CONF-9205430--Summ.

# New Land Disposal Restrictions for Contaminated Soil and Debris, and Newly Identified Toxicity Characteristic Organic Wastes

May 1992

MASTER

Presented at the HAZTECH International Conference
Pittsburgh, Pennsylvania
May 12-14, 1992

U.S. Department of Energy
Office of Environmental Guidance
Washington, D.C.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

## DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

## PREFACE

This document is a reprint of a paper presented at the HAZTECH International Conference, Pittsburgh, PA, May 12 - 14, 1992. This paper was developed by the Office of Environmental Guidance, RCRA/CERCLA Division (EH-231) with the support of Pacific Northwest Laboratories, and presented by Mr. Bill Fortune, of the RCRA/CERCLA Division. Questions regarding this paper may be directed to Mr. Fortune at (202) 586-7302.

## ABSTRACT

The applicability of the Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (LDR) program to radioactive mixed wastes (RMW) has been clarified through U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy (DOE) rulemakings and notices. However, a number of waste management concerns involving RMW and RMW-contaminated soil and debris continue to exist with respect to achieving compliance with LDR provisions and treatment standards. Consequently, DOE has become increasingly proactive in its participation in the LDR rulemaking process and in the identification of LDR compliance issues associated with its RMW inventories. Both data and recommendations from across the DOE complex have been collected and transmitted to EPA in response to proposed requirements that would implement LDR for contaminated soil and debris, and certain newly identified toxicity characteristic (TC) organic wastes. Much of this information focused on concerns related to the application of proposed regulatory approaches to RMW streams. Some highlights from the information included in these DOE responses are presented.

## INTRODUCTION

Historically, there has been a lack of clarity regarding the applicability of RCRA to RMW. Some clarification was provided on July 3, 1986, when the EPA published a notice in the Federal Register (51 FR 24504) establishing that RMW was subject to RCRA and requiring States to petition EPA for authorization to regulate RMW. However, this notice also stated that, pending an interpretation of the definition of "byproduct material" by the DOE, EPA would regulate these materials on a

case-by-case basis. Thus, for many DOE facilities, uncertainties remained regarding the subset of their radioactive waste that should, or ultimately would, be classified as RMW. Despite these uncertainties, in response to the proposed LDR Framework Rule that was published in January 1986 (51 FR 1602), DOE raised several areas of potential concern relative to the application of LDR requirements to RMW. These concerns included: (1) the apparent lack of consideration given in determining whether treatment technologies were demonstrated or applicable to RMW, (2) that EPA should consider radioactive issues in conducting technology risk assessments, and (3) that there are difficulties encountered in applying the toxicity characteristic leaching procedure (TCLP) to RMW. However, at that time, DOE did not conduct an in-depth evaluation of the impact of the LDR program on RMW management because of remaining regulatory uncertainties regarding the applicability of RCRA to RMW.

These uncertainties were largely resolved on May 1, 1987, with DOE's publication in the Federal Register (52 FR 15937) of a final rule (the so-called "byproduct material" interpretation) that clarified the definition of RMW, and reiterated that RMW is waste that contains both a radioactive component subject to the Atomic Energy Act (AEA) and a hazardous component subject to RCRA. Before promulgation of this rule, DOE's RMW had generally been managed in accordance with DOE Orders designed to implement AEA requirements. Thus, prior to 1987, the treatment, storage and disposal (TSD) of DOE RMW had not generally been conducted in accordance with RCRA regulations. Moreover, before promulgation of this rule, little information had been systematically collected regarding the quantities and hazardous characteristics of RMW throughout the DOE complex, nor about the capability of existing DOE facilities to manage

RMW in compliance with EPA's current and pending RCRA regulations.

After the "byproduct material" interpretative rule was published in 1987, DOE began evaluating the extent of RMW compliance problems across the DOE complex. This is an ongoing process, and DOE is continuing to develop, evaluate, and implement RMW management strategies throughout the complex in efforts to achieve LDR compliance. It is also important to note that most of the RMW characterization data that have been collected since the "byproduct material" interpretation reflect preliminary process knowledge, rather than analytical results. However, DOE is continuing to refine and expand both its process knowledge and its ability to analyze RMW in the laboratory.

As a result of the "byproduct material" interpretation and DOE's subsequent, ongoing assessment, a number of RCRA compliance issues have emerged relating to DOE's RMW inventories and management practices. The impact of the RCRA LDR program on RMW management is a case-in-point.

The basic framework for the LDR program was established with the enactment of the Hazardous and Solid Waste Amendments of 1984 (HSWA). However, when Congress enacted HSWA, the ramifications of ultimately regulating RMW under the same regulations that would be promulgated for nonradioactive hazardous wastes were not fully considered. Likewise, with the development of prohibitions on land disposal for hazardous waste in the initial LDR rulemakings, consideration apparently was not given as to whether or not there were technologies or adequate available treatment capacity for RMW. To some extent this was because of uncertainty as to whether RMW was subject to RCRA regulation. But it also reflected the lack of data describing

RMW characteristics and inventories available to EPA at that time. The first two LDR final rules (those for spent solvent and dioxin wastes, and California List wastes) were published in the Federal Register in 1986 and 1987, respectively. Neither of these final rules specifically addressed RMW.

As DOE's understanding of LDR applicability to RMW has progressed, its efforts to identify and evaluate actions to achieve LDR compliance have progressed correspondingly. Since the initial LDR rulemakings, DOE has become increasingly proactive in its participation in EPA's rulemaking process for establishing restrictions applicable to the remaining scheduled wastes (i.e., First-, Second-, and Third-Third hazardous wastes), as well as for newly identified and listed wastes, and contaminated soil and debris. During the past several years, the DOE Office of Environmental Restoration and Waste Management (EM) has collected considerable data and information on RMW, including types and volumes generated, physical and chemical characteristics, and treatment methods and capacities. In addition, the DOE Office of Environment, Safety and Health (EH) has coordinated and developed formal, consolidated responses to LDR-rulemaking notices published by EPA in the Federal Register. In developing these consolidated responses, EH requests input from DOE's Field Organizations and Program Offices. Substantial characterization, treatment, and capacity data have been provided to EPA: (a) as a component of DOE comment packages in response to proposed LDR rulemakings [e.g., October 24, 1991 LDR Advance Notice of Proposed Rulemaking (ANPRM); January 9, 1992 LDR Proposed Rule], (b) in accordance with compliance agreements (e.g., Rocky Flats Plant Federal Facility Compliance Agreement; Hanford Federal Facility Agreement and Consent Order), and (c) as part of a recent DOE case-by-case extension petition. Such

informal and formal information exchange between EPA and DOE regarding the applicability of the LDR program to DOE's RMW inventory is continuing.

During the past year, EPA has published several Federal Register notices proposing new or revised LDR regulations for contaminated debris and soil, and TC organic wastes. Contaminated debris was addressed in EPA's May 30, 1991 ANPRM (56 FR 24444-24465) and was subsequently addressed in a January 9, 1992 proposed rule (57 FR 958-1042). Contaminated soil and newly identified TC organic wastes were addressed in EPA's October 24, 1991 ANPRM (56 FR 55160-55189) and a proposed rule is expected in May, 1992.

DOE considers contaminated debris and soil as among its most intractable problems relative to LDR treatment standards and compliance. To prepare comprehensive, consolidated DOE responses to the regulatory approaches proposed for these wastes, EH requested that DOE's Field Offices, Program Offices, Project and Area Offices, and other organizations review the notices and provide comments and recommendations regarding the potential impact of the proposed requirements on their operations and facilities. As part of a cooperative effort between EH and EM, DOE organizations were also requested to submit documents or data describing inventories, characteristics, and treatment technologies for contaminated soil and debris, and TC organic wastes. Summaries and copies of documents and data found to be most applicable to the notices were transmitted to EPA as part of DOE's consolidated response. To ensure that the RMW data provided to EPA were as current as possible, DOE organizations were also asked to review and, if necessary, update the information on their low-level, high-level, and

transuranic RMW streams currently included in DOE's Waste Management Information System (WMIS) database.

The remainder of this paper highlights some of DOE's perspectives, concerns, and recommendations regarding the application of the LDR program to its RMW inventory, with particular emphasis on RMW-contaminated soil and debris, and TC organic wastes.

## CONTAMINATED SOIL AND DEBRIS

### Contaminant Levels and Health-Based Standards

As discussed in the Federal Register notices cited above, EPA's "contained in" policy states that contaminated media (i.e., debris, soil, groundwater, sediments) containing RCRA wastes must be managed as if they themselves were hazardous until the media no longer contain the hazardous waste or until the hazardous waste is delisted. This raises the question of when a contaminated media can be considered to no longer contain the hazardous waste. EPA has not provided definitive guidance on this point; however, some guidance has previously been offered. In a discussion specifically addressing the "contained-in" interpretation in EPA Superfund LDR Guide #5, (Determining When Land Disposal Restrictions are Applicable to CERCLA Response Actions, OSWER Directive 9347.3-05FS, July 1989), EPA states that any mixture of a non-solid waste and a RCRA-listed hazardous waste must be managed as a hazardous waste as long as the material contains **(i.e., is above health-based levels)** the listed hazardous waste. This implies that if the listed hazardous waste is present below health-based levels, the mixture need not be managed as a hazardous waste.

However, EPA proposes to establish LDR treatment standards as the threshold for determining when a contaminated media no longer contains a listed hazardous waste. DOE agrees that LDR treatment standards are generally appropriate as "contained-in" thresholds. However, there is one instance in which an LDR treatment standard may not be appropriate as a "contained-in" threshold. That is in situations where the LDR treatment standards are set as constituent concentration levels and the standards are lower than an appropriate health-based level. This may be the case for certain revised treatment standards being considered for contaminated media. In such instances, the contaminated media should not be considered to contain a listed hazardous waste where the contaminant(s) of concern (a) have been treated to below the appropriate health-based levels, or (b) are already below appropriate health-based levels in the untreated contaminated media.

EPA's proposed approach for codifying the "contained-in" policy is sound. However, the proposed approach may require treatment of all contaminated soil and debris (including those with hazardous constituent concentrations below health-based levels) in order to achieve LDR treatment standards, and as a criteria which must be met in order for them to be deemed clean and no longer subject to Subtitle C requirements. EPA has recognized the application of health-based standards as being protective of human health, and, in fact, uses health-based standards in evaluating delisting petitions. With this in mind, it would seem that the treatment of hazardous waste, and especially RMW, to best demonstrated available technology (BDAT) treatment standards that are below health-based levels is unnecessary to protect human health and the environment.

Finally, it should be noted that in its January 9, 1992, proposed rule, EPA outlines an approach that would allow a site that manages contaminated debris to request a site-specific determination by the EPA Region (or authorized State) as to whether toxic constituent levels are below levels that should be under Subtitle C control. EPA states:

> "The rule, if adopted, would thus codify the contained-in principle that the Agency currently applies on a case-by-case basis. If toxic constituents are not present at levels that could pose a hazard to human health or the environment (and if the debris does not exhibit a characteristic), the debris would be excluded from the definition of hazardous waste."

Adoption and codification of the "contained-in" policy within the existing RCRA regulations would allow those RMW that pose only a minimal threat to human health and the environment to be managed outside of the RCRA Subtitle C program but within the provisions of State and local regulations, the AEA, and applicable DOE Orders. This approach would allow valuable cleanup funds to be directed towards remediation or closure of those waste management units having the greatest potential to adversely affect human health and the environment. If such an approach is not taken, limited hazardous waste landfill space will continue to be used for the disposal of environmental media (i.e., soil, groundwater, sediments) and debris that contain minute concentrations of hazardous constituents.

**Health-based Standards as Alternatives to the Mixture and Derived-from Rules**

EPA is currently in the process of reexamining the "mixture" and "derived-from" rules of the RCRA hazardous waste management program (these provisions are found at 40 CFR 261.3). This regulatory effort is being conducted as a result of a recent federal appeals court decision (*Shell Oil Co. v. U.S. Environmental Protection Agency [EPA], No. 80-1532, D.C. Cir., December 6, 1991).* In this decision, the court ruled that EPA had not provided sufficient notice and opportunity to comment on the "mixture" and "derived-from" rules. In the January 9, 1992 LDR proposed rule, EPA recognized that any revisions to these rules may affect implementation of the LDR program, and requested comment on the impact of the court decision on this LDR proposed rule.

Revisions to these rules could potentially reduce DOE's inventory of RMW, and RMW-contaminated soil and debris. DOE recognizes that the original intent of these rules was to address legitimate enforcement concerns, such as the commingling of listed wastes with nonhazardous solid waste to avoid regulation under RCRA Subtitle C jurisdiction. While in agreement with the original intent of these rules, DOE believes that the determination as to whether a waste should be classified as hazardous or non-hazardous should also take into account factors such as: the nature and concentration of the chemical or radiological component of the waste, the risk to human health and the environment posed by the waste, and the degree of protection afforded by the methods by which the waste will be subsequently managed [e.g., as a result of applicable Atomic Energy Act (AEA) or RCRA Subtitle D requirements].

Many of DOE's RMW streams contain only trace quantities of RCRA-listed hazardous waste. In these instances, the predominant hazard posed to human health and the environment is overwhelmingly radiological rather than chemical in nature. The radiological components of RMW streams must always be managed in accordance with the requirements of the AEA. However, even with trace, or non-detectable concentrations of RCRA-listed wastes, all RMW streams also must be managed under RCRA Subtitle C jurisdiction due to the existing "mixture" and "derived-from" rules. This dual AEA and RCRA jurisdiction often results in overlapping, and occasionally conflicting, regulatory requirements. Moreover, it does not appear to advance EPA's legitimate enforcement concerns nor to appreciably reduce risk to human health and the environment. The requirement that these wastes be managed under RCRA Subtitle C can unnecessarily tax limited treatment, storage, and disposal (TSD) capacity that could be better used for hazardous wastes that pose more significant health and environmental risk. Furthermore, in some cases, strict compliance with RCRA requirements can result in situations where worker exposure to radiation is potentially increased.

DOE urged EPA to fully recognize and consider the unique difficulties posed by the application of these rules to RMW. Specifically, DOE recommended that the "mixture" and "derived-from" rules be modified to incorporate concentration-based exclusion criteria (health-based standards) as a means of defining wastes that are subject to RCRA Subtitle C regulation. With respect to RMW management, such an approach would save resources as well as reduce the potential for personnel exposure to radiation. DOE believes that protection of human health and the environment is adequately addressed by managing RMW streams that contain very low concentrations of RCRA

listed constituents exclusively as radiological wastes. The risks to human health and the financial costs associated with meeting RCRA requirements for such RMW streams outweighs the environmental or health benefit derived from their concurrent regulation as a RCRA hazardous waste.

### Treatment Technology Categories for RMW-Contaminated Media

Both contaminated debris and contaminated soil present a wide diversity of matrices, contaminants, constituent concentrations, and other variable properties. Considering this diversity, DOE (in response to the two LDR ANPRMs) asserted that generators and managers of these wastes should be afforded the flexibility to select the most appropriate treatment option for their specific contaminated soil and debris waste streams. In its January 9, 1992 proposed rule (which includes proposed requirements for contaminated debris), EPA recognized the need for such flexibility, and proposed an approach that identifies a group of specified technologies based on the types of debris and the contaminant categories. The determination as to which particular BDAT technology is to be utilized would be left up to the regulated community. The proposed rule identified three general technology categories for contaminated debris: extraction, destruction, and immobilization. Eighteen (18) specific treatment methods listed under the three general families of technologies were proposed as BDAT for the various contaminated debris types and contaminant categories. Other applicable treatment technologies identified in the future because of technological advances will most likely fall within one of these three general treatment categories as well.

DOE thoroughly supports EPA's proposed approach that allows flexibility in determining appropriate treatment methods for contaminated debris. Particularly with respect to DOE's RMW, the flexibility afforded in EPA's proposed approach is essential to the development of treatments that are safe and appropriate for both the radioactive and the chemically hazardous components of RMW. Furthermore, the proposed approach to establish treatment standards as specified technologies for specific combinations of contaminants and debris types will alleviate the analytical verification problems associated RMW-contaminated debris. This regulatory approach also inherently accounts for the fact that regional and geographical differences can affect treatment selection. For example, soil washing may be the treatment of choice for the sandy loam soils that are common at the DOE Hanford Site, but it may not be the treatment of choice for the clay soils that are common at the Savannah River Site.

Notwithstanding the flexibility in the approach proposed for contaminated debris, the 18 identified BDAT technologies may not offer any suitable treatment alternatives for certain forms of RMW-contaminated debris (particularly high-activity forms). EPA states that the 18 identified technologies were considered "demonstrated" if they were currently in commercial operation for treatment of the waste or constituent of interest, including radioactive waste. However, the database on treatment of RMW is limited, particularly with respect to high-activity RMW. It is doubtful that EPA can conclude that all 18 identified technologies have been demonstrated for RMW, particularly for RMW requiring remotely handled treatment. This category of RMW may present insurmountable difficulties in achieving treatment according to the proposed operating and performance standards for the 18 technologies due to the necessity for remote handling. EPA, in cooperation with DOE, should examine this type of

debris more closely in its assessment of debris characteristics which may affect the performance or effectiveness of treatment technologies. DOE recommended that EPA consider radioactivity as part of the list of debris characteristics identified in the final regulation, and urged EPA to recognize that the technologies identified as BDAT may not be suitable for all RMW.

**Alternative Approaches for Contaminated Soil**

As with contaminated debris, DOE firmly believes that EPA should provide waste generators and managers of contaminated soil wastes with the flexibility to select the most appropriate treatment option for their specific contaminated soil waste streams. With this consideration, DOE (in response to the October 24, 1991 LDR ANPRM) recommended that EPA categorize the demonstrated and available soil treatment technologies into three generic treatability groups identical to those proposed for contaminated debris, i.e., destruction, extraction, and immobilization. As an alternative to this approach, a regulatory framework for contaminated soil that uses more specific structural/functional groups and percent reductions could also provide the needed degree of flexibility. Such an approach is discussed in EPA's Superfund LDR Guide #6A (Obtaining a Soil and Debris Treatability Variance for Remedial Actions, OSWER Publication 9347.3-06FS, July, 1989) and #6B (Obtaining a Soil and Debris Treatability Variance for Removal Actions, OSWER Publication 9347.3-06BFS, September, 1990). If a sufficient number of structural/functional groups (e.g. polychlorinated biphenyls, dioxins, herbicides) are used to subcategorize contaminated soil and concentration ranges or percent reductions are established, then requiring treatment of contaminated soil to meet the specified concentration ranges or

percent reductions would be appropriate. However, the regulated community should be afforded the flexibility to demonstrate the absence of some of the groups rather than being required to analyze for each group. If this approach is pursued, it would be beneficial to the regulated community for EPA to publish a table or appendix specifying the structural/functional groups that appropriately correspond to each listed waste code.

As a modification to this alternative approach, DOE suggested that EPA consider establishing the percent reduction criteria concurrent with certain threshold levels. As EPA points out in Superfund LDR Guides #6A and #6B, the benefit to be derived from a percent reduction approach is proportional to the original contaminant concentration. If contaminant levels are very high, than even a 95 or 99% reduction could still leave unacceptably high residual concentrations. On the other hand, if original concentrations are quite low, than treatment to obtain a 95 or 99% reduction may be an unnecessary expenditure of resources. It was recommended that EPA consider expanding upon a percent reduction framework by establishing both upper and lower threshold concentration levels. A percent reduction would be required under this alternative approach and the contaminants would require treatment that, at a minimum, would achieve concentrations below a specified upper threshold level. A lower threshold could be established that would constitute the "contained-in" level. Further treatment would not be required once the constituent concentrations fall below this lower threshold level.

### Sampling and Analysis of RMW

Required procedures for sampling and analyzing RCRA hazardous wastes are described in "Test Methods for Evaluating

Solid Waste Physical/Chemical Methods" (SW-846). However, meeting SW-846 requirements for RMW can pose significant difficulties and similar problems will be encountered with RMW-contaminated soil and debris. For example, SW-846 requires the use of specific sample collection equipment and containers that may not be appropriate for RMW-contaminated soil and debris. At some DOE sites, RMW above 200 millirem per hour requires remote-handling procedures. RMW-contaminated soil or debris above this concentration would require remotely-operated sample collection devices, special containers to address the radiological hazards, and analysis in hot cell laboratories. The use of manipulators in limited hot cell laboratory space is very time-consuming, and holding times specified in SW-846 are often exceeded. Limiting the radiation to which workers are exposed [in accordance with the as low as reasonably achievable (ALARA) requirements, as mandated by the AEA] is a major concern for the DOE. Consideration must be given to potential adverse health effects associated with the radioactive component of RMW-contaminated soil and debris, and the difficulties associated with SW-846 protocols for analyzing soil or debris contaminated with such components.

**Containment Buildings**

In its January 9, 1992 proposed rule, EPA proposed to establish a regulatory definition for a new waste management unit known as a "containment building." Containment buildings would include units that are fully enclosed with a floor, walls and a roof, and would require a secondary containment system if the hazardous waste contains even very small quantities of free liquid. This type of unit is currently considered an indoor waste pile (e.g., a concrete pad inside a building), but under this proposal separate design and operating standards would be

established for containment buildings. Generally, this proposal would allow prohibited wastes such as potliners, lead slags, and contaminated debris (that are not amenable to management in RCRA tanks or containers) to be stored or treated within containment buildings. Management of hazardous wastes in these units would not be viewed as placement on the land (i.e., land disposal).

DOE supports the establishment of "containment buildings" as a new hazardous waste management unit. This type of unit is currently used at many DOE sites to store large and very radioactive pieces of equipment that are no longer in use. Some of these pieces of equipment may have a hazardous component and, therefore, would be RMW. The use of containment buildings to store highly radioactive equipment to allow for decay is necessary for proper management of such wastes as well. Since EPA is proposing that the LDR storage prohibition will apply to containment buildings, DOE requested EPA to concur that storage for radioactive decay meets the standard in 40 CFR 268.50 of storage "solely for the purpose of the accumulation of such quantities of hazardous waste as are necessary to facilitate proper recovery, treatment or disposal . . ."

Containment buildings would also be very beneficial to DOE's environmental restoration activities, since many contaminated debris wastes generated by these activities will not be amenable to traditional container/tank storage units.

Notwithstanding DOE's support for the proposed definition of containment buildings, DOE offered the following suggestions with respect to the implementation and enforcement of the proposed requirements.

(a) The proposed requirement that "the containment building must be completely enclosed" should be modified or deleted. The term "completely" could be misconstrued to mean airtight which is not necessary given the other restrictive language in proposed regulation. Also, the requirement that the floor of the containment building must be able to withstand the movement of heavy equipment within the unit should be qualified. Some may interpret this to require a facility to have such floors despite the fact that heavy equipment is not used in the facility. The requirement that the containment unit be designed so as to prevent collapse or failure may be misinterpreted to mean that the building must be constructed so as to be able to withstand earthquakes, volcanoes, and other unlikely geological or meteorological events. Applicable building codes for a particular locality will assure appropriate building structure.

(b) The proposed requirement for a liquid collection system to prevent the accumulation of liquid on the floor should be revised or qualified to allow for the use of sumps, dikes, or other appropriate systems. The requirement for secondary containment could be rigidly interpreted to mean that the building must provide the equivalent of the containment required for tank systems under RCRA (i.e., 40 CFR 264.193 and 265.193). Implementation of this provision potentially could lead to these buildings being treated like a tank system with containment being required underneath and extending up the walls of the building. This was probably not what was intended and the requirement should be qualified to clarify that appropriate internal systems would suffice.

(c) In the proposed rule, EPA stated that it intends "containment buildings to be used to store or treat only dry wastes, i.e., those with no free liquids or those hazardous wastes that contain very

small quantities of free liquids". EPA requested comment on whether the liquids release test or paint filter liquids test should be used for testing wastes to be stored. DOE asserted that these tests would not be appropriate for determining the presence of free liquids in the case of many RMW items. As mentioned above, one of the primary uses of containment buildings within the DOE complex would be to store large, very radioactive pieces of equipment. Performance of these types of tests on such radioactive equipment would need to be done remotely and would be quite costly. Furthermore, it may not be possible to conduct these tests on certain pieces of equipment. Since appropriate remote control equipment to perform such analyses is not presently in DOE containment buildings, new buildings would be required so that the proper equipment could be installed prior to the building environment becoming too contaminated to allow worker access. As an alternative, DOE suggested that EPA require use of the paint filter liquids test to identify the quantity of free liquids only where achievable. For cases where such testing is not feasible, DOE requested that EPA allow the presence of free liquids to be determined based on visual inspections or on knowledge of what comprises the waste.

(d) EPA has proposed that containment buildings storing wastes with very small amounts of free liquids must provide secondary containment. Secondary containment is clearly an appropriate requirement in cases where liquid might be expected to come into routine contact with the floors or walls of a facility. However, in the case of containment buildings dedicated to the storage of radioactive equipment, free liquids (if any were present) would not come into routine contact with the floors or walls of the facility. In such cases, administrative controls (e.g., regularly scheduled inspections) should be recognized as a sufficient substitute for secondary containment. This would

allow the continued use of containment buildings that are currently storing RMW. The alternative is expensive new construction of containment buildings equipped with secondary containment systems that would be of little or no practical value.

**Determination of Debris Contaminants that Require Treatment**

EPA has proposed that debris be treated for any Part 261 Appendix VIII constituent (i.e., hazardous constituents list) that an owner or operator could reasonably know may contaminate the debris at levels of analytical detection. DOE does not completely agree with this regulatory approach. The proposal to require Appendix VIII constituent identification, and treatment for debris contaminated with listed waste, appears to be a consistent requirement for EPA to propose given that the treated listed debris may no longer be considered hazardous and may be able to be disposed of in a Subtitle D facility. Furthermore, the proposed regulatory approach generally coincides with the procedures for delisting waste from the RCRA Subtitle C program, and for determining removal and decontamination of hazardous constituents under RCRA clean closure provisions. However, under EPA's contained-in policy, contaminated media (including debris) that contains RCRA listed wastes must be managed as if they were hazardous until the media no longer contains the listed hazardous waste. This policy does not include the condition that Appendix VIII hazardous constituents must be identified and treated to below a certain level. With this consideration, DOE asserts that debris contaminated with a listed waste not be required to be identified and treated for all Appendix VIII constituents that may be contaminating the debris. EPA appears to concur with this logic as stated in the January 9,

1992 proposed rule (specifically Section V.E.1 - When Debris Stops Being a Hazardous Waste):

> EPA is proposing to deal with these two classes of debris (i.e., debris that is a solid waste and debris that is not a solid waste) in the same manner in this rule. By doing so, the debris would no longer be subject to Subtitle C if it is treated in accord with the methods designated in the rule, or no longer has listed wastes present at concentrations at which the debris would be considered to contain hazardous waste. EPA is proposing this result because there may be no environmental difference between solid waste debris and debris that is not a solid waste, and so the same rules as to when the debris no longer should be subjected to Subtitle C regulation could apply in either case. It simply appears to make no sense that two classes of debris which appear environmentally indistinguishable be subject to very different regulatory regimes.

DOE considers the requirement to treat for all potentially present hazardous constituents listed in Appendix VIII to be unnecessary and overly burdensome. DOE maintains many facilities that are over 40 years old. A reasonable search for documentation of constituents that may have contacted the structures and equipment to be decommissioned could be construed as searching through volumes of old and obscure archive records. Such a requirement would be overly burdensome given the large number of constituents found in Appendix VIII and given the probable vagueness of such records. An Appendix VIII search would

most certainly delay the disposition of cleanup debris and subject DOE to unnecessary compliance uncertainties. Appendix VIII was not designed to stand alone as a determinant of whether or not a material is hazardous to human health and the environment. Due consideration needs to be given to concentrations, mobility, and other factors as specified in the criteria for listing a hazardous waste that contains Appendix VIII constituents [40 CFR 261.11(a)(3)]. The contaminants subject to treatment should be limited to the Appendix VIII constituents that were responsible for the waste's being listed, i.e., those constituents that are identified in 40 CFR 268.41(a), Table CCWE; and 268.43, Table CCW.

Additionally, in a situation where the treatment of a listed debris would not result in a nonhazardous waste due to its characteristic nature, DOE considers that the requirement to treat for all Appendix VIII constituents would not add to the protection of human health and the environment since the waste will still be managed in a Subtitle C hazardous waste unit. For this reason and the reasons discussed above, DOE does not support this proposed requirement.

Similarly, DOE does not believe that it is appropriate to require the treatment of characteristic debris (i.e., debris exhibiting the characteristic of toxicity) for all Appendix VIII constituents reasonably known to contaminate the debris. Whereas the treatment of debris contaminated with a prohibited listed waste in accordance with specified technologies can result in a waste or environmental media that is no longer RCRA-regulated, treatment of much characteristic debris will not necessarily result in a nonhazardous waste. Even if treatment of a characteristic debris removes the debris from Subtitle C jurisdiction, it should not have more stringent requirements than for treatment of a

characteristic nondebris waste. This does not preclude EPA from setting a specified technology for debris wastes which would, in many cases, have the desired effect of addressing any Appendix VIII constituents present.

Furthermore, under the proposed requirements, DOE would not support the proposal that Appendix VIII constituents must be treated if they are reasonably known to contaminate the debris at levels of analytical detection. Analytical detection should only be the measuring criteria for Appendix VIII constituents that cannot be detected at a health-based level. Health-based levels are consistently used for the purposes of delisting petitions, RCRA closure, and decontamination criteria (although this decision utilizes more of a site-specific determination), and are commonly used for application of the contained-in policy during RCRA or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) cleanup actions. For consistency, Appendix VIII constituents that an owner or operator reasonably knows may contaminate the debris should only trigger the requirements for treatment if such constituents are above levels of potential health significance. However, in practical terms, the distinction will probably be of little consequence since "reasonable knowledge" of an Appendix VIII constituent's presence in much of the debris will be a gross determination at best. In most cases, it seems likely that a distinction as to whether constituent concentrations are above or below detection levels, health-based levels, or F039 (multi-source leachate) levels will be unable to be made.

## Definition of Debris

DOE's contaminated debris inventory includes, but is by no means limited to: lead bricks, underground tanks, flooring and roofing materials, sheet metal, discarded equipment, tools, process vessels, job control wastes (booties, wipes, rags, mops, coveralls, etc.), resin and carbon beds, cadmium wastes (control rods, HEPA filters), construction and demolition materials, scintillation vials, pipes, valves, railroad cars, cranes, vegetation, and animal remains. In many instances, however, debris generated during DOE's past operations was not inventoried before burial or other storage. Consequently, it is very likely that ongoing and future site characterization studies will reveal additional forms of contaminated debris. Undoubtedly, the private sector and other government agencies also have contaminated debris unique to their enterprises or missions. To avoid future uncertainties, the definition of debris that is codified in regulation should be broad enough to accommodate this diversity and should eliminate any ambiguity as to whether a contaminated object is or is not to be considered debris.

In the January 9, 1992 notice, the definition of "debris" proposed by EPA indicates that solids that are "identified as being residues from treatment of wastes and/or wastewaters . . ." are not considered debris. One of several concerns DOE raised in response to this proposed definition was that it appears to exclude industrial equipment used to treat waste once such equipment is taken out of service. For example, there is a large stainless steel filter (14 ft. x 1.5 ft) at one of DOE's facilities that will perform an important separation of highly radioactive waste from lower activity waste prior to vitrification of the highly radioactive fraction. This filter is expected to become a waste at some point in time due to either radial or axial

blockage. It seems logical that this equipment should be handled as a debris waste when discarded. However, the proposed definition of debris seemed to exclude this piece of equipment, as well as many others, because it could be construed that the equipment was a residue from treatment of a waste. DOE recommended that the definition be modified to clarify (also by providing examples) that discarded industrial equipment (such as filters, pumps, etc.) would be included in the definition of debris even if the equipment had been used to treat wastes or wastewaters.

EPA also proposed (in the January 1992 proposed rule) a definition of "contaminated debris" to include debris that exhibits a prohibited hazardous waste characteristic, or that contains a prohibited listed hazardous waste. DOE requested that EPA provide clarification regarding the methodology to be used in determining whether certain contaminated debris exhibits a prohibited hazardous waste characteristic. The need for such clarification stems from the fact that the sampling protocols for determining whether or not a waste exhibits a hazardous characteristic are generally ill-suited for obtaining a representative sample of many contaminated debris wastes. High level radioactive waste melters illustrate the problem. These large melters consist of a steel vessel lined with chromium-containing refractory material. When taken out of service, the entire unit might be classified as inherently hazardous due to the presence of chromium in the refractory material. It is difficult to establish what would constitute a representative sample of such a waste form. A classification methodology is needed that accounts for the relative proportions of the hazardous components included in the debris item. DOE has proposed an approach for classifying the melters based on the known chromium concentration of the leachate from the refractory

brick. This leachate concentration level of chromium could be used to determine a weighted average chromium concentration by applying a conversion factor that reflects the ratio of the mass of the refractory brick to the mass of the whole melter. DOE requested that EPA provide general guidance on methods for sampling and classifying large, contaminated debris items such as used high level radioactive waste melters.

## NEWLY IDENTIFIED TOXICITY CHARACTERISTIC ORGANIC WASTES

### Treatment Standards and Characteristic Levels

The EPA has requested comment (in the October 24, 1991 ANPRM) on whether treatment standards for TC organics should be established at or below the characteristic level, and whether the standards should be based on a total constituent analysis or the TCLP. For RMW, DOE supports establishment of treatment standards at the characteristic level based on a total constituent analysis. DOE recommends that EPA set treatment standards at the TC organic characteristic level, and provide endorsement and clarification on the use of a total constituent analysis to arrive at a TC organic concentration through the use of the theoretical maximum leaching level.

Current RCRA regulations require waste generators to determine if a waste is a TC organic hazardous waste by using the TCLP to determine if the concentration in the waste extract exceeds the established characteristic levels. DOE is already experiencing certain difficulties in using the TCLP on RMW. These problems increase as the organic concentration levels that need to be detected are lowered, and radiological exposure is thus increased due to larger required sample volumes. For example, EPA-

required sample volumes cannot be obtained for high-dose RMW because these sample volumes would result in excessive radiation exposure to personnel conducting the sampling and analyses. Obtaining required sample volumes can also be difficult due to sampling technology limitations. Technologies are not available to take an adequate sample through the small ports on some RMW containment structures. Likewise, maintenance of a zero headspace is not possible in many instances because of the problems in obtaining a full container of a radioactive sample, while at the same time assuring that no spillage occurs that would contaminate personnel. In some instances it is impossible to obtain a representative sample for organics from a RMW because the RMW is also thermally hot which causes the organics to volatilize. In summary, the imposition of LDR treatment standards based on the TCLP at levels below the characteristic level would result in greater compliance uncertainty for DOE because many more RMW streams would be unquantifiable at such levels.

In addition to these analytical considerations, DOE supports establishing TC organic treatment standards at the characteristic levels because if properly set, the TC levels should represent levels that provide adequate public health and environmental protection. Also, the logic asserted by EPA in its final rulemaking for Third-Third characteristic treatment standards should also apply to TC organic wastes; because of the diversity of waste forms that characteristic wastes encompass, no one BDAT will be appropriate. Therefore, treatment standards should be set at the characteristic level. This will provide sufficient flexibility to select the most appropriate technologies for treating the diversity of TC organic waste forms.

## SUMMARY: GENERIC DIFFICULTIES IN MEETING LDR TREATMENT STANDARDS FOR RMW AND RMW-CONTAMINATED SOIL AND DEBRIS

Although it is clearly more desirable to address RMW treatment issues on a generic basis rather than through the variance process, there are insufficient data at present to identify all potential problems that may arise in treating RMW to meet existing LDR treatment standards. Data on RMW characterization and treatment methods are both limited.

RMW characterization efforts are not yet complete, particularly for DOE's large radioactive and RMW inventory from past generation, and for contaminated soil and debris that will be generated in future environmental restoration activities. The use of process knowledge is not always sufficient for such waste streams, since historical information on how these wastes were generated is often lacking. The testing of both old and new RMW can also be difficult because of worker exposure concerns and other problems associated with RMW sampling and analysis, including the lack of validated analytical methods for RMW. In addition, there is limited laboratory capacity to conduct RMW analyses.

Data on treatment of RMW are also lacking because of the limited number of RMW treatment units currently operating. Treatment systems for RMW must be designed not only to treat the hazardous component of the RMW, but also to limit the release of radionuclides to the environment by airborne and waterborne pathways, and to control contamination. Release limits for radionuclides are stated in terms of a total radiation dose from all nuclides, and the difficulty of complying with the

dose limits depends on the particular mixture of radionuclides, their radiotoxicities, and their quantities. The release of some radionuclides can be controlled by chemical or mechanical means, e.g., filters, but some can only be controlled by limiting the amount processed. For example, if soil containing tritium is thermally processed, the only practical way to control the release of tritium to the atmosphere is to control the rate at which tritium is fed to the process equipment, which, in turn, limits the rate at which the soil can be processed. In such cases, immobilization technologies may be preferable in order to maintain radiation exposure that is ALARA. Worker safety concerns include both inhalation hazards and direct radiation hazards. Direct radiation hazards are controlled by limiting both exposure time and quantities processed, and by increasing distance and shielding. Treatment of high radiation waste can require remote operations to control exposure, making it more difficult to run and maintain equipment. Thus, equipment reliability and ease of maintenance are also major concerns that must be factored into the design of treatment systems.

In light of the above issues, it is not at present possible to identify all the potential problems that may arise in meeting existing LDR treatment standards for RMW. However, DOE is moving forward with efforts to characterize its RMW and to develop appropriate treatment capacity. With regard to characterization, DOE has a number of efforts underway to address RMW sampling and analytical problems. These ongoing efforts include: (1) development of remotely handled analytical laboratories, (2) development and approval of alternatives to the methods described in SW-846 for RMW, and (3) development of sampling containers that will improve zero-headspace problems. With regard to treatment capacity, DOE's plans to bring additional RMW treatment units on-line in the near future,

and research and development efforts related to the treatment of RMW are continuing. As RMW characterization and technology development efforts proceed and come to fruition, DOE will continue to provide EPA with information to ensure that RMW-related issues and concerns are factored into LDR regulations.