United States Environmental Protection Agency
Office of Solid Waste Washington, DC 20460
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EPA

Background Document for Land Disposal Restrictions - Wood Preserving Wastes (Final Rule)

Capacity Analysis and Response to Capacity-Related Comments

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CHAPTER 1
INTRODUCTION

This document presents the capacity analysis that EPA conducted to support the Phase IV Land Disposal Restrictions (LDRs) rulemaking on newly listed wastes from wood preserving. EPA conducts capacity analyses to evaluate the need for national capacity variances from the land disposal prohibitions.[1] The capacity analysis provides estimates of the quantities of wastes that will require alternative commercial treatment prior to land disposal as a result of the LDRs and estimates alternative commercial treatment capacity available to manage wastes restricted from land disposal. In this rule, EPA is promulgating LDRs for certain wastes listed and identified since November 1984 that have not been covered in previous LDR rulemakings.

1.1 LEGAL BACKGROUND

The Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA), enacted on November 8, 1984, set basic new priorities for hazardous waste management. Land disposal, which had been the most widely used method for managing hazardous waste, is now the least preferred option. Under HSWA, EPA must promulgate regulations restricting the land disposal[2] of hazardous wastes according to a strict statutory schedule. As of the effective date of each regulation, land disposal of wastes covered by that regulation is prohibited unless (1) the waste meets the treatment standards that have been established, or (2) it can be demonstrated that there will be no migration of hazardous constituents from the disposal unit for as long as the waste remains hazardous.

Under the LDR Program, EPA must identify levels or methods of treatment that substantially reduce the toxicity of a waste or the likelihood of migration of hazardous constituents from the waste. Whenever possible, the Agency prefers to define treatment in terms of performance (i.e., maximum acceptable concentrations of hazardous constituents in the treated waste or residuals), rather than in terms of specific treatment methods, and thus provide the regulated community with flexibility in complying with the LDRs. EPA's standards are generally based on the performance of the best demonstrated available technology (BDAT) for that waste, as documented by treatment data collected at well-designed and well-operated systems using that technology, or are based on data derived from the treatment of similar wastes that are as difficult or more difficult to treat.

The LDRs are effective immediately upon promulgation unless the Agency grants a national capacity variance from the statutory date because of a lack of available treatment capacity (see RCRA section 3004(h)(2)). For every waste, EPA considers—on a national basis—both the capacity of commercially available treatment technologies and the quantity of restricted wastes currently sent to land disposal for which on-site treatment capacity is not available. If EPA determines that adequate alternative commercial treatment capacity is available for a particular waste, the land disposal restriction is effective immediately. If not, the Agency establishes an alternative effective date based on the earliest date on which adequate treatment capacity will be available or two years, whichever is less. During the variance period, management of the wastes is still subject to 40 CFR 268.5 (h). Once the variance expires, the wastes must meet the LDR treatment standards prior to being land disposed.

RCRA also allows generators to apply for extensions to the LDRs on a case-by-case basis for specific wastes generated at a specific facility for which there is not adequate capacity (RCRA section 3004(h)(3)). EPA may grant case-by-case capacity variances to applicants who can demonstrate that: (1) no capacity currently exists anywhere in the U.S. to treat a specific waste, and (2) a binding contractual commitment is in place to construct or

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[1] The LDRs 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)).

[2] RCRA defines land disposal "to include, but not be limited to, any placement of such hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave" (RCRA section 3004(k)).

otherwise provide alternative capacity, but due to circumstances beyond the applicant's control, such alternative capacity cannot reasonably be made available by the effective date (40 CFR 268.5).[3]

HSWA's schedule divided hazardous wastes into three broad categories: solvent and dioxin wastes; California list wastes;[4] and "scheduled" wastes. EPA restricted surface disposed solvents and dioxins from land disposal on November 7, 1986 and deep well injected solvents and dioxins from land disposal on July 26, 1998. The final rule for California list wastes, which was issued on July 8, 1987, covers wastes originally listed by the State of California and adopted intact within HSWA. The "scheduled" wastes consist of all wastes that were identified or listed as hazardous prior to November 8, 1984 but were not included in the first two categories listed above. HSWA's statutory timetable required that EPA restrict one-third of these wastes by August 8, 1988, two-thirds by June 8, 1989, and the remaining third by May 8, 1990. For hazardous wastes that are newly identified or listed after November 8, 1984, EPA is required to promulgate land disposal prohibitions within six months of the date of identification or listing (RCRA Section 3004(g)(4)). However, the statute does not provide an automatic prohibition of land disposal of such wastes if EPA fails to meet this deadline. Exhibit 1-1 summarizes the previous LDR rulemakings and their respective promulgation dates.

1.2 OVERVIEW OF CAPACITY ANALYSIS AND COMMENT RESPONSE METHODOLOGIES

In evaluating the need for national capacity variances, EPA estimates the quantities of waste requiring alternative commercial treatment as a result of the LDRs and the capacity available at commercial treatment facilities to manage the restricted wastes.[5] By comparing the capacity demand with the available commercial capacity, EPA can identify capacity shortfalls and make determinations concerning national capacity variances. Using comments to the proposed rule and the NODA, EPA refines this analysis as appropriate. This section provides an overview of EPA's methodology in estimating required commercial treatment capacity, briefly summarizes the capacity analysis conducted for today's rule, and highlights the national capacity variances that EPA is promulgating in today's rule.

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[3] RCRA also allows generators to petition for a variance from treatment standards if the waste cannot be treated to meet LDR standards due to its chemical or physical properties. These variances are known as treatability variances (40 CFR 268.44).

[4] The "California list" comprises the following classes of wastes: liquid hazardous wastes with a pH of less than or equal to 2.0 (acidic corrosive wastes); all liquid hazardous wastes containing free cyanides, various metals, and polychlorinated biphenyls (PCBs) exceeding statutory concentration levels; and all wastes (liquid, sludge, or solid) containing halogenated organic compounds (HOCs) in concentrations greater than or equal to specified statutory levels.

[5] EPA also derived estimates of affected facilities and waste quantities for the regulatory impact analysis (RIA). Both the RIA and the capacity analysis examined wastes in the industrial sectors likely to generate most of the Phase IV wastes. However, the goals of a capacity analysis and an RIA are very different, which often results in some differences in methodologies, data, and results. A first step to satisfying the goals of a capacity analysis is to make a "threshold" determination concerning whether a national treatment capacity variance is needed for the two years following promulgation of a waste's LDR treatment standards. Thus, EPA estimates the required and available commercial treatment capacity for all affected wastes and facilities, but often only to the extent needed to make this threshold determination. For example, when upper-bound estimates of required capacity are well below lower-bound estimates of available capacity, then generally a variance is not needed and the analysis can stop. Similarly, when lower-bound estimates of required capacity far exceed the upper-bound estimates of available capacity, then often the two-year maximum capacity variance is needed. Results that are between these two extremes generally require EPA to conduct further analyses. In contrast to the capacity analysis' focus on required and available capacity during the next two years and its initial focus on threshold determinations, the RIA concentrates on estimating specific potential long-term costs and benefits of the LDR treatment standards. Typically, only the significant (or dominant) costs and benefits are assessed during the RIA. In summary, therefore, differences between the goals of the capacity analysis and the RIA are expected to result in reasonable differences in the methodologies, data, and results.

EXHIBIT 1-1
SUMMARY OF PREVIOUS LAND DISPOSAL RESTRICTIONS RULEMAKINGS

Rulemaking	Federal Register Notice	Promulgation Date
Solvents and Dioxins (surface disposed)	51 *FR* 40572	November 7, 1986
Solvents and Dioxins (deep well injected)	53 *FR* 28188	July 26, 1988
California List (surface disposed)	52 *FR* 25760	July 8, 1987
California List (deep well injected)	53 *FR* 30908	July 26, 1988
First Third Rule	53 *FR* 31138	August 8, 1988
First Third Rule (deep well injected)	54 *FR* 25416	June 7, 1989
Second Third Rule	54 *FR* 26594	June 8, 1989
Third Third Rule	55 *FR* 22520	May 8, 1990
Newly Listed and Identified Wastes (Phase I)	57 *FR* 37194	June 30, 1992
Interim Final Rule for Vacated Treatment Standards	58 *FR* 29860	May 24, 1993
Organic TC Wastes and Newly Listed Wastes (Phase II)	59 *FR* 47982	September 19, 1994
Decharacterized Wastewaters, Carbamate Wastes, and Spent Potliners (Phase III)[6]	61 *FR* 15565	April 8, 1996

1.2.1 Determination of Required Commercial Treatment Capacity

Required commercial treatment capacity represents the quantity of wastes currently being land disposed that cannot be treated by the generator and, consequently, will need commercial treatment to meet the LDR treatment standards. EPA uses the available information and best engineering judgment to develop estimates for required commercial capacity. Those wastes that are managed in on-site treatment systems are excluded from the estimates of required commercial capacity. Required commercial capacity also includes the residuals generated by treatment of these wastes (i.e., the quantity of generated residuals that will need treatment prior to land disposal).

EPA identifies the waste streams potentially affected by the LDRs by types of land disposal units, including surface impoundment, waste pile, land treatment unit, landfill, and underground injection well. Salt dome formations, salt bed formations, and underground mines and caves are additional methods of land disposal that are affected by the LDRs; however, because few wastes are disposed by these three methods, these methods typically are not addressed in the analysis of required alternative capacity.

To determine the type of alternative capacity required to treat the affected wastes, EPA conducts a "treatability analysis" of each waste stream. Based on the waste's physical and chemical form and information on prior management practices, EPA assigns the quantity of affected waste to an appropriate technology (i.e. a technology that can meet the treatment standards). Mixtures of RCRA wastes (i.e., waste streams described by more than one waste code) present special treatability concerns because they often contain constituents (e.g., organics and metals) requiring different types of treatment. To treat these wastes, EPA develops a treatment train that can treat all

[6] On August 26, 1996, the Agency revised the carbamate waste treatment standards for one year from the date of publication ("Emergency Revision of the Land Disposal Restrictions (LDR) Phase III Treatment Standards for Listed Hazardous Wastes from Carbamate Production," 61 FR 43923). On January 14, 1997, the Agency extended the national capacity variance for spent potliners (K088) for six months ("Land Disposal Restrictions Phase III - Emergency Extension of the K088 Capacity Variance; Final Rule," 62 FR 1991).

waste types in the group (e.g., incineration followed by stabilization of the incinerator ash). In these cases, the Agency estimates the amount of residuals that would be generated by treatment of the original quantity of waste and includes these residuals in the quantities requiring alternative treatment capacity.

EPA identifies the quantities of waste requiring alternative treatment on a facility level basis; if the appropriate treatment technology is not available on site, or if adequate available capacity is not present to manage the waste, then the appropriate quantity of waste requiring alternative treatment is aggregated into a national demand for commercial capacity. EPA excludes from the estimates of required commercial capacity those wastes that are managed in on-site treatment systems.

1.2.2 Determination of Available Commercial Treatment Capacity

The analyses conducted to determine available commercial treatment capacity focuses on treatment capacity projected to be available for the two years following promulgation of the LDRs, starting from the baseline capacity identified in the Phase III LDR rule (61 *FR* 15565).[7]

The determination of available capacity focuses on commercial facilities. Consequently, all estimates of capacity presented in this document represent commercially available capacity.[8] In order to determine whether to grant a national capacity variance for newly listed and identified wastes regulated in today's rule, EPA analyzed available commercial capacity for alternative treatment technologies capable of meeting the LDR treatment standards. This capacity analysis generally included estimating the maximum or design capacity for appropriate waste management systems and the amount of waste currently going to these systems (utilized capacity). Available capacity was estimated as the difference between maximum and utilized capacity. For today's rule, EPA analyzed commercial capacity for wastewater treatment systems, hazardous waste combustion (including incineration and reuse as fuel), and stabilization for soil and debris. On-site treatment technologies, which may also be used, are not discussed here.

1.2.3 Comment Response

EPA reviews all comments submitted in response to the proposed LDR rule and NODA, and for the purposes of this background document, identifies those related to treatment capacity. Relevant comments then are summarized and categorized according to type of waste, treatment technology, issue, etc. Data from the comments are identified and incorporated into the capacity analysis. Next, the Agency develops responses to each comment category, as appropriate. Finally, the comment summaries, copies of the verbatim comment text, and the responses are compiled into a background document. (For wood preserving wastes, the capacity analysis and comment response documents are combined into one document).

1.3 SUMMARY OF CAPACITY ANALYSIS FOR TODAY'S RULE

To estimate the need for national capacity variances, EPA estimated the quantities of waste requiring alternative commercial treatment as a result of the land disposal restrictions and the capacity available at commercial treatment facilities to manage the restricted wastes. Exhibit 1-2 indicates the total quantities of surface disposed wastes that will require alternative commercial treatment capacity as a result of the rule, and whether treatment capacity is available for these wastes.

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[7] EPA, *Background Document for Capacity Analysis for Land Disposal Restrictions -- Phase III, Decharacterized Wastewaters, Carbamate Wastes, and Spent Potliners*, April 1996.

[8] Available treatment capacity can be categorized by facility status into four groups: (1) commercial capacity - capacity at facilities that manage waste from any facility; (2) on-site (private capacity) - capacity at facilities that manage only waste generated on-site; (3) captive capacity - capacity at facilities that manage only waste from other facilities under the same ownership; and (4) limited commercial capacity - capacity at facilities that manage waste from a limited number of facilities not under the same ownership. For all capacity analyses, estimates on available capacity reflect available commercial capacity.

Exhibit 1-3 summarizes the wastes for which EPA is granting a national capacity variance. EPA is granting two-year national capacity variances for soil and debris contaminated with newly listed wood preserving wastes and mixed radioactive wood preserving waste, including soil and debris contaminated with mixed radioactive wood preserving wastes.

1.4 ORGANIZATION OF BACKGROUND DOCUMENT SUPPORTING THE CAPACITY ANALYSIS

EPA has prepared this background document to present the capacity analyses conducted for the Phase IV LDRs. This document is organized into four chapters, as described below:

- **Chapter 1: Introduction.** Provides background, general methodology, and a summary of the analysis.

- **Chapter 2: Available Treatment Capacity.** Describes the methodology and data used to determine available capacity for wastewater treatment, combustion of liquids and solids, and stabilization.

EXHIBIT 1-2
QUANTITIES REQUIRING COMMERCIAL TREATMENT
AS A RESULT OF THE LDRs

Waste Type	Quantities Requiring Alternative Capacity (tons/year)	Adequate Alternative Capacity Available? (Yes/No)
Newly Listed Wood Preserving Wastes		
- Organic Nonwastewaters	8,600	Yes
- Inorganic Nonwastewaters	350	Yes
- Organic Wastewaters	440	Yes
- Inorganic Wastewaters	13,000	Yes
- Soil and Debris	Over 100,000	No
Mixed Radioactive Wood Preserving Wastes/Soil and Debris Contaminated with Mixed Radioactive Wood Preserving Wastes	0[a]	No

[a] The Agency has not found any quantities of mixed radioactive wood preserving waste. However, if any such wastes exist, commercial capacity that is available must be used for mixed wastes that were regulated in previous LDR rulemakings and whose variances have already expired

EXHIBIT 1-3
SUMMARY OF NATIONAL CAPACITY VARIANCES
FOR PHASE IV WASTES

Waste Category	Effective Date of Land Disposal Prohibition
Newly Listed Wood Preserving Wastes - Organic Nonwastewaters - Inorganic Nonwastewaters - Organic Wastewaters - Inorganic Wastewaters	90 Days from Date of Promulgation
Soil and Debris Contaminated with Newly Listed Wood Preserving Wastes	Two Years from Date of Promulgation
Mixed Radioactive Wood Preserving Waste	Two Years from Date of Promulgation

- **Chapter 3: Capacity Analysis for Newly Listed Wood Preserving Wastes**. Discusses the methodology and data used to conduct the capacity analysis for newly listed wood preserving wastes (F032, F034, F035).

- **Chapter 4: Summary of Comments and Response to Comments for Newly Listed Wood Preserving Wastes**. Presents and summarizes the industry comments received for the proposed rule and the NODA. This chapter also includes EPA's response to the comments.

CHAPTER 2
AVAILABLE TREATMENT CAPACITY

This chapter presents EPA's estimates of available commercial treatment capacity for Phase IV wood preserving wastes. Section 2.1 summarizes the results of EPA's analysis of available commercial combustion capacity at incinerators and boilers and industrial furnaces (BIFs). Section 2.2 summarizes the results of EPA's analysis of the available wastewater treatment capacity. Section 2.3 summarizes the results of EPA's analysis of the available commercial stabilization capacity. Section 2.4 summarizes vitrification capacity. Note that other technologies besides those addressed in this chapter that are capable of achieving UTS are not precluded from being used. Best demonstrated available technology (BDAT) for arsenic in F035 wastewaters, for example, is based on vitrification, yet treatment technologies such as stabilization can be used as long as UTS are met (and the treatment does not constitute impermissible dilution).

2.1 COMMERCIAL COMBUSTION CAPACITY

This section summarizes the results of EPA's analysis of available commercial combustion capacity at incinerators and BIFs (primarily cement kilns that are authorized to burn hazardous wastes as fuel). This includes an analysis of incinerator and BIF combustion capacity information received from the Hazardous Waste Treatment Council (HWTC) and the Cement Kiln Recycling Coalition (CKRC) in 1993 and the Environmental Technologies Council (ETC) in 1994.[9] Data were also obtained from Rollins Environmental Services (RES) through comments and subsequent submissions of Confidential Business Information (CBI) in 1996.

2.1.1 General Methodology

In 1993, the HWTC and CKRC surveyed their membership to obtain data on combustion capacity, which was then submitted to EPA. Subsequent to the original HWTC survey, members also received a supplemental questionnaire regarding the burning of soils. In 1994, ETC submitted updates to the HWTC Survey from its members. Survey responses received from incinerators are classified as confidential business information (CBI) and thus are provided only in an aggregated form in this document. Following the receipt of the original surveys, the Agency reviewed the data submitted by each facility to evaluate the completeness, consistency, and accuracy of the information. The Agency identified and reconciled data gaps and anomalies by contacting the respective HWTC or CKRC coordinators and the individual facilities in question.

Concurrent with the receipt of surveys received from the member groups, the Agency developed a database to track and process major data elements for the capacity analysis. The database contains facility information (e.g., location, EPA identification number of burner, number of units currently on-line), unit specific information (e.g., type of incinerator/kiln unit, operating hours per year, types of hazardous waste feed systems, types of hazardous waste burned in 1992), and waste-type specific information (e.g., tons of hazardous waste burned in 1992, average hazardous waste feed rate, maximum practical capacity, maximum permit capacity). Subsequent updates to the original survey submissions have also been entered into this database.

The information received from facilities participating in these surveys does not lend itself to simple summation and tabulation of results because facilities sometimes differed in their approach to reporting quantities burned or burning capacity. Incineration systems can generally accept multiple waste forms (e.g., pumpable sludges and aqueous liquids) and accepting larger amounts of one waste form may reduce the capacities for others. In responding to the HWTC survey (and ETC updates), facilities sometimes grouped waste types for their capacity-related responses. For example, if a feed system can accommodate both liquids and pumpable sludges, a facility may report a capacity for both forms grouped together. To address this interchangeability of waste forms, the Agency's LDR capacity database accommodated the reported waste groupings (e.g., by developing one capacity estimate for liquids and pumpable sludges combined).

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[9] In 1994, HWTC became the Environmental Technologies Council (ETC). ETC provided EPA with a 1994 update to the commercial incinerator survey.

A second issue also relating to the interchangeability of waste forms required more extensive consideration. In the HWTC survey (and ETC update), some facilities reported the maximum combustion capacity for individual waste forms that together exceed the reported overall capacity of the unit. As a result, summing these individual capacities results in a total capacity that far exceeds what a facility may practically accommodate. Therefore, the Agency developed an algorithm to address this situation. The waste apportionment algorithm focuses on three primary variables: the quantity of waste burned during the year, the maximum practical capacity of the unit, and the available capacity for burning hazardous waste. The available capacity for a waste form (e.g., aqueous liquids, dry solids) is obtained by taking the difference between the quantity of the form burned (hazardous and non-hazardous waste) and the maximum capacity for the waste form. The Agency's approach assumes that a facility will not stop burning non-hazardous waste if it is currently burning non-hazardous waste but all unutilized capacity will be used for hazardous waste. Difficulties arise, however, because facilities report maximum capacities for each waste form without regard to capacity accounted for by other waste forms (e.g., some facilities report the same treatment capacities for sludges as for soils because their treatment systems can accommodate both wastes). Consequently, the sum of maximum capacities for all waste forms may exceed the total capacity.

In these cases, the Agency distributed the total maximum hazardous waste capacities reported by each facility to individual waste forms based on burning practices. The utilization rate for each waste form was calculated by dividing the larger of the quantity of hazardous waste burned or total waste burned for that waste form by the sum of the quantities burned for all waste forms. A new maximum hazardous waste capacity for each waste form was then calculated by multiplying the utilization rate for that waste form by the maximum practical capacity for the incineration unit as a whole.

If the calculated maximum capacity for a waste form exceeded the reported value for that form, EPA used the reported value. In this case, the difference between the calculated and reported value was then redistributed to other waste forms using a hierarchy based on the types of wastes in this rule for which capacity has historically been most limited relative to demand. The Agency used the following order for redistributing capacity:

- Soils;
- Bulk Solids;
- Containerized Solids;
- Nonpumpable Sludges;
- Pumpable Sludges;
- Compressed Gases;
- Non-aqueous Liquids; and
- Aqueous Liquids.

Cement kiln capacity for hazardous waste generally is limited by air emission limits (e.g., boiler and industrial furnace (BIF) limits under 40 CFR 266 subpart H), feed system limitations (e.g., particle size and viscosity limits), and product (i.e., cement clinker) quality considerations.[10] For instance, cement quality considerations may require that wastes burned in cement kilns have a heating value of at least 5,000 BTU/lb to ensure adequate temperatures in the kiln. (Comments received by EPA in previous rulemakings, however, indicate that some kilns accept wastes below this heating value.) Incineration capacity is also limited by air emission limits and other permit limits (such as heat release limits), and feed system limits. EPA has taken these limitations into account in its estimates of available commercial combustion capacity.

"Pre-baseline" (i.e., prior to accounting for Phases I, II, and III LDR required capacity) available combustion estimates were calculated using the above methodology.[11] EPA then subtracted the required combustion capacity for any previously regulated wastes that are not accounted for in the data received from the incinerators or BIFs (e.g., Phase I wastes under variance and Phase II and III wastes) to derive the baseline available combustion

[10] As discussed later in this section and in Chapter 3, additional limitations are applicable for wood preserving wastes.

[11] *Background Document for Capacity Analysis for Land Disposal Restrictions Phase II -- Universal Treatment Standards, and Treatment Standards for Organic Toxicity Characteristic Wastes and Other Newly Listed Wastes. Volume 1: Capacity Analysis Methodology ands Results*. U.S. EPA. August 1994.

capacity for Phase IV wastes. The capacity required for Phase II and III wastes is not reflected in the estimates of utilized capacity because the Phase II and III rules, promulgated on September 19, 1994 (59 *FR* 47982) and April 8, 1996 (61 *FR* 15566), respectively, were not in effect when the estimates were submitted to EPA. In addition, some Phase I wastes (F037 and F038 in particular) were under a variance for at least part of the period of time for which EPA received capacity estimates (see 57 FR 37194, June 30, 1992).

For this final rule, EPA conducted additional analysis by incorporating new data submitted by commenters to the proposed rule, developing assumptions to account for the uncertainty associated with the age of the bulk of the data (which are now several years old), assessing the availability of mobile combustion capacity to address on-site demand for treating contaminated soil and debris, and assessing potential trends in combustion capacity over the next two years. Thus, this additional analysis primarily involved four activities: (1) updating available capacity where possible using facility-specific CBI submitted by Rollins Environmental Services (RES); (2) applying assumptions to obtain a bounded range of overall available capacity; (3) reviewing data on mobile incinerators; and (4) researching potential impacts of upcoming maximum achievable control technology (MACT) standards.

2.1.2 Results

Exhibit 2-1 summarizes EPA's estimate of the "pre-baseline" commercial hazardous waste available capacity by waste form for incinerators and BIFs. The following paragraphs discuss refinements of these estimates for wood preserving wastes in terms of two types of capacity: (1) liquids, and (2) pumpable/nonpumpable sludges, solids, and soils. This discussion is organized around these two types of capacity because most wastes are assigned to these two types of treatability groups.

EXHIBIT 2-1
PRE-BASELINE AVAILABLE COMMERCIAL HAZARDOUS WASTE
COMBUSTION CAPACITY SUMMARY

Waste Form	Incinerators			BIFs			Total Available (1000 tpy)
	Maximum (1000 tpy)	Available (1000 tpy)	Percent Utilized	Maximum (1000 tpy)	Available (1000 tpy)	Percent Utilized	
Liquids (aqueous)	190	92	51	NA	NA	NA	92
Liquids (non-aqueous)	346	159	54	NA	NA	NA	159
Reported as All Liquids (aqueous & non-aqueous)	82	56	31	1,548	702	55	759
Reported as Liquids & Pumpable Sludges Grouped	32	20	38	236	49	79	68
Pumpable Sludges	116	66	43	37	12	68	78
Nonpumpable Sludges	32	17	47	5	1	72	18
Reported as Solids & Nonpumpable Sludges Grouped	53	38	27	35	11	69	49
Bulk Solids	133	70	47	25	18	30	88
Dry Solids	NA	NA	NA	49	39	20	39
Containerized Solids	231	102	56	146	106	28	208
Compressed Gases	5	3	43	NA	NA	NA	3
Soils	169	157	7	NA	NA	NA	157
TOTAL LIQUIDS & PUMPABLE SLUDGES	766	393	49	1,822	763	58	1,156
TOTAL SOLIDS & NON-PUMPABLE SLUDGES	618	384	38	261	175	33	560
TOTAL	1,390	780	44	2,083	938	55	1,718

1. Values for maximum, available, and percent utilized reflect pre-baseline data (i.e., prior to accounting for Phase I, II, and III required capacity). Values estimated for Phase IV wastes are based on these data and are provided in the text. These numbers may not add due to rounding.
2. This report only includes capacity for currently operating units. The following units are not included in the roll-ups: Waste-Tech (Kimball, NE), Waste-Tech (East Liverpool, OH), CWM (Chicago, IL), and Ash Grove (Louisville, NE).
3. The following BIFs have been included in these figures based on data obtained from the September 1993 EI Digest: North Texas Cement (Midlothion, TX), Florida Solite (Green Cove Springs, FL), Carolina solite (Albermarle, NC), Solite Co. (Arvonia, VA), Solite Co. (Cascade, VA), Essroc (Logansport, IN), Giant (Harleyville, SC), Heartland Cement Co. (Independence, KS), Medusa Cement Co. (Wampum, PA), River Cement (Festus, MO), and Southdown (Fairborn, OH).

Combustion capacity for liquid forms of hazardous wastes has historically been more readily available than capacity for sludges and solids. Using data from Exhibit 2-1, EPA estimates that the pre-baseline available commercial combustion capacity for liquids is 1,078,000 tons per year.[12] EPA then subtracted the 11,000 tons of capacity required for liquid Phase II wastes. Because Phase III did not result in any required capacity for liquids, the result—1,067,000 tons per year—is assumed to still be available overall. EPA then refined this estimate for Phase IV wood preserving wastes by using CBI information from the HWTC/ETC surveys and CKRC about which incinerators have final Part B permits to treat hazardous these wastes. That is, because of the dioxin/furan monitoring requirements for interim status incinerators, EPA assumes that such facilities will not accept Phase IV wood preserving wastes (as a worse case). This refinement reduces available liquid capacity by 45,896 tons/year to approximately 1,021,104 tons/year. Finally, EPA used CBI to subtract the available capacity of combustion facilities that do not yet have, or have not applied for, a modification to their permit to treat Phase IV wood preserving wastes. This refinement reduces available liquid combustion capacity for Phase IV wood preserving wastes by approximately 135,565 tons/year to 885,539 tons/year.

EPA used data from Exhibit 2-1 to estimate that the available pumpable/nonpumpable sludge, solid, and soil commercial combustion capacity in the pre-baseline (i.e., prior to the Phase I rule) is 638,000 tons/year.[13] Post-Phase I and II (but pre-Phase IV) data obtained from one major treater, RES, through comments (see Chapter 4) and subsequent submissions of CBI (see Appendix A for non-CBI meeting minutes), as well as extrapolation of these data to all other combustion data, were used to update this pre-baseline estimate and to simultaneously account for Phase I and II wastes. The result is approximately 489,100 tons/year,[14] with a range of about 410,400 to 568,600 tons/year.[15] For the Phase III wastes, EPA estimated that the relevant required sludge, solid, and soil combustion capacity is 4,600 tons/year. Therefore, the overall current (pre-Phase IV) combustion capacity for sludge, solid, and soil is estimated at 484,500 tons/year (between about 405,800 to 564,000 tons/year). EPA then adjusted this estimate by subtracting the 142,800 tons/year of available capacity from BIFs[16]—based on the worst-case assumptions that the BTU and other characteristics of the wood preserving sludges, solids, and soils will result in the BIFs refusing the wastes—to estimate that approximately 341,700 tons/year of incineration capacity (between about 286,100 to 397,600 tons/year) is available. EPA then refined this estimate further for Phase IV wood preserving wastes, as it had for the liquid combustion capacity analysis, by using information from the HWTC/ETC and CKRC surveys about which facilities have final Part B permits and which combustors will have modified their permits to treat these wastes. Thus, subtracting the capacity of incinerators that are interim status and will not have modified

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[12] EPA first estimated that there is approximately 1,010,000 tons/year of available capacity for waste forms reported as "aqueous liquids" (92,000 tons/year), "non-aqueous liquids" (159,000 tons/year), and "all liquids" (759,000 tons/year). EPA then added to this quantity the estimate of available capacity to treat "liquid/pumpable sludges" (i.e., 68,000 tons/year). Because this latter quantity is for mixed forms of waste, it was excluded from the non-liquid estimate described below to avoid double counting.

[13] EPA summed the available capacity for "pumpable sludges" (78,000 tons/year), "non-pumpable sludges (18,000 tons/year), "solids and non-pumpable sludges" (49,000 tons/year), "bulk solids" (88,000 tons/year), "dry solids" (39,000 tons/year), "containerized solids" (208,000 tons/year), and "soils" (157,000 tons/year).

[14] To calculate this quantity, EPA first developed separate estimates of available combustion capacity for RES facilities and non-RES facilities. EPA determined the pre-baseline capacity available at non-RES facilities by subtracting the pre-baseline combustion at RES facilities from the pre-baseline estimate of national sludge, solid, and soil combustion available capacity. EPA then subtracted an estimate of the non-RES share of wastes restricted from land disposal due to the Phase I and II rulemakings. EPA then added this result to the estimated increase in RES available capacity to estimate the total available capacity for incinerators and BIFs. Because most of this information is CBI, EPA cannot disclose the details in this document.

[15] Because of the age of the data used and the uncertainties of the various assumptions used, EPA developed a "best estimate" and a range of available combustion capacity values. EPA's best estimate is based on a calculation of the current percentage of the Phase I and II wastes that RES is combusting. The range was calculated by assuming that RES is combusting a lesser percentage than the best estimate (lower end), or is burning a greater percentage than the best estimate (upper end).

[16] This quantity was obtained by estimating the ratio of the pre-baseline quantity of BIF to total pumpable/nonpumpable sludges, solids, and soil available capacity (i.e., 187,000/638,000 tons/year) and applying it to the pre-Phase IV available capacity.

permits (i.e., 38,366 and 159,634 tons/year, respectively) results in an estimate of 143,700 tons/year (between about 87,600 to 199,100) of available combustion capacity for Phase IV wood preserving sludges, solids, and soils.

Finally, as indicated in Exhibit 2-1, the available combustion capacity for soils is expected to be substantially less than 87,600 tons/year (the lower bound for sludges, solids, and soils) since not all combustion units that accept nonpumpable/pumpable wastes or solids are expected to accept soils for treatment. A rough estimate for soils is that approximately 35,800 tons/year of the available capacity is expected to accept Phase IV wood preserving soils for treatment.[17] This estimate could range from a lower end of about 21,900 tons/year to an upper end of about 49,775 tons/year.

In an analysis of the mobile incineration industry in 1989, no vendor contacted by the Agency felt that RCRA wastes are a viable market for mobile incinerators since the length and site specificity of the permitting process pose a barrier that companies find uneconomic to overcome.[18] Recent industry publications, such as *The Hazardous Waste Consultant*, indicate that the public continues to oppose nearly every proposed hazardous waste management facility, and state and local legislative bodies continue to pass restrictive siting laws or permitting moratoriums. As a result, many project sponsors of mobile (and stationary) incinerators have already, or may eventually, find the process too costly.[19]

The estimates discussed above of available combustion capacity are expected to remain relatively steady or decrease somewhat through 1999. Although one munitions treatment facility is awaiting approval of its permit to burn military munitions and other explosives, no applications for new hazardous waste incinerators are immediately pending. Most of the proposals for new combustion capacity that have surfaced recently are for facilities that specialize in the combustion of military munitions, other explosive materials, or mixed wastes.[20] In addition, several facilities that had proposed expansion of thermal capacity have now abandoned their proposals.[21] Moreover, difficulties in permitting make it highly unlikely that other combustion units, such as mobile incineration units, could be brought on-line in the near-term (i.e., within two years). Lastly, the final maximum achievable control technology (MACT) standards for combustors (expected in 1998; see proposed rule, 61 FR 17358) may decrease this available capacity to some degree. However, given the worst-case assumptions used above, EPA does not expect the MACT standards to significantly reduce the available capacity estimated for Phase IV wood preserving wastes.

2.2 WASTEWATER TREATMENT CAPACITY

This section summarizes the results of EPA's analysis of wastewater treatment systems for wastewaters covered by the Phase IV rule. The analysis of available capacity used three data sources. The primary source is the set of two BDAT background documents for wood preserving wastewaters.[22] Another source is an Office of Water questionnaire specifically targeted to wastewater treatment systems. The third source, the 1991 Biennial Reporting System (BRS), was used to confirm the data provided by the second source. The BRS is a system by which RCRA-regulated treatment, storage, and disposal facilities (TSDFs) and large quantity generators provide EPA with information on their hazardous waste activities. The PS Form of the 1991 BRS contains information on the waste treatment systems, including both maximum and utilized capacity.

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[17] This estimate is 25 percent of 143,200 ton/year (the best estimate for sludges, solids, and soils). The percentage is obtained using the pre-baseline available soil capacity of 157,000 tons and the pre-baseline available sludge, solid and soil capacity of 638,000 tons per year.

[18] U.S. EPA. Mobile Incineration: An Analysis of the Industry. February 1989.

[19] "Commercial Hazardous Waste Management Facilities: 1997 Survey of North America," *The Hazardous Waste Consultant*. March/April 1997.

[20] "Commercial Hazardous Waste Management Facilities: 1997 Survey of North America," *The Hazardous Waste Consultant*. March/April 1997.

[21] Aptus, Inc. (Rollins) of Coffeyville, Kansas; Holnam, Incorporated of Ada, Oklahoma; and Medusa Cement Company of Clinchfield, Georgia, as described in "Commercial Hazardous Waste Management Facilities: 1997 Survey of North America," *The Hazardous Waste Consultant*. March/April 1997. Note that the planned expansion by Aptus, Incorporated, would have added more combustion capacity to the estimates discussed above.

[22] These two documents are the BDAT technical background document and the BDAT response to comment document in the docket for today's rule.

As described in more detail in the BDAT technical background document, most of the wastewater treatment effluent data examined from wood preserving sites indicate that UTS are already being met. Furthermore, in cases where UTS are not being met, that document describes how prevailing wastewater treatment practices at wood preserving facilities are either capable of meeting the standard, by proper optimization, or within the context of a treatability variance under 40 CFR 268.44 (h). Wastewater treatment technologies such as biological treatment, steam stripping, carbon adsorption, or combinations of these and other technologies can treat organics regulated in F032 and F034 to the concentration levels promulgated in this rule. These wastewater technologies are readily available to, or in use at, wood preserving facilities. For metals in wastewater forms of F032, F034, and F035, EPA has determined that treatment levels can be achieved by lime addition followed by sedimentation and filtration for arsenic, and on chemical precipitation followed by sedimentation for chromium. Again, these wastewater technologies are readily available to, or in use at, wood preserving facilities. F032 wastewaters can be pretreated and commingled in order to enable their treatment via biological treatment systems. For instance, it is common practice to commingle wastewater and to remove total suspended solids, oil suspensions, and other colloids and suspended species to ensure the amenability of these waste streams to biological treatment. In addition, the BDAT document indicates that activated carbon adsorption is used widely for the remediation of surface and groundwaters contaminated with chemicals in wood preserving wastes and has been shown to reduce the levels of dioxins/furans in wastewater effluents from biological treatment units. These practices are common at wood preserving facilities. Of course, since no specific method of treatment is required to be used under the promulgated treatment standards, any type of treatment other than impermissible dilution may be used to achieve these concentration levels.

Notwithstanding the ability of readily available treatment systems to be optimized to meet treatment standards, EPA also evaluated the availability of wastewater treatment in terms of actual quantities. In 1991, EPA's Office of Water (OW) developed the Waste Treatment Industry Questionnaire to collect information on centralized wastewater treatment capacity.[23] The information collected during this effort represents 1989 data and includes maximum and available treatment capacity. Exhibit 2-2 presents the information provided by individual facilities. All of the listed facilities have a final or interim RCRA permit. As shown, approximately 40 million tons (9.7 billion gallons) of wastewater treatment capacity are available each year at these facilities. In addition, there are 11 other treatment facilities that were not included in this estimate because they did not supply the requested capacity information. By assigning the average available capacity (638,000 tons/year) to each of the non-reporting facilities, EPA estimates a total available wastewater treatment capacity of more than 47 million tons each year. According to data collected for the Third Third Rulemaking, this capacity is in the form of many different types of treatment.[24]

EXHIBIT 2-2
AVAILABLE WASTEWATER TREATMENT CAPACITY

Name	EPA ID Number	Maximum Capacity (gallons)	% Used in 1989	Available Capacity (gallons)
Sloss Industries Corporation		548,000,000	33	367,160,000
Crosby and Overton, Inc.		2,340,000	100	0
Oil Process Co.	CADO5O806850	1,894,000	81	363,000
Southern California Chemical Co., Inc.		21,350,000	60	8,589,000
Romic Chem. Corp.		4,983,000	59	2,043,000
CP Chemicals		5,808,000	74	1,510,000

[23] Memorandum from Debra DiCianna, Engineering and Analysis Division, Office of Water, U.S. EPA to Bengie Carroll, Capacity Programs Branch, Office of Solid Waste, U.S. EPA, April 20, 1993. See Appendix B.
[24] *Background Document for Third Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions, May 1990,* and *Background Document for Capacity Analysis for Newly Listed Wastes and Hazardous Debris to Support 40 CFR 268 Land Disposal Restrictions*, June 1992.

EXHIBIT 2-2
AVAILABLE WASTEWATER TREATMENT CAPACITY

Name	EPA ID Number	Maximum Capacity (gallons)	% Used in 1989	Available Capacity (gallons)
Chem-Tech Systems	CAT080033681	0	0	0
H&H Ship Service		0	0	0
Norris Industries, Inc.		477,791,000	45	262,355,000
Appropriate Technologies II, Inc.		8,943,000	18	7,333,000
Solvent Service Co., Inc.	CAD059494310	0	0	0
American Chemical & Refining Co.	CTD001184894	2,375,000	79	499,000
Envirite Corporation (CT)		53,500,000	30	37,552,000
Pratt & Whitney Aircraft Group MD & CPD.	CTD000844399	1,760,669,000	2	1,312,578,000
United Oil Recovery, Inc.		13,140,000	50	6,570,000
Cecos Treatment Corp.		62,500,000	6	58,738,000
Environmental Waste Resources, Inc.	CTD072138969	38,536,000	78	8,478,000
Alternate Energy Resources, Inc.		1,867,200,000	20	1,493,387,000
Pearl Hbr. Navy Public Works Ctr.		0	0	0
Maytag Co.		390,000,000	73	105,300,000
John Deere-Component Works		43,212,000	63	15,989,000
Envirite Corp. (IL)	ILD000666206	10,620,000	67	3,516,000
Peoria Disposal Co.-Pottstown		50,000,000	49	25,625,000
Chem-Clear, Inc.		36,000,000	47	19,080,000
Beaver Oil Co., Inc.	ILD064418353	14,000,000	20	11,200,000
Heritage Environmental Services, Inc.	IND093219012	299,290,000	30	209,443,000
Eli Lilly & Co. Tippecanoe Labs	IND006050967	0	0	0
Clean Harbors, Inc.	MDD980555189	44,100,000	12	38,808,000
American Waste Oil Corp.		6,240,000	80	1,248,000
Environmental Waste Control, Inc		60,000,000	30	42,000,000
Cyanokem		30,865,000	34	20,371,000
Dynecol, Inc.		36,320,000	50	18,291,000
Edwards Oil Co.		21,600,000	80	4,320,000
Metro Recovery Systems	MND981098478	15,130,000	50	7,565,000
Heritage Environmental Services, Inc	NCD121700777	7,500,000	72	2,100,000
Brunswick Corp.	NED043534635	244,000	3	237,000
Dupont E I De Nemours, Chamber Works	NJD002385730	14,600,000,000	78	3,212,000,000

EXHIBIT 2-2
AVAILABLE WASTEWATER TREATMENT CAPACITY

Name	EPA ID Number	Maximum Capacity (gallons)	% Used in 1989	Available Capacity (gallons)
CP Chemicals, Inc.	NJD002141950	54,000,000	90	5,400,000
Remtech Environmental Group		0	0	0
Chemical Waste Management of New Jersey	NJD089216790	52,560,000	23	40,471,000
Eticam	NVD980895338	750,000	14	647,000
Chemical Waste Management of New York		21,024,000	73	5,676,000
Cecos International	NYD080336241	0	0	0
Chemical Management, Inc.	NYD000691949	7,800,000	44	4,368,000
Envirite Corp.		63,963,000	44	35,909,000
Clark Processing, Inc.		6,500,000	86	910,000
Research Oil Co.	OHD004178612	86,300,000	49	44,013,000
Brush Wellman, Inc.		0	0	0
Cecos International, Inc.	OHD087433744	23,400,000	12	20,592,000
Clean Harbors	OHD000724153	63,000,000	65	22,050,000
Conoco, Inc. Ponca City	OKD007233836	720,000,000	92	57,600,000
US Pollution Control, Inc.		6,000,000	50	3,000,000
Tektronix, Inc.	ORD009020231	407,788,000	13	353,675,000
Waste Conversion, Inc.	PAD085690592	35,986,000	80	7,197,000
Envirite Corporation (PA)	PAD010154045	30,000,000	79	6,300,000
Mill Service, Inc.	PAD059087072	74,200,000	57	32,129,000
Mill Service, Inc. Yukon Plt.		164,000,000	44	91,840,000
Eticam	RID980906986	6,000,000	42	3,480,000
CP Chemicals, Inc.		45,602,000	61	17,785,000
Tricil Environmental Services, Inc.		89,712,000	9	81,638,000
TN Eastman Div. Eastman Kodak	TND003376928	8,710,000	88	1,045,000
Osco Incorporated		0	0	0
Intercontinental Terminals Co.		100,000,000	17	83,000,000
Encycle/Texas, Inc.		120,500,000	30	84,892,000
Empac, Inc. Deer Park		316,411,000	35	205,636,000
Treatment One, Div. of Set Environmental, Inc.		2,000,000	2	1,960,000
Belpar Environmental of Virginia, Inc.		390,000	70	117,000
Boeing Co.-Auburn	WAD041337130	371,935,000	42	214,123,000

EXHIBIT 2-2
AVAILABLE WASTEWATER TREATMENT CAPACITY

Name	EPA ID Number	Maximum Capacity (gallons)	% Used in 1989	Available Capacity (gallons)
Crosby and Overton, Inc. Plant 2		20,752,000	1	20,646,000
Chemical Processors, Inc.		13,142,000	40	7,830,000
Chemical Processors, Inc.		0	0	0
Chemical Processors, Inc.		17,001,000	41	10,102,000
Petroleum Reclaiming Service, Inc.		15,750,000	11	14,018,000
Northwest Enviroservice, Inc.		35,640,000	62	13,458,000
Union Carbide AGR. Prod. Co., Inc.	WVD004325353	2,102,000,000	57	903,860,000
Inco Alloys International, Inc.	WVD076826015	0	0	0
Total		**25,616,967,000**		**9,699,612,000**

EPA used the 1991 BRS to confirm available wastewater treatment capacity (see Appendix B). The BRS is a system by which RCRA-regulated treatment, storage, and disposal facilities (TSDFs) and large quantity generators provide EPA with information on their hazardous waste activities. The PS Form of the 1991 BRS contains information on the waste treatment systems, including both maximum and utilized capacity. EPA determined the total available wastewater treatment capacity[25] reported in the BRS at facilities representing approximately 90 percent of the total operational capacity reported in the Waste Treatment Industry Questionnaire. According to the BRS, in total these facilities have 33 million tons of available capacity (7.9 billion gallons). If this estimate is adjusted to reflect the fact that it only represents 90 percent of the total operational capacity, approximately 37 million tons (33 million tons divided by 0.9) of available wastewater treatment capacity are available. This estimate is close to 80 percent of the estimate obtained from the OW Questionnaire.

2.3 STABILIZATION CAPACITY

Stabilization is a primary conventional commercial treatment technology for some of the wood preserving wastes restricted from land disposal due to the Phase IV LDRs. In analyzing alternative treatment capacity for stabilization, the Agency in part built on the capacity analysis conducted for the Third Third LDR rule (55 FR 22520, June 1, 1990). That analysis was based on data contained in the May 1990 TSDR Capacity Data Set. The TSDR Capacity Data Set contains results from the National Survey of Hazardous Waste Treatment, Storage, Disposal and Recycling Survey (the TSDR Survey). The TSDR Survey was administered in 1987 to 2,500 facilities and was designed to provide comprehensive information on current and planned hazardous waste management, and practices at RCRA-permitted and interim status treatment, storage, recycling, and disposal facilities. The TSDR Survey collected projections of capacity changes from 1986 through 1992. The TSDR Capacity Data Set includes the amount of hazardous and nonhazardous waste entering each treatment system in 1986, the maximum hazardous waste capacity, and the maximum total waste capacity.

Following the original TSDR Survey, EPA updated the TSDR Capacity Data Set for critical technologies based on confirmation of planned capacity changes, and other information received since the survey (e.g., comments on proposed rules). Updated information was obtained by contacting facilities and verifying critical projected capacities reported in the TSDR Capacity Data Set. Based on the information provided by facility contacts, EPA determined whether planned facility capacity had come on line as projected. Furthermore, EPA verified various

[25] Specifically, the estimate includes all aqueous organic and/or inorganic treatment systems.

assumptions concerning treatment for the wastes addressed in this proposed rule. (For a more detailed explanation of the TSDR Survey and the Third Third Rule, refer to U.S. EPA, Background Document for Third Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions, May 1990, in the docket for the Third Third rule.)

To estimate the stabilization capacity available for Phase IV wood preserving wastes, the capacity demand for previous LDR rules was subtracted from the available stabilization capacity estimated from the TSDR Capacity Data Set. The available stabilization capacity from the TSDR Survey and updates was 3,125,000 tons/year. EPA estimated in the Third Third rulemaking that the capacity required as a result of the Third Third and previous LDR rules was 1,921,000 tons/year. Furthermore, the capacity required for Phase I was 77,000 tons/year, was 0 tons/year for Phase II wastes,[26] and was 0 for Phase III wastes.[27] Thus, EPA estimates the stabilization capacity available for Phase IV wastes to be 1,127,000 tons/year. Furthermore, as with wastewater treatment capacity, stabilization can be readily optimized to meet to meet UTS and can be quickly increased; see Appendix C (developed primarily for the TC metal and mineral processing capacity analysis) for additional detail on this topic.

2.4 VITRIFICATION CAPACITY

The Agency has determined that vitrification technology is commercially available for treating limited quantities of Phase IV wastes, such as some arsenic wastes, that are difficult to treat using stabilization. One commenter (Beazer East, Inc.), responding to the original Phase IV proposed rule (60 FR 43654), identified a commercial vitrification facility that may have some available capacity.[28] Using the ATTIC and VISIT databases,[29] EPA also identified a sample of companies conducting or providing supplies for vitrification and subsequently held discussions with several facility representatives (see Appendix D).[30] One company EPA identified operates one vitrification system with an available capacity of 15,000 tons/year (readily expandable to three systems for a total capacity of 45,000 tons/year). A full-scale, commercial unit (ME in Butte, Montana) treats approximately 2,000

[26] EPA believes that stabilization may be required to treat underlying hazardous metal constituents in some Phase II organic TC wastes after combustion but that the actual amount requiring capacity is a small fraction of available capacity.

[27] EPA believes that stabilization may be required to treat underlying hazardous metal constituents in Phase III wastes after combustion, but that the actual amount requiring capacity is a small fraction of available capacity.

[28] Marine Shale Processors (MSP) uses vitritification in a tested, full-scale process. The commenter also notes, however, that MSP's regulatory status remains in question.

[29] Alternative Technology Treatment Center (ATTIC) Database, U.S. EPA. (see WWW.EPA.GOV/ATTIC) and the Vendors Information System of Innovative Treatment Technology (VISITT) (see WWW.PRC.EMI.COM:80/VISITT).

[30] As seen in the Appendix, the following is a small sample of commercial vendors providing vitrification equipment or services: Geosafe Corp, Vortec Corp, Retech Inc., GTS of Duratech, and MSE.

tons/year. Bench-scale and pilot-scale systems for vitrification are known to have been underway at numerous other facilities in 1994.[31]

Notwithstanding this potentially available vitrification capacity, EPA realizes that available capacity is relatively low. Because EPA is setting numerical limits, however, other treatment technologies capable of achieving the UST limits are not prohibited from being used, except for those that may constitute impermissible dilution. For example, the lower concentration arsenic wood preserving wastes can be readily treated using stabilization or other treatment technologies.[32]

[31] Attachment to memorandum from Bill Kline (U.S. EPA) to ICF Incorporated, March 17, 1994 (see Appendix D).
[32] See Section 2.3 in this document and Appendix C in the Phase IV LDR BDAT Background Document for additional discussion.

CHAPTER 3
CAPACITY ANALYSIS FOR NEWLY LISTED WOOD PRESERVING WASTES

3.1 INTRODUCTION

This chapter presents the capacity analysis for the newly listed wood preserving wastes F032, F034, and F035. Specifically, this chapter presents the data and methodology used to derive estimates of the quantities of F032, F034, and F035 that require alternative treatment capacity prior to land disposal as a result of the proposed LDRs.

3.1.1 Regulatory History

Section 3001(e) of the Resource Conservation and Recovery Act (RCRA) requires EPA to determine whether to list wastes containing chlorinated dioxins and chlorinated dibenzofurans. As part of this mandate, the Agency conducted a listing investigation of dioxin-containing wastes from pentachlorophenol wood preserving processes and pentachloro-phenate surface protection processes. In addition, EPA included two other similar wood preserving processes using creosote and aqueous inorganic formulations containing chromium or arsenic in this investigation.

On December 8, 1988, EPA proposed four listings for wastes from wood preserving and surface protection, as well as a set of standards for the management of these wastes (53 *FR* 53282). The Agency finalized three of these listings as well as Subpart W standards for the management of these wastes on drip pads on December 6, 1990 (55 *FR* 5450).[33] On October 24, 1991 (56 *FR* 55160) EPA stated its intentions to establish LDR treatment standards for these three newly listed wood preserving wastes. On August 22, 1995 (60 *FR* 43654), EPA proposed treatment standards for these wastes and, based on a preliminary capacity analysis, proposed to grant a two-year variance from these standards only for soil and debris contaminated with the newly identified wood preserving wastes.[34] In addition, on May 10, 1996 (61 *FR* 21418) EPA published a Notice of Data Availability (NODA) which identifies additional treatment standard options for F032 wood preserving wastes. Today's rule establishes final treatment standards for the newly listed wood preserving wastes and establishes the effective date of such standards based on EPA's capacity analysis.

3.1.2 Wood Preserving Listings

The wood preserving listings categorize the waste streams into waste codes based on the preservative used and type of process:

F032: Wastewaters (except those that have not come into contact with process contaminants), 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 or potentially cross-contaminated wastes that are currently regulated as hazardous wastes (i.e., F034 or F035), 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.

F034: Wastewaters (except those that have not come into contact with process contaminants), 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.

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[33] Although the Agency originally proposed to list one additional waste stream (F033), the Agency did not include that waste in the final rule.

[34] EPA determined that there was adequate treatment capacity available for all other newly listed wood preserving wastes, and therefore proposed not to grant any capacity variances for these wastes.

F035: Wastewaters (except those that have not come into contact with process contaminants), 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 includes K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.

3.2 DATA SOURCES

EPA has collected information on wood preserving wastes, including contaminated soil and debris, to support both the listing rule and the proposed LDRs. The primary data sources used in this capacity analysis are described below.

3.2.1 Biennial Reporting System (BRS)

The 1993 BRS provides information on waste generation and management practices at the individual waste stream and facility level. The BRS is a system by which RCRA-regulated treatment, storage, and disposal facilities (TSDFs) and large quantity generators provide EPA with information on their hazardous waste activities. The BRS contains information on the waste streams generated on site and received from off site, waste physical form, waste codes, waste quantity, and the treatment systems used to treat each hazardous waste stream. Data from the BRS is included in Appendix F.

3.2.2 Wood Preserving RIA

A regulatory impact analysis (RIA) was prepared on November 1990 for the listing of F032, F034, and F035 wood preserving wastes. The RIA examined the costs, economic impacts, and benefits of listing the wastes as hazardous. Information on wood preserving facilities and waste characteristics was obtained primarily from two sources: facility and production data from an industry consultant and waste characteristics data from a RCRA 3007 Survey.

The primary source of information used in the RIA to determine the number of wood preserving facilities and their characteristics, and current production was a 1989 report developed by James T. Micklewright that contains the names and addresses of all wood preserving plants in the U.S., information about their production processed, and summary statistics on the wood preserving industry in 1987. This report is issued annually and the Agency has used information from the most recent report to adjust the estimates developed for the 1990 RIA.

The 1990 Micklewright report identified 543 wood treating plants in operation in 1990, 534 pressure treating plants and 9 non-pressure treaters. Based on production reports for 431 plants and estimates of production by 112 non-reporting plants, Micklewright estimated that the industry treated 585.6 million cubic feet of wood products in 1990.

According to the RIA, the majority of pressure-treating plants (87.7 percent) used only one type of preservative: 76.4 percent treated with an inorganic preservative, almost all of which contained arsenic; 7.7 percent treated with creosote; and 3.6 percent used pentachlorophenol. The remaining 12.3 percent used more than one type of preservative. These plants may generate more than one of the three newly listed wood preserving wastes.

The primary source of data used in the RIA to assess waste generation at wood preserving facilities was a RCRA 3007 Survey conducted by EPA in 1985. This survey was used to gather information about 1984 treated wood production volumes, production processes, waste generation, waste characteristics, and waste management practices. Questionnaires were mailed to the 100 wood preserving plants listed in Micklewright's 1981 industry survey. EPA received responses from 85 facilities (81 pressure plants and 4 non-pressure plants) which together generated 6.28 million tons (221.5 million ft^3) of treated wood. The facilities responding represented 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.

3.2.3 1994 Micklewright Report

EPA obtained the 1994 Micklewright report entitled *Wood Preservation Statistics, 1993* from the American Wood Preserving Association. This report provides information on key changes in waste generation and management practices relative to previously reported data.

According to this report, 352 companies operate a total of 471 active plants in the wood preservation industry in the United States. Of the active plants, two are non-pressure treaters. Thus, there are 469 pressure treaters nationwide. More than half of the pressure-treating facilities are small, single cylinder operations.

Among the treated products are crossties, switch and bridge ties, poles, crossarms, pilings, fence posts, lumber, timbers, and plywood. Preservatives used to treat these products include creosote solutions, chlorophenolic (oilborne) preservatives, inorganic (waterborne) preservatives, and fire retardants.

- Creosote solutions include creosote, creosote-coal tar, and creosote petroleum. Processes that use creosote solutions generate F034 wastes.

- Oilborne preservatives include pentachlorophenol, copper naphthenate, zinc naphthenate, and copper-8-quinolinolate. Use of these preservatives results in the generation of F032 wastes.

- Waterborne preservatives are inorganic formulations containing chromium and arsenic. Processes that use these preservatives generate F035 wastes.

- Fifty plants use various combinations of two or more preservatives. Exhibit 3-1 provides the number of pressure-treating facilities by type of preservative.

As shown in Exhibit 3-1, the majority of plants use only inorganic preservatives. Furthermore, the greatest volume of wood is treated with inorganic preservatives. Exhibit 3-2 provides data on the volume of wood treated by each type of preservative in 1993.

EXHIBIT 3-1
WOOD PRESERVING PLANTS BY TYPE OF PRESERVATIVE, 1993

Preservative	Waste Code	Number of Plants
Inorganic	F035	362
Creosotes	F034	40
Pentachlorophenol	F032	19
Mixed	Combinations of F032, F034, F035	50
Total		471

EXHIBIT 3-2
VOLUME OF WOOD TREATED BY TYPE OF PRESERVATIVE, 1993

Preservative	Waste Code	Wood Treated (1,000 cubic feet)
Inorganic	F035	470,504
Creosotes	F034	92,132
Pentachlorophenol	F032	36,155

3.2.4 ANPRM Comments

The October 24, 1991 Advanced Notice of Proposed Rulemaking (ANPRM) (56 FR 55160) identified EPA's data requirements for conducting a capacity analysis for wood preserving wastes. EPA requested comments and information on the quantities and characteristics of F032, F034, and F035 that are generated and managed, as well as on hazardous soil and debris contaminated with these wastes. EPA also requested information concerning available or potential treatment technologies, their capacity, performance, and limitations or constraints. The Agency received seven comments regarding wood preserving wastes. These comments have been incorporated into the final capacity analysis. A list of the commenters, the major issues addressed in the comment, and any data submitted in the comment can be found in Exhibit E-1 of Appendix E.

3.2.5 Comments to the Phase IV Proposed Rule and Notice of Data Availability

In response to the August 22, 1995 proposed rule for the Land Disposal Restrictions - Phase IV: Issues Associated with Clean Water Act Treatment Equivalency, and Treatment Standards for Wood Preserving Wastes and Toxicity Characteristic Metal Wastes (60 FR 43654) and the May 10, 1996 Notice of Data Availability, EPA received a number of comments on the proposed wood preserving treatment standards. These comments have been incorporated into the final capacity analysis. Please refer to Chapter 4 of this document for a detailed discussion of these comments as well as the Agency's response.

3.2.6 Phone Logs, Communications, and Clarifications of Comments Submitted

During the development of the Phase IV Rule, EPA conducted communications with representatives from industry and the EPA Regions to gather relevant data for the wood preserving waste capacity analysis. These comments have been incorporated into the final capacity analysis and can be found in Appendix F.

3.3 WASTE GENERATION AND MANAGEMENT

3.3.1 Waste Generation

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 have used chlorophenolic formulations, even though they may currently be using other preservatives.[35] F034 wastes are generated by facilities that use creosote in their wood preserving formulations. F035 wastes are generated by facilities that use inorganic formulations. Wastes that are generated as a result of using mixed chlorophenolic/inorganic formulations or chlorophenolic/creosote formulations carry more than one waste code. For the purposes of this analysis, wastes that carry the F032 waste code will be classified as F032 wastes, regardless of the other waste codes they may carry. Similarly, wastes generated from mixed creosote/inorganic formulations (i.e., wastes that carry both the F034 and F035 codes) will be classified as F034 wastes.

However, the Agency has proposed a redefinition of F032 wastes that would exclude from the definition any wastes that carried the F034 and F035 waste codes.[36] According to the BRS, several facilities generate F032/F034 and F032/F035 wastes. Therefore, this redefinition, if finalized, could potentially shift quantities away from F032 to F034 and F035.

For this capacity analysis, the 1993 BRS was used as the primary source of information on the generation of the newly listed wood preserving wastes. EPA's methodology for determining the quantity of newly listed wood preserving wastes generated annually is described below.

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[35] 40 CFR 261.35 provides an exemption from this definition for facilities that no longer use chlorophenolic formulations and meet certain management requirements.

[36] December 5, 1991, 56 *FR* 63848.

- First, EPA extracted from the 1993 BRS all waste streams that contained at least one of the newly listed wood preserving waste codes (F032, F034, or F035).
- Next, using the waste form information provided by the BRS, EPA determined whether each waste stream was organic or inorganic, and the form of each waste stream (wastewater[37], nonwastewater, soil, or debris).
- Wastes were then classified based on the combination of wood preserving waste codes each stream carried. If the waste stream only carried a single wood preserving waste code, it was classified as that code. If the waste carried F032 in addition to another code, it was considered an F032 waste. If the waste carried both the F034 and F035 codes, it was classified as an F034 waste.
- Any waste stream that contained a newly listed wood preserving waste code as well as a listed waste generated by an industry other than the wood preserving industry (as indicated by the waste code description) was classified as a mixed listed waste, and excluded from the generation estimate.[38]
- Next, EPA eliminated several streams from its generation estimate that EPA identified as non-primary generation based on the generator of the waste.[39] For example, EPA deleted waste streams generated by facilities such as DuPont Chambersworks and USPCI that carried many other waste codes in addition to the wood preserving wastes codes. In deleting such streams, the Agency relied on professional judgment.
- Finally, to ensure that the analysis did not double-count waste streams, EPA eliminated streams with an origin code indicating that the stream was received from off site but not managed on site.[40]
- To determine waste generation, EPA then summed all remaining waste streams by waste code classification, waste form, and organic/inorganic classification.[41]

Exhibit 3-3 presents the quantities of waste generated, by waste code, according to the BRS. (Detailed BRS results are presented in Appendix G.) These estimates are slightly lower than the estimates provided in the proposed rule background document. This is due to EPA's refinement of the methodology for eliminating non-primary streams from the generation estimate. However, this information is subject to several limitations. First, the BRS may not include all generators of these wastes, because small quantity generators are not required to complete the survey. Second, newly listed wood preserving wastes that are recycled and are exempt from regulation as a hazardous waste are not included in the BRS. Third, wastes that are generated as the result of treatment or recycling of a newly listed wood preserving waste (i.e., wastes that are derived from F032, F034, or F035) will be reported in

[37] Because there is no direct way of identifying liquid wastewaters from liquid nonwastewaters using BRS data, EPA assumed that all liquid wastes (i.e., wastes with the form code B1XX or B2XX) were wastewaters.

[38] For example, waste streams containing F037 and F038 wastes (sludges from the treatment of petroleum refining wastewaters) as well as F034 wastes were classified as mixed listed wastes. EPA believes that mixed listed wastes cannot represent primary generation of wood preserving wastes. In performing its capacity analyses, EPA only includes primary waste streams in its estimate of waste generation. Non-primary waste streams (e.g., treatment residuals) are not included in the estimate of waste generation. However, in looking at the required treatment capacity for a waste stream, EPA does consider the entire treatment train. If the treatment residuals from the initial step of post-regulatory treatment train will require additional treatment to meet the LDRs, EPA considers the capacity required for both the initial treatment as well as the additional treatment. For example, if the treatment train for a waste stream is combustion followed by stabilization of the ash, EPA estimates both the required incineration capacity for the primary waste stream as well as the required stabilization capacity for the treatment residual.

[39] In general, EPA does not include treatment residuals in the estimate of waste generation because if management practices change as a result of the LDRs, such residuals will no longer be generated. Also, in many cases treatment residuals already meet the LDR standards. If the post-regulatory management practices will generate residuals that require additional treatment, EPA will account for the treatment of these residuals in the estimate of required capacity.

[40] Waste streams that are sent to a transfer facility and then sent to a hazardous waste management facility should be reported in the BRS twice, once by the facility generating the waste and once by the facility transferring the waste. To avoid double-counting, waste with an origin code of 4 (indicating that the waste was received from off site and not managed on site) were eliminated.

[41] Because treatment standards for the newly listed waste streams depend on whether the stream contains organic or inorganic constituents, waste streams are classified as either organic or inorganic.

the BRS, so the estimates may include non-primary generation. Finally, the data are for 1993 and may not reflect changes in waste generation and management that have occurred since 1993.[42]

Given the limitations of the BRS data, EPA also estimated the generation of newly listed wood preserving wastes using a second methodology. Using the 1985 RCRA §3007 Survey data, the listing RIA derived average waste generation rates for each waste stream in terms of cubic meter of wood treated. EPA used these waste generation rates in conjunction with the total volume of wood treated with each

EXHIBIT 3-3
1993 GENERATION OF NEWLY LISTED WOOD PRESERVING WASTES

Waste Type	Quantity Generated (Tons)
F032	
Organic Nonwastewater	7,333
Inorganic Nonwastewater	10,246
Organic Wastewater	25,872
Inorganic Wastewater	129,766
Soil	10,472
Debris	11
F034	
Organic Nonwastewater	2,139
Inorganic Nonwastewater	14
Organic Wastewater	31,707
Inorganic Wastewater	2,568,030
Soil	9,448
Debris	3
F035	
Organic Nonwastewater	600
Inorganic Nonwastewater	1,900
Organic Wastewater	3,400
Inorganic Wastewater	9,772
Soil	2,700
Debris	0
Total	
Organic Nonwastewater	9,500
Inorganic Nonwastewater	11,000
Organic Wastewater	58,000
Inorganic Wastewater	2,700,000
Soil	22,000
Debris	14.0

Source: 1993 Biennial Reporting System, July 1995 version. Totals may not sum due to rounding.

preservative type in 1993 to estimate the quantities of wood preserving wastes generated. Exhibit 3-4 presents these estimates. However, these estimates do not correspond directly to waste codes, since the determination of which code a waste stream carries depends on the type of preservatives used at a particular facility. Nevertheless, even when summing the total amount of waste presented in Exhibit 3-4, the quantity of waste generated is less than the quantity of waste estimated to be generated by the BRS.

[42] The 1995 BRS will not be available until the summer of 1997, and thus could not be used for this analysis.

For the capacity analysis, EPA estimated the quantity of wood preserving wastes generated based on the BRS data rather than using the RIA and Micklewright data because the BRS also provides information regarding the management of wastes, as described in the next section. Also, EPA assumed that

EXHIBIT 3-4
GENERATION OF WOOD PRESERVING WASTES USING RIA AND MICKLEWRIGHT DATA

Type of Preservative	Quantity of Wood Treated (Cubic feet)	Generation Rates (Tons/cubic feet)		Quantity Generated (Tons)	
		Wastewater	Residuals	Wastewater	Residuals
Inorganic	470,504,000	0	0.000003	0	1,400
Creosote	92,132,000	0.004333	0.000017	399,000	1,500
PCP	36,155,000	0.004333	0.000027	157,000	960
Total	598,791,000			556,000	3,900

Totals may not sum due to rounding.
Sources: *Regulatory Impact Analysis for the Final Listing of Certain Wood Preserving Wastes*, December 1990 and *Wood Preserving Statistics, 1993*

all waste transferred to other facilities or reported as managed in unidentified system types would require alternative treatment.[43] These estimates are different from the estimates provided in the proposed rule due to refinements in EPA's methodology for identifying non-primary generation and the worst-case assumption that wastes managed in unidentified system types will require alternative treatment.

3.3.2 Waste Management

The 1993 BRS provides information on waste management, as well as information of waste generation. The wood preserving RIA and the 1994 Micklewright Report did not provide sufficient information on waste management practice. EPA estimated the quantity of waste requiring additional capacity, assuming that all waste currently land disposed (i.e., where the BRS management system type was landfill, land treatment, surface impoundment, deepwell injection, or other disposal) would require treatment, and that all wastes already treated would not require additional treatment. Exhibit 3-5 presents these estimates. In calculating these quantities, EPA assumed that waste that was currently being treated would not require any additional treatment in order to meet the treatment standards.

As discussed further in Section 3.6, EPA is assigning wastewaters and nonwastewaters contaminated with the newly listed organic wood preserving wastes to combustion, which will produce treatment residuals that may require treatment prior to land disposal. These residuals include air pollution control scrubber waters, wastewater treatment sludge, and incinerator ash. In the capacity analysis of the First Third LDR rule (53 FR 31138) and several subsequent LDR rules, EPA determined that facilities considered their ability to treat scrubber water on site when reporting the capacity of their incinerators. As a result, EPA does not estimate the quantity of scrubber wasters that may require alternative treatment capacity. EPA, however, augmented the estimated volumes of wastewaters and nonwastewaters contaminated with wood preserving wastes by the residual volume of incinerator ash and scrubber water treatment sludge. As discussed in the capacity analysis for the First Third rule, EPA assumed that the

[43] Given the manner in which transfers are reported, it is not always possible to identify how transferred wastes are managed. Therefore, as a worst-case scenario, EPA has assumed that all transferred wastes require additional treatment to meet the LDRs. However, the quantity of waste transferred is not significant.

EXHIBIT 3-5
QUANTITY OF NEWLY LISTED WOOD PRESERVING WASTES
REQUIRING ALTERNATIVE TREATMENT CAPACITY IN 1993

Waste Type	Quantity Requiring Alternative Capacity (Tons/Year)
F032	
Organic Nonwastewater	6,965
Inorganic Nonwastewater	141
Organic Wastewater	0
Inorganic Wastewater	12,761
Soil[a]	985
Debris[a]	11
F034	
Organic Nonwastewater	1,671
Inorganic Nonwastewater	0
Organic Wastewater	440
Inorganic Wastewater	0
Soil[a]	8,751
Debris[a]	0
F035	
Organic Nonwastewater	6
Inorganic Nonwastewater	206
Organic Wastewater	1
Inorganic Wastewater	58
Soil[a]	71
Debris[a]	0
Total	
Organic Nonwastewater[b]	8,732
Inorganic Nonwastewater[b]	1,255
Organic Wastewater	441
Inorganic Wastewater	13,000
Soil[a]	9,800
Debris[a]	11

Source: 1993 Biennial Reporting System, July 1995 version. Totals may not sum due to rounding.
[a] The quantity of soil and debris wood preserving wastes requiring alternative treatment capacity is discussed more fully in Section 3.4. The BRS does not include estimates of the over 100 million tons of contaminated media that may require treatment as contaminated sites are cleaned up over the next several years.
[b] These numbers include the estimated quantity of incinerator ash and wastewater treatment sludge derived from the combustion of these organic wastewaters and nonwastewaters. See the text for further discussion.

volume of incinerator ash is 10 percent of the original volume and that the volume of scrubber water treatment sludge is one percent of the original volume.[44] As a result, the quantity of organic nonwastewaters requiring alternative treatment capacity was increased by 90 tons per year to 8,732 tons per year and the quantity of inorganic nonwastewaters was increased by 908 tons per year to 1,255 tons per year, as seen in Exhibit 3-5.

The information provided by other sources on waste management practices supports the estimates derived from the BRS. According to the RCRA 3007 Survey that EPA conducted for the listing of these wastes, 63 percent of the facilities responding to questions about wastewater generation and management discharged wastewaters to Publicly Owned Treatment Works (POTWs), while 13 percent stored or disposed of their wastewaters in land-based units (including land application units, evaporation ponds, and surface impoundments). Furthermore, most F032 and

[44] See the capacity analysis for the First Third LDR rule.

F034 wastewaters are currently pre-treated by oil/water separation in tanks and discharged under a NPDES permit and thus are not subject to the LDRs as currently managed. Ten percent of the facilities also use some type of aeration process and three percent use activated carbon filtration. During the listing process, EPA assumed that inorganic wastewaters are reused in the process and also are not subject to the LDRs as currently managed. Industry sources have confirmed this assumption.[45]

3.4 SOIL AND DEBRIS CONTAMINATED WITH NEWLY LISTED WOOD PRESERVING WASTES

As shown in Exhibits 3-3 and 3-5, the 1993 BRS indicates that some soil and debris contaminated with the newly listed wood preserving wastes were generated and managed in 1993. EPA believes that remedial actions at wood preserving sites could generate large additional quantities of soil and debris contaminated with the newly listed wood preserving wastes that are not accounted for in the BRS. These wastes will require additional combustion and other capacity for treatment.

For required combustion capacity for soil and debris, EPA examined Superfund Records of Decision (RODs) signed between 1986 and 1993 for data on volumes of surfaced-disposed soil and debris managed ex-situ at wood preserving sites (see Appendix H). From these data, the Agency initially calculated a low-end estimate of the quantity of soil and debris from Superfund remedial actions that would require additional combustion capacity. The low-end estimate assumed that only soil and debris contaminated with dioxins or furans would be managed using combustion to meet the LDR treatment standards, while wastes contaminated only with other constituents would be managed using non-combustion treatment technologies such as bioremediation or stabilization/solidification. Based on these assumptions (discussed in more detail in Appendix H), EPA estimates that between 100,000 and 260,000 tons of soil and debris generated during Superfund remedial actions alone at wood preserving sites may require additional combustion capacity each year over the next two years. Soil and debris from wood preserving sites is also likely to be generated during cleanup of non-NPL sites as well as from cleanups under programs other than Superfund, such as through RCRA corrective actions and closures, State cleanups, or voluntary cleanups. For example, Kerr-McGee has said that four of its seven facilities are undergoing RCRA corrective actions.[46] Beazer East also provides an analysis indicating that non-NPL sites generate a substantial amount of contaminated soil (see Appendix H for further discussion of Beazer East's analysis). As a result, the quantity of soil and debris contaminated with the newly identified wood preserving wastes is likely to be much higher than the low-end estimate presented above. As discussed in Section 3.6.2, however, EPA determined that the low-end estimate of required alternative treatment capacity was greater than available capacity, and therefore the Agency did not conduct a rigorous analysis to develop a high-end estimate of the quantity of contaminated soil and debris. Nevertheless, as discussed in Appendix H, EPA believes that the high-end of this range is significantly higher than 100,000 tons per year.

As seen in Attachment 1 of the February 14, 1997 memorandum presented in Appendix H, these soil and debris volumes are contaminated predominantly with various mixtures of specific chemicals that in turn indicate mixtures of F032, F034, and F035 wastes. Data gathered from the BRS supports this conclusion (see Appendix G). Based on its review of Superfund RODs, the Agency believes that a relatively small proportion of soil and debris contaminated with wood preserving wastes is contaminated only with F035 wastes. About 47,000 cubic yards of soil and debris was contaminated only with F035 waste compared to the approximately 851,000 cubic yards of soil and debris that was contaminated with mixtures of F035, F032, and F034 waste (see Attachment 1 of the February 14, 1997 memorandum in Appendix H). Where soil and debris are contaminated with both organic (i.e., F032 and F034) and inorganic (i.e., F035) wood preserving wastes, treatment trains (e.g., combustion followed by stabilization) will be required to effectively manage the contaminated soil and debris. As a result, the available treatment capacity for F032 and F034 wastes will affect the available treatment capacity for F035-contaminated volumes of soil and debris that also contain F032 and/or F034 waste.

Commenters provided additional data regarding quantities of contaminated soil and debris. The following summarizes commenters' responses:

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[45] See communication logs in Appendix F.

[46] See February 19, 1997 phone log in Appendix F detailing EPA discussions with Steve Ladner of Kerr-McGee.

- In response to the NODA, Georgia's Department of Natural Resources commented that it was in the process of cleaning up six abandoned wood treating facilities and expected to generate a total of 130,000 tons of soil contaminated with F032, F034, and F035 wastes from these cleanups over the next two years.[47]

- In response to the proposed rule, the Penta Task Force noted that approximately 10,500 tons of F032-contaminated soil and debris are generated annually at wood processing facilities, and large volumes (as high as 102 million tons) of contaminated soils from past operations may require treatment.

- In response to the ANPRM, Beazer East submitted a study of 31 Superfund Records of Decision (RODs) on wood preserving that showed that a total of 2.2 million cubic yards of contaminated soil (over 2.6 million tons) was removed at wood preserving sites. According to this commenter, if this quantity is extrapolated to the entire universe of wood preserving sites, a total of up to 85.3 million cubic yards (about 102 million tons) of contaminated soil could be generated through remedial actions. This commenter also estimated the contaminated soil and rock at an additional wood preserving site to be 75,000 cubic yards (approximately 90,000 tons).

- Another commenter to the ANPRM, the James Graham Brown Foundation, estimated remedial actions at one of its former sites will include cleanup of a total of 8,000 cubic yards (about 9,600 tons) of contaminated soil.

- Through a telephone conversation with EPA, an EPA Region X representative said that about 5,000 tons of soil and debris contaminated with F032 and F034 waste will be excavated from a wood preserving site in Washington.[48] Another Region X commenter noted that there are a number of site cleanups in Region X that are generating large quantities of pentachlorophenol and creosote wastes from efforts to contain dense non-aqueous phase liquids (DNAPLs).[49]

- One commenter noted that the Corrective Action Management Unit (CAMU) Rule allows soil and debris contaminated with wood preserving wastes to be managed without application of the LDRs, but the commenter noted that if the legal interpretation of CAMU is a concern, potentially larger quantities of soil and debris contaminated with wood preserving wastes could require alternative treatment.[50]

Another issue concerning hazardous soil and debris is the closure of surface impoundments. Prior to the listing of the wood preserving wastes as hazardous, many facilities stored these wastes in surface impoundments. For the most part, facilities can no longer use these surface impoundments because they do not meet the minimum technology requirements under the Hazardous and Solid Waste Amendments (HSWA) of 1984. [51] According to the American Wood Preservers Institute, facilities are not retrofitting their impoundments. Instead, facilities are using drip pads or 90-day exempt tanks. Therefore, the surface impoundments have been or will be closed. Closure of the surface impoundments could potentially result in the generation of large quantities of soil and debris contaminated with F032, F034, and F035. Kerr-McGee, for example, has stated that five of its seven wood preserving facilities have closed surface impoundments that may have large surrounding areas contaminated with F034 wastes because of possible extensive contaminant migration.[52]

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[47] See January 16, 1997 phone log in Appendix F detailing EPA discussions with Jim Brown of the Georgia Department of Natural Resouces.
[48] See January 21, 1997 phone log in Appendix F detailing EPA discussions with Beth Sheldrake of EPA Region X.
[49] See January 6, 1997 letter in Appendix F from Judi Schwarz, Region X to Susan Slotnick.
[50] See phone log in Appendix F detailing February 19, 1997 discussion between EPA and Steve Ladner of Kerr-McGee.
[51] Facilities are given four years to retrofit surface impoundments, once the wastes in them have been listed as hazardous. If the surface impoundment is not retrofitted to meet MTRs, it cannot be used to manage hazardous wastes. Since these wastes were listed in December 1990, the four-year window has expired.
[52] See February 19, 1997 phone log in Appendix F detailing EPA discussions with Steve Ladner of Kerr-McGee.

Based on the data provided in the comments and the analysis described at the beginning of this section, over 100,000 tons per year of contaminated media may require additional combustion treatment alone. Larger amounts may require other types of alternative treatment to comply with the Phase IV LDRs.

3.5 MIXED RADIOACTIVE WOOD PRESERVING WASTES

The Agency has also sought data on mixed radioactive wood preserving wastes and at this time has not found any quantities. Nevertheless, any commercial capacity that is available for mixed radioactive wastes must be used for mixed wastes that were regulated in previous LDR rulemakings and whose variances have already expired.

3.6 CAPACITY ANALYSIS

EPA generally applies available capacity first to wastewaters and nonwastewaters and then to soil and debris. The capacity analysis is therefore discussed separately for each category. Mixed radioactive wastes also are addressed.

3.6.1 Wood Preserving Wastewaters and Nonwastewaters Contaminated with Newly Listed Wood Preserving Wastes

As discussed in Section 3.3, EPA estimates that very small quantities of wood preserving wastewaters (approximately 441 tons of organic wastewater and 13,000 tons of inorganic wastewater) will require alternative treatment capacity in order to comply with Phase IV LDRs. As shown in Exhibit 3-5, EPA estimates that approximately 10,000 tons of nonwastewaters (8,732 tons of organic nonwastewaters and 1,255 tons of inorganic nonwastewaters) will require alternative treatment as a result of the Phase IV LDRs.

Based on the available capacity information provided in Chapter 2 and the required capacity information presented above, EPA has determined that there is adequate capacity available to treat wood preserving wastewaters and nonwastewaters (organic and inorganic). This conclusion is based on the following comparison of available and required capacity for the various wood preserving wastewaters and nonwastewaters:

- sufficient liquid combustion capacity (approximately 885,000 tons per year) is available to treat the required capacity of organic wood preserving wastewaters (about 441 tons per year)[53];

- sufficient stabilization capacity (over one million tons per year) and limited vitrification capacity are available to treat the required capacity of inorganic wood preserving nonwastewaters (about 1,255 tons per year);

- sufficient pumpable/non-pumpable sludge, solid, and soil combustion capacity (approximately 87,600 to 199,100 tons per year) is available to treat the required capacity of organic nonwastewaters (about 8,732 tons per year); and

- sufficient wastewater treatment capacity available (several million tons, plus the ability of systems to be optimized quickly) to treat the required capacity of inorganic wastewaters (about 13,000 tons per year).[54]

However, because F032 residues resulting from Part 265 combustion units will have to meet applicable numerical limits for dioxins and furans prior to disposal, and because the estimate of required capacity excluded wastes managed in on-site captive thermal devices operated under 40 CFR Part 265 (i.e., interim status incinerators), the

[53] As discussed in Final Best Demonstrated Available Technology Background Document for Wood Preserving Wastes - F032, F034, and F035, EPA has determined that wastewater treatment technologies such as biological treatment, steam stripping, carbon adsorption, or a combination of these technologies also can treat organics regulated in F032 and F034 to the promulgated concentration limits.

[54] EPA has determined that treatment levels can be readily achieved by lime addition followed by sedimentation and filtration for arsenic, and by chemical precipitation followed by sedimentation for chromium.

Agency conducted additional analysis to be consistent with the analysis of available commercial combustion capacity in Chapter 2 (which accounted for the commercial interim status incinerators). That is, if the on-site captive combustion capacity is available to manage the waste covered in today's rule, the amount of required commercial capacity would increase. Therefore, as an upper bound, EPA assumed that all organic F032 waste that is generated—approximately 7,333 tons/year of nonwastewaters and 25,872 tons/year of wastewaters—could require alternative combustion capacity, which would increase total required commercial combustion capacity to about 9,100 tons/year for nonwastewaters and 26,312 tons of wastewaters. Even with this assumption, however, there clearly is sufficient combustion capacity to treat the waste. Furthermore, the Agency expects that some of the F032 wastes estimated above may also carry the D037 waste code and thus may be meeting the Phase II LDRs. Because the Phase II D037 treatment standards are comparable to the Phase IV standards, many of the F032 wastes will not require a significant amount of additional capacity. Therefore, these estimates of required capacity are likely to overestimate the quantity of waste actually requiring treatment.

In light of this analysis, the Agency is providing only a 90-day national capacity variance for newly listed wood preserving wastewaters and nonwastewaters (organic and inorganic) to allow facilities sufficient time to arrange for treatment of their wastes and/or modify existing treatment systems (e.g., wastewater treatment systems) to meet the LDR standards for these wastes.

3.6.2 Soil and Debris Contaminated with Newly Listed Wood Preserving Wastes

EPA does not believe that there is adequate combustion capacity available to treat soil and debris contaminated with newly identified wood preserving wastes. As discussed in Chapter 2, the Agency estimates that there is combustion capacity available to treat about 87,000 to 199,100 tons per year of hazardous wastes. This estimate, however, encompasses capacity for sludges, solids, and soils. The Agency estimates that capacity available to treat only soils and debris that require combustion is about 25 percent of this range, or about 21,900 to 49,775 tons per year. In contrast, the Agency has estimated that between 100,000 and 260,000 tons of soil and debris from Superfund remedial actions alone that are contaminated with mixtures of F032, F034, and F035 wastes may require additional combustion capacity. The required capacity increases when soils and debris generated under RCRA corrective actions and closures, State cleanups, and voluntary cleanups are included in the required capacity estimate. Furthermore, logistics issues may severely hamper the ability of site managers to obtain adequate alternative treatment in the near term. For example, as seen in Chapter 4, Beazer East stated that most incinerators that can manage nonpumpable materials only accept such materials in small quantities, and fewer than five of the RCRA-permitted incinerators can handle truckloads or railcar volumes of contaminated media. Beazer East believes that, as a result, soils and similar remediation wastes will pose material handling and capacity problems for most of the nonpumpable incinerators. Other commenters indicated that facilities have no control over the timing of cleanups that must be approved by EPA or states.[55] Obtaining permits for on-site combustion and other waste management, and the redesigning of specific on-site remedial actions, can take years to accomplish. Finally, as discussed in Section 3.4, the Agency has found that the majority of soil and debris contaminated with F035 waste is also contaminated with organic contaminants, including F032 and/or F034 wastes. Because of treatment train issues, F035 waste mixed with F032 and/or F034 waste will consequently not be able to be treated until the organic portion of the waste has been treated. Thus, given the lack of available capacity and other issues associated with soil and debris contaminated with F032, F034, and/or F035 wood preserving wastes, the Agency is granting a two-year variance for these wastes.

3.6.3 Mixed Radioactive Wastes

As discussed previously, the Agency has not found any quantities of mixed radioactive wood preserving waste. Nevertheless, as discussed in detail in the proposed Phase IV rule capacity analysis, any commercial capacity that is available for mixed radioactive wastes must be used for mixed wastes that were regulated in previous LDR rulemakings and whose variances have already expired. Therefore, EPA is granting a two-year national capacity variance for any mixed radioactive wood preserving wastes and for any soil and debris contaminated with mixed radioactive wastes that may exist.

[55] See February 19, 1997 phone log in Appendix F detailing EPA discussions with Steve Ladner of Kerr-McGee.