ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 268

[FRL-3978-4]

Land Disposal Restrictions: Potential Treatment Standards for Newly Identified and Listed Wastes and Contaminated Soil

AGENCY: Environmental Protection Agency (EPA).

ACTION: Advance notice of proposed rulemaking (ANPRM) and request for comment and data.

SUMMARY: EPA today is requesting data and comments on its approach for determining the Best Demonstrated Available Technology (BDAT) for many wastes that have been identified and listed as hazardous since the enactment of the Hazardous and Solid Waste Amendments (HSWA) in November, 1984. Today's notice includes a discussion of potential BDAT and related capacity for the following: Listed wastes from wood preserving operations (F032, F034, and F035); spent potliners from primary aluminum reduction (K088); characteristic hazardous wastes generated by the mining and mineral processing industries that are no longer suspended by the Bevill Amendment; and wastes that have been recently identified as D004 through D043 based on the toxicity characteristic leaching procedure (TCLP), i.e., TC wastes. EPA also is soliciting data and comment on its approach to developing BDAT for contaminated soil.

DATES: Comments and data must be submitted on or before December 9, 1991.

ADDRESSES: The public must send an original and two copies of their written comments to EPA RCRA Docket (OS-305), U.S. Environmental Protection Agency, 401 M St., SW., Washington, DC 20460. Place the Docket Number F-91-CSP-FFFFF on your comments. The RCRA Docket is located at the above address, and is open from 9 a.m. to 4 p.m. Monday through Friday, except for Federal holidays. The public must make an appointment to review docket materials by calling (202) 475-9327. The public may copy a maximum of 100 pages from any regulatory document at no cost. Additional copies cost $.20 per page.

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 comments on diskettes is not mandatory, nor will it result in any advantage or disadvantage to any commenter. Rather, EPA is experimenting with this procedure as an attempt to expedite our internal review and response to comments. For further information on the submission of diskettes, contact the Waste Treatment Branch at the phone number listed below.

FOR FURTHER INFORMATION CONTACT: For general information, contact the RCRA Hotline at (800) 424-9346 (toll-free) or (703) 920-9810 locally. For technical information on BDAT contact the Waste Treatment Branch, Office of Solid Waste (OS-322-W), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, (703) 308-8434. For technical information on capacity analyses, contact the Capacity Branch, Office of Solid Waste (OS-321-W), (703) 308-8440.

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I. Background

A. Summary of Statutory/Regulatory Requirements

The Hazardous and Solid Waste Amendments (HSWA), enacted on November 8, 1984, specify dates when particular groups of hazardous wastes are prohibited from land disposal unless "* * * it has been demonstrated to the Administrator, to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the disposal unit or injection zone for as long as the wastes remain hazardous" (RCRA section 3004(d)(1), (e)(1), (g)(5); 42 U.S.C. 6924(d)(1), (e)(1), (g)(5)).

The amendments also require the Agency to set "* * * levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized" (RCRA section 3004(m)(1), 42 U.S.C. 6924(m)(1)). Wastes that meet the BADT standards established by EPA are not prohibited and may be land disposed.

EPA promulgates land disposal restrictions (LDRs) under 40 CFR part 268. Treatment standards for restricted wastes are promulgated under 40 CFR part 268, subpart D. All of the land

disposal restrictions are effective when promulgated unless the Administrator grants a national capacity variance from the otherwise applicable date and establishes a different date (not to exceed two years beyond the statutory deadline) based on "* * * the earliest date on which adequate alternative treatment, recovery,or disposal capacity which protects human health and the environment will be available" (RCRA section 3004(h)(2), 42 U.S.C. 6924(h)(2)). The Administrator may also grant a case-by-case extension of the effective date for up to one year, renewable once for up to one additional year, when an applicant successfully makes certain demonstrations (RCRA section 3004(h)(3), 42 U.S.C. 6924(h)(3)). A case-by-case extension can be granted whether or not a national capacity variance has been granted.

In response to these requirements, EPA promulgated five regulations: Solvents and Dioxins, November 7, 1986 (52 FR 40572); California List, July 8, 1987 (52 FR 25760); First Third, August 17, 1988 (53 FR 31128); Second Third, June 23, 1989 (54 FR 26594); and Third Third, June 1, 1990 (55 FR 22520). These rulemakings set treatment standards for all hazardous wastes that were identified and listed in 40 CFR 261.21, .22, .23, .24, .31, .32, and .33 prior to November, 1984. Land disposal of these wastes in underground injection wells was regulated in separate rules for Solvents and Dioxins, California List, and First Third wastes (see 53 FR 28188, 53 FR 30908, and 54 FR 25416, respectively).

RCRA further requires the Agency to make land disposal prohibition determinations for hazardous wastes that are newly identified or listed in 40 CFR part 261 after November 8, 1984, within six months of the date of identification or listing (RCRA section 3004(g)(4), 42 U.S.C. 6924)g)(4)). The statute does not, however, provide for an automatic prohibition (referred to as a "hard hammer") of land disposal of such wastes if EPA fails to meet this deadline.

The Third Third rule, promulgated on May 8, 1990, set treatment standards for five newly identified wastes. Today's notice suggests possible treatment standards for a number of the remaining newly identified and listed hazardous wastes, and for contaminated soil, and requests comments and data.

In an advance notice of proposed rulemaking on May 30, 1991 (56 FR 24444) EPA requested data and comments on possible BDAT and treatment capacity for other wastes that have been identified and listed as hazardous since the enactment of the Hazardous and Solid Waste Amendments (HSWA) in November, 1984. These included newly listed wastes generated from the production of ethylene dibromide (EDB), ethylenebisdithiocarbamic acid (EBDC), methyl bromide, dinitrotoluene, toluenediamine, unsymmetrical dimethylhydrazine (UDMH), ortho-toluidine (U328), para-toluidine (U353), and 2-ethoxyethanol (U359). The Agency, in addition, solicited data and comment on potential approaches for developing treatment standards for two newly listed wastes from petroleum refining (i.e., F037 and F038), and for contaminated debris.

The Agency also solicited comment on possible modifications to existing land disposal restriction (LDR) provisions that may simplify the implementation of the BDAT treatment standards: potential universal treatment standards for various categories of wastes; conversion of treatment standards for various F and K wastes from standards based on scrubber waters to those based on conventional wastewater treatment; modifications to the treatment standards for F001–F005 solvent wastes; modifications of treatment standards for lab packs; and potential concentration-based treatment standards based on recovery of chromium from various hazardous wastes.

In the May 30, 1991 notice, and in a notice of proposed rulemaking for K061 wastes (April 12, 1991 (56 FR 15020)), EPA presented a concept for generic delisting of residues from high temperature metals recovery processes. EPA is, today, soliciting further comment on the concept of generic delisting as it may apply to other categories of wastes, such as incinerator ash and stabilized wastewater treatment sludges, and the relationship to EPA's potential establishment of universal treatment standards for certain categories of wastes. (See discussion of universal standards in section III.A. of the May 30, 1991.)

B. Summary of EPA's Procedures for Developing Treatment Standards

A general overview of the Agency's approach in performing analysis of BDAT for hazardous wastes can be found in section III.A.1. of the preamble to the final rule for Third Third wastes (55 FR 22535, June 1, 1990). The framework for the development of the entire Land Disposal Restrictions program was promulgated in the Solvents and Dioxins rule (51 FR 40572 (November 7, 1986)).

The following steps outline the general procedures that EPA follows in the development of waste code-specific treatment standards:

(1) Characterize and divide the wastes to be regulated into treatability groups (by waste code) based on similarities in physical and chemical properties of the wastes and constituents.

(2) Screen all applicable technologies to identify potential BDAT for each treatability group.

(3) Screen the treatment data from "demonstrated" "available" technologies with regard to the design and operation of the equipment, the quality assurance/quality control (QA/QC) analyses of the performance and operating data, and the accuracy and precision of the analytical tests used to assess treatment performance.

(4) Statistically evaluate the individual performance data for each of the various treatment technologies (where data from more than one technology are available) to determine the "best." Where data exist for only one technology, the Agency uses best engineering judgment to assess whether that technology represents the best applicable technology for that particular waste and whether the data indicate that the treatment system was well-designed and well-operated.

(5) Determine which constituents to regulate considering the technologies will be well-operated, thus assuring consistent achievement of best treatment.

(6) Develop the waste code-specific treatment standards accounting for all QA/QC measures.

Treatment standards are expressed either as maximum constituent-specific concentrations allowed in the waste (40 CFR 268.43), in an extract of the treated waste (40 CFR 268.41), as a specific technology or group of technologies (40 CFR 268.42), or as a combination of these. Although the statute provides discretion to establish BDAT standards as either levels or methods of treatment, EPA would rather set concentration-based treatment standards whenever possible, because they provide the regulated community with flexibility in choosing treatment technologies, and encourage the investigation and development of new and alternative technologies. (This does not, however, supersede the prohibitions on dilution to achieve the concentration-based treatment standard. See, for example, 55 FR 22656.) In addition, establishing concentration-based standards provides a means of ensuring that treatment technologies are consistently operated at conditions that will result in the best demonstrated performance.

In section III.A.1. of the Third Third final rule (55 FR 22535–22542 (June 1, 1990)), EPA discussed several additional issues that are important in determining compliance with the treatment standards, including: the applicability of treatment standards to treatment residues identified as "derived-from" wastes and to waste mixtures; impermissible switching of wastewater and nonwastewater standards (with specific discussions of issues associated with characteristic wastes); placing facility-specific monitoring and compliance requirements in waste analysis plans; and the relationship of concentration-based standards to detection limits and practical quantitation limits (PQLs).

II. Requests for General Comments and Data

EPA specifically is soliciting comment and data on the following as they pertain to the wastes identified in today's notice: State-of-the-art treatment and recycling technologies; waste characterization; waste minimization (as demonstrated both here and abroad); factors affecting treatment performance that should be considered during sampling/analysis efforts; on-site and off-site treatment capacity requirements; potential outreach activities; and information on the costs for setup and operation of any current and alternative treatment technologies for these wastes.

In previous notices, the Agency promulgated listings for certain wastes as hazardous under 40 CFR part 261. Although data on waste characteristics and current management practices have been gathered as part of the administrative record for each listing rule, the Agency has not completed its evaluation of the usefulness of these data for developing specific BDAT standards or assessing the capacity to treat (or recycle) these newly listed wastes. As a result, EPA is soliciting comments on the completeness of the existing listing data (as found in the administrative record for the notices for the proposed and final listing actions for each waste) and is requesting additional data and information with respect to treatment and capacity.

In order to expedite EPA's review of all comments and data submitted in response to this notice, EPA is requesting that the comments and data be voluntarily identified by the section headings and subheadings (or numbers) of today's notice. For example, comments on the "wood preserving wastes" could be identified by that title or by "V.A.", its subheading number. EPA recognizes that many comments may actually apply to several headings or subheadings (e.g., a comment on soil contaminated with wood preserving wastes could be identified as a comment for either V.A., wood preserving wastes, or IV., contaminated soil). In this case, the commenter should select the identification that they deem most appropriate, or simply identify the comment as a "general comment". While EPA does screen all comments for applicability to all areas discussed in today's notice, this identification procedure is expected to significantly expedite EPA's review process, particularly when coupled with the voluntary submission of comments on computer diskettes (as requested in the ADDRESSES section of today's notice).

A. Request for Comment and Data on Pollution Prevention for Newly Identified and Listed Wastes

EPA has made substantial progress over the years in improving environmental quality through its media-specific pollution control programs. Standard industrial practice for pollution control has concentrated largely on "end-of-pipe" treatment or land disposal of hazardous and nonhazardous wastes. HSWA established, however, a national policy of reducing or eliminating wastes as expeditiously as possible (RCRA section 1003(b)). EPA also realizes that programs emphasizing management of pollutants after they have been generated have limitations. EPA believes that reducing or eliminating discharges and/or emissions to the environment through the implementation of cost-effective source reduction and environmentally sound recycling practices can produce additional environmental benefits. Many businesses are already incorporating pollution prevention programs into their strategic planning. Such programs may decrease the volume and/or toxicity of wastes by altering production to incorporate source reduction or recycling.

Under sections 3002(b) and 3005(h) of HSWA, hazardous waste generators are required to certify that they have a program in place to reduce the volume or quantity and toxicity of hazardous waste to the degree determined by the generator to be economically practicable. EPA encourages generators to pursue source reduction and environmentally sound recycling wherever possible to reduce the need for the costs of subsequent treatment, storage, and disposal. Waste minimization planning programs have been suggested by EPA and mandated by some States.

To aid the regulated community, EPA has produced documents such as Draft Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program; Notice and Request for Comment (54 FR 25056 (June 12, 1989)) and The EPA Manual for Waste Minimization Opportunity Assessments (EPA 600/2–88/025, April 1988). Several States also have enacted waste minimization legislation (e.g., Massachusetts Toxics Use Reduction Act of 1989; Oregon Toxics Use Reduction and Hazardous Waste Reduction Act, House Bill 3515, July 2, 1989). Additional States have legislation pending that will mandate some type of pollution prevention program and/or facility planning, and many others offer technical assistance to companies that seek alternatives to treatment, storage, and disposal of waste.

Successful reduction in waste generation often does not require complex and/or expensive process changes. There are many relatively simple, cost-effective, and easily implemented engineering solutions that will achieve this goal. Evaluation of adherence to existing process control measures, along with slight modifications of these measures, can often result in volume reduction and significant cost savings to industry. These evaluations also may point out the need for more complex engineering evaluations (e.g., mixing effectiveness, process temperatures and pressures, and reagent grade selection). Simple physical audits of current waste generation and in-plant management practices for the wastes can also yield positive results. These audits often turn up simple, cost-effective, and easily implemented practices that do not involve complicated engineering analyses. They may point out, for example, the need for the repair and/or replacement of leaking pipes, valves, and simple equipment. In addition, they may identify the need to modify inspection and/or maintenance schedules.

Waste minimization opportunities for the manufacturing processes generating the wastes identified in today's notice may result in significant reductions in waste generation and, thus, considerable cost savings for industry. The Agency is interested in comments and data on such opportunities, including both successful and unsuccessful attempts to reduce waste generation, volume, or toxicity and the cost-effectiveness of these practices. It is also possible that, owing to previous implementation of waste minimization procedures, some facilities or specific

processes have little potential for decreases in waste generation rates or toxicity.

For the wastes identified in today's notice, the Agency is particularly interested in such specific information as: Data on the quantities of wastes that have been or could be reduced; a way to calculate achievable percentage reductions (accounting for changes in production rates); potential reduction in toxicity of the wastes; the results of waste audits; and potential cost savings that can be (or have been) achieved.

EPA is currently investigating new approaches that would incorporate waste minimization techniques into the BDAT process. BDAT standards could potentially be developed that somehow use source reduction and recycling technologies as the methods for controlling hazardous constituents in the waste. One approach could involve the use of alternative mass-balance limitations for some constituents as they remain in the treatment residuals after application of best available source reduction and/or recycling techniques. For example, the concentration of heavy metals and total cyanides in electroplating wastewater treatment sludges (e.g., F006 wastes) have been demonstrated to be reducible through the use of various source reduction and recycling techniques implemented in the manufacturing process prior to treatment. Thus, implementation of waste minimization practices prior to generation and subsequent stabilization of the wastewater treatment sludges would significantly reduce not only the total mass of hazardous constituents, but also the total volume of wastes destined for land disposal units. Such a result would accord well with the mandate of section 3004(m) to promulgate BDAT standards that reduce waste toxicity or mobility in a way that "minimizes" threats to human health and the environment. (Data currently available indicate that stabilization can often result in a significant increase in total waste volume when complying with current treatment standards.) In addition, there may be situations where specifying the use of a treatment or recovery technology might provide more effective protection than relying on concentration-based or mass-based standards.

All of this is not to say that the Agency will require waste minimization as BDAT, especially by identifying a specific technology that must be used. While the Agency believes that waste minimization is important, we also believe that there should be flexibility in the program in order to encourage innovation so as to find new and better methods to control hazardous wastes. Thus, the Agency welcomes comments on whether, and if so, how cost-effective waste minimization could be factored into the development of BDAT.

B. General Approach to the Development of BDAT for Newly Identified and Listed Wastes

While the Agency has established a waste management hierarchy that favors source reduction, recycling, and recovery over conventional treatment, it is inevitable that some wastes will be generated. (See EPA's Pollution Prevention Strategy, January 1991.) Thus, standards based on treatment using BDAT will need to be developed for these wastes. The Agency recognizes that there may be some special situations where the generation of a particular waste can be totally eliminated, but this is unlikely for most wastes.

The Agency intends to develop BDAT standards for newly identified and listed wastes based on the transfer of performance data from the treatment of wastes with similar chemical and physical characteristics or similar concentrations of hazardous constituents. It also is likely that the treatment standards for these wastes will be established for both wastewater and nonwastewater forms and on a constituent-specific basis. These constituents are not necessarily limited to those identified as present in the wastes in today's notice.

The technologies forming the basis of the treatment standards, in general, are determined by whether the wastes contain organics and/or metals. For wastes containing primarily organics, the Agency has found that incineration and other thermal destruction techniques can destroy most organics to concentrations at or near the limit of detection as measured in the ash residues. Many people are concerned about environmental impacts of incinerating hazardous wastes, however, and prefer that alternative treatment technologies be used for wastes that must be treated. While the Agency believes that incineration and other thermal destruction technologies achieve a level of relatively complete destruction of organics, EPA typically establishes concentration-based standards based on these data rather than requiring the wastes to be incinerated. Thus, any alternative technologies that can achieve these levels may be used, unless otherwise restricted. In fact, where alternative destruction or removal technologies cannot achieve these levels, but achieve reasonably comparable results, the Agency may promulgate adjusted treatment standards achievable by both incineration and these technologies (see, for example, the promulgated treatment standards for petroleum refinery wastes (K048-K052) which are achievable by critical fluid extraction, thermal desorption, biotreatment, or incineration).

Since metals are never destroyed, wastes containing metals must be directly reused, extracted for recovery, chemically stabilized, or generated such that the metals are in a chemical state where the metals are substantially immobile or otherwise rendered less toxic. Wastes containing both organics and metals are usually first subject to some destruction technology, and since metals typically concentrate in the ash and/or scrubber water sludges, these additional residues may have to be chemically stabilized.

Wherever feasible, the Agency is considering transferring treatment standards for both wastewater and nonwastewater forms of the newly identified and listed wastes from the list of treatment standards in F039, the listing for multi-source leachate, promulgated in the Third Third final rule (see 40 CFR 268.41 and .43 for treatment standards applicable to F039 wastes). These treatment standards were developed not only for F039 but also for the corresponding U and P wastes and for many of the F and K wastes. The standards were based on the use of several treatment technologies performed on a wide variety of waste matrices, thus ensuring that the treatment standards are achievable for a wide variety of wastes. The standards for the nonwastewater forms of F039 are known to be achievable by thermal destruction techniques, such as incineration, or burning in boilers or industrial furnaces, while those for the F039 wastewaters are achievable by multiple wastewater treatment technologies. If a newly identified or listed waste or a new waste contains chemicals that are not currently regulated in F039 wastes, EPA will develop treatment standards for these constituents and may then propose to add them to the treatment standards for F039. (The Final BDAT Background Document for U and P Wastes/Multi-source Leachate is available from NTIS (National Technical Information Service), 5285 Port Royal Road, Springfield, Virginia 22161, (703) 487-4600. The NTIS numbers for the three-volume set are PB90-234337, PB90-234345, and PB90-234352.)

In order to determine whether existing treatment standards such as those established for F039 can be transferred, the Agency is soliciting the following data and information on these newly identified and listed wastes: Technical descriptions of the treatment systems that are currently being used for these wastes; descriptions of alternative technologies that might be currently available or anticipated as applicable; performance data for the treatment of these wastes (in particular, constituent concentrations in both treated and untreated wastes, as well as information on the equipment design and optimum operating conditions); information on known or perceived difficulties in analyzing treatment residues or specific constitutents; quality assurance/control information for all data submissions; and information on the costs for setup and operation of any current and alternative treatment technologies for these wastes.

C. General Approach to the Analysis of Capacity for Newly Identified and Listed Wastes

1. Data Availability

In determining when land disposal prohibitions for a given waste should become effective, EPA must evaluate the availability of capacity to treat that waste. The Agency performs capacity analyses to determine the amount of alternative treatment or recovery capacity available to accommodate the volumes of waste that will be affected by the land disposal prohibition. If adequate capacity exists, the waste is restricted from further land disposal. If adequate capacity does not exist, EPA may grant a national capacity variance for the waste for up to two years, or until adequate alternative treatment capacity becomes available, whichever is sooner. To perform the necessary capacity analyses, the Agency needs reliable data on current waste generation, waste management practices, available alternative treatment capacity, and planned treatment capacity.

For previous land disposal restriction rules, the Agency performed capacity analyses using data from national surveys, including the 1981 Mail Survey, the 1986 National Screening Survey, the 1987 National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (the TSDR Survey), and the 1987 National Survey of Hazardous Waste Generators (the Generator Survey). The Agency conducted the TSDR Survey to obtain comprehensive data on the nation's capacity for managing hazardous waste and on the volumes of hazardous waste being land disposed. The Generator Survey includes data on waste generation, waste characterization, and hazardous waste treatment capacity in units exempt from RCRA permitting. Data from the TSDR and Generator Surveys were used in capacity analysis for the First Third, Second Third and Third Third LDR rules.

Although the TSDR and Generator Surveys were conducted in 1987, data from these surveys reflect 1986 waste generation and waste management practices. These surveys cannot be used to determine the volumes of newly listed and identified waste requiring treatment, since the majority of these wastes were not listed as hazardous until after 1986 and, therefore, were not included in the surveys. In addition, these surveys may not contain adequate information on currently available capacity to treat newly listed and identified wastes because the data reflect 1986 capacity and do not include facility expansions or closures that have occurred since then. Although adjustments have been made to these data to account for changes in waste management through 1990, this was not done on a consistent basis across all waste management practices. For these reasons, the Agency requests data on currently available treatment capacity to determine whether adequate capacity exists to treat newly listed and identified wastes.

EPA has compiled data from available sources including proposed and final listing rules, regulatory impact analyses (RIAs), background information documents (BIDs), and the National Survey of Solid Waste from Mineral Processing Facilities, and the Petroleum Refining Data Base. Even with these sources, however, gaps in the capacity-related data for newly listed and identified wastes remain. Much of the data are several years old and may not reflect current waste generation and management practices. In particular, data from the proposed and final listing rules are often incomplete, and, in some cases, no data on waste generation or management are included, since these rules focus on the characteristics that render a waste hazardous, rather than on waste generation and management. The RIAs and BIDs frequently use estimated data based on assumptions rather than on data collected directly from generators. The National Survey of Solid Waste from Mineral Processing Facilities does contain data for some of the mineral processing wastes; however, not all mineral processing wastes were included in the survey. The Petroleum Refining Data Base reflects 1983 data and does include all currently operating petroleum refineries. For these reasons, EPA requests additional data on the waste generation and management of newly listed and identified wastes to perform capacity analyses for these wastes.

2. Waste Management Practices

To perform capacity analyses, the Agency needs to determine the volumes of hazardous waste that will require treatment prior to land disposal. The volumes of waste requiring treatment depend, in turn, on the waste management practices employed by the hazardous waste generators. Hazardous waste that is currently treated on-site does not require additional commercial treatment capacity. Hazardous waste generators may also manage their waste using practices exempt from RCRA regulations. For example, hazardous wastes discharged to POTWs or navigable waters without any intervening land disposal are not subject to the treatment standards (i.e., they are restricted and not prohibited, and therefore subject only to recordkeeping requirements. See, e.g., 55 FR 22662). Some generators may manage their waste entirely in RCRA-exempt tanks and thus likewise may not be affected by the treatment standards; others may recycle their waste immediately after generation and not land dispose it.

Other waste management practices can also affect capacity analyses. Generators may co-manage hazardous waste with nonhazardous waste or may dewater hazardous waste, thus changing the volume of waste requiring treatment. Newly listed and identified wastes mixed with regulated hazardous waste may currently undergo treatment and, thus, have been accounted for in the capacity analyses for past rulemakings. Additionally, the hazardous waste treatment technologies may generate additional wastes in the form of residuals that also will be subject to the LDRs.

As stated above, some generators already treat their hazardous waste on-site. Other generators may decide to construct on-site treatment capacity, if it is economically feasible. Since capacity analyses determine the availability of commercial treatment, wastes that are treated on-site are not included in the estimate of the volumes requiring commercial alternative treatment capacity. Nevertheless, the Agency must still obtain information on the volumes of waste that are or will be treated on-site. However, to the extent that residuals from the treatment of

hazardous waste are generated, the Agency also needs to account for these residuals in its capacity analysis. EPA requests information on the volumes of waste that are or will be treated on-site or at captive facilities, the residuals generated from treatment, as well as any planned changes in on-site capacity.

Much of the data on waste management practices for newly listed and identified wastes were collected prior to the listing of those wastes. The added costs of managing a regulated hazardous waste may have induced generators to minimize or recycle their waste or otherwise alter their management practices. Any change in management practices will affect the volumes of waste requiring commercial treatment capacity.

As can be seen from the above discussion, to perform capacity analyses, EPA requests information on current and future waste management practices for newly listed and identified wastes, including the volumes of waste that are recycled, mixed with or co-managed with other waste, discharged under Clean Water Act provisions, injected underground via a regulated unit, and the volumes and types of residuals that are generated by the various management practices applicable to newly listed and identified wastes (e.g., treatment residuals).

3. Availability of Treatment

The availability of adequate commercial treatment capacity for wastes not otherwise treated determines whether or not a waste is granted a national capacity variance. The commercial hazardous waste management industry is extremely dynamic. National commercial treatment capacity changes as new facilities come on-line, as new units and new technologies are added at existing facilities, and as facilities expand existing units. The available capacity at commercial facilities also changes as facilities change their commercial status (e.g., changing from a fully commercial to a limited commercial or captive facility). In addition, the amount of utilized treatment capacity changes as national capacity variances granted for previous LDR rules expire and as economic and regulatory conditions change the baseline demand for various treatment technologies. To determine the availability of capacity for treating newly listed and identified wastes, the Agency needs to consider currently available capacity, as well as the timing of any future changes in available capacity.

Commercial combustion capacity for sludges and solids is an important and extremely dynamic component of the nation's hazardous waste management system. Previous LDR rules have substantially increased demand for this technology. Historically, there has been a shortage of capacity for this treatment; however, the increased demand for sludge/solid combustion has encouraged this sector to expand. EPA requests current data on the availability of sludge/solid combustion capacity as well as any planned expansions at combustion facilities in order to determine whether adequate capacity will be available for those newly listed and identified wastes that may require sludge/solid combustion.

Waste characteristics such as pH level, BTUs, anionic character, and physical form may also limit the availability of certain treatment technologies. For these reasons, the Agency requests data and comments on waste characteristics that might limit or preclude the use of any treatment technologies.

EPA requests data from facilities capable of treating hazardous wastes on their current treatment capacity and information on any plans they may have in the future to expand or reduce existing capacity. The agency also is requesting comments from companies that may be considering developing new hazardous waste treatment capacity. Specifically, EPA requests information on the determining factors involved in making decisions to build new treatment capacity.

4. EPA's Current Plans Concerning Capacity

In cases where important information for conducting capacity analysis for newly listed and identified wastes is not currently available, EPA may conduct additional data collection efforts to obtain the necessary data. The Agency could target the facilities generating large volumes of newly listed or identified wastes to obtain additional capacity-related data. The Agency may also collect additional information from the hazardous waste management industry on currently available treatment capacity.

The Agency is using this notice to present available data on newly listed and identified wastes. Whenever possible, the sources of the data are indicated. In this notice, EPA also presents key issues and preliminary assessments of capacity for newly listed and identified wastes. In addition, this notice presents a wide variety of potential approaches and assumptions the Agency could evaluate to develop capacity assessments for newly listed and identified wastes. EPA is requesting specific data and comments on currently available data and the possible approaches to capacity analyses from generators of newly listed and identified wastes. The data submitted to the Agency will be used in the capacity analyses for newly listed and identified wastes and to corroborate case-by-case variance determinations, as well as for other types of analyses (e.g., economic and cost impact analyses, regulatory impact analyses, market studies).

As noted, capacity information is important for many decisions and policies. To ensure the quality of this information, EPA must collect and validate the relevant data, and otherwise develop the pertinent data base, prior to analysis. This often is an iterative process which can be lengthy. EPA stresses that all knowledgeable parties should provide us with their data, comments and concerns as early as possible for the wastes and issues addressed by this notice.

D. Newly Identified Mixed Radioactive Hazardous Wastes

Radioactive mixed wastes (RMW) are unique hazardous wastes because of dual regulation by the Atomic Energy Act (AEA) for the radioactive components and by RCRA for the hazardous waste components. The hazardous waste components of RMW must meet all applicable treatment standards for each waste code prior to its disposal, unless the wastes are managed in land disposal units that have been granted a no-migration petition. Treating RMW presents, however, a major difficulty: Achieving the treatment standards for hazardous wastes while at the same time ensuring that the AEA safety and handling requirements for radioactive materials are met. In some instances, this may be resolved by establishing specific treatment standards for specific types of RMW, as the Agency did in the Third Third rule (see 40 CFR 268.42, Table 3), or by establishing site-specific variances for the waste.

RMW consists of hazardous waste mixed with high-level radioactive wastes, transuranic (TRU) wastes, or low-level radioactive wastes. High-level radioactive wastes are spent fuel from commercial nuclear reactors or wastes from the production of atomic weapons. TRU wastes contain elements with atomic numbers greater than 92 (the atomic number for uranium) and pose greater radioactive hazards than the low-level wastes because they contain long-lived alpha radiation emitters. Low-level radioactive wastes include

radioactive wastes that are not classified as high-level or TRU wastes.

All treatment standards that have been promulgated to date for RMW were in the Third Third final rule. Except for four specific types of RMW that have unique treatment standards, all promulgated treatment standards for RCRA listed and characteristic wastes also apply to the corresponding RMW. The Agency specifically is requesting comment on difficulties the regulated community has encountered with the treatment standards for RMW. EPA particularly is interested in resolving these issues on a more generic basis rather than relying solely on the use of the variance process.

While EPA does not specifically expect that many of the newly listed F and K wastes listed in today's notice are generated as RMW, EPA does anticipate that many radioactive wastes will now qualify as hazardous wastes (i.e., RMW) due to the recent toxicity characteristic (TC) rule. In addition, the development of new treatment standards for contaminated soil are expected to be applicable to some RMW. EPA, therefore, is requesting comment and data about specific RMW that are TC wastes and are considered soil. In addition, EPA requests information and suggestions on special decontamination procedures that have been developed (or may be required) specifically for the removal of the radioactive components of contaminated soil. (These may affect the selection of appropriate management practices for these wastes.) EPA, therefore, is requesting that readers carefully review today's notice in its entirety for its potential applicability to RMW with respect to generation, treatment, and capacity for all wastes discussed in today's notice.

E. Request for Comment on the Nexus of the Bevill Amendment and the Land Disposal Restrictions

EPA also solicits comment on requiring residues from the devices referred to in the Bevill amendment (utility boilers burning coal, various mining and mineral processing furnaces, and cement kilns) to meet the LDR treatment standards as a condition of being eligible for the Bevill exemption when these devices process prohibited hazardous wastes. In other words, if a cement kiln were to burn a prohibited spent solvent as fuel or a soil contaminated with a prohibited waste as raw material substitute, along with its normal raw material, the cement kiln dust would have to meet the treatment standard for the prohibited solvent as a condition to being considered a temporarily-exempt Bevill waste. The Agency solicits comment as to whether these devices are achieving the treatment standards in practice, and if not, for which hazardous wastes are the standards not being achieved and by what margin.

The Agency is aware of the legal argument that if these residues are covered under the Bevill amendment, then they cannot be regulated under subtitle C and so could not be subject to any of the LDR prohibitions. The DC Circuit has rejected a similar argument that would have nullified otherwise-applicable subtitle C requirements not directly related to the Bevill residues in *American Iron and Steel Inst.* v. *EPA*, 886 F. 2d 390, 395–96 (DC Cir. 1989). Moreover, Congress did not directly address the status of residues from Bevill devices that coprocess prohibited hazardous wastes, so that the Agency has considerable discretion in classifying such residues. Where Congress was concerned about subtitle C regulation of coprocessed hazardous waste affecting Bevill status of residues, it said so explicitly. See RCRA section 3004(q)(1). The absence of such a cautionary provision in any of the land disposal restriction statutory provisions is an indication of Congress' lack of concern.

III. Potential BDAT for Toxicity Characteristic Wastes

A. Background

On March 29, 1990, EPA promulgated revisions to 40 CFR 261.24—the Toxicity Characteristic or "TC"—replacing the EP leaching procedure with the toxicity characteristic leaching procedure (TCLP). This rule also increased the number of waste codes regulated under this characteristic from 14 to 40. TC wastes that are considered newly identified wastes for the purpose of developing land disposal restrictions (LDRs) fall into two categories. One consists of 26 new organic codes and includes all wastes identified as D018–D043. Newly identified wastes in the second category are limited to those D004–D011 metal wastes and D012–D017 pesticide wastes that are now hazardous because of the change in the leaching procedure. (See further explanation of this situation in a later discussion of D004–D017 wastes in section III.E. of today's notice.) The following sections of today's notice discuss how EPA intends to determine BDAT for these newly identified wastes and to propose treatment standards for them under the LDRs.

EPA is also soliciting information that may be used to characterize industrial generation patterns that could then be used to assess the potential for source reduction or recycling for these TC wastes. While source reduction and recycling are high priorities for any hazardous waste, the wide diversity of generation of these TC wastes is expected to impact EPA's ability to evaluate source reduction and recycling. (See also EPA's general solicitation for information on pollution prevention opportunities in section II.A. above.)

B. Potential Treatment Standards for New TC Organic Wastes (D018–D043)

D018—Benzene
D019—Carbon tetrachloride
D020—Chlordane
D021—Chlorobenzene
D022—Chloroform
D023—o-Cresol
D024—m-Cresol
D025—p-Cresol
D026—Cresol
D027—1,4-Dichlorobenzene
D028—1,2-Dichloroethane
D029—1,1-Dichloroethylene
D030—2,4-Dinitrotoluene
D031—Heptachlor
D031—Heptachlor epoxide
D032—Hexachlorobenzene
D033—Hexachloro-1,3-butadiene
D034—Hexachloroethane
D035—Methyl ethyl ketone
D036—Nitrobenzene
D037—Pentachlorophenol
D038—Pyridine
D039—Tetrachloroethylene
D040—Trichloroethylene
D041—2,4,5-Trichlorophenol
D042—2,4,6-Trichlorophenol
D043—Vinyl chloride

1. General Approach to Establishing Concentration-Based Treatment Standards

EPA is considering two general analytical approaches for the development of concentration-based treatment standards for the newly identified TC wastes (D018–D043). One approach is to establish standards based on the analysis of TCLP leachates. The other approach is to establish standards based on total constituent analysis. Applicability of these approaches depends on the physical form of the waste (i.e., whether the TC waste is a wastewater or a nonwastewater), whether the waste is a metal or an organic, the toxicity of the waste, and the available performance data. The Agency considers these and other factors in establishing BDAT treatment standards (see BDAT Methodology Background Document).

A central issue in establishing treatment standards for the newly identified TC wastes is whether or not to require treatment below levels that would define the waste as hazardous. In the final rule for Third Third wastes,

EPA was confronted with this same issue for the EPA characteristic metal wastes (D004–D011) and pesticide wastes (D012–D017). (See the general discussion of the development of treatment standards for these wastes in 55 FR 22553–22575 (June 1, 1990).) In that rule, EPA maintained that it has the authority to establish treatment standards below the characteristic levels, and did so, where data were available. (See also the discussion below on the consideration of other programs.) In keeping with this reasoning, for some of the characteristic wastes, the Agency also established standards that require the use of specified treatment or recovery methods that also ensure treatment below the characteristic level.

EPA recognized, however, that there were far-reaching policy considerations regarding the actual implementation of this approach, particularly as they relate to subtitle D facilities and to discharges under the Clean Water Act or Safe Drinking Water Act. (These were important factors in establishing treatment standards for the EP characteristic wastes.) EPA is, thus, evaluating the impact of establishing treatment standards for the TC wastes on these other environmental programs. Therefore, notwithstanding the legal and technical precedents established in previous LDR rulemakings, the Agency specifically requests comment on whether, as a policy matter, standards should be set below the levels that would define the waste as hazardous.

a. Nonwastewaters

While either of the two analytical approaches—TCLP leachate or total analysis—could be used for nonwastewater forms of TC wastes, it is somewhat difficult to compare potential treatment standards based on total constituent analysis to those that might be developed based on TCLP analysis (or to the characteristic levels). This is primarily because of the inherent differences in the analytical techniques. In a TCLP analysis, organic constituents are extracted from a waste using an aqueous leaching medium, while in a total analysis, they are extracted using an organic solvent (typically at elevated temperatures or with significant agitation).

One could compare the numerical value of a potential TCLP standard to a theoretical maximum leaching level derived from a total constituent standard. One would have to assume that the entire amount of the TC constituent (as represented by the total constituent concentration at the level of the standard) would be extracted into an aqueous leaching medium. One would then have to account for the 20-fold dilution inherent in the TCLP analytical procedure. A theoretical maximum leaching value could, thus, be calculated by dividing the numerical value of the total constituent treatment standard by a factor of 20.

One possible advantage in establishing a TCLP standard for a nonwastewater TC waste is that the basis of the treatment standard would than be consistent with the analytical basis for defining the waste as hazardous. EPA could, thus, directly compare any potential TCLP standard to the corresponding TCLP level. One problem in developing such standards is, however, that the majority of treatment data currently available to EPA is based on total constituent analysis rather than TCLP analysis. Without the appropriate TCLP data for both treated and untreated wastes, it is more difficult for EPA to establish standards based on TCLP analysis (except, perhaps, for establishing the characteristic level as the standard).

There appear to be at least three major advantages to establishing standards based on total constituent analysis for nonwastewaters. First, such standards would be consistent with the majority of treatment standards for hazardous organics in other RCRA hazardous wastes (i.e., they are also based on analysis of total constituents). This would be particularly advantageous for those listed wastes that are regulated for the same constituents included in the TC. The following example demonstrates this point. A treatment standard requiring total constituent analysis for benzene (as well as 12 other constituents) exists for K048 wastes. If a D018 waste (TC for benzene) is commingled with a K048 waste prior to treatment and if the treatment standard for the D018 waste is based on TCLP analysis, the treatment residues would have to be analyzed for benzene using both a total analysis and a TCLP analysis. Total analysis for the other constituents would have to be performed regardless of the analytical basis of the D018 standard.

Second, EPA is investigating the potential for establishing a set of standards for over 200 organic constituents that could be universally applied to the majority of listed hazardous wastes and could virtually replace many of the existing standards. As evidence in the aforementioned example, standards based on different analyses (i.e., total and TCLP) could complicate the application of these universal standards. Two different basis of analytical standards for the same constituents could, thus, potentially interfere with the total goal of simplifying the treatment standards.

Third, treatment standards based on a total constituent analysis more accurately measure the performance of extraction and destruction technologies, while standards based on TCLP analysis typically measure the performance of immobilization technologies. (Extraction technologies remove and often recover organics for either reuse or subsequent destruction. Destruction technologies involve biological, chemical, and/or thermal destruction of the hazardous organics.) Where it is desirable to minimize the hazardous organics in residues requiring land disposal (i.e., assuming source reduction techniques have been employed to reduce the generation of the waste in the first place), treatment standards reflecting the total amount of hazardous organics that have been destroyed or extracted from the waste (i.e., standards based on total constituent analysis) more accurately measure this goal than do those standards based on a leachable amount.

b. Wastewaters

The TCLP analytical procedure was established primarily for application to nonwastewaters. For wastewater forms of the TC wastes, the protocol in 40 CFR 261.24(a) calls for total constituent analysis of the TC constituents in the waste (i.e., where the waste contains less than 0.5 percent filterable solids). The issue of comparing TCLP analysis versus total constituent analysis is, thus, moot for TC wastewaters. The major issue is whether to establish technology-specific standards, concentration-based standards at the characteristic level, or concentration-based standards below than the characteristic level.

In the final rule for Third Third wastes, EPA established technology-specific treatment standards rather than setting concentration-based standards for wastewater forms of D012–D017 pesticides. While this is a potential option for the TC organic wastes (D018–D043), preliminary investigation indicates that many treatment technologies may have to be specified as BDAT. The variability of waste types and quantity of D018–D043 wastewaters is also expected to be much greater than the D012–D017 wastewaters. (See further discussion of TRI data and capacity data on wastewaters in sections III.B.5. and III.C., respectively.) This variability in waste characteristics further complicates the selection of the

most appropriate technologies to specify as BDAT.

Additional complications arise in establishing technology-specific standards for TC wastewaters. Unless treatment standards account for all possible treatment trains required for the TC wastewaters, facilities would have to apply for a treatability variance (40 CFR 268.44) or for a demonstration of equivalency (40 CFR 268.42(b)) on a relatively frequent basis. These additional regulatory requirements and procedures could potentially serve as impediments to the development or use of innovative or alternative treatment technologies. Where the standards are expressed as concentrations, the flexibility in selecting the most appropriate treatment technology for each facility and waste is generally increased.

Moreover, if EPA were to specify technologies for TC wastewaters, it would most likely have to establish additional means of ensuring that the technologies are well-designed and well-operated. This is particularly important as illustrated in the following example. The efficiency of carbon adsorption for TC wastewaters listed for substituted phenolics (i.e., D023, D024, D025, D026, D037, D041, and D042) is greatly affected by the pH of the untreated waste. By using the correct pH, these phenolics can be almost completely removed from the wastewater for significant periods of time. Using the wrong pH or using the carbon too long can reduce the efficiency of removal to essentially zero. Specifying carbon adsorption as a standard would, therefore, need to incorporate provisions into the standards that ensure proper control of pH.

With respect to concentration-based standards, the Agency believes that there are three major advantages to establishing such standards for D018–D043 wastewaters (rather than technology-specific standards). First, wastewater treatment data using many different wastewater treatment technologies are available for all 26 TC organic constituents. This implies that concentration-based standards can be established that would allow a facility to select the most appropriate technology for a given waste. Second, wastewater treatment standards for these TC organics (as they are regulated in other RCRA hazardous wastes) are also concentration-based rather than technology-specific. Third, concentration-based standards would conform to EPA's concept of establishing a universal set of wastewater standards for organics.

Available data indicate that concentration-based standards can be readily met at levels below characteristic levels. However, under the existing regulations, once a waste is treated to the characteristic level, the waste is no longer considered hazardous. Therefore, the Agency questions what benefits are gained by requiring TC wastewaters to be treated to levels below the characteristic level. Nevertheless, if such levels can be readily obtained and if the Agency decides to set a universal set of treatment standards, the Agency believes that it may be appropriate to set the treatment standard below the characteristic level in order to simplify compliance with the rules. The Agency specifically solicits comment on this point.

2. Characterization of D013–D043 Wastes

In the process of developing treatment standards for D018–D043, EPA will be examining the industries and processes generating these wastes. In doing so, EPA will determine whether there are certain waste characteristics based on generation patterns that may impact the achievability of potential treatment standards. Since these wastes have been recently identified, complete generation data for D018–D043 wastes may not be available until the next biennial reporting for RCRA hazardous wastes. As a result, chemical and physical characterization data are also expected to be limited.

According to the regulatory impact analysis conducted for the TC, D018–D043 wastes are generated by widely diverse industries and/or processes and should, therefore, be comprised of a broad range of constituent concentrations in a variety of physical matrices. In the Third Third final rule, EPA encountered similar situations in developing treatment standards for wastes identified as D004–D017 (based on the old EP leaching procedure), for F039 (multisource leachate), and for many U or P wastes. EPA was able to account for the variability in waste characteristics in developing treatment standards for these wastes.

3. Potential Treatability Groups for D018–D043 from the Petroleum Refining Industry

In an attempt to minimize the number of treatment standards for D018–D043 nonwastewaters, one option that EPA is evaluating would be to set concentration-based standards that would be applicable to the majority of TC wastes. EPA is requesting information on anticipated patterns in waste characteristics or industrial generation that may assist EPA in establishing treatability subcategories for D018–D043 wastes.

EPA anticipates that one such industry is the petroleum refining industry. A potential problem with TC nonwastewaters from this industry is that these wastes may contain significant amounts of oil. Recovery of the oil or other organics, thus, becomes an important alternative to incineration or other destructive technologies. If certain D018–D043 wastes from the petroleum refining industry can be identified that are similar to the listed wastes from this industry (K048–K052, F037, and F038) or if they are demonstrated to contain sufficient levels of recoverable organics, EPA may propose a separate treatability group within each appropriate TC waste code. EPA specifically solicits comment on this approach and the probability of the existence of such recoverable TC wastes. EPA also solicits information and data that could be used to establish a minimum or maximum organic content (as measured by total oils and greases content or total organic content) for this potential subcategory.

4. Potential Transfer of Standards from F039 Wastewaters and Nonwastewaters

One option EPA is considering is to transfer the concentration-based standards for the 26 TC organic constituents in D018–D043 from the corresponding standards for wastewater and nonwastewater forms of F039, multisource leachate. (These were also developed for the corresponding U and P wastes.) The standards for each TC chemical in D018–D043 would then be transferred from the corresponding constituent standard of F039 (e.g., the standard for D018 would be transferred from the wastewater and nonwastewater standards for benzene in F039).

The primary basis of this potential transfer is the similarities in the assumptions behind the development of the F039 standards and those expected for these TC wastes. F039 wastes and the corresponding U and P wastes can come from many different sources and can vary in concentration levels much like the TC wastes. EPA examined many sources of data in developing these standards, including treatment data on specific U and P wastes, F and K wastes from a variety of industries, and multisource leachate. F039 treatment standards, thus, take into account not only the high degree of variability of waste matrices, but also the variability in treatment technologies used.

a. Nonwastewaters

The treatment standards for nonwastewater forms of F039 were based primarily on incineration performance data. Most of these data came from EPA-conducted incineration tests. The standards are generally quite close in numerical value to those for K048–K052. Since standards for K048–K052 are achievable by critical fluid extraction and thermal desorption, EPA suspects that the potential standards for D018–D043 based on a transfer from F039 are achievable by other technologies. On May 30, 1991, EPA solicited information and data that would indicate whether these standards could be achieved using treatment technologies other than incineration. (See 56 FR 24444.) EPA is not aware of situations where the standards for the TC organic constituents as regulated in other hazardous wastes are not being achieved. Nevertheless, the Agency specifically solicits comment on this point.

b. Wastewaters

The development of standards for multisource leachate (F039) wastewaters was based on a transfer of performance data from various sources, including: (1) The Office of Water's Industrial Technology Division and National Pollution Discharge Elimination System data (specifically from the Organic Chemicals, Plastics, and Synthetic Fibers database); (2) the Hazardous Waste Engineering Research Laboratory's database; (3) the Office of Solid Waste BDAT data (from previous land disposal restriction rules); and (4) additional wastewater treatment data from articles on wet air oxidation and powdered activated carbon treatment. Many of the aforementioned data included a significant amount of biological wastewater treatment data.

Most of the wastewater F039 standards are below the corresponding TC characteristic levels. As discussed earlier, EPA has not made a decision to establish treatment standards below the TC characteristic levels. In fact, EPA is specifically requesting comment on this issue. While EPA has not completed its analysis of the impact of establishing these standards, some capacity information suggests that the impact of going below the characteristic levels may be less than expected. Preliminary data indicate that the majority of TC wastewaters may be currently managed in units exempt from general compliance with land disposal restrictions or from compliance with the treatment standards. As a result, EPA anticipates there may be relatively few facilities that are actually impacted. EPA is specifically soliciting comment and facility-specific information that might indicate the potential scope of this impact.

c. Availability of Background Information

The BDAT Background Document for U and P wastes and Multisource Leachate (F039) consists of three volumes. Volume A covers the wastewaters with standards expressed as concentrations. Volume B pertains to those wastes for which technologies were specified as standards. Volume C covers the nonwastewaters with standards expressed as concentrations. These documents are organized by constituent; cross-reference tables with waste code, regulated constituent, and treatment standards are included. These documents provide EPA's rationale and technical support for developing treatment standards for hazardous constituents in F039. (The Final BDAT Background Document for U and P Wastes/Multisource Leachate is available from NTIS (National Technical Information Service), 5285 Port Royal Road, Springfield, Virginia 22161, (703) 487–4600. The NTIS numbers for the three-volume set are PB90–234337, PB90–234345, and PB90–234352.)

5. Use of the Toxic Release Inventory Data

EPA intends to rely, in part, on data from the Toxic Release Inventory (TRI) to assist in the investigation of the overall scope of potential generators and to estimate the likely presence of waste characteristics that may interfere with applicable treatment processes. Data on the releases of chemicals specified in 40 CFR part 372 are submitted annually by industries with two-digit standard industrial classification codes, 20 through 39, as required by section 313 of the Emergency Planning and Community Right-to-Know Act. Most of the 26 TC organic chemicals are included on that list. The TRI data do not, however, track the generation and release of specific hazardous wastes such as the TC wastes. They report, instead, the releases of the chemicals corresponding to the TC. EPA anticipates that release data on the TC chemicals may be used to estimate the potential magnitude of EPA's investigations and, thus, could provide another tool for investigating sources and patterns of potential generation of TC wastes. (See also the discussion of industrial generation of TC wastes in the discussion of capacity for TC wastes below.)

Preliminary examination of the 1987 data for total releases (i.e., the sum of the quantities released to the air, land, and water) of the chemicals corresponding to the new TC wastes indicates that a total of approximately 580 million pounds of these chemicals were released. Most (98 percent) of the total releases involved nine relatively volatile organics. In descending order of total quantities released, these nine chemicals were: Methyl ethyl ketone, trichloroethylene, tetrachloroethylene, benzene, chloroform, 1,2-dichloroethane, vinyl chloride, chlorobenzene, and carbon tetrachloride. While the releases for these nine chemicals are quite large, EPA suspects that the majority of them were to the air. This is supported by other EPA estimates indicating a rate of 85 percent loss of volatile organics to the air. As a result, the magnitude of the generation of solid wastes containing these chemicals is expected to be significantly lower than that implied by the total release data.

If these chemicals were released as solid wastes and were above the characteristic limits, they would correspond to the new TC wastes identified as D035, D040, D039, D018, D022, D028, D043, D021, and D019. All nine of these chemicals were released by 50 or more facilities (per chemical). Patterns may, thus, exist in the industries releasing these chemicals that may potentially lead to the development of treatability groups.

The 1987 TRI data also indicate that only 2.8 million pounds of six specific organic chemicals (hexachlorobenzene, hexachloro-1,3-butadiene, Chlordane, Heptachlor, 2,4,6-trichlorophenol, and 2,4,5-trichlorophenol) were released from a total of only 22 facilities. If these six chemicals were released in solid wastes and were above the characteristic limits, they would correspond to the new TC wastes identified as D032, D033, D020, D031, D042, and D041. Because these six chemicals are typically used as pesticides and because they are anticipated to be generated by a very limited number of facilities, EPA anticipates that the variability in the composition of these six wastes may be somewhat limited. Therefore, EPA is investigating whether this would justify transferring existing treatment data.

The TRI data also indicate that o-cresol, m-cresol, p-cresol, and pentachlorophenol were released from fewer than 50 facilities each, totalling only 1.2 million pounds. While analysis of the data is incomplete, it may be assumed that the releases came from facilities preserving wood with these

chemicals. These data could easily represent facilities generating D023, D024, D025, and D037 wastes. EPA also intends to investigate whether the transfer of treatment standards for K001 and U052 wood preserving wastes may be appropriate for these wastes or whether a separate treatability group based on the wood preserving industry should be developed.

C. Capacity Issues for All TC Wastes

The primary sources of capacity-related data for TC wastes is the Regulatory Impact Analysis (RIA) and Background Information Documents (BIDs) prepared for the TC rulemaking which estimated total volumes of waste generated by all industrial sectors studied, the volume for each waste stream expected to exhibit the TC, the number of facilities affected, and the volume of wastes managed in land-based units that may be affected by the LDRs. EPA estimated that 2.34 billion tons of waste exhibiting the TC would be generated annually by the industries studied. Most of this waste (over 2.33 billion tons) is an aqueous liquid, with a very small portion (50,000 tons) being organic liquid. Sludges and slurries account for approximately 2,000,000 tons, while solid residuals account for approximately 20,000 tons. Most of the TC wastes are generated by a few industries. It was estimated that the petroleum refining industry generates almost 760,000,000 tons of TC wastes, or about 33 percent of all TC wastes generated annually. Together, the synthetic rubber, cellulosic and noncellulosic synthetic fiber, organic chemical, and petroleum refining industries generate over 80 percent of the total TC wastes produced annually.

EPA estimated that approximately 16,000 facilities may generate TC wastes. While 13,000 facilities in the wholesale petroleum marketing industry (80 percent of all facilities) could generate TC wastes, these facilities produce only 3 percent of the total volume of TC wastes. In contrast, the five industries that account for over 80 percent of the volume comprise less than 4 percent of the facilities.

In the RIA, EPA evaluated information on preregulatory or baseline management practices and estimated likely postregulatory (i.e., following the promulgation of the TC rule) compliance practices for each waste type. In particular, EPA assumed in the RIA that after the rule was implemented, facilities would use the least costly method of managing TC wastes as hazardous waste. EPA assumed in the RIA that the aqueous liquids would be managed in exempt wastewater treatment tank units or underground injection wells. Prior to the promulgation of treatment standards for newly identified TC wastes, solid residuals and sludges and slurries were likely to be managed on-site in subtitle C landfills. Management practices for sludges and slurries also could include on-site or off-site commercial subtitle C land application units or off-site commercial subtitle C landfills. TC wastes managed in land-based units, including underground injection wells, are subject to the LDRs and require alternative treatment. EPA requests information on the current management of nonwastewaters exhibiting the TC.

Wastewaters account for over 99 percent of the total waste volumes exhibiting the TC. The volume of wastewater residuals and of wastewaters that are deep-well injected are significant for capacity determinations. EPA estimated that approximately 760,000,000 tons of wastewaters are managed in surface impoundments annually, over 70 percent of which are generated by the petroleum refining industry. All other types of facilities were assumed to be using baseline management practices for wastewaters and are already in compliance with the subtitle C requirements.

Using currently available data, EPA estimates that approximately 540,000 tons (132 million gallons) of used oil generated annually may both exhibit the TC and be land disposed. (Used oil that exhibits the TC and is recycled is exempt from subtitle C control, except where the used oil is burned as a fuel; in this instance, the used oil is subject to minimal standards.) EPA may analyze treatment capacity for used oil separately from other TC wastes because, although used oil is generated across a wide variety of industries, the specific characteristics and management practices of used oil distinguish it from other TC wastes. EPA requests additional data on the generation and management of used oil and comment on this estimate.

In performing capacity analyses for TC wastes, EPA will have to account for the overlap of TC wastes with previously regulated waste. Some waste streams previously regulated as hazardous for certain metals may exhibit the TC. Because the TCLP is a different testing procedure than the EP, there may be additional volumes of characteristic wastes exhibiting the TC than were accounted for in the Third Third rule.

Wastes from industries not analyzed in the RIA or BIDs supporting the TC rule may also exhibit the TC, but EPA currently has few data on the wastes generated by these industries. In addition, there may be other potential sources of TC wastes, not specifically related to an industry or directly related to the generation of current waste streams. The primary sources of these other wastes are remediation wastes, soil, and debris generated during remedial activities taken under CERCLA remedial and removal actions, RCRA corrective actions or closure actions, state program authorities, and voluntary private party cleanup activities; certain PCB wastes; and waste disposed of in shallow Class V injection wells.

Currently available data on the facilities generating newly identified TC wastes do not generally indicate whether these facilities have on-site treatment capacity. EPA's capacity determinations for TC wastes will be impacted by the extent to which facilities generating TC wastes rely upon commercial treatment.

EPA requests information from industries that generate newly identified TC wastes, including information on volumes of TC wastes generated, current waste management practices (including the proportion of TC wastes that are land disposed), on-site treatment capacity, and the current regulatory status of generators. EPA may collect information in the future on facility-specific generation and management of TC wastes.

The lack of facility-specific management data also makes it difficult for EPA to determine what fraction of wastewaters is managed in tanks exempt from subtitle C requirements—a management practice likely to be more economical than the other management options. Consequently, EPA needs information on the actual management practices for wastes exhibiting the TC.

D. Additional RIA Information for TC Wastes

While an RIA for the TC rule was completed at the time it was promulgated, EPA is now soliciting the following additional information in order to understand more fully the recent costs impacts that the TC rule has had on industry: With respect to the cost of testing wastes for applicability of the TC, how often is judgment based on knowledge of the waste being used rather than on quantitative waste analysis? What process changes are being made in order to comply with the rule? What percentage of compliance is being achieved through such process changes? What are the increases in cost

per metric ton of managing TC wastes in Subtitle C disposal units?

The Agency also requests comment and data addressing the following RIA issues: What are the potential differences in human health and environmental benefits associated with setting treatment standards at the characteristic level versus below the characteristic level? What are the cost increases associated with meeting treatment standards that are below the characteristic levels? What is the potential for restricting from use certain types of technologies (including innovative technologies), if the standards are below the characteristic levels? What implementation problems would arise, if the former TC wastes (i.e., no longer exhibiting a hazardous characteristic) are restricted from land disposal as a result of the establishment of standards below the TC levels?

E. New TC Wastes That Were Not Previously Hazardous by the Old EP Leaching Procedure (D004–D017)

In the final rule for the Third Third wastes (55 FR 22520), EPA promulgated treatment standards for D004–D017 wastes, but only for those wastes that were previously hazardous by the old EP leaching procedure and remain hazardous by the new TCLP. This was due, in part, to the fact that the TC final rule was not promulgated until after the D004–D011 treatment standards had already been proposed. Wastes that were not hazardous by the old EP leaching procedure that are now hazardous using the new TCLP are considered newly identified D004–D017 wastes and are currently not subject to the treatment standards.

EPA is attempting to ascertain the existence of the wastes caught by this anomaly and to define their universe. EPA, thus, is soliciting information on the generation, characterization, and treatability of these newly identified wastes. Information on these wastes (assuming they exist) will assist EPA in developing treatment standards for them.

EPA envisions that two general categories of wastes may be in this universe. First, there may be new waste types and generators that were previously not in the hazardous waste system. Second, there may be wastes for which the frequency of being hazardous has increased (i.e., wastes that were not hazardous by the EP leaching procedure, but now fail the TCLP). The Agency requests information on the generation and management practices for both categories of newly identified TC wastes. Generators submitting comments and information of their newly identified D004–D017 wastes should specify in which of the above categories their wastes fall.

1. Metal Wastes (D004–D011)

D004—Arsenic
D005—Barium
D006—Cadmium
D007—Chromium (total)
D007—Lead
D009—Mercury
D010—Selenium
D011—Silver

a. Newly Identified D004–D011 Wastes

In anticipation of the promulgation of the TC rule, EPA established treatment standards for D005, D006, D007, D009, D010, and D011 nonwastewaters requiring compliance based on TCLP analysis rather than the old EP leaching procedure. This was possible because treatment data based on TCLP analysis of these six metals were available that supported the promulgated treatment standards. (In many cases, other supporting treatment data based on EP analysis were also available.) This also provided a consistent analytical basis for measuring compliance for both the characteristic and the treatment standards.

On the other hand, treatment standards for D004 (arsenic) and D008 (lead) nonwastewaters were established requiring compliance based on analysis of either an EP leachate or a TCLP leachate. This is because the data used to promulgate treatment standards for D004 and D008 were based on EP analysis (i.e., those data representing the most difficult waste to treat) and because additional data appeared to indicate that the TCLP leaching procedure was more aggressive than the EP procedure for certain D004 arsenic and D008 lead wastes. The Agency, thus, specified that if a waste does not achieve the nonwastewater standard based on analysis of a TCLP extract but does achieve the standard based on analysis of an EP extract, the waste is in compliance with the standard. (See the further discussion of the use of the TCLP versus EP analytical methods for compliance with the treatment standards in 55 FR 22660 (June 1, 1990).)

In an attempt to simplify the application and enforcement of these standards, EPA is now considering proposing that the treatment standards for D004 and D008 nonwastewaters be based solely on the analysis of TCLP extracts. EPA is soliciting comment and data on whether making this change in the analysis of load and arsenic would present any problems for the generators or treaters of these wastes.

For new wastes brought into the hazardous waste system, EPA is soliciting comment on their treatability and their anticipated ability to comply with the existing TCLP treatment standards for the old EP wastes. For all D004–D011 nonwastewaters that are newly characteristic TC wastes, EPA is, thus, considering proposing the application of the existing D004–D011 treatment standards.

b. Issues Concerning Existing Standards for D004–D011

In an advance notice of proposed rulemaking (56 FR 24444 (May 30, 1991)), the Agency solicited comment and data that could potentially be used to develop revised treatment standards for metal-bearing wastes. Except for D010 selenium wastes, treatment standards for metal-bearing wastes that were previously EP toxic are currently at the characteristic levels for D004–D011.

The Agency is now evaluating whether to revise the treatment standards for D004–D011 nonwastewaters; before the Agency could do this, additional data would have to be provided that could be used to define specific treatability groups. Standards for some treatability groups may conceivably be below the characteristic levels, while standards for the highly concentrated, difficult-to-treat, metal-bearing wastes may be somewhat higher than the characteristic levels. Any data on stabilization being submitted should include detailed information on the characteristics of all wastes being co-treated (both hazardous and nonhazardous), characteristics of the reagents or waste reagents being added, and their mixing ratios (including the amount of water or wastewater being added). This information is necessary in order to assess whether the data represent valid, significant treatment or merely represent the effects of dilution, and whether levels are being achieved through the presence of constituents found in the other wastes that may not be available to other facilities.

EPA is specifically interested in treatment data from pyrometallurgical, hydrometallurgical, and stabilization processes. The Agency is also requesting data on the available treatment/recovery capacity for these processes and on plans for expansion or closure of treatment systems. EPA will evaluate these data to determine whether to establish a universal set of metal standards for a limited number of definitive waste subcategories, such as metal hydroxide sludges, incinerator ash, metal sulfide sludges, and slags

from pyrometallurigcal technologies. These universal standards for subcategories could potentially lead to a justification for automatic delisting or generic exclusion. (This concept was presented in the proposed rule on April 12, 1991 (56 FR 15020) for residues from the high-temperature metals recovery of zinc from K061 electric arc furnace dust.) Wastes that do not fall under these subcategories would then remain subject to existing standards, and, in a sense, the characteristic level would essentially become a default standard for all other metal-bearing wastes.

Finally, in the Third Third final rule, treatment capacity extensions were given for some nonwastewater EP toxic metals (arsenic, lead materials before secondary smelting, mercury). When the capacity extensions expire, these wastes must meet characteristic BDAT before being land disposed. EPA would like to know if adequate treatment capacity is still unavailable (and how the waste is currently being treated), so that we might investigate other treatment options for these wastes, rather than relying on case-by-case variances. This information can be used to develop standards that are attainable by these treaters before their variances run out.

2. Pesticide Wastes (D012–D017)

D102—Endrin
D013—Lindane
D014—Methoxychlor
D015—Toxaphene
D016—2,4-D
D017—2,4,5-TP (Silvex)

While developing the existing standards for D012–D017 pesticides wastes, EPA determined that the number of wastes affected was very small. D012–D017 wastes that are considered newly listed TC wastes are, therefore, unlikely to exist. Since the existing nonwastewater treatment standards for D012–D017 were based on incineration and since incineration has been demonstrated to be less dependent upon matrix interferences, it is likely that any newly identified D012–D017 nonwastewaters (provided they exist) can comply with the existing D012–D017 nonwastewater standards.

EPA is, thus, considering proposing to extend the existing D012–D017 standards to all newly identified D012–D017 TC wastes. These standards are based on an analysis of total constituents in the waste rather than on a TCLP analysis.

EPA set methods of treatment for the EP toxic pesticide wastewaters in the Third Third final rule (55 FR 22554). Because treatment methods rather than concentration-based standards apply to these wastewaters, the dilution prohibition applies when these wastes are managed in systems regulated by the Clean Water Act, and destruction of these constituents is assured.

EPA is evaluating whether to transfer the concentration-based standards developed for these constituents in F039 to the respective D012–D017 wastewaters. This would be consistent with promulgated standards for many U, P, and K pesticide wastes that contain the same pesticides. EPA requests any comments on what the impact would be if concentration-based standards were set for these wastes.

IV. Potential BDAT for Contaminated Soil

This section of today's notice presents a discussion of the data currently available to EPA on contaminated soil, the status of ongoing treatment evaluations, and the approach and options EPA is considering for establishing revised treatment standards for contaminated soil. (A discussion of data and EPA's approach to develop treatment standards for contaminated debris was addressed in a previous advance notice of proposed rulemaking published on May 30, 1991 (56 FR 24444).) EPA is today soliciting any available treatment data and other information relating to the development of revised treatment standards for contaminated soil.

Commenters submitting performance data for treatment or recovery technologies in response to today's notice are requested to include, to the extent possible, the following: Complete chemical and physical analysis of the contaminated soil, treated soils, treatment residuals, and any other materials separated from the contaminated soil; technical descriptions of the treatment or recovery process, including design and operating parameters; and information on the quality control/quality assurance (QA/QC) procedures utilized for sampling, analyzing, and operating the technology.

EPA has developed a "Quality Assurance Project Plan (QAPP) for Characterization Sampling and Treatment Tests Conducted for the Contaminated Soil and Debris (CS&D) Program" that describes the data quality objectives of the contaminated soil and debris program and provides the following: Detailed protocols for field sampling and measurement; a list of contaminated soil and debris constituents; procedures for sample custody and transportation; and additional QA/QC procedures for sampling and analysis. This document is available in the docket. Those planning new treatment tests with the intent of submitting data to EPA are urged to consult the QAPP and communicate with EPA before testing to confirm that the data developed will meet EPA's QA/QC objectives.

EPA also is soliciting information on the costs associated with treatment or recovery technologies for contaminated soil in order to prepare a revised regulatory impact analysis. Of interest are technical reports that include costs or estimates of costs for set-up and operation of the treatment technology. These reports should include the appropriate information on treatment efficiencies and applicability to various soil types, including all the technical information discussed in the preceding paragraphs.

A. Development of Potential Regulatory Definitions for Soil and Contaminated Soil

EPA has previously developed definitions for soil that serve as guides in applying the treatment standards. The Agency now is considering and requesting comment on whether regulatory definitions for soil and contaminated soil are necessary or could provide a means of simplifying the implementation of treatment standards. These definitions could be placed either in 40 CFR 260.10 for general application, or in 40 CFR 268.2 for application only to the land disposal restrictions. The preliminary regulatory definitions for soil and contaminated soil are given below. (The appearance of these suggested definitions in today's notice should not be construed as replacing definitions that appear in other regulatory situations.) *Soil* means unconsolidated earth material composing the surficial geologic strata (material overlying bedrock), consisting of clay, silt, sand, or gravel size particles (sizes as classified by the U.S. Soil Conservation Service), or is a mixture of such materials with other liquids, sludges, or solids, and is inseparable by simple mechanical removal processes. *Contaminated soil* means soil that contains RCRA hazardous waste(s) listed in 40 CFR part 261, subpart D, or soil that otherwise exhibits one or more characteristics of a hazardous waste as defined in 40 CFR part 261, subpart C.

The term "inseparable" to describe mixtures of soil and wastes was developed to allow site managers (e.g., on-scene coordinators, remedial project managers, or equivalent corrective action officials) to determine whether the material to be excavated is separable from the soil by simple in-situ mechanical removal processes. Such

processes include pumping, dredging, or excavation by backhoe, forklifts, or other devices.

This approach is also intended to avoid requiring chemical analysis for soil characteristics in order to determine the exact boundaries between contaminated soil and wastes (e.g., soil particle size, elemental composition of the soil, or other characteristics, such as percent moisture, that would distinguish the soil from the waste). A basis for such chemical analysis has not been developed, and requiring this would most likely have a significant impact on the progress of the remedial action.

Liquids, sludges, solids, and wastes are, however, often separated during the treatment of contaminated soil. Depending upon the treatment process utilized for the soil, these separated materials may or may not have received treatment. It is, therefore, likely that these materials may require additional treatment. (See discussion of potential treatment standards for these residues later in this section. Treatment standards applicable to these materials will probably be different from those for the treated soil.)

B. Applicability of Existing Treatment Standards, Superfund 6A and 6B Guides, and EPA's Contained-in Policy

In promulgating land disposal restrictions (LDRs), including treatment standards, for Solvents and Dioxins, California List wastes, and the First, Second, and Third Third listed wastes, the Agency regulated soil contaminated with these restricted wastes. The LDRs promulgated in 40 CFR part 268 thus generally apply to contaminated soil and include such soil generated from corrective actions and closures at RCRA-regulated land disposal sites, remedial and removal actions at CERCLA (Superfund) sites, and private-party cleanups.

EPA has determined, however, that contaminated soil generally is more difficult to treat than the corresponding RCRA industrial waste. Special treatability variance procedures were established for contaminated soil based on limited soil treatment data that existed at the time. These data were used to develop interim guidance treatment levels (Superfund LDR Guides #6A and #6B, OSWER Directives 9347.3–06FS and 9347.3–07FS) for assessing these treatability variances. Complete copies of the 6A and B guides can be obtained by calling the RCRA Hotline at 1–800–424–9346.

Under EPA's "contained-in" policy, contaminated media (i.e., debris, soil, groundwater, sediments) containing RCRA wastes must be managed as if they were hazardous waste until the media no longer contain the hazardous waste (i.e., until decontaminated) or until the hazardous waste is delisted. To date, EPA has not issued any definitive guidance as to when, or at what levels, environmental media contaminated with hazardous waste no longer contain such waste. The Agency is considering codifying the contained-in policy when LDRs are promulgated for contaminated soils by determining that once a contaminated soil meets the applicable BDAT treatment standards, it no longer contains the hazardous waste, and, therefore, is no longer subject to Subtitle C requirements.

C. Related EPA Activities on Contaminated Media

1. Contaminated Media Cluster

The Agency has recently begun a broader consideration of contaminated media issues that will have some influence on the issues raised today. This effort is designed to improve the overall quality of its regulatory decision-making by looking at groups or clusters of regulations in order to develop more integrated approaches to various environmental problems. The purpose of one of these regulatory clusters, the Contaminated Media Cluster, is to develop a more integrated Agency approach to its policies and regulations dealing with waste remediation programs. Over the next several months, the Contaminated Media Cluster will gather information on the quantities and types of waste needing remediation, the types of risks they represent, the current statutory and regulatory framework, the elements of an effective cleanup process, and the costs and benefits of cleanup. The culmination of that effort will be a regulatory strategy that includes a set of objectives and operating principles for EPA's remediation programs. The LDR regulatory effort and the resolution of issues on contaminated soil will be closely coordinated with the Contaminated Media Cluster.

2. Weathered Sludges

EPA believes that weathered sludges may constitute a new category of contaminated media. EPA currently is attempting to assess the definition of weathered sludges, the comparison of these sludges to newly generated sludges, methods available to treat these sludges, and the relationship of these sludges to sediments. EPA is requesting data or comments on any of the above areas to consider in developing a research program which may lead to the amendment of BDAT standards that are currently applicable to weathered sludges.

3. EPA Lead Strategy

In the case of soil contaminated with lead, EPA will integrate the present rulemaking effort with the Agency's Lead Strategy, which was issued on February 21, 1991. This strategy presents a coordinated approach addressing the significant health and environmental problems resulting from lead pollution. Lead is a multimedia pollutant with significant toxic concerns; accordingly, EPA plans to address lead contamination by coordinating its authorities across programs. Copies of the Lead Strategy can be obtained by calling the TSCA Hotline at 1–800–835–6700.

4. Bioremediation

As a follow-up to the Administrator's Bioremediation Summit held in February, 1990, EPA explicitly is soliciting contaminated soil treatment data on biological technologies to aid in the development of treatment standards for contaminated soil. EPA is aware of the impact of all LDR rulemaking on the development and application of innovative treatment technologies. This notice affirms EPA's interest in gathering private sector data for consideration in setting treatment standards.

D. Applicable Treatment Technologies and the Availability of Treatment Data for Contaminated Soil

EPA is aware of nine general categories of treatment technologies that are considered to be available and demonstrated for contaminated soil: (1) Biological treatment; (2) chemical extraction; (3) soil washing; (4) dechlorination; (5) low-temperature thermal desorption; (6) high-temperature distillation; (7) thermal destruction; (8) stabilization; and (9) vitrification.

EPA has reviewed 124 remedial actions with Records of Decision (RODs) that had the potential to trigger LDRs. This review indicated that 112 sites (93 percent) had some type of soil contamination. Of the 1,350,000 cubic yards (cy) of soil to be treated, 644,000 cy (48%) were to be incinerated, and 437,000 cy (32%) were to be solidified/stabilized. Aeration, biological treatment, soil washing, and miscellaneous other methods were used for the remainder.

EPA also has reviewed over 500 documents dealing with treatment of contaminated soil. Sixty-seven of these documents contained analytical data on soil treatment. Many of these data

(contained in 54 of the documents) have, however, several limitations for the purpose of developing treatment standards, including: inadequate quality assurance/quality control information; incomplete analysis for all contaminated soil constituents; and inconsistencies in the use of analytical test methods. In addition, some of these data do not represent pilot-scale or full-scale operations, and some were generated from treatment of synthetically spiked soil and not actual contaminated soil. Because of these deficiencies, an intensified data collection effort was initiated, including: Collecting existing data from remedial actions and removals; collection of available data through the Superfund Innovative Technology Evaluation (SITE) program; and planning EPA-sponsored treatment tests of specific treatment technologies on selected contaminated soils to fill in data gaps for various combinations of contaminants, soils, and treatment technologies.

EPA is soliciting treatment data on demonstrated and available technologies for soils of varying clay, silt, and sand content, as well as mixtures of organics and inorganics, to determine the impacts of these matrices on the treatability of contaminated soils. Data on the effect of hot spots of contamination and preprocessing (e.g., mixing of soils before treatment) on treatability is also being solicited.

In the final rule for Third Third wastes, EPA determined that the presence of radionuclides did not generally affect the selection or performance of the treatment or recovery process determined to be BDAT for the corresponding RCRA hazardous waste. For a few radioactive mixed wastes, however, the radioactivity of the wastes significantly impacted the selection of applicable treatment technologies (e.g., D009 elemental mercury wastes and D008 lead shielding). EPA is, therefore, soliciting data and other information on the impact of the following radionuclides on the selection and performance of applicable treatment technologies for soils contaminated with radioactive mixed wastes: (1) Americium–241; (2) Cesium–134 and 137; (3) Cobalt–60; (4) Plutonium–238 and 239; (5) Radium–224 and 226; (6) Strontium–90; (7) Technetium–99; (8) Thorium–228 and 232; and (9) Uranium–234 and 238.

E. Potential Regulatory Construct for Revised Treatment Standards for Contaminated Soil

Existing treatment standards in the LDR program are found in 40 CFR part 268, subpart D, and specifically as leachate concentrations in § 268.41, as required treatment methods in 268.42, and as total constituent concentrations in § 268.43. As a result, any revised treatment standards for contaminated soil might logically fall under the construct of these regulations. The Agency may, however, consider placing revised treatment standards for contaminated soil in a new regulatory section or in a new appendix within 40 CFR part 268, subpart D.

Revised treatment standards could be established for contaminated soil as an alternative set of standards for the existing waste codes. To avoid the complications of ascertaining the applicable waste codes, this set of standards could be presented in an appendix or table within a new regulatory section of part 268, subpart D, and would be applicable to all soil contaminated with any RCRA hazardous waste listed in 40 CFR part 261. A four digit, alphanumeric code similar to those for listed wastes could be established in part 268 that could be used solely for the purpose of record keeping and only under the land disposal restrictions.

1. Potential Treatment Standards for the Residual Treated Soil

a. Sets of Concentration-based Standards

Concentration-based standards could be established for the contaminated soil and debris (CSD) list of constituents. (This list includes the BDAT list of constituents plus constituents identified in the Contract Lab Program under CERCLA that do not appear in the BDAT list.) These constituents would be measured in the residual treated soil and would consist of maximum allowable total constituent concentrations for organics and maximum allowable concentrations in a TCLP extract of the treated soil for metals. EPA is currently investigating all available treatment data and is performing field evaluations of technologies in order to develop a set (or sets) of concentration-based standards.

Although EPA recognizes that different soil types and sources of contamination may have an effect on the treatability of contaminated soil, EPA expects that available data may limit EPA to a single set of concentration-based standards based on the most difficult to treat waste. This procedure has been commonly used in the development of existing treatment standards.

EPA believes that these concentration-based standards will most likely be achievable by a variety of technologies. In order to achieve these treatment standards, however, some soils that are more highly contaminated may need to be treated with technologies that are relatively more aggressive than others (i.e., incineration, high-temperature distillation).

b. Standards Based on Organic Treatability Groups

EPA may propose to maintain the constituent structural/functional treatability group concept that was developed in the treatability variance guidance for contaminated soil, because of potential variations in constituent concentration and differences in soil type. These groups were created because treatment data for many individual constituents were not available or were deficient in quality, thus making it difficult to produce constitutent-specific guidance. This approach also recognizes that structurally and functionally similar organic constituents can be treated in a similar manner. This concept was also integral to the development of transfers of treatment data for the existing treatment standards for listed wastes.

c. Standards for Metals

The majority of soils contaminated with metals are expected to be considered hazardous on the basis of the toxicity characteristic and, thus, the applicable treatment standards could be the corresponding standards for D004–D011. EPA is specifically soliciting treatment data and comment on those contaminated soils or types of soils that are not expected to be able to comply with the existing treatment standards for D004–D011. For soils known to be identified with listed waste codes that are hazardous only for their metal content (e.g., K061 and K069), EPA solicits comment on whether these soils can comply with the existing metal standards for those waste codes.

d. Potential Standards Based on Percent Removal or Ranges of Concentrations

Case-by-case variances from existing treatment standards can currently be set within specified concentration ranges or ranges of percent removal (as designated in the treatability variance guidance documents). In establishing ranges of concentrations or ranges of percent removal as revised treatment standards for soil, there is no mechanism for requiring treatment any more stringent than the upper end of a concentration range or the lower end of a percent removal range. In other words, when there is a concentration range as a treatment standard (e.g., 10–50 ppm),

there is no apparent incentive to treat to a concentration significantly lower than the upper concentration (i.e., 50 ppm); when there is a percent removal range (e.g., 80–99 percent), there is no apparent incentive to remove significantly more than the lower percent (i.e., 80 percent). For this reason, establishing ranges as sole treatment standards does not appear to be a practical option.

Percent removals, triggered by threshold levels (similar to the concept used in developing the treatability variance guidance), potentially could be used as alternatives to concentration-based standards to address the concern that more highly contaminated wastes (those above the threshold) may not be treatable to the specified concentration levels. Alternatives that are more consistent with previous development of treatment standards involve adjusting the concentration-based standards so that the limits are achievable on the most difficult to treat waste or subcategorizing the wastes into separate treatability groups and establishing separate concentration-based standards. The problem with the percent removal concept is that when contaminant concentrations are very high in a soil, the percent removal could result in insufficient treatment with significantly high concentrations of contaminants remaining in the "treated" soil. WPA specifically solicits comment on this approach.

e. Standards for Soils Contaminated with Constituents That Are Difficult to Analyze

There are hundreds of RCRA U and P waste codes for which there are no verified analytical methods for measuring concentrations in treatment residues. The CSD list and BDAT list of constituents do not include these chemicals for this very reason. In establishing treatment standards for contaminated soils, EPA must account for the potential presence of these constituents in the soil.

When other constituents are present in the contaminated soil that can be verified through chemical analysis (i.e., those on the CSD or BDAT lists), these other constituents may act as surrogates to verify that the difficult to analyze constituents have been properly treated. The chemicals on the CSD list are generally the most widely used chemicals in the nation and are thus most likely to be found in the majority of contaminated soil. Treatment standards based on analysis for only the CSD list of constituents thus will more than likely suffice for most situations.

Situations may arise, however, where these difficult to analyze constituents could be the only constituents contaminating a soil; thus, standards based on analysis of the CSD list would be inappropriate (e.g., a spill or leak of one of these U or P wastes). In such a situation, EPA is considering the application of the existing treatment standards for these U and P wastes: incineration (identified in 40 CFR 268.42 as INCIN). This would be limited to situations where only this waste code was known to be present. Alternative technologies could still be used through a demonstration of equivalency, as outlined in 40 CFR 268.42(b), or through the variance procedure in 40 CFR 268.44. EPA solicits specific comments on the approaches for developing treatment standards for soil known to be contaminated with difficult to analyze constituents.

f. Potential Standards Based on Total Residual Hazards

While recognizing that concentration based BDAT treatment standards are being employed within the Superfund program and RCRA corrective action program, EPA is also attempting to improve risk estimation measures by developing a Risk Assessment Guidance for Superfund: Volume 1—Human Health Evaluation Manual (Part B, Development of Risk-based Remediation Goals) (Draft, April 1991), which will allow for a detailed evaluation of the total residual hazards through the use of standardized risk assessments. Consequently, EPA is requesting comments on how the Agency might consider total residual hazards from remediation technologies in determining the BDAT treatment standards for contaminated soils.

2. Potential Standards for Nonsoil Residues

Depending upon the treatment process that is applied to the contaminated soil, nonsoil nonwastewater residues and wastewater residues may be generated that could require further treatment. (For example, low temperature thermal desorption will probably result in a concentrated organic residue containing the hazardous constituents of concern.) For some technologies such as soil washing, nonwastewater residues are generated during the treatment process that contain a significant amount of soil. EPA anticipates that these residues will be considered soil and would, therefore, have to comply with the standards developed for the residual soil.

Since the separated materials are actually derived from the hazardous waste that originally was contaminating the soil, one option for developing treatment standards for these residues would be to apply the existing applicable treatment standard for that hazardous waste code (if identifiable). This, again, requires prior knowledge of the identity of the waste code that was contaminating the soil. The residues could logically carry the waste code or codes of the wastes originally contaminating the soil.

Another possible option is to establish one set of concentration-based treatment standards for each of these residue types. These sets of standards then could be applicable as treatability groups of contaminated soil. EPA believes that existing data used in developing other treatment standards may also be used to develop standards for both these nonwastewaters and wastewaters.

A similar situation exists for multisource leachate, which, theoretically, could be derived from any combination of waste codes. As a regulatory solution, the Agency created a new listing for multisource leachate (F039) and established treatment standards for approximately 200 constituents. On the basis of the technical theory behind the development of these treatment standards for F039 and the corresponding U and P chemicals, EPA could establish nonwastewater and wastewater treatment standards for residues from the treatment of contaminated soil by transferring the corresponding standards from F039. EPA believes this approach would be technically supportable and the resulting treatment standards achievable for these residues. EPA specifically solicits comment on this approach.

F. Analysis of Capacity Data for Contaminated Soil

EPA needs to determine the volume of soil contaminated with newly listed and identified wastes that is currently land disposed in order to assess whether adequate alternative treatment capacity exists to treat these wastes. The Agency has already set LDR effective dates for soil contaminated with Solvents and Dioxin wastes, California List wastes, and First Third, Second Third, and Third Third wastes. EPA will, however, have to collect and evaluate data on all contaminated soil because EPA's current information is limited.

A comprehensive data base on the generation volumes and characteristics of contaminated soil and the capacity of treatment technologies is important for the following reasons: To determine the volumes of soil contaminated with newly listed and identified wastes that

may require alternative treatment; to assess the available capacity of treatment technologies suitable for soil contaminated with these wastes; and to identify the total volume of affected contaminated soil, which may include soil contaminated with regulated wastes in addition to newly listed and identified wastes.

EPA has initially categorized two types of sources of contaminated soil. The first type consists of sites where remedial/removal actions are or will be taking place. Remedial/removal action sites where contaminated soil can be generated can be divided into five groups: Superfund sites, RCRA corrective action sites, RCRA facility closures, federal facility cleanups, and voluntary cleanups. The major sources of available capacity-related data on contaminated soil at these sites are Superfund RODs; RCRA Facility Investigations and Facility Assessments; SARA Capacity Assurance Plans; Federal Facility Data Sources; and the New Jersey ECRA Data Base. EPA is expecting to supplement these sources with data from studies that are currently being conducted. The Office of Solid Waste is, for example, considering collecting data on RCRA corrective actions to support the upcoming corrective action rule. The results of these data collection efforts and the relevant capacity-related data on contaminated soil will be included in the capacity analysis when they become available.

The second type consists of spill and excavation sites (e.g., excavation of hazardous waste tanks) that are not included in the remedial/removal category. EPA currently has little information on the generation of contaminated soil from these sources.

1. Issues Specific to Treatment Capacity for Soil

Much of contaminated soil remediation is performed on-site. In fact, current information indicates that between one-half and two-thirds of the waste being treated under CERCLA response actions is being treated or disposed of on-site. It is likely, then, that mobile treatment units will be employed to treat contaminated soil. EPA is investigating the development of an approach to "count" these units, assuming their potential availability for several sites in succession. If, for example, a mobile unit can treat 1,000 cubic feet of contaminated soil per day, the Agency could assume that the unit represents 250,000 cubic feet of annual treatment capacity, or a lesser volume, based on practical operational throughput.

Because there is no comprehensive source on contaminated soil treatment and volume data, the Agency will rely on a variety of sources for capacity analysis. The Agency plans to use assumptions to fill the remaining data gaps. When using multiple sources of data, it is important to be aware of different reporting guidelines, definitions of contaminated soil, and the potential for inconsistencies across data sources.

A second data quality concern involves data overlap. Contaminated soil volumes have the potential to be double-counted, particularly between commercial treatment facilities and the major generators (i.e., Superfund remediations, RCRA corrective actions, RCRA closures, voluntary remediations, and actions undertaken at federal facilities). EPA notes that keeping track of contaminated soil volumes during the treatment process will be necessary to estimate required treatment capacity.

Some RCRA facilities consider sites that deliver waste for disposal for one day, or over a few days, to be one-time generators. The actual length of time it takes to treat and/or dispose of waste from remedial actions can vary considerably, however. The difference between recurrent and one-time waste generation is that a recurrent generator continues to produce waste over time while a one-time generator needs to treat or dispose of a fixed amount of waste. This clarification is important for analyzing treatment capacity for contaminated soil, because these wastes are one-time generated wastes. The interpretation of the reported quantities of contaminated soil is another important consideration for the capacity analysis. In some reports, for example, contaminated soil is recorded as a one-time quantity, in others as an annual generation for a specified number of years (e.g., assuming a five-year remediation, a report might present one-fifth of the total in each of five successive years). The Agency is aware that the definition of "annual generation" is important for the capacity analysis for contaminated soil and requests comments on this issue.

Because federal facilities are typically large (i.e., Department of Energy and Department of Defense facilities), they may generate the greatest volumes of contaminated soil. Moreover, current data indicate that federal facilities may contain up to 25 million cubic feet of mixed radioactive contaminated soil. EPA plans to obtain information on contaminated soil at these facilities.

Because of several years usually elapse between the completion of an ROD or an RFI and the start of site remediation, there is a delay between the time actions are recommended for a site cleanup and the time available treatment capacity is needed. The Agency, therefore, will consider the schedule of future listings, the cleanup start dates for sites on the National Priorities List, and sites involving a plan for voluntary cleanup. A second timing issue that affects the capacity analysis is the duration of cleanup actions. Since many actions are still ongoing, data on the duration of cleanup actions are currently incomplete.

Another timing issue concerns the availability of alternative treatment technologies to treat contaminated soil on a non-continuous basis. Because contaminated soil is largely a finite quantity with low volumes of repeated generation, the length of time necessary to complete remedial actions is important in assessing whether sufficient capacity will exist to treat contaminated soil. The current availability of mobile incineration may, for example, be sufficient to remediate all contaminated soil over several years but not within the same year. The Agency requests comments on the length of time required to complete remedial actions in which contaminated soil is generated.

EPA also needs more information on the constraints associated with making treatment capacity available (i.e., technical, geographical, economic, and regulatory (e.g., permitting)), and on the typical length of time it takes for treatment systems to become fully operational.

2. Preliminary Assessment of Treatment Capacity for Contaminated Soil

Remedial actions at hazardous waste sites are likely to generate the largest volumes of contaminated soil. The Agency reviewed data for 146 sites from 1988 RODs and for 141 sites from 1989 RODs in order to characterize the volumes of contaminated soil that may require treatment under the LDRs. The facilities reviewed included both Superfund lead remedial actions and private party lead remedial actions. A significant number of RODs did not distinguish volumes of contaminated soil from contaminated debris. In addition, contaminated soil wastes were often combined with other soil wastes in the RODs, making it difficult to determine the magnitude of the contamination. Finally, in

recommending remedial technologies, RODs rarely indicated the relative quantities of contaminated soil that would be assigned to each technology.

Two notable conclusions can be drawn from the Agency's initial analysis of Superfund RODs. First, the current data indicate that 10 percent of the facilities account for 75 percent of the total contaminated soil volume. Second, the majority (55 percent) of contaminated soil is contained in-situ (i.e., within the area of contamination) and is not likely to trigger the LDRs. These findings are significant in directing the focus of the capacity analysis. The data also indicate that while a few large-quantity generators of contaminated soil account for most of the volume generated, these large volumes tend to be contained on-site and may not require off-site commercial capacity. This observation may become important as the Agency examines contaminated soil at federal facilities.

There are several management options available for contaminated soil at Superfund sites. Most contaminated soil volumes are contained in-situ, yet these volumes, along with the volumes treated in-situ, are unaffected by the LDRs. Facilities may also treat contaminated soil on-site or send it off-site for treatment; if these volumes are land disposed either on-site or off-site they must meet the contaminated soil treatment standards. Nonwastewaters and wastewater residuals from soil treatment also must meet the relevant LDR standards prior to land disposal. These management options for contaminated soil will be the focus of the Agency's capacity analysis.

The total volume of contaminated soil at Superfund sites for which RODs were signed in 1988 and 1989 is approximately 8.7 million tons. Approximately 3.7 million tons are reportedly land disposed either on-site or off-site and may trigger the LDRs. Data from the RODs have also been used to determine the breakdown of contaminated soil and sludge treatment practices.

The Agency requests comments on this analysis. The Agency also requests data on contaminated soil subject to remediation at Superfund and RCRA corrective action sites, including data on the actual volume of contaminated soil at each site; applicable hazardous waste codes (if identifiable); current and planned management practices for contaminated soil; and the starting date and projected duration of cleanup actions.

V. Potential BDAT for Four Specific F and K Wastes Promulgated After November, 1984

A. Potential BDAT for Newly Listed Wastes from Wood Preserving Operations (F032, F034, and F035)

On December 6, 1990 (55 FR 50450), EPA listed F032, F034, and F035 as hazardous wastes from the wood preserving industry. Detailed descriptions of the listings and waste characterization data for these wastes are presented in the final rule and Listing Background Document for these wastes. EPA has begun analysis of the data and information contained in these documents to develop concentration-based standards and to analyze treatment and recycling capacity for these wastes.

Concentration-based standards that may be proposed for the organic constituents in F032, F034, and F035 wastes may be based on the transfer of standards from other wood preserving wastes, such as K001 (bottom sediment sludge) and U051 (creosote), or on the transfer of standards from other wastes determined to be similar or more difficult to treat, such as those developed for F039 (multi-source leachate). The development of these standards is discussed in the Third Third final rule (June 1, 1990) for K001 and U051 at 55 FR 22582, and for F039 at 55 FR 22619.

Standards for the inorganic constituents in F032, F034, and F035 wastes may be based on performance data currently being developed by EPA's Office of Research and Development (ORD) or based on a transfer of standards from various metal-bearing wastes that are determined to be as difficult to treat. These include D004 (wastes characteristic for arsenic), K031 (specific organo-arsenical veterinary chemicals), D007 (wastes characteristic for chromium), and K062 (spent pickle liquor from iron and steel manufacture). The development of standards for these wastes is discussed in the Third Third final rule (June 1, 1990) for D004 and K031 at 55 FR 22556, and for D007 at 55 FR 22563. K062 standards were discussed in the First Third final rule (August 17, 1988) at 53 FR 31164.

Treatment data and supporting documentation for all the aforementioned wastes are provided in the administrative reocrds for the respective rules and are summarized in the appropriate BDAT Background Documents located in those records. The following sections of today's notice discuss how EPA might use the information and data on the aforementioned wastes in developing proposed treatment standards for F032, F034, and F035. For simplicity, the Federal Register references discussed above are not repeated in the discussions of potential BDAT.

1. Potential BDAT for F035 Wastes

F035—Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.

F035 wastes are generated by facilities that use inorganic wood preserving formulations. The inorganic preservatives of concern in the listing are arsenical and chromate salts dissolved in water. The most commonly used inorganic preservatives include chromated copper arsenate (CCA), ammoniacal copper arsenate (ACA), acid copper chromate (ACC), chromated zinc chloride (CZC), and fluor-chrome-arsenate-phenol (FCAP). EPA estimates that over 80 percent of all wood preserved with inorganics are preserved with CCA.

EPA may propose concentration-based standards for F035 wastewaters and nonwastewaters that would include all the constituents expected from the use of all the aforementioned formulations, i.e., arsenic, copper, chromium, zinc, fluoride, phenols, and lead. (Lead, which is regulated in K001 and U051 wastes, and mercury have also been suggested as potentially being present in these wastes.)

Most treatment data currently available for the inorganic constituents are from the treatment of hazardous wastes other than F035 wastes. Treatment processes for wastewaters containing these inorganic constituents typically involve the use of chemical oxidation, chemical reduction, precipitation, and filtration of sludges. Treatment for nonwastewaters include cementitious or pozzolanic stabilization, vitrification, or stabilization with specialized reagents (i.e., for arsenic).

Because F035 wastes consist primarily of inorganics, EPA is investigating the potential for developing concentration-based standards that are based on the leachability of metals from residuals of recovery processes. EPA specifically solicits comment and data on the applicability of high-temperature metal recovery processes (such as copper smelting operations) or conventional hydrometallurgical processes for the

recovery of arsenic, copper, and chromium from F035 wastes.

EPA also solicits information and data on the potential for incorporating pollution prevention as an alternative BDAT. EPA is particularly interested in procedures that facilities could use to reduce the generation of not only F035, but also F032 and F034. Owing to the widespread use of inorganic preservatives and the relative decline in the use of creosote and chlorophenolics, it is possible that F035 wastes realistically may have a greater potential for overall reduction through pollution prevention activities. (See also a general discussion and request for comment on EPA's approach to pollution prevention in the land disposal restrictions program in Section II.A. of today's notice.)

a. Treatment Data for Inorganics in Wastewaters

EPA's Office of Research and Development has conducted preliminary bench-scale treatment studies on wastewaters synthesized to mimic the composition of F035 wastewaters as they might appear from facilities using CCA formulations. The process studied focused on the treatment of arsenic and chromium in the wastes and consisted of two stages. The first stage of the treatment process oxidizes any trivalent arsenic present to the pentavalent state for subsequent precipitation and filtration as ferric arsenate and ferric hydroxide. In the second stage, hexavalent chromium is reduced to the trivalent state for subsequent precipitation and removal.

Besides these bench-scale data, EPA has performance data for treating various arsenic and chromium-bearing industrial wastewaters. While some of these data are for wastewaters containing relatively low concentrations of these metals, they were used to develop treatment standards for wastewater forms of multi-source leachate (F039). EPA is investigating the feasibility of directly tranferring the F039 standards for metals other than arsenic and chromium to these wood preserving wastes.

Additional treatment data exist for arsenic-bearing wastewaters (D004) generated from the veterinary pharmaceuticals industry. These wastewaters contain various inorganic forms of arsenic (in different ionic states), along with various organo-arsenical pharmaceuticals. The matrix of this D004 wastewater may be determined to be more difficult to treat than that expected for F032, F034, or F035. As such, these data may be used in the development of arsenic standards for these wood preserving wastewaters.

Wastewater treatment data for chromium in K062 (see below) and various D007 wastewaters are being considered for development of treatment standards for chromium.

b. Treatment Data for Metals in Nonwastewaters

EPA currently has performance data for the treatment of hexavalent chromium and other metals in K062 wastes. The treatment process for these wastes includes reduction of the hexavalent chromium to the trivalent state, followed by chemical precipitation with lime and/or sulfide, settling, filtering, and dewatering of the sludge. The concentration-based standards for K062 nonwastewaters were then developed based on the leachability of the metals from this sludge. The concentrations of chromium and lead in the untreated K062 wastes appear to be within an order of magnitude of the concentrations expected in F035 wastes, thus providing a basis for transfer of the concentration-based standards for chromium and lead. The concentrations of arsenic in untreated F035 wastes are, however, five orders of magnitude higher than those in K062. Additional performance data for the treatment of chromium also exist for various types of other nonwastewaters identified as D007. These primarily include data on cementitious and pozzolanic stabilization. Many of these D007 nonwastewaters are expected to be as difficult to treat as F035 nonwastewaters.

Stabilization and vitrification tests have been conducted on various arsenic-bearing nonwastewaters that were used in the development of treatment standards for K031, K084, K101, K102, P010, P011, P012, P036, P038, and U136 wastes (June 1, 1990, 55 FR 22560). Based on data for some D004 nonwastewaters that contained over one percent of arsenic, vitrification was determined to be BDAT for all nonwastewater forms of these ten wastes. While data from nonconventional stabilization processes indicated that other D004 wastes low in arsenic could be stabilized to lower treatment levels using additives (e.g., iron salts) and specialized reagents, insufficient data were available to create separate treatment standards for subcategories of D004 wastes based on their arsenic content. Therefore, EPA promulgated treatment standards based on vitrification of the most difficult to treat wastes, i.e., those with high concentrations of arsenic.

EPA may develop proposed treatment standards for F035 nonwastewaters based on a transfer of the performance data for the metals in the aforementioned wastes.

2. Potential BDAT for F034 Wastes

F034—Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.

F034 wastes are generated by facilities that have used creosote in their wood preserving formulations. Creosote generically refers to mixtures of relatively heavy residual oils (liquid and solid aromatic hydrocarbons) obtained from the distillation of wood, coal tar, or crude petroleum. Only creosote from coal tars are, however, accepted for use as wood preservatives. The majority of creosote-based formulations consist of coal tar creosote or blends of creosote and crude coal tar.

When unused creosote is discarded or spilled, it is the listed hazardous waste identified as U051 (a more complete explanation of generation of listed wastes identified as U wastes is provided in 40 CFR 261.33). Treatment standards for U051 and K001 wastes were promulgated in the Third Third final rule (55 FR 22582) and established concentration-based standards for lead and six organics, including naphthalene, pyrene, phenanthrene, pentachlorophenol, touluene, and total xylene(s). EPA is considering proposing a transfer of standards for the constituents regulated in U051 and K001, as well as any other organic constituents that may be anticipated to be present in F034 wastes, such as other polynuclear aromatic hydrocarbons and other solvents.

Pentachlorophenol was selected for regulations in U051 wastes because of the anticipated co-management of U051 with K001 wastes (which are also regulated for pentachlorophenol) and the likelihood that U051 wastes could be generated in the form of a spill residue at a site that uses or used pentachlorophenol. EPA stated that a facility's waste analysis plan could be revised to eliminate analysis for pentachlorophenol, provided the facility could demonstrate that it never used pentachlorophenol and that the U051 wastes were generated only as an off-specification product.

Note: On January 31, 1991 (55 FR 3864), EPA published a technical amendment to the

Third Third final rule correcting a publication error in the standard for pentachlorophenol in U051 and K001 nonwastewaters. The correct standard is 7.4 mg/kg.)

According to the listing definition, F034 wastes should not contain pentachlorophenol, and EPA may not propose treatment standards for pentachlorophenol in F034 wastes. EPA is, however, specifically soliciting comment on this issue.

The U051 and K001 nonwastewater standards for naphthalene, pyrene, phenanthrene, pentachlorophenol, toluene, and total xylene(s) are based on the analysis of ash from the incineration of K001 wastes. The standards for these six organics were modified somewhat in the Third Third final rule and were transferred as standards for F039 nonwastewaters. For these and other organics that might be expected to be present in F034 wastes (or F032), EPA also is considering proposing a transfer of the corresponding nonwastewater standards that were developed for F039.

While the standards for the organics are based primarily on analysis of incinerator ash, EPA believes that most of these organic standards are achieveable by several technologies other than incineration. (Standards for organics in petroleum refining wastes identified as K048–K052 are well within an order of magnitude of the corresponding standards set for F039 nonwastewaters and have been demonstrated to be achievable by solvent extraction, thermal desorption, or incineration.) EPA is soliciting specific data and comment on the achievability of the F039 nonwastewater standards using other technologies, such as biodegradation, as applied specifically to F034 wastes or wastes that are similar to F034. Since these standards may also be proposed for F032, EPA similarly solicits data and comment for these organics in F032 wastes.

For all organics in wastewaters, EPA is considering a direct transfer of the constituent-specific wastewater standards that were developed for F039. The promulgated treatment standards for the organics in U051 and K001 currently are based on incineration scrubber wastewaters, while the F039 wastewater standards are based on one or more of the following wastewater treatment technologies: Biological degradation, powdered activated carbon treatment (PACT), steam stripping, wet-air oxidation, and granulated activated carbon adsorption. Because the standards for F039 were based on the use of multiple technologies, EPA anticipates these wastewaters standards also will be achievable for wastewaters from wood preserving operations.

The characterization data available for metals in F034 wastes show that chromium, lead, and arsenic appear to be present at treatable concentrations. EPA is considering proposing treatment standards for these three metals and is investigating whether other metals also may be present. Standards for metals in F034 wastes are likely to be proposed similar to those being developed for F035 (as discussed above). Because F034 wastes contain organics (creosote), EPA may propose to transfer metal treatment standards from those wastes containing organo-metallic compounds (e.g., D004 wastewaters from veterinary pharmaceuticals and K031), rather than those containing only inorganic forms of these metals.

3. Potential BDAT for F032 Wastes

F032—Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with section 261.35 of this chapter and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.

As described in the listing, F032 wastes are generated from wood preserving processes that use chlorophenolic formulations (such as pentachlorophenol and tetrachlorophenol) or from facilities that previously used chlorophenolic formulations—even though they currently may be using creosote or inorganic preservatives. The potential presence of hazardous constituents from these other wood preserving formulations most likely will affect the selection of constituents to be proposed for regulation in the treatment standards for F032 wastes.

EPA is considering transferring all the organic and inorganic standards currently being investigated for proposal for F034 and F035 wastewaters and nonwastewaters to standards for F032 wastewaters and nonwastewaters. Since F032 wastes are expected to contain treatable levels of several chlorophenolics, EPA may propose additional treatment standards for these constituents. EPA specifically solicits waste characterization data that may be available (or that could be developed) supporting or refuting the necessity of regulating the various homologues and congeners of chlorine substituted phenolics. Treatment standards for these constituents may be proposed based on a transfer from F039 or from the corresponding U waste for that particular chlorophenolic.

Listing data indicate the potential presence of up to ten homologues of polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) in some F032 wastes. EPA solicits data and comment on whether the regulation of these constituents as treatment standards for either wastewaters or nonwastewaters may cause these wastes to go untreated. It has been EPA's experience that where these constituents have been proposed for regulation in a waste-specific treatment standard, the commercial hazardous waste treatment industry tends to shy away from treating these wastes, thus resulting in unnecessary delays in such treatment. This is primarily due to the acute sensitivity of the public to these constituents and the increase in liability resulting from handling them. EPA solicits ideas on how treatment standards for F032 wastes could be constructed so as to avoid delays in treatment that may arise from these concerns.

4. Analysis of Capacity Issues for F032, F034, and F035

a. Currently Available Capacity Data

In 1985, EPA conducted a RCRA Section 3007 survey to gather information on treated wood production volumes, production processes, waste generation, waste characteristics, and waste management practices in effect in 1984. Eighty five plants (81 pressure and 4 non-pressure plants), representing 15 percent of the total number of identified active plants in 1984 and 44.5 percent of the total production of treated wood in 1984 submitted data. Using this survey data and information provided in public comments on the proposed wood preserving listing rule, EPA determined generation rates for waste streams in the wood preserving industry.

Thirty-three percent of survey respondents reported generating and managing process wastewater and most of these used chlorophenolics or creosote preservatives. EPA has determined that process wastewater generated at facilities using inorganic preservatives is reused in the process. Approximately 63 percent of the facilities responding to questions about wastewater generation and management sent wastewater to a POTW, while 13 percent stored or disposed of their wastewater in land-based units, including land application units,

evaporation ponds, and surface impoundments. It is likely that the wastewater management practices of facilities that used surface impoundments in 1984 have changed since bottom sediment sludge from wastewater treatment at wood preserving facilities using chlorophenolics or creosote is a listed hazardous waste (K001), and, therefore, these land-based units are now subject to the minimum technology requirements under HSWA. These facilities are currently sending wastewater to POTWs or using thermal evaporation.

Approximately 70 percent of facilities using chlorophenolic preservatives and 84 percent of facilities using inorganic preservatives reported in the 3007 Survey that a waste contractor removed their process residuals. Additional information collected by EPA indicates that other facilities treat their waste as hazardous and dispose of it in subtitle C landfills. In addition, most of the facilities that send wastewater to a POTW pretreat the wastewater. Although the bottom sludges from wastewater treatment at facilities using organic preservatives are already a listed hazardous waste, other sludge/solid residuals from wastewater treatment may be subject to the LDRs. EPA does not have information on waste generation rates for these residuals.

No information has been collected on the generation or management of discarded spent formulations. EPA assumes that such wastes may be generated in very small quantities during maintenance of work tanks or closure of wood preserving facilities.

To calculate total volumes for each waste stream, the waste generation rates per unit of wood treated were multiplied by the total volume of wood treated with each preservative type. Because the listing definition of F032 includes all wood preserving waste generated at facilities that use or have previously used chlorophenolics, any waste from creosote or inorganic processes at facilities that also use chlorophenolics was classified as F032. Wastes from inorganic processes at facilities that also use creosote were classified as F034. When estimating total waste generation, waste from facilities that use multiple preservatives was re-grouped into the correct category.

b. Specific Capacity Issues for Nonpressure Treaters

Comments on the proposed wood preserving listing rule (53 FR 53282) indicated that there are approximately 100 nonpressure treaters currently in operation. Nonpressure treaters, which are normally very small facilities, are believed to use chlorophenolic formulations. While these facilities could potentially qualify as conditionally exempt small quantity generators (generating less than 100 kg/month), no information is readily available on actual waste generation rates to confirm this possibility. Although EPA has received some data from four nonpressure treaters, the data were not used to calculate waste generation rates for nonpressure processes. EPA therefore requests data and information on nonpressure treaters in order to improve the capacity analysis for these wastes.

c. Specific Capacity Issues for Inorganic Preservative Wastewaters

Because most facilities using inorganic preservatives achieve zero discharge by reusing process wastewater, a wastewater generation rate for facilities using inorganic preservatives was never calculated. Thus, EPA may consider establishing recycling as BDAT for these inorganic wastewaters. The lack of information on the volumes of waste generated would, therefore, not affect the capacity analysis. If recycling is, however, not established as BDAT, the availability of commercial treatment becomes an issue. If this is the case, a generation rate for inorganic wastewater will need to be estimated. EPA requests comments and additional data on the generation and management of inorganic wastewaters for F032, F034, and F035 wastes, and the volumes that are currently recycled.

d. Preliminary Assessment of Capacity

Data available to EPA on the generation of F032 wastes indicate that 300,000 tons of organic wastewater, 2,000 tons of organic nonwastewater, and 60 tons of inorganic nonwastewater are generated annually. The generation of F034 wastes consists of 330,000 tons of organic wastewater, 1,500 tons of organic nonwastewater, and 30 tons of inorganic nonwastewater. Currently available data on F035 wastes indicate that 1,300 tons of inorganic nonwastewater are generated annually. Since inorganic processes typically have no net generation of wastewater because water is recycled back into the treatment process without intervening land disposal, inorganic wood preserving wastewater may not require alternative treatment capacity.

EPA requests comments on the data presented above and solicits additional data from nonpressure treaters including information on waste generation rates. EPA also requests data on current wastewater treatment practices for wood preserving facilities that used surface impoundments in 1984.

5. Request for Data on the Regulatory Impact Analysis for Developing BDAT for F032, F034, and F035

While EPA performed a regulatory impact analysis for the listing of F032, F034, and F035 wastes, EPA is now soliciting additional related information in order to perform such analysis on potential BDAT for these wastes.

EPA is soliciting specific information on the drip pads used at wood preserving sites. (1) What are the rates and quantities of drippage for the different processes used in wood preserving (e.g., creosote, pentachlorophenol, inorganic)? (2) What are the constituent concentrations of the drippage? (3) How many facilities have drip pads, and what is the type of construction used for the pad (e.g., concrete, asphalt, other)? (4) What are the age and condition of the drip pads? (5) How many of the drip pads have liner systems? (6) How many facilities are doing nonpressure wood preserving through a dripping process?

EPA is also attempting to ascertain information on the financial status of the wood preserving industry: (1) Do wood preserving facilities have the ability to finance capital improvements? (2) What types of loans do these firms qualify for, and what are the conditions set on the loan? (3) At what interest rate do these firms borrow?

In the process of listing F032, F034, and F035 as hazardous wastes, EPA also proposed to create a listing for F033 surface protectants, but deferred regulation on this waste because of a lack of data. Besides the information requested above, EPA is attempting to determine the number of facilities currently using sodium pentachlorophenate as a surface protectant and the number that have used sodium pentachlorophenate in the past. This information will assist EPA in making a listing determination for F033 wastes.

B. Potential BDAT for Newly Listed Aluminum Potliners (K088)

Wastes identified as K088 are described in 40 CFR 261.32 as spent potliners removed from electrolytic cells at primary aluminum reduction facilities. K088 wastes were originally listed as hazardous on July 16, 1980 (45 FR 47832), but RCRA section 3001(b)(3)(A)(ii) (also known as the Bevill amendment) suspended the listing. In response to a court order (*EDF* v. *EPA*, No. 86-1584,

DC Cir. July 29, 1988), the suspension was lifted in a final rule on September 13, 1988 (55 FR 35412), thereby relisting K088 wastes as hazardous.

Potliners are comprised of very large solid blocks of carbon that line electrolytic cells used for reduction of aluminum oxide and formation of molten aluminum. The electrochemistry of the manufacturing process results in gradual contamination of the carbon blocks over the lifetime of the cell (typically ranging from 4 to 7 years). As a result, K088 wastes contain relatively high concentrations of fluoride and cyanide and often contain lower concentrations of various polynuclear aromatic hydrocarbons, other organics, and some metals. A more detailed description of the listing, along with characterization data for these wastes, is presented in the final rule and Listing Background Document for K088 wastes.

EPA has begun analysis of the data and information contained in these documents for the development of BDAT treatment standards and for the subsequent analysis of treatment and recycling capacity for these wastes. The relatively infrequent generation of these wastes (per cell), their unusual physical size and composition, along with the electrochemical nature of the manufacturing process, will all impact the potential for waste minimization, treatment, and recycling of these wastes. EPA is currently investigating how all of these factors will affect the selection of BDAT and is specifically soliciting comment on these issues.

1. Applicable Treatment and Recycling Technologies

EPA is investigating thermal destruction technologies such as incineration and fuel substitution as applicable to K088 wastes. EPA's Office of Research and Development (ORD) has recently conducted performance testing of rotary kiln incineration on samples of K088 wastes selected as the most difficult to treat. EPA also is aware of reported efforts by the aluminum industry to evaluate the use of K088 wastes as fuel substitutes or fluor-spar substitutes in industrial furnaces such as cement kilns, wool cupolas, and iron and steel furnaces.

EPA is also gathering information on the potential recovery of fluorides using thermal treatment, the removal and/or recovery of fluorides using chemical extraction, the reuse of the spent potliners for their carbon content, and the recovery of cryolite (present from the manufacturing process) from the K088 wastes. (See further discussion of capacity issues from the cryolite recovery process in section V.B.5. below.) A company in the aluminum industry recently indicated to EPA that its parent company is developing a proprietary commercial process, referred to as the Comtor process, and claimed that it can thermally detoxify spent potliners allowing for the potential recovery of fluorides. Information on these technologies was, however, unavailable for inclusion in today's notice and administrative record. EPA is soliciting information on all potential recovery technologies for K088 wastes.

2. Potential Slagging of K088 Wastes During Thermal Destruction

Prior to EPA's testing of the incineration of K088 wastes in a rotary kiln, there were some concerns about how to prevent slagging of materials in the kiln. (Slagging refers to the agglomeration of fused ash or particulates and can occur in the thermal unit or air pollution control devices.) Slagging is likely to have a negative effect on the performance and/or operation of a kiln depending upon the design of the kiln and the waste being incinerated.

Slagging can often be prevented and controlled by adopting one or more of the following techniques. One technique, based on thermochemical reactions, is to add fluxing agents such as calcium silicate to the waste to prevent any fused potliner pieces from agglomerating on the surface of the kiln refractory. EPA contemplated using this technique. In fact, EPA performed several tests prior to the test burn in order to determine if anti-agglomerants should be added to the feed prior to burning. First, analyses of ash fusion temperature were performed that indicated no slagging should occur at the proposed incineration temperature. Second, a brief scoping burn was performed prior to the test burn demonstrating that the K088 material should not slag in the kiln.

Other techniques, usually based on the thermochemical properties inherent to the spent potliners, primarily involve the control of various operating parameters of the kiln. In one such technique, the temperature of the kiln is operated well above the fusion temperature of the wastes so that the thermodynamics and kinetics of destruction are controlled by the high temperatures.

In another technique, the kiln is operated well below the fusion point of the waste, but uses longer residence time to assure destruction. EPA's incineration test utilized this technique. The kiln was operated at temperatures up to 1800 F, which is significantly below the anticipated fusion point of 2700 F for the K088 ash. EPA did not attempt to incinerate K088 wastes at temperatures above this fusion point because the necessary operating temperatures were beyond EPA's rotary kiln design capabilities. Since K088 wastes are generated as hard carbon blocks in various large sizes, EPA had to pretreat the wastes to a particle size below one quarter of an inch in order to homogenize and feed the waste into the incinerator. The K088 wastes were fed to the rotary kiln incinerator over a period of three days with a residence time of about one hour.

On the third day, some slagging was observed. While data on the operating temperatures of the kiln have not yet been correlated to these observations, EPA is uncertain if the slagging may have been a result of analytical testing procedures to determine the ash fusion point of the K088 wastes. In addition, EPA observed that the K088 wastes fed during the third day contained more fine particles than during the previous two days. EPA is unclear on whether the fine particle size may have played a role in the slagging problems or whether it was simply the fluctuations in kiln temperature. It is also possible that the high concentration of fluoride in the K088 wastes may have played a significant role in slagging owing to the fusion properties and reactivity of some fluoride salts.

3. Potential for Establishing Concentration-based Standards

An analysis of residues from the testing of rotary kiln incineration of these K088 wastes leads EPA to believe that concentration-based treatment standards may be possible. As discussed in the beginning of this notice, EPA attempts to establish concentration-based standards for wastes so as to allow the use of any technology that can technically achieve the numerical values.

EPA's preliminary analytical test results quantifying the concentration of cyanide constituents (amenable, total, and TCLP) show that 90 to 97 percent of amenable cyanides were destroyed. The amenable cyanide analysis of the ash was reported as 1 to 190 mg/kg. While the operating and analytical data have not undergone full review within EPA, they have been placed in the administrative record for today's notice for public review and comment. EPA is specifically soliciting review of these data and preliminary findings.

EPA also is reviewing data from the incineration of K088 wastes in Reynolds Aluminum modified cement kiln. This process included the addition of approximately 30 percent sand and 30

percent limestone to the K088 wastes. An exit temperature of 1200 F was maintained for the ash, which was similar to the exit temperature during EPA's testing. A residence time of up to two hours was used rather than the one hour residence time for EPA's testing. Reynolds reported achieving levels of cyanides (total) ranging from 0.5 mg/kg to 16 mg/kg in the ash residues.

EPA is also considering an alternative of transferring data from the rotary kiln incineration of K011, K013, and K014 (wastes containing cyanides and nitriles). These wastes were incinerated under similar operating temperatures and residence times to those of the K088 test. The final cyanide concentrations in these ashes averaged 11 mg/kg.

Results of the analysis for metals and for organic constituents such as volatiles and polynuclear aromatic hydrocarbons have not been reviewed for inclusion in today's notice. These data will, however, be reviewed for possible development of concentration-based treatment standards.

4. Potential for Specifying Technologies as a Treatment Standard

Should difficulties arise in analyzing hazardous constituents in the treatment residues, EPA may have to propose standards specifying the use of certain technologies. EPA is soliciting comment and data indicating any known or perceived analytical difficulties specifically for residues from the thermal destruction or recovery of K088 wastes.

EPA is investigating whether thermal destruction technologies such as incineration or fuel substitution would have to be specified as the treatment standard. Because of the potential for slagging (as discussed above), standards for K088 wastes may need to include minimum operating temperatures, minimum residence time, and/or the use of specific fluxing agents. These additional requirements may be necessary to ensure that the thermal units are operated properly (i.e., no slagging) and that the hazardous organic constituents of concern are destroyed. EPA is soliciting comments on these issues and is soliciting data that could assist in establishing such operating conditions. In addition, EPA is investigating the need to require specific controls for other thermal destruction or recovery processes such as those that would use K088 wastes as either a fuel substitute or fluor-spar substitute.

5. Currently Available Capacity Data

In 1988, EPA collected data on K088 and other waste streams for a RCRA section 8002(p) study and Report to Congress. Data indicate that approximately 130,000 tons of spent aluminum potliners are generated every year. EPA has also received updated data from the aluminum industry indicating approximately 14,000 tons are sent to cryolite recovery annually and 500 tons are otherwise recycled. Approximately 5,000 tons of K088 wastes are either incinerated or burned as fuel. The remaining wastes, approximately 105,000 tons, are placed in units that are now considered land disposal units. These figures reflect, however, management practices prior to the relisting of this waste.

The cryolite recovery process extracts the mineral cryolite (i.e., sodium aluminum fluoride) from spent potliners for reuse in the aluminum reduction process. This process generates residues that are considered to be K088 wastes based on the derived-from rule (50 FR 639 (January 4, 1985)). The data submitted on waste generation rates indicate that approximately 1,700 tons per year of these residues would be generated during cryolite recovery, provided the K088 spent potliners are not mixed with any other materials during the recovery process. If the potliners are mixed with other waste prior to recovery, the volume of K088 residues could be much higher. In fact, data from facilities using this process indicate that this could be as much as 30,000 tons per year. Just prior to publication of this notice, additional information from the aluminum industry indicates that this recovery process is being discontinued. EPA solicits comment on the reasons for the apparent abandonment of this process and its effect on the potential for establishing cryolite recovery as BDAT.

Curent data for K088 indicate that 100,000 tons of spent potliners may require treatment prior to land disposal, and the volume of cryolite recovery residues requiring treatment prior to land disposal could be greater than 30,000 tons per year. EPA requests comments on this analysis, specifically on current and projected data on the generation and management of K088 wastes, including information concerning on-site treatment capacity. In addition, EPA requests information on the cryolite recovery processes employed, including the volume of K088 treated, the volumes of other waste mixed with K088 prior to recovery, the volumes of K088 cryolite recovery residues, and the waste characteristics and management practices for those residues.

VI. Potential BDAT for Mineral Processing Wastes

A. Background

RCRA section 3001(b)(3)(A)(ii) also known as the "Bevill exclusion" excludes "solid waste from the extraction, beneficiation, and processing of ores and minerals" from regulation as hazardous waste under subtitle C of RCRA, pending completion of certain studies by EPA. In 1980, EPA interpreted this exclusion (on a temporary basis) to encompass all "solid waste from the exploration, mining, milling, smelting, and refining of ores and minerals" (45 FR 76619, November 19, 1980). In July 1988, a Federal Court of Appeals (*EDF* v. *EPA*, 852 F.2d 1316 (DC Cir. 1988), *cert. denied*, 109 S. Ct. 1120 (1989)) found this exclusion to be based upon the "special waste" concept first proposed by EPA in 1978 (43 FR 58946), and that Congress intended the term "processing" in the Bevill Amendment to include only those wastes from processing ores or minerals that meet the "special waste" concept, that is, "high volume, low hazard" wastes. (852 F.2d at 1328–29.)

In compliance with this Court decision, on October 20, 1988 EPA published a proposal to define further the scope of section 3001(b)(3)(A)(ii) of RCRA. (See 53 FR 41288.) In that proposal, EPA presented criteria for defining mineral processing wastes and criteria for identifying mineral processing wastes that are high volume and low hazard. On September 1, 1989 (54 FR 36592) and January 23, 1990 (55 FR 2322), EPA published final rules that removed a number of mineral processing wastes from the so-called "Bevill exclusion." A definition of mineral processing wastes (54 FR 36628) excludes wastes derived from beneficiation processes. All "high volume and low hazard" mineral processing wastes (for definitions, see 54 FR 36607 and 36597, respectively) retained within the final Bevill mineral processing waste exclusion have been subjected to detailed study by EPA, and the findings were contained in a Report to Congress that was submitted to Congress on July 31, 1990.

Most of the mineral processing wastes removed from the Bevill exclusion appear to be characteristic for EP metals (D004–D011), corrosivity (D002), and/or reactivity (D003). EPA considers these wastes to be "newly identified" wastes because they were brought into the RCRA Subtitle C system after the date of enactment of HSWA on November 8, 1984. In the Third Third final rule published on June 1, 1990, EPA promulgated BDAT treatment standards

for characteristic hazardous wastes (D001–D017). For reasons outlined at 55 FR 22667, EPA determined, however, that the newly identified mineral processing wastes are not subject to these standards. At that time, EPA had not performed the technical analyses necessary to determine if the treatment standards for characteristic wastes could be achieved for mineral processing wastes. This was further complicated by the fact that the universe of wastes covered by the Bevill exclusion was not completely defined and, thus, neither was the universe of mineral processing wastes that are considered hazardous. Recent investigation of waste characterization data also indicate that many of these wastes may have unique treatability and/or capacity problems.

EPA must, therefore, develop treatment standards for all mineral processing wastes that have lost their Bevill exclusion and have been recognized as newly identified wastes. This section of today's notice describes the waste characterization, treatment, and capacity data currently available on these wastes and discusses approaches EPA could take to develop BDAT treatment standards for these wastes. EPA is also soliciting data and information on opportunities for incorporating pollution prevention (i.e., source reduction) into the BDAT determination.

B. Waste Characteristics Based on Generation Patterns and Potential Treatability Groups

EPA has recently begun reviewing waste characterization data for the mineral processing wastes from various sources, including sampling data from EPA's Office of Research and Development, data from EPA's Office of Water, responses (from potential generators) to RCRA section 3007 requests for information, EPA-sponsored surveys of facilities in the mining and mineral processing sectors, public responses to proposed rules on EPA's interpretation of the Bevill exclusion, and various other literature sources. Review of this information (see exhibit 1) indicates that approximately 36 industrial sector/processes currently generate 97 different general categories of wastes that may be classified as hazardous.