containing waste cause either bottom ash or collected particulate matter to have higher levels of dioxin than the incineration of other non-dioxin wastes. Our decision on whether to propose to allow dioxin-containing waste codes to be eligible for an incinerator ash waste code (either with or without special management conditions) will be guided by the technical information we receive. We solicit comments on both approaches and on others that we should consider.

D. Should We Regulate Specific Constituents of Concern in the Ash?

One potential problem with establishing a new waste code for incinerator ash is that it may require treatment of constituents that are not in the as-generated waste at levels of concern, but are either formed in the ash (*e.g.,* dioxins) or concentrated in the ash (*e.g.,* metals) during treatment. Currently, constituents that are not identified as UHCs in the untreated characteristic waste and that form during treatment only have to be treated if it is determined that there is a new LDR point of generation after the treatment occurs. We clarified two LDR point of generation questions in a recent technical amendment (64 FR 25411, May 11, 1999). There, we said:

(1) For residuals that are the end product of a one-step treatment process or the end product of a treatment train, the treater has the obligation to ensure only that the original UHCs meet UTS standards and that the treatment residuals are not themselves characteristic. If a treatment residual in this scenario does not meet the treatment standards for the original characteristic (*i.e.,* when treatment is ineffective or incomplete) and requires further treatment, EPA does not consider the treatment residue to be newly generated for LDR purposes. Such a treatment residue, however, cannot be land disposed until it meets the treatment standard applicable to the original waste. This situation would normally involve retreating the waste residuals on-site. Any UHCs added or created by the treatment process are not required to be treated because there is no new point of generation for LDR purposes. However, as noted above, if the treatment residuals are themselves characteristic due to a new property (for example, an incinerator ash resulting from the incineration of several listed wastes is now only characteristic for D008 lead), then the treater must make a new determination of the UHCs present—either through knowledge or additional testing. This is the same obligation that attaches to any generator of a hazardous waste.

(2) For treatment residuals that appear only at intermediate steps of a treatment train, there is no obligation to determine UHCs or to determine whether the residual is itself characteristic. Intermediate-step treatment residuals are not newly generated hazardous wastes for LDR purposes. Thus, even when an intermediate treatment residual is sent off-site for further treatment (such as incinerator ash going offsite for stabilization and land filling), our current regulations at 40 CFR 268.7(b)(5) require only that the UHCs identified at the LDR point of generation be identified. There is no such requirement for any new UHCs that may be added or created during the preceding steps of the treatment process.

As indicated above, if we develop a separate waste code for incinerator ash and if the ash is considered a new LDR point of generation, full waste characterization of the ash would have to take place. Some constituents that were not UHCs in the characteristic wastes originally going into the incinerator could now be UHCs, particularly metals that are concentrated in the ash or, potentially, trace levels of dioxins and furans. We solicit comment and data on the concentration of metals or dioxins/furans in incineration ash and on the effect of establishing a waste code for incinerator ash. If we do not receive data, we may need to presume that these constituents are present in the ash at levels above UTS. In addition, we request data on levels of dioxin and furan leaching from incinerator ash, both untreated and after stabilization. These data will be highly important for our deliberations on whether to establish a separate waste code for incineration ash and, if so, what the treatment standard should be.

E. Would the Incinerator Ash Waste Code Be Optional?

Our initial thinking is that the original waste codes would not apply to incinerator ash (*i.e.*, no waste code carry through). This is mainly because categorizing ash according to the original waste codes may, in some cases, result in less treatment of waste constituents than if the waste were categorized as a new waste code for incineration ash. For example, ash from the incineration of listed organic wastes may contain low levels of metals that would not be treated under the treatment standard for the original waste but would be found at higher levels in the ash due to concentration. We solicit comments on this issue and, in particular, whether the incinerator ash code should always apply, or whether the original waste codes should apply in some circumstances (including on a case-by-case basis). We would also like comments on how this second option would affect the consistency and accuracy of the BRS database.

F. Are There Ways To Reduce the Analytical Burden?

We are soliciting comments on approaches that could be used to limit the number of constituents that would require testing and analysis if a new waste code for incinerator ash were established. For example, we already have provided regulatory relief for organic constituents in listed waste that have been combusted when testing and analysis indicates they are below detection limits (40 CFR 268.40(d)). The provision allows these wastes to meet concentrations that are one order of magnitude greater than the LDR treatment standard. Under the ash waste code approach, would it be environmentally protective to allow testing and analysis of the other organic constituents to serve as surrogates for nondetectable constituents? If so, which ones? We solicit data on this issue.

One variation on this approach would apply a reduced analytical scheme only to incineration units that treat many waste codes. Rather than require analysis of the hundreds of constituents that could potentially be present, we could instead develop a list of surrogate constituents to regulate. We note that some previous efforts along this line have shown that selecting appropriate surrogates is a very difficult technical challenge. If we could overcome this challenge, then we expect that this list would most likely include the most difficult to combust organic constituents, all metals, and some thermally labile constituents to confirm performance of the unit. Analysis of these surrogate constituents would demonstrate adequate treatment of all incoming wastes of concern. These types of treatment data would also show whether metals have concentrated in the ash, and what types of treatment (*e.g.*, stabilization) would be appropriate before land disposal. We are requesting comment on this issue, including data and potential constituents for this surrogate list.

G. Request for Comment

We are requesting comments and data on the following ash waste code topics.

- We solicit general comments on whether we should establish a waste code for incineration ash.
- We solicit comments on whether to exclude ash derived exclusively from listed dioxin-containing wastes F020–F023 and F026–F027 from the incineration ash code.
- We solicit data on whether there are significant differences in the ash from different combustion units, and whether hazardous constituents partition into different types of residues, from these different units. If differences do exist, should we regulate the ash from these different units accordingly?
- We solicit comments on whether the incineration ash waste code should be defined as the incineration of more than one hazardous waste containing organic constituents, including organic toxicity wastes (D012–D043) and wastes with greater than 1% total organic carbon, or whether it should be defined in some other way.
- We solicit comment on whether the treater should only be responsible for meeting the treatment standards for those constituents specified in their permit waste analysis plan, which would be negotiated on a site-specific basis.
- We solicit comments on whether the incinerator ash code should always apply, or whether the original waste codes should apply in some circumstances (including on a case-by-case basis). We would also like comments on how this second option would affect the consistency and accuracy of the BRS database.
- We solicit comments on approaches that could be used to limit the number of constituents that would require testing and analysis if a new waste code were established.
- We solicit comment and data on whether under the ash waste code approach, would it be environmentally protective to allow testing and analysis of the other organic constituents to serve as surrogates for nondetectable constituents? If so, which ones?

XI. Should EPA Establish Tailored Treatment Standards for Mixed Wastes? [41]

A. What Are Mixed Wastes?

Mixed wastes are those wastes that satisfy the definition of radioactive waste subject to the Atomic Energy Act (AEA) and that also contain listed or characteristic hazardous wastes. On July 3, 1986, we determined that the hazardous portions of mixed wastes are subject to RCRA regulation (51 FR 4504). This situation creates a dual and complementary regulatory framework between RCRA and the AEA.

Because the hazardous portions of mixed waste are subject to RCRA, the land disposal restrictions apply. The hazardous portions must therefore meet the appropriate LDR treatment standards before land disposal.

B. What Are the Issues Associated With Regulating Mixed Wastes?

Potential difficulties exist when applying the LDRs to mixed waste. They relate primarily to analytical problems and concerns about worker exposure to radiation when treating or testing mixed waste.

The Department of Energy (DOE) has raised these types of issues at several junctures, including the July 1998 LDR roundtable and in comments on several LDR rules, the proposed Hazardous Waste Identification Rule (HWIR), and the Mixed Waste Disposal Rule. With respect to compliance monitoring, DOE asserts that the difficulty and costs associated with sampling and analysis increase as the constituent concentration levels that need to be detected are lowered and as radiological exposure increases. Some of the analytical difficulties and costs associated with sampling and analysis include:

- Sample collection—The sample volumes specified in ''Test Methods for Hazardous Wastes'' (SW–846) may not be obtainable for high level mixed waste (*i.e.*, spent fuel from commercial nuclear power plants and defense high-level waste from the production of weapons) because the sample volumes would result in excessive radiation exposure to personnel collecting the samples and conducting the analyses.
- Storage—Special sample storage containers must be used to address radiological hazards. For example, refrigeration of samples cannot be achieved in all instances because samples must be placed in pre-designed lead-lined shipment containers that do not lend themselves to cooling.
- Interference due to the radiological matrix—Some radionuclides interfere with the detection of hazardous constituents. For example, when a mixed waste sample containing plutonium is volatilized and analyzed as an emission spectra, the plutonium peak obscures peaks that indicate the presence of hazardous metals. DOE asserts that this is a common analytical problem for mixed waste containing transuranic elements (atomic number greater than 92).
- Manipulating high level mixed waste—Analysis must be conducted in hot cell laboratories where the waste is remotely handled. The use of manipulators is time consuming and, as a result, it is often difficult to conform to the holding times specified in SW–846.
- Limited analytical capacity and capability—Laboratory capacity as well as capability for handling mixed waste is limited. The shortage in capacity is most acute for higher level wastes. In addition, when equipment becomes ''hot'' due to exposure to radionuclides in samples, it must be dedicated to analysis of radioactive materials only.

[41] Note that EPA recently published a proposed rule on the storage, treatment, transportation, and disposal of mixed waste proposed rule. See 64 FR 63464, November 19, 1999.

• Waste disposal—The costs associated with cleanup and waste disposal after analysis are substantial. For example, protective clothing and equipment used during sampling activities must be handled as low level radioactive waste.

• Exposure—The policy under DOE's health and safety program is to maintain exposures As Low As Reasonably Achievable (ALARA). Worker exposure during collection, handling, and transport of samples as well as during analysis needs to be minimized, which sometimes does not occur when meeting RCRA compliance obligations.

C. How Has EPA Responded to the Issues Associated With Regulating Mixed Waste?

Recognizing the public's concern over potential radiation exposure from mixed waste testing, we developed, in close coordination with the Nuclear Regulatory Commission (NRC), a mixed waste testing guidance titled ''Joint NRC/EPA Guidance on Testing Requirements for Mixed Radioactive and Hazardous Waste.'' [42] The primary purpose of this guidance document is to help NRC licensees and others characterize their mixed waste in accordance with RCRA regulations while keeping radiation exposure as low as reasonably achievable (ALARA). The guidance emphasizes flexibility in the RCRA testing requirements so that the ALARA concept can be incorporated. For example, the guidance emphasizes and encourages the use of process knowledge whenever possible to avoid unnecessary exposure to radiation. The guidance describes methods by which individuals who sample and analyze mixed waste may reduce their occupational radiation exposure, for example by keeping RCRA frequency of testing to a minimum by avoiding duplicative testing.

In the LDR Third Third final rule (55 FR 22552, June 1, 1990), we relied upon data and information submitted by DOE to tailor several treatment standards for certain mixed wastes. These data indicated that for certain high-level wastes that also display hazardous metal characteristics the most appropriate treatment standard is vitrification. The DOE vitrification process reduces the mobility of both the hazardous and radioactive components of the waste. We therefore adopted vitrification as the treatment standard for these high level mixed wastes. Because the treatment standard is expressed as a specified method of treatment, facilities need not demonstrate compliance by routinely measuring concentration levels, thus minimizing worker contact with the high level mixed waste.

Another treatment standard was established for characteristic radioactive lead solids. It requires radioactive wastes such as lead shielding, pigs, and other elemental forms of lead to be macroencapsulated. By requiring a surface coating or a jacket of inert inorganic materials, this treatment standard substantially reduces surface exposure to potential leaching media. We established other tailored treatment standards for mixed wastes containing elemental mercury and for mercury contaminated radioactive hydraulic oil. All of these treatment standards reduce workers' exposure to radioactivity because there is no requirement to measure compliance with treatment standard levels.

In addition, in a recent ANPRM (64 FR 28949, May 28, 1999) we solicited comment on establishing a tailored treatment standard for one type of radioactive mixed waste containing mercury. As explained in that ANPRM, under current regulations, no separate treatment category exists for high mercury wastes that also contain radioactive materials. Therefore, the current regulations may result in equipment contamination by radiation to recover radioactive mercury that must then be further treated and disposed because it is no longer useful. In the mercury ANPRM, we specifically requested comments on eliminating the retorting treatment standard for mixed mercury wastes, and on allowing the use of alternative technologies, with the residuals having to comply with a numerical limit. Please refer to the mercury ANPRM for additional discussion of this issue and instructions for viewing background materials.

D. What Is EPA Considering in This ANPRM?

The threat of radiological exposure cannot be completely eliminated because mixed wastes will require handling for purposes of treatment and compliance monitoring before disposal. Therefore, we encourage NRC licensees and others to use the ''Joint NRC/EPA Guidance on Testing Requirements for Mixed Radioactive and Hazardous Waste'' to keep the worker exposure to radiation to a minimum. Precautions to minimize exposure from waste analysis should be identified and incorporated into site-specific waste analyses plans, which are overseen by state and regional authorities under the Federal Facilities Compliance Act.

We remain committed to reducing radiological exposure as much as possible. Therefore, we wish to explore if additional opportunities exist for mixed radioactive wastes to have a specified method of treatment rather than concentration limits as the treatment standard. For instance, high-level nonwastewaters that must be remotely handled may be good candidates for a specified treatment method such as vitrification, if it is designed to trap air and water emissions and to create a stable glass. Similarly, carbon adsorption may be appropriate for certain mixed radioactive wastewaters such as high molecular weight organics.

E. Request for Comment

We are soliciting comments and data on the treatability of mixed waste and on the analytical problems associated with measuring compliance with concentration levels. In particular, we are interested in whether there are other treatment methods that should be tailored to specific mixed wastes, like the ones established in the Third Third final rule, particularly because such standards eliminate the need for compliance monitoring with its associated dangers of worker exposure to radiation.

Commenters should submit data on the technology and its operating parameters. It is important that the data submitted is complete (*i.e.*, a complete description of the technology, its operating parameters, and any chemical reactions that take place). In addition, the commenter should submit data on the properties of the mixed waste for which the tailored treatment method is requested. This should also include detailed information on whether and how the presence of radionuclides affects the performance of the treatment technology. Once these data are evaluated, we may propose to establish tailored treatment standards that are expressed as required methods of treatment for certain mixed radioactive wastes.

XII. Is EPA Addressing LDR Paperwork Burden in This ANPRM?

One of the issues raised during the LDR roundtable was whether the paperwork burden could be reduced in the LDR program. Participants suggested that we allow electronic recordkeeping and reporting, and that we further reduce the requirements for generators, treaters, and disposers. We agree that these are good ideas. They are not, however, discussed in this ANPRM, but they are included in a separate EPA Notice of Data Availability (NODA) that

[42] This guidance document can be found in the docket for today's notice.

addresses burden reduction. See 64 FR 32859, June 18, 1999.

The NODA contains ideas to reduce the reporting and recordkeeping paperwork burden throughout OSW's regulatory programs, including the LDR program. Currently, the LDR paperwork requirements account for nearly one-third of the burden for the RCRA program. Substantial reduction has already occurred, particularly as a result of the May 12, 1997 LDR rule. Before this rule, generators and treaters that sent their hazardous waste off-site had to send a notification with each shipment of waste informing treaters and disposers of the composition of the waste stream. This rule changed these requirements so that the notification need only be sent with the initial waste shipment, so long as the waste and the receiving facility remained unchanged. This paperwork change resulted in a savings of 1,630,000 burden hours annually.

The NODA describes a number of other possible changes to reduce the LDR burden. These changes include eliminating 268.7(a)(1) Generator Waste Determinations; eliminating 268.7(b)(6) Recycler Notifications and Certifications; eliminating 268.7(d) Hazardous Debris Notifications; eliminating 268.9(a) Characteristic Waste Determinations; and streamlining 268.9(d) Notification Procedures. See the NODA for further information on these possible changes to reduce the LDR paperwork burden.

The NODA was the first step in developing a final regulation for reducing reporting and recordkeeping burden for the RCRA program. We plan to issue a proposed rule this year to follow-up on some of the items in the NODA.

XIII. What Issues Are Not Addressed in This ANPRM?

In addition to the nine main issues described in this ANPRM, a number of other issues were brought up by participants at the 1998 LDR roundtable. Due to our own prioritization and resource constraints, we were not able to investigate these issues in depth. We are, however, interested in new comments from you on any of these issues.

1. Dilution prohibition: In the 1996 Phase III LDR rule (61 FR 15566, April 8, 1996), we promulgated a list of inorganic wastes that are not allowed to be treated by combustion because of the low presence of organics in these wastes. We may need to investigate which inorganic wastes are currently combusted, and determine whether to expand the list, if it is currently too restrictive. Also, we may need to investigate current information available to EPA on the issue of wastes that go into fuel blending and the issue of waste code carry-through.

2. Generator Knowledge: We could investigate whether there is too much or too little reliance on generator knowledge to determine which underlying hazardous constituents in characteristic wastes need to be treated.

3. Plain Language: We could simplify the LDRs by rewriting them in plain language.

4. Refractory Bricks: We could evaluate whether refractory bricks from incinerators should still be subject to treatment standards based on listed waste codes.

5. Generator Guidance: We could clarify through guidance how generators can more easily determine when LDRs apply and which treatment standards are applicable.

XIV. Administrative Requirements

A. Regulatory Flexibility

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the APA or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions. This ANPRM will not have a significant impact on a substantial number of small entities because it does not create any new requirements. Therefore, EPA provides the following certification under the Regulatory Flexibility Act, as amended by the Small Business Regulatory Enforcement Fairness Act: Pursuant to the provision at 5 U.S.C. 605(b), I certify that this action will not have a significant economic impact on a substantial number of small entities. However, there is the potential for future actions related to this ANPRM to have a significant economic impact on a substantial number of small entities. Therefore, the Agency will examine whether the Regulatory Flexibility Act applies in the preparation of any future rulemakings related to this ANPRM.

B. Executive Order 13045

Protection of Children from Environmental Health Risks and Safety Risks (62 FR 19885, April 23, 1997), applies to any rule that: (1) Is determined to be ''economically significant'' as defined under E.O. 12866; and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This ANPRM is not subject to E.O. 13045 because it is does not, at this point, involve decisions intended to mitigate environmental health or safety risks. Of course, as the information in response to this ANPRM is evaluated, we will continue to examine whether E.O. 13045 applies.

List of Subjects in 40 CFR Part 268

Hazardous waste, Reporting and recordkeeping requirements.

Dated: June 12, 2000.

Carol M. Browner,

Administrator.

[FR Doc. 00–15392 Filed 6–16–00; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF TRANSPORTATION

Federal Motor Carrier Safety Administration

49 CFR Parts 350, 390, 394, 395 and 398

[Docket No. FMCSA–97–2350; formerly FHWA–97–2350 and MC–96–28]

RIN 2126–AA23

Hours of Service of Drivers; Driver Rest and Sleep for Safe Operations

AGENCY: Federal Motor Carrier Safety Administration (FMCSA), DOT.

ACTION: Notice of proposed rulemaking (NPRM); extension of comment period.

SUMMARY: The FMCSA is extending this rulemaking's comment period until October 30, 2000. This is in response to numerous petitions received by the FMCSA from motor carriers, drivers and trucking associations, and several members of Congress requesting an extension of the comment period closing date. The petitioners based their requests on the time required to review the vast body of research, assess the impact of the proposed rules, and provide meaningful comments.

The FMCSA is also placing in the docket the pre-publication final report on ''Effects of Sleep Schedules on Commercial Motor Vehicle Driver Performance,'' prepared by the Division