United States
Environmental Protection
Agency

Solid Waste and
Emergency Response
(5305W)

EPA530-R-97-028
NTIS: PB97-176 937
April 1997

EPA

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

Capacity Analysis and Response to Capacity-Related Comments

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Printed on paper that contains at lest 20 percent postconsumer fiber

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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

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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)).

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 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

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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.

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.

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

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

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).

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 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.

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[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.

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

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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.

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 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.

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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.

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.

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-

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

[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.

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
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

[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)
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
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

EXHIBIT 2-2
AVAILABLE WASTEWATER TREATMENT CAPACITY

Name	EPA ID Number	Maximum Capacity (gallons)	% Used in 1989	Available Capacity (gallons)
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
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

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

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 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

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[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.

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 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]

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[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.

[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.

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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.

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.

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.

- 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]

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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.

[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

- 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 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

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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.

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

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.

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

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

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 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

[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.

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:

- 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]

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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.

- 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]

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

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[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.

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 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.

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[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.

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.

CHAPTER 4
COMMENT/RESPONSE

4.1 INTRODUCTION

In 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), EPA proposed treatment standards for certain wastes listed and identified since November 1984 that have not been covered in previous Land Disposal Restriction (LDR) rulemakings. In addition, EPA issued the Land Disposal Restrictions Phase IV Proposed Rule–Issues Associated with Clean Water Act Treatment Equivalency, and Treatment Standards for Wood Preserving Wastes and Toxicity Characteristic Metal Wastes: Notice of Data Availability (NODA) on May 10, 1996 (61 FR 21418).

EPA received 123 comments to the proposed rule and 21 comments to the NODA.[56] This chapter summarizes those comments related (either directly or indirectly) to the capacity analysis for the newly listed wood preserving wastes.[57] EPA received 8 comments to the Phase IV Proposed Rule and 6 to the Notice of Data Availability (NODA) on the capacity analysis for F032, F034, and F035 wastes: Beazer East (23); Rollins Environmental Services, Inc. (27, N19); Penta Task Force (32, N3); Utilities Solid Waste Activities Group et al (USWAG) (35); American Wood Preservers Institute (39); Chemical Waste Management (48, N18); J.H. Baxter (58); The Hazardous Waste Management Association (97); Georgia Department of Natural Resources (N13); DuPont Engineering (N16); and Dow (N9).[58]

The comments address eight issues related to the capacity analysis for wood preserving wastes:

1. Discrepancy Exists in the Wood Preserving Waste Generation Estimates;
2. Sufficient Combustion Capacity Exists for Newly Listed Wood Preserving Wastes;
3. Insufficient Incineration Capacity Exists for F032 Wastes;
4. Capacity for F032 Will Not Increase;
5. No Alternative Dioxin/Furan Technologies Are Commercially Available;
6. Insufficient Vitrification Capacity Exists for Newly Listed Wood Preserving Wastes;
7. Available Capacity Does Not Exist for Newly Listed Wood Preserving Wastewaters; and
8. National Capacity Variance Is Needed for Soil and Debris Contaminated with Newly Listed Wood Preserving Wastes.

For each of these issues, we present a summary of the issue, EPA's response to the commenters' questions and concerns, and photocopies of the actual comment letters.

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[56] Lists of the commenters to the proposed rule and the NODA can be found in Appendix B. Each comment has been assigned a document number. In the rest of the chapter we will refer to the commenter both by name and by document number. Comment numbers beginning with an "N" indicate the comment was received in response to the NODA. Comment numbers with no "N" indicate the comment was received in response to the proposed rule.

[57] Comments that pertain to other waste streams and/or issues not addressed in today's rule will be addressed when the respective rules are finalized.

[58] Comment N9 addresses capacity for F024 under the mistaken assumption that EPA is revising the BDAT standards for F024. Therefore, the Agency has not addressed this comment because it is not relevant to the capacity analysis for this rule.

4.2 DISCREPANCY EXISTS IN THE WOOD PRESERVING WASTE GENERATION ESTIMATES

Summary:

In the proposed rule, EPA provided two estimates of the generation of newly listed wood preserving wastes, one for the purpose of the capacity analysis, and one for the purpose of the Regulatory Impact Analysis (RIA). Two commenters, Penta Task Force (32) and American Wood Preservers Institute (39), noted the discrepancy between these estimates. Penta Task Force stated that the estimate provided in the capacity analysis is an order of magnitude higher than the estimate in the RIA for F032 wastes and stated that the capacity analysis methodology more accurately reflects actual F032 waste volumes (32:15-16). American Wood Preservers Institute requested reevaluation and clarification of contradicting capacity estimates for F032 wastes (39:20-21).

Response:

The focus of the capacity analysis is not the same as that of the RIA. Thus, there can be differences in the estimates developed for these two separate analyses. The capacity analysis focuses on the quantity of waste requiring alternative treatment capacity over the two years following promulgation of the final LDR rule to evaluate whether a national capacity variance is required. The RIA focuses on the quantity of waste affected by the LDR rule over a much longer time frame following promulgation of the rule to evaluate the costs and benefits of the rule. Furthermore, while the RIA invariably develops a "best estimate" of the quantities of waste, the capacity analysis often uses an iterative process whereby an upper-bound estimate is first developed in order to determine whether the available capacity would be exceeded. If so, a more refined estimate is developed.

Also, as one of the commenters notes, EPA did not have data indicating whether wastes were wastewaters or nonwastewaters. Therefore, for the capacity analysis, wastes were classified as wastewaters or nonwastewaters based on the form of the waste that was reported to EPA in the 1993 Biennial Reporting system.

For the final rule, EPA has reevaluated both the capacity analysis and the RIA to resolve any discrepancies that cannot be explained by the different foci of the two analyses. The quantity of wood preserving wastes requiring alternative treatment capacity that is estimated in the revised capacity analysis now lies within the low-end and high-end estimate presented in the RIA. In the RIA, EPA estimates that between 3,860 tons and 18,808 tons of wood preserving nonwastewaters will require alternative treatment capacity under the Phase IV LDRs (see Exhibit 2-3 of the RIA). In the revised capacity analysis, EPA has estimated that about 10,000 tons of wood preserving nonwastewaters will require alternative treatment capacity (see Section 3.3.2 of this document).

Comments:

See next page.

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In its Regulatory Impact Analysis, EPA has assumed that only some 1,200 tons of F032 nonwastewaters are generated each year at the 49 wood processing facilities that would become subject to the F032 treatment standards. RIA, ES-12, Exh. 3-2 at 3-5, 3-6. But that estimate is flatly inconsistent with the 12,600 tons estimate found in the Capacity Analysis. As noted above, the Capacity

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Analysis estimates the F032 waste volumes at 22,000 tons per year; that estimate is based on data gleaned from the 1993 Biennial Reporting System ("BRS"). The RIA, on the other hand, derives it estimate on the basis of 1993 production statistics multiplied by a waste generation rate taken from a 1985 RCRA 3007 survey.

The methodology used in the Capacity Analysis more reliably reflects actual F032 waste volumes. The BRS data used in the Capacity Analysis reflect recent data reported by wood preserving sites on the actual quantities of wastes transferred off-site for treatment or disposal during 1993. The 1985 RCRA 3007 survey, on the other hand, was conducted at a time when most wood treating facilities were using surface impoundments for waste management and therefore had limited ability to quantify waste generation rates. Also, the RIA incorrectly asserts that the BRS report might reflect double counting of waste streams. In point of fact, the procedures used by BRS to collect the data were carefully designed to avoid double-counting. For these reasons, the volume estimates in the Capacity Analysis are more accurate than those presented in the RIA. If EPA were to use these more accurate volume estimates to analyze costs, it is clear as shown below that the cost of meeting the treatment standards at a six 9s incinerator would be prohibitive.

Commenter: American Wood Preservers Institute
Comment Number: 39
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EPA estimates some 40 tons of inorganic wastewater and 2,880 tons of inorganic non-wastewater will require alternative treatment capacity per year. EPA representatives stated that these numbers come in part from the Biennial report. However, generators do not distinguish between wastewaters and non-wastewaters. Therefore, it is unclear how EPA obtained these numbers.

By EPA's capacity analysis estimation, 12,600 tons of F032 non-wastewater sludges and residuals are generated at wood preserving facilities per year.[37] However, the Agency presents contradictory figures in its regulatory impact analysis where EPA estimates only 1,200 tons of F032 non-wastewaters are generated per year.[38] In addition, the Agency estimates that millions of tons of previously-contaminated soils and debris may require treatment.[39]

COMMENT:

The Agency's methodologies for calculating capacity and waste generation are unclear, inconsistent, and warrant explanation. The final rule should clarify how EPA achieved the estimates for total inorganic wastewater and non-wastewater. EPA

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[36] See, "National Capacity Assessment Report: Capacity Planning Pursuant to CERCLA Section 104(c)(9)", EPA 530-R-94-040.
[37] "Best Demonstrated Available Technology (BDAT) Background Document for Wood Preserving Wastes" (July 1995) and "Capacity Analysis", Section 3-8, EPA.
[38] "Regulatory Impact Analysis of the Phase IV Land Disposal Restrictions (Draft)", (August 7, 1995).
[39] Id.

Commenter: American Wood Preservers Institute
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should explain which number reflects actual F032 waste generation volumes and use the correct volume throughout its analysis.

4.3 SUFFICIENT COMBUSTION CAPACITY EXISTS FOR NEWLY LISTED WOOD PRESERVING WASTES

Summary:

In the proposed rule, EPA stated that combustion would be able to meet the proposed treatment standards for the organic newly listed wood preserving wastes (both wastewaters and nonwastewaters). Based on EPA's assessment that there was over one million tons of available liquid combustion capacity available and over 100,000 tons of available sludge/solid combustion capacity, EPA proposed not to grant a variance for organic newly listed wood preserving wastes. Rollins Environmental Services, Inc. (27, N19) supports EPA's determination that sufficient combustion capacity exists for these wastes. Rollins stated that EPA's available sludge/solid capacity estimate does not include combustion capacity at the ECOVA facility in Nebraska. Rollins provided capacity data for all of their combustion facilities to EPA as Confidential Business Information (CBI). Rollins also stated that EPA overestimated capacity requirements for Phase II wastes as 439,500 tons and that this estimate should be less than 100,000 tons annually (27:3-4) (N19:1-3). In their comment to the NODA, Penta Task Force (N3) stated that the proposed suboption 3 (which EPA is finalizing today) would increase the number of facilities that could accept these wastes and alleviate capacity shortfall problems (N3:3).

Response:

EPA acknowledges Rollins Environmental Services, Inc.'s support and has incorporated the data provided into its revised capacity analysis. Refer to Chapter 2 in this document for a detailed discussion of how the data were incorporated into the analysis. In response to the Penta Task Force comment, EPA agrees that the number of facilities that could accept wood preserving wastes likely will increase and thus has incorporated this increase into the assumptions used to develop available capacity estimates in Chapter 2.

Comments:

See next page.

Commenter: Rollins Environmental Services
Comment Number: 27
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EPA's own capacity survey, used for this proposal, shows an available sludge/solid combustion capacity of 115,900 tons. However, even this large volume of available capacity severely under reports the true actual available commercial combustion capacity. The Agency's survey demonstrates the following available combustion capacity numbers for sludge/solids:

Available Capacity	560,000 tons
Capacity Required for Phase II Wastes	(439,500)tons
Capacity Required for Phase III Wastes	(4,600) tons
Total Available Capacity	115,900 tons

RES feels the 115,900 tons of available capacity for sludges/solids is under reported for several reasons. The EPA's data did not include capacity figures from the ECOVA facility in Nebraska. Also the estimate that Phase II wastes are utilizing 439,500 tons of available capacity is extremely high. Anecdotal evidence, and records searches, indicate that the volume of *additional wastes* requiring treatment after promulgation of the Phase II treatment standards amounts to well less than 100,000 tons annually. Therefore, the real thermal capacity for sludge/solids should be significantly higher than the 115,900 tons the Agency estimates.

The commenters primary concern about thermal treatment capacity appears to be of the available capacity may not be available for F032 wastes if these wastes have a Dioxin/Furan treatment standard. The commenters imply that only a small percentage of the available thermal capacity will be open to wastes with a Dioxin/Furan standard. RES feels this is not a valid concern.

Commenter: Rollins Environmental Services
Comment Number: 27
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RES operates five incineration facilities in the U.S. (see Attachment A). Three of these facilities (located in Kansas, Texas, & Utah) have demonstrated the ability to meet the Dioxin/Furan treatment standard under a variety of operating conditions. These facilities represent roughly 70% of the thermal treatment capacity of RES. We are confident the other two RES facilities could also meet these treatment standards (because of design & operational similarities between all RES incinerators) if there is sufficient demand to require utilizing these facilities. Within the RES system alone there is sufficient capacity to handle the F032 wastes.

Commenter: Rollins Enivironmental, Inc.
Comment Number: N19
Page Number: 1

ROLLINS ENVIRONMENTAL INC.

One Rollins Plaza, P.O. Box 2349, Wilmington, DE 19899, 302/426-2700

June 7, 1996

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RCRA Information Center
U.S. Environmental Protection Agency (5305W)
401 M Street SW
Washington, D.C. 20460

Rollins Environmental Services, Inc. Comments on Land Disposal Restrictions Phase IV Proposed Rule--Issues Associated With Clean Water Act Treatment Equivalency, and Treatment Standards for Wood Preserving Wastes and Toxicity Characteristic Metal Wastes; Notice of Data Availability; Docket Number F-96-P42A-FFFFF

Dear Sir or Madam:

This letter constitutes the comments of Rollins Environmental Services, Inc. On the above referenced notice.

Statement of Interest

Rollins Environmental Services, Inc. (RES) and its wholly-owned subsidiary companies is a full service company engaged in the treatment and destruction of hazardous and toxic wastes. Our interests are directly affected by the outcome of this regulatory proposal.

Treatment Standards for Wood Preserving Waste F032

In this NODA, the EPA is responding to the Wood Preserving Industry's concern that a Dioxin/Furan treatment standard for F032 would discourage commercial incineration facilities from treating this waste. Several years ago this concern would have been valid. However, in light of the technical upgrades that have taken place, and huge quantities of available capacity, in the incineration industry this concern should no longer affect Agency regulations. For example, just within the RES system there is more than sufficient capacity to treat the F032 process wastes and meet the proposed Dioxin/Furan treatment standard.

The wholly-owned subsidiaries of RES represent the largest block of incineration capacity in the

Commenter: Rollins Enivironmental, Inc.
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U.S. As stated in our comments of 11/17/96, "three RES subsidiaries (located in Kansas, Texas, and Utah) have demonstrated the ability to meet the" proposed F032 "Dioxin/Furan treatment standard under a variety of operating conditions." "These facilities represent roughly 70% of the thermal treatment capacity of RES. We are confident the other two RES facilities could also meet these treatment standards if there is sufficient demand to handle the F032 wastes. Within the RES system alone there is sufficient capacity to handle the F032 wastes." RES is convinced these comments are still valid today, **and there is no capacity shortage for the treatment of F032 process wastes** (see attached 6/5/96 announcement of "Campaign Mode" at Coffeyville due to overcapacity).

There is a demonstratively sufficient amount of capacity to meet the proposed Dioxin/Furan treatment standards for F032 process wastes. Additionally, RES contends there is sufficient capacity to meet the proposed Dioxin/Furan treatment standards for F032 contaminated media wastes. However, since the data on the quantity of F032 contaminated media is incomplete, it is conceivable there may be a large F032 contaminated media cleanup that exceeds the capacity of facilities able to meet the Dioxin/Furan treatment standard. RES also acknowledges that some incineration facilities may not be able to meet the Dioxin/Furan treatment standard, thereby limiting the available capacity for large contaminated media projects.

Therefore, RES recommends the option of an alternative treatment standard for F032 contaminated media waste, available under limited circumstances. This option would allow an F032 contaminated media generator to utilize the alternative treatment standard under the following condition:

- The generator certifies to the EPA that a request to at least five incineration facilities indicates there is insufficient capacity to treat the F032 contaminated media while meeting the Dioxin/Furan treatment standard.

RES further recommends that EPA adopt the combination of suboptions 2 & 3 as outlined in the NODA as the alternative treatment standard. Under this recommendation, after certifying there is insufficient capacity for treatment of F032 contaminated media, a generator could utilize the alternative treatment standard of "Combustion in a Part B permitted facility that meets a Dioxin/Furan emission standard of 0.20 ng/DSCF."

Conclusion

There is sufficient existing treatment capacity to meet the Dioxin/Furan treatment standard for all F032 process wastes.

Also, there is sufficient existing treatment capacity to meet the Dioxin/Furan treatment standard for most F032 contaminated media projects. However, the treatment standard for F032 contaminated media should allow an alternative standard of "Combustion in a Part B permitted facility that meets a Dioxin/Furan emission standard of 0.20 ng/DSCF." after the generator certifies there is insufficient capacity to treat the F032 contaminated media while meeting the

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Dioxin/Furan treatment standard.

Should you have any questions about these comments, please contact me at (302) 426-3471.

Sincerely,

Michael G. Fusco
Director, Regulatory Analysis

cc: P. Retallick
D. Scherger

Commenter: Penta Task Force
Comment Number: N3
Page Number: 3

B. Option 3 -- CMBST In RCRA-Permitted Devices.

The Penta Task Force recognizes that Option 3, which provides for combustion in RCRA-permitted facilities, would increase the number of combustion facilities that would accept F032 waste and, thus, is by far preferable to the proposed dioxin/furan treatment standard. Option 3 also would fully satisfy the LDR criteria as an appropriate treatment standard. Indeed, EPA's August, 1995 proposal was predicated on the finding that incineration is the best demonstrated available treatment ("BDAT") for dioxins/furans in F032 waste. And EPA has oft-stated that various types of incineration have been demonstrated to treat high and low level dioxin/furan constituents in a variety of organic wastes to levels below detection limits in incineration residues. Option 3 thus would ensure that F032 waste is treated by BDAT technology without the attendant stigma and capacity shortfall problems that would result from setting dioxin/furan numerical limits in the treatment residue.

Although Option 3 is preferable to setting dioxin/furan numerical limits, we do not believe there is a regulatory justification for limiting the treatment standard to permitted combustion devices only. As recently as April, 1996, EPA has amended the treatment standards for the various waste codes that were previously subject to an incineration (INCIN) standard to allow combustion in all hazardous waste incinerators, boilers and industrial furnaces under the new treatment code CMBST. See 61 Fed. Reg. 15,566, 15,601-15,653 (April 8, 1996). EPA has offered no justification for retreating from that decision now in the case of F032 (and perhaps F024) wastes.

Under either option -- Option 1 or Option 3 -- the number of treatment facilities that would accept F032 wastes would be greatly expanded. The Penta Task Force believes that all options being considered by the Agency are fully protective of health and safety and, thus, consideration of practicability and cost should drive the selection of the appropriate treatment option. As explained in our November, 1995 comments, the practical consequences of setting dioxin/furan numerical limits for F032 wastes would be to force wood preserving facilities to send their wastes to the only commercial incineration facility -- the Aptus Incinerator in Coffeyville, Kansas -- that is permitted to treat dioxin-containing waste.

4.4 INSUFFICIENT INCINERATION CAPACITY EXISTS FOR F032 WASTES

Summary:

Several commenters [Beazer East (23); Penta Task Force (32, N3); American Wood Preservers Institute (39); Chemical Waste Management (48, N18); J.H. Baxter (58); the Hazardous Waste Management Association (97); and the Dow Chemical Company (N9)] question whether there is adequate available combustion capacity that can meet the proposed treatment standards for dioxins and furans in F032 wastes. EPA proposed treatment standards for dioxins and furans in F032 wastes, which precluded the use of incinerators that are not permitted to accept dioxin and furan wastes. However, in its capacity analysis for the proposed rule, EPA assumed that all incinerators would be able to treat these wastes, found that there was sufficient incineration capacity available, and thus did not propose a capacity variance for F032 wastes.

Beazer East stated that the proposed LDR standards for dioxins and furans in F032 will create insurmountable disposal problems because only one incinerator in the US is licensed to accept dioxin and furan wastes (23:4,8-10). Penta Task Force stated that the available capacity at the one facility permitted to incinerate dioxins and furans to the proposed standards, the APTUS facility, is less than 6,600 tons/yr for non-PCB wastes. According to Penta Task Force, this creates a shortfall in capacity for the estimated 12,600 tons of F032 nonwastewater process sludges and residuals (32:3-4;13-17,26, N3:2,5). American Wood Preservers Institute (AWPI) stated that the APTUS facility has 19,500 to 25,400 tons of capacity per year, 70 percent of which is dedicated to TSCA-regulated PCB waste, leaving 5,850 to 7,350 tons per year available for other waste streams. AWPI noted that even if all of this remaining capacity is dedicated to F032 waste, there is not sufficient capacity to treat the actual volumes of F032 wastes, and given the strong public resistance to new incinerators and the huge costs associated with permitting facilities capable of meeting a destruction and removal efficiency (DRE) of 99.9999%, additional incineration capacity for dioxin-containing wastes is not likely (39:24-26).

Chemical Waste Management stated that if an incineration facility must demonstrate a DRE of 99.9999%, then EPA must grant a national capacity variance for F032 wastes. However, the commenter notes that if incineration or combustion is established as the treatment standard, its facilities may be able to accept F032 wastes (48:38, N18:2). J.H. Baxter stated that Laidlaw Environmental, the current handler of Baxter's F032 waste streams, will no longer accept the wastes if the dioxin standard for F032 is adopted, and that it will be extremely difficult to obtain timely treatment for F032 waste streams. Baxter also noted that the one commercial facility currently permitted to combust dioxin and furan wastes has an annual capacity is 22,000 tons, 70% of which is devoted to incineration of TSCA-regulated wastes contaminated with PCBs. According to Baxter, this leaves capacity for 6,600 tons of waste from RCRA-regulated disposal activities, which will create a capacity shortfall (58:1-3).

The Hazardous Waste Management Association (HWMA) believes that the Agency's statement regarding the only permitted facility to combust F032 wastes with dioxin and furan constituents (60 FR 43682) contradicts its capacity analysis, which indicates there is sufficient capacity. HWMA stated that there may be sufficient incineration capacity for F034 wastes, but not for dioxins and furans proposed as BDAT for F032, and recommended that EPA either promulgate a two-year national capacity variance or remove dioxins and furans from the F032 treatment standards (97:17-18). The Dow Chemical company believes that EPA has not sufficiently analyzed the available treatment capacity for these wastes (N9:2,3).

Response:

In today's rule EPA is not requiring the combustion of F032 wastes in a "six 9's" destruction and removal efficiency combustion device. Therefore, facilities may combust F032 wastes at any RCRA facility regulated under CFR Part 266 or 264, Subpart O without having to monitor the concentrations of dioxins and furans left behind in the combustion residues. This alternative should eliminate the "stigma" types of concerns raised by commenters. In addition, facilities may combust F032 wastes in combustion devices regulated under CFR Part 265, Subpart O units, provided the residues meet the applicable standards for each regulated dioxin or furan constituent, or make a demonstration that their combustion is at least equivalent to that required of permitted incinerators or Part 266 BIFs, in which case these interim status incinerators would also have the option of not monitoring for dioxins in combustion residue. EPA has determined that approximately 885,539 tons/year of available capacity exists for liquid Phase IV wood preserving wastes and the approximately 87,600 to 199,000 tons/year of available capacity exists for pumpable/nonpumpable sludges, solids, and soils at combustion facilities permitted to accept F032 wastes (see Section 2.1.2 of this document), while required capacity is only a fraction of these amounts. Therefore, there is sufficient capacity to treat F032 to the final LDR standards, and EPA is not granting a national capacity variance for these wastes.

Comments:

See next page.

Commenter: Beazer East
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As discussed in greater detail below, the Agency's proposed LDR for dioxin/furan congeners (hereinafter referred to as "dioxin/furan") as constituents of F032 LDR lacks scientific justification and will create insurmountable disposal problems. For example, EPA has determined that its proposed one part per billion ("ppb") concentration limit for dioxin/furan can be achieved by incineration, without considering the consequence of only one incinerator being licensed in the United States to accept such waste. Furthermore, EPA has intentionally, through its Draft Combustion Strategy For Combustion of Hazardous Waste, May 1993 ("Combustion Strategy"), created significant impediments to the issuance of new permits for additional hazardous waste incinerators. Moreover, as Beazer has consistently maintained in its previous comments, the public simply refuses to tolerate the risks of new incineration, particularly with respect to the more controversial substances, such as PCBs or dioxins. Under these circumstances, any thought of obtaining a new permit for an incinerator which would be used to incinerate dioxin/furan is unfathomable.

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II. EPA HAS FAILED TO CONSIDER THE TECHNICAL, ECONOMICAL AND PRACTICAL IMPACTS OF THE PROPOSED LDRs ON REMEDIATION

EPA's Proposed Rule fails to consider a number of critical issues related to the remediation of wood treating sites. These issues involve LDRs for F032, F034 and F035 as discussed below.

A. The Proposed LDRs for Hazardous Waste No. F032 Will Create Insurmountable Disposal Problems.

1. Dioxin/Furan should not be regulated constituents under the F032 LDR.

Regulation of dioxin/furan as constituents under the F032 LDR is scientifically unwarranted. One of the first LDRs for dioxin/furan-containing wastes was established by EPA for F027.[2] EPA established the F027 LDR at 1 ppb (in leachate) and is now arbitrarily applying the 1 ppb standard to F032.

EPA's characterization of F027 as acutely hazardous was based on trace levels of hexachlorodioxins. See *Toxicological Profile for Pentachlorophenol,*

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[2] EPA established LDRs for the "dioxin-wastes" F020-23 and F026-28 in one rulemaking on January 14, 1986. 51 Fed. Reg. 1602.

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May 1994, Agency for Toxic Substances and Disease Registry (ATSDR). EPA considers hexachlorodioxins as potent animal carcinogens. Id. This characterization of hexachlorodioxins is not technically founded and is even refuted by the results of a bioassay performed by the National Toxicity Program ("NTP") in 1989, the results of which were reported in NTP-TR-349 and in NIH Publication 89-2804 (the "NTP cancer bioassay"). As noted in a November 27, 1991 letter from Vulcan Chemicals to EPA (the "Vulcan Letter") (obtained from the RCRA docket), the NTP cancer bioassay on penta conclusively demonstrated that any cancer response observed in exposed laboratory animals was due to the toxic overexposure of the test animals to penta and not to the trace amounts of hexachlorodioxin present. See the Vulcan Letter, p.3.

Moreover, the EPA's Science Advisory Board's ("SAB's") recent evaluation of EPA's draft dioxin risk reassessment documents has sharply criticized EPA's reliance on the standard default assumption of a linear non-threshold model for carcinogenic risk and has called for a substantial rewrite of the assessment. The SAB concluded that one major weakness of the assessment was that the presentation of scientific findings portrayed in the draft conclusions was not balanced and exhibited a tendency to overstate the evidence of danger.

Accordingly, Beazer believes that EPA currently is without sufficient scientific bases for regulating dioxin/furan as a constituent of F032.

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RECOMMENDATION:

Given that EPA has yet to scientifically demonstrate and support the risk from low level exposure to dioxin/furan, Beazer recommends that EPA exclude dioxin/furan from regulation as part of the F032 LDRs until agreement on the scientific underpinnings of this regulatory action is achieved.[3]

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[3] Beazer has serious doubts regarding the Agency's rote reliance on technology-based standards to meet LDRs. The Agency has discretion to utilize either a risk-based or technology-based standard, American Petroleum Institute v. EPA, 906 F.2d 729 (D.C. Cir. 1990) and in the case of dioxin/furan, Beazer believes that a site-specific risk-based standard is more appropriate on both a scientific and practical basis. If EPA retains dioxin/furan as an indicator parameter for F032, the standard should not be identical for all congeners. EPA has determined that 2,3,7,8-TCDD is the most toxic of the dioxin/furan congeners. 51 Fed. Reg. 1732. In order to assess the risks posed by dioxin/furan other than 2,3,7,8-TCDD, EPA adopted an interim procedure for assessing the risks to human health based on toxicity equivalency factors ("TEFs") which permits the conversion of any dioxin/furan congener into an equivalent concentration of 2,3,7,8-TCDD or Toxicity Equivalents ("TEQs"). Id. In 1989, EPA adopted the International TEFs which are presented below for the six dioxin/furan congeners in the proposed LDRs for F032.

Compound	Toxicity Equivalent Factor
Tetrachlorodibenzo-p-dioxins (2,3,7,8-TCDDs)	1.0
Pentachlorodibenzo-p-dioxins (2,3,7,8-PeCDDs)	0.5
Hexachlorodibenzo-p-dioxins (2,3,7,8-HxCDDs)	0.1
Tetrachlorodibenzo-p-furans (2,3,7,8-TCDFs)	0.1
Pentachlorodibenzo-p-furans (2,3,4,7,8-TCDFs)	0.5
Hexachlorodibenzo-p-furans (2,3,7,8-HxCDFs)	0.1

See *Interim Procedures for Estimating Risks Associated With Exposures to Mixtures of Chlorinated Dibenzo-p-dioxins and -dibenzofurans (CDDs and CDFs).* U.S. Environmental Protection Agency, Risk Assessment Forum, Washington D.C. EPA/625/3089/016 (1989).

All of the dioxin/furan congeners shown above exhibit significantly less toxicity than 2,3,7,8-TCDD. The one congener that is associated with pentachlorophenol, HxCDDs, is 10 times less toxic than 2,3,7,8-TCDD. Clearly, the proposed LDR treatment standard for nonwastewaters of 1 ppb for all the listed dioxins/furans other than possibly 2,3,7,8-TCDD is not consistent with the risks identified in the recent scientific literature associated with each of the congeners. Moreover, EPA has acknowledged that dioxin/furan wastes are immobile. 51 Fed. Reg. 1602 (January 14, 1986). Thus, the risk associated with F032 wastes placed in a secure Subtitle C landfill is dramatically different than the residential risk scenario EPA has utilized to develop dioxin/furan action levels.

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The Penta Task Force is aware that there is one commercial incineration facility that is permitted to treat dioxin-containing wastes and that the stigma issue does not apply to that facility. But that facility -- the Aptus Incinerator in Coffeyville, Kansas -- is a unit operating at 99.9999 percent ("six 9s") DREs and was designed to handle "acutely hazardous" dioxin-containing wastes. Because EPA has already decided, after an extensive review of the matter, that it is not appropriate to classify F032 wastes as acutely hazardous, any treatment strategy that relies on the management of the wastes in a six 9s incinerator would be improper.

The refusal of treatment facilities to accept F032 wastes will lead to severe shortfalls in treatment capacity. The Coffeyville facility simply does <u>not</u> have sufficient capacity to handle the volumes of F032 wastes that will become subject to the treatment standard. Moreover, even if there were sufficient capacity for six 9s incineration of F032 wastes, the costs compared to incineration at a four 9s unit would be exorbitant. By the Agency's own reckoning, some 12,600 tons of F032 nonwastewater process sludges and residuals are generated each year at wood preserving sites. In comparison, the available capacity of the Coffeyville facility for non-PCB wastes is less than 6,600 tons per year,

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or only one-half that which would be needed to handle the volumes of F032 wastes that would require treatment. As shown below, incineration of the 12,600 tons of F032 process wastes in a six 9s incinerator would cost in excess of $115 million dollars per year compared to the cost of only $12 million dollars for incineration in a four 9s unit. This cost would need to be borne by relatively few companies -- there are only 49 wood preserving plants that generate F032 waste and many of these plants are small- to moderate-sized businesses. (Indeed, even if four 9s incinerators would take the waste, but were forced to charge the same cost as six 9s incineration because of added analytical costs or the need for multiple burns to meet the 1.0 ppb standard, the economic impact on wood preserving sites would have the same devastating impact.)

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B. The Stigma Problem Will Lead To Treatment Capacity Shortages.

The Capacity Analysis prepared in connection with this rulemaking estimates that some 12,600 tons of F032 nonwastewater sludges and residuals are generated at wood preserving facilities each year. See Capacity Analysis, 3-8. See also,

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Final Proposed Best Demonstrated Available Technology (BDAT) Background Document for Wood Preserving Wastes F032, F034-F035, Table 3-6, at 3-53 (July 26, 1995) (hereinafter "F032 BDAT Background Document"). If commercial hazardous waste incinerators refuse to take the waste, it will need to go to the Aptus facility in Coffeyville, Kansas -- the only incinerator permitted to accept dioxin-containing wastes. Indeed, EPA's Regulatory Impact Analysis ("RIA") for the proposed rule assumes that the wastes are treated at Coffeyville, which indicates EPA's tacit recognition of the problem.[5]

The annual capacity for the Aptus facility is on average roughly 22,000 tons per year. Telephone Interview with Rollins Environmental Services (Oct. 23, 1995). Of that amount, 70 percent of the incinerator's capacity is dedicated to TSCA-regulated PCB wastes. See Memorandum from Jose Labiosa, USEPA/OSW, Re: Conversation with Chris Logelin, APTUS, (March 16, 1993) (Dkt. No. PH4P-S0127). As such, only 22,000 tons x 0.3, or 6,600 tons, of the facility's total annual capacity is available for

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[5] It should be noted that although EPA's Capacity Analysis relies on the total combustion capacity provided by all four 9s incinerators and BIFs, its Regulatory Impact Analysis assumes that the F032 wastes will be treated at the Coffeyville facility. See, Regulatory Impact Analysis of the Phase IV Land Disposal Restrictions (Draft), 3-6 n.12 (Aug. 7, 1995) (hereinafter "RIA"). Moreover, the volumes of F032 wastes assumed in EPA's Capacity Analysis are 10 fold greater than that assumed in the RIA. Compare Capacity Analysis, at 3-8 (12,600 tons) with RIA, at ES-12, Exh. 3-2 at 3-5 (1,200 tons). In short, the Capacity Analysis is based on one set of assumptions -- incineration of some 12,600 tons of F032 nonwastewaters in four 9s incinerators and BIFs -- and the RIA is based on another series of assumptions -- incineration of 1,200 tons of F032 nonwastewaters in the only six 9s facility permitted to handle such wastes. See RIA, 3-6 n.12. This glaring discrepancy in the methodologies used to support the rulemaking serves to highlight the significant conceptual problems with the Agency's overall approach to establishing the F032 treatment standards.

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incineration of non-PCB wastes. (And some portion of that capacity presumably is already being used to burn dioxin-containing wastes under the waste codes F020, F021, F022, F023, F026, F027 and F028.) In short, the capacity of the Coffeyville facility is only one-half that which would be needed to handle the F032 nonwastewater process wastes.

Moreover, some 10,520 tons of F032-contaminated soil and debris are generated annually at wood processing facilities and large volumes (perhaps as high as 102 million tons) of contaminated soils from past operations may require treatment. See Capacity Analysis, 3-10 to 3-11. Although EPA has proposed a two-year national capacity treatment variance for F032-contaminated soil and debris, neither the Capacity Analysis nor the Regulatory Impact Analysis provide any indication of the significant costs and capacity issues that necessarily will arise after the variance period ends and these contaminated soils require treatment. EPA's failure to squarely address this problem is another example of the significant conceptual problems associated with the current proposal.

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C. **The Treatment Costs Will Be Prohibitive.**

EPA has seriously understated the treatment costs for the volumes of F032 nonwastewaters that will become subject to the rule. In its Regulatory Impact Analysis, EPA has assumed that only some 1,200 tons of F032 nonwastewaters are generated each year at the 49 wood processing facilities that would become subject to the F032 treatment standards. RIA, ES-12, Exh. 3-2 at 3-5, 3-6. But that estimate is flatly inconsistent with the 12,600 tons estimate found in the Capacity Analysis. As noted above, the Capacity

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Analysis estimates the F032 waste volumes at 22,000 tons per year; that estimate is based on data gleaned from the 1993 Biennial Reporting System ("BRS"). The RIA, on the other hand, derives it estimate on the basis of 1993 production statistics multiplied by a waste generation rate taken from a 1985 RCRA 3007 survey.

The methodology used in the Capacity Analysis more reliably reflects actual F032 waste volumes. The BRS data used in the Capacity Analysis reflect recent data reported by wood preserving sites on the actual quantities of wastes transferred off-site for treatment or disposal during 1993. The 1985 RCRA 3007 survey, on the other hand, was conducted at a time when most wood treating facilities were using surface impoundments for waste management and therefore had limited ability to quantify waste generation rates. Also, the RIA incorrectly asserts that the BRS report might reflect double counting of waste streams. In point of fact, the procedures used by BRS to collect the data were carefully designed to avoid double-counting. For these reasons, the volume estimates in the Capacity Analysis are more accurate than those presented in the RIA. If EPA were to use these more accurate volume estimates to analyze costs, it is clear as shown below that the cost of meeting the treatment standards at a six 9s incinerator would be prohibitive.

In estimating costs, EPA has evaluated the incremental cost of requiring combustion of F032 nonwastewaters by a six 9's DRE incinerator against the cost under a "no treatment option." RIA, 3-7. We believe that a more illustrative measure of costs would be to compare the cost of incineration at a six 9s unit with the cost of incineration at a four 9s unit. Our consultant, H.M. Rollins, recently contacted representatives of the

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Aptus facility and learned that the unit cost of incinerating dioxin-containing wastes at that facility is currently $4.50/lb ($9,000/ton).[7] By comparison, the unit cost for incineration at a four 9s incinerator is roughly $0.48/lb ($960/ton). The incremental cost of six 9s versus four 9s incineration thus is roughly $8,000/ton ($9,000 - $960 = $8,040). The cost of incineration of the 12,600 tons of F032 nonwastewaters would be roughly $113 million per year at the Coffeyville facility and roughly $12 million per year in a four 9s incinerator. The incremental cost of six 9s versus four 9s treatment of the F032 wastes is thus some $101 million per year. These prohibitive and unnecessary costs [illegible] need to be borne by the relatively few wood preserving sites -- 49 in all -- that would become subject to the rule.

Commenter: Penta Task Force
Comment Number: 32
Page Number: 26

A. **EPA Should Establish Incineration As An Alternative Treatment Standard.**

Incineration in a four 9s combustion unit currently is the only practicable technology for treating F032 waste streams. Because of the stigma problem, that technology will be unavailable if the Agency sets treatment standards for dioxin/furan constituents in the waste.

Commenter: Penta Task Force
Comment Number: N3
Page Number: 2

As explained in our comments on the August, 1995 Phase IV LDR proposal, numerical limits for dioxin and furan constituents of F032 waste will raise treatment costs to prohibitive levels, will foreclose the only practicable avenue for treatment -- thermal treatment in combustion units that are subject to subtitle C standards, and is inconsistent with EPA's past regulation of other similar chlorinated waste that contain dioxins and furans (i.e., F024 waste).

Commenter: Penta Task Force
Comment Number: N3
Page Number: 5

In short, Option 2 does not address the principle problem with the proposed dioxin/furan treatment standard -- the lack of available treatment capacity for such waste and the exorbitant cost of treatment in those limited circumstances where the capacity does exist.

Commenter: American Wood Preservers Institute
Comment Number: 39
Page Number: 24

EPA IGNORES THE STIGMA ASSOCIATED WITH DIOXIN AND FURAN WASTES

EPA states that incineration should be able to meet the proposed treatment standards for organic wastewaters and non-wastewaters.[45] However, this ignores the stigma associated with dioxin and furan wastes.

EPA is aware of the dioxin and furan waste stigma and has acknowledged this it directly and indirectly on several occasions. In 1991, the Agency noted that "the commercial hazardous waste treatment industry tends to shy away from these (dioxin-containing) wastes, thus resulting in unnecessary delays in such treatment."[46] The Agency also acknowledged that incineration capacity is limited and "the possibility of increased capacity in the future is constrained by EPA's "Draft Strategy for Combustion of Hazardous Waste", issued in May 1993.[47]

Presently, there is only one incinerator permitted to accept dioxin-containing wastes in the United States – Rollin's APTUS facility in Coffeyville, Kansas. EPA has not issued standards dealing with particulate matter and dioxins/furans under its combustion strategy. Given the strong public resistance to new incinerators, and the huge costs associated with permitting a six-9's facility (several millions of dollars), additional incineration capacity for these wastes is not likely.

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[45] 60 FR 43685 (August 22, 1995).
[46] See, Advanced Notice of Proposed Rulemaking (ANPR) "Land Disposal Restrictions: Potential Treatment Standards for Newly Identified and Listed Wastes and Contaminated Soils", 56 FR 55160, 55179 (October 24, 1991).
[47] See, "Presumptive Remedies for Soil, Sediments, and Sludges at Wood Treater Sites Quick Fact Sheet (Draft)" (November 1994).

Commenter: American Wood Preservers Institute
Comment Number: 39
Page Number: 25

COMMENT:

AWPI believes that sufficient incineration capacity does not exist to meet the actual volumes of F032 wastes.

ALTERNATIVE TECHNOLOGIES TO INCINERATION DO NOT EXIST

EPA states that "any available technology can be used to meet the LDR level.[48] All of the so-called "alternatives" were evaluated by the Office of Technology Assessment (OTA) in 1991. Of the thirteen identified dioxin and furan treatment technologies, only one (rotary kiln incineration) had been developed, permitted and used on a site cleanup.[49]

COMMENT:

AWPI is unaware of any alternative technology that has been developed to commercial scale, permitted to receive, and capable of meeting the 1 ppb PCDD and PCDF UTSs.

INCINERATION FOR F032 IS NOT "AVAILABLE"

EPA has based its treatment standards for F032 on incineration. The Agency estimates that the 49 plants using pentachlorophenol generate 12,600 tons of F032 non-wastewater process sludges and residuals per year. In addition, these plants will generate some 10,500 tons of F032 soil and debris annually.

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[48] 60 FR 43680 (August 22, 1995).
[49] See, "Dioxin Treatment Technologies-Background Paper", U.S. Congress, Office of Technology Assessment, OTA-BP-0-93, p.13 (November 1991).

Commenter: American Wood Preservers Institute
Comment Number: 39
Page Number: 26

While not disputing that the technology has been demonstrated, AWPI questions how EPA can state that it is "available." Only one site (APTUS) is permitted to accept dioxin-containing wastes with a 19,500 to 24,500 tons per year capacity. Of that amount, 70 percent is dedicated to TSCA-regulated PCB waste leaving 5,850 to 7,350 tons per year capacity available for other waste streams.[50]

COMMENT:

If one assumes that the APTUS facility will dedicate the remaining 30 percent capacity exclusively to burning F032 waste, and assuming the high end of the capacity range (7,350 tons per year), the APTUS facility comes up short by 15,750 tons per year. One six-9's facility does not constitute "available" technology.

Commenter: Chemical Waste Management
Comment Number: 48
Page Number: 38

Furthermore, it is not clear to CWM how the Agency's Combustion Strategy will alleviate this problem as the Agency states it will. The establishment of stricter dioxin and furan requirements on combustion facilities will still not alleviate the dioxin myth in the eyes of the public that has been perpetuated by the Agency.

Commenter: Chemical Waste Mangement
Comment Number: N18
Page Number: 2

CWM believes that the easiest approach to implement would be to establish INCIN or CMBST as the treatment standard for the D/F constituents in the F032 wastes. If F032 dioxins and furans are regulated in this manner then CWM incineration facilities will be much more likely to accept F032 waste streams than if specific D/F constituents are regulated individually.

Commenter: J.H. Baxter
Comment Number: 58
Page Number: 1

Along with other members of the wood preservation industry, J.H. Baxter is concerned about the impact of the proposed 1.0 part per billion treatment standard for dioxins and furans in the F032 wastestreams. J.H. Baxter believes there is not adequate capacity for treatment of F032 wastes if a treatment standard is established for dioxin constituents. Even with adequate capacity, the high cost of incineration would make the economic impact on our company and other affected wood treating facilities devastating.

We also have provided comments on the current classification of wood preserving production waste waters as solid waste. J.H. Baxter believes EPA should amend the regulations to exempt recycled wood preserving waste waters from the definition of solid waste.

Commenter: J.H. Baxter
Comment Number: 58
Page Number: 2.

I. *Treatment Standards for F032 Wood Preserving Wastes*

A. EPA's Proposal Does Not Address Capacity Shortfall Issues

J.H. Baxter uses pentachlorophenol (penta) to treat wood products, primarily utility poles and utility pole cross-arms, that are exposed to extreme weather conditions for extended periods of service. The treating solution for these wood products consists of penta and oil, usually fuel or diesel grade. Consequently, F032 wastestreams have high energy values. They are accepted at permitted incineration facilities as alternative energy sources. If the proposed regulation with the associated dioxin standard is adopted, the wood preserving industry no longer will be able to utilize the facilities currently permitted to burn F032 wastes.

In 1991 EPA requested data and comments on treatment standards for many newly listed RCRA wastes, including F032 wastes. At that time, the Agency noted that in its experience when dioxin and furan constituents are proposed for regulation in waste-specific treatments, the hazardous waste industry "tends to shy away" from the treating such wastes, creating delays in treatment. 56 Fed. Reg. 55160, 55179 (Oct. 24, 1991). The proposal stated that the delays result "due to the acute sensitivity of the public to these constituents and the increase in liability resulting from handling them." Id. In effect, these wastes are pariahs as far as the public and the hazardous waste treatment industry are concerned. EPA, therefore, solicited ideas on how F032 treatment standards could be constructed, so as to avoid anticipated bottlenecks in treatment for these wastes.

In the current proposal, EPA notes that many commentors to its 1991 notice expressed concerns that facilities would not accept the F032 waste if the treatment standards include a dioxin limitation. J.H. Baxter shares these concerns. J.H. Baxter has been informed by Laidlaw Environmental, the commercial hazardous waste facility currently handling our F032 wastestreams, that Laidlaw will not accept these wastes if the dioxin standard for F032 wastes is adopted. J.H. Baxter has no doubt that it will be extremely difficult, if not impossible, to obtain timely treatment for F032 wastestreams, should dioxin constituents be regulated.

Commenter: J.H. Baxter
Comment Number: 58
Page Number: 3

In contrast to the concern about treatment delays it viewed as serious in 1991, EPA now curtly dismisses the issue in one sentence, stating that the Agency's "Combustion Strategy" will alleviate this problem. 60 Fed. Reg. at 43682. In reviewing the proposed regulation there is no discussion of the "Combustion Strategy" or whether facilities legally will be able to accept and treat wastes with the associated dioxin standard using this "Combustion Strategy."

Presumably, the "Combustion Strategy" refers to a draft policy statement issued by EPA on May 18, 1993, that discusses both short and long-term goals for incinerators and industrial furnaces. It is impossible to ascertain how this policy statement can alleviate the unwillingness of the hazardous waste industry to accept F032 wastes if a dioxin standard is imposed. As noted earlier by EPA, refusals by commercial hazardous waste treaters to accept wastestreams with specific dioxin standards are based on public sensitivities and concerns about increased liability. Changes in permitting requirements or incinerator capacity applicable to a dioxin standard for F032 may be goals of EPA's draft policy. These goals currently have not changed public perceptions or decreased liability concerns for waste treaters. No treatment standard should be tied to these changes until they are realities.

In the newly proposed regulation, EPA has identified only one commercial facility currently permitted to combust wastes that may have PCDD and PCDF constituents with concentrations above the treatment standard proposed for F032 wastes. 60 Fed. Reg. at 43681. It is our understanding that this incineration facility has an annual capacity of only 22,000 tons. Seventy percent of this annual capacity is devoted to incineration of TSCA-regulated wastes contaminated with polychlorinated biphenyls. Therefore, this facility has additional annual capacity for only 6,600 tons of wastes from RCRA-regulated disposal activities. This predictable, extreme capacity shortfall is not addressed at all by EPA in the proposal.

Commenter: Hazardous Waste Management Association
Comment Number: 97
Page Number: 17

The Agency is proposing a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes. HWMA supports this proposal in principal; however, it is not clear whether this includes D004-D011 newly identified wastes. The Agency states that, "EPA is proposing a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes" (60 FR 43686). This statement implies that the capacity variance is for all newly identified Phase IV soil and debris, a universe which does include D004-D011 newly identified wastes. However, the Agency does not indicate that this national capacity variance is being

Commenter: Hazardous Waste Management Assocation
Comment Number: 97
Page Number: 18

Furthermore, it is not clear how the Agency's Combustion Strategy will alleviate this problem as asserted by the Agency. The establishment of stricter dioxin and furan requirements on combustion facilities will still not alleviate the myth in the eyes of the public that dioxin is the most toxic compound known to man and that no exposure is acceptable.

Commenter: DOW
Comment Number: N9.
Page Number: 2

Suboptions 2 and 3 also raise national capacity questions which EPA must address before further consideration of adopting such constraints can proceed

Commenter: DOW
Comment Number: N9
Page Number: 3

In considering the additional limitations described in Suboptions 2 and 3, EPA has not addressed whether sufficient available capacity would remain which is licensed to treat the volume of F024 and F032 currently generated. Dow alone currently generates over 50,000 tons per year of F024 at its U.S. facilities. Implementation of Suboptions 2 or 3 would require a significant portion of that waste volume to be managed offsite in commercial units. Before proceeding, EPA must analyze the U.S. wide generation of the potentially impacted waste codes considering how much available treatment capacity would be available after such requirements would go into effect.

4.5 CAPACITY FOR F032 WILL NOT INCREASE

Summary:

In the proposed rule, EPA stated that although some commenters to the ANPRM (56 FR 55160) had expressed concern that treatment facilities would not accept F032 waste if the treatment standards include a dioxin concentration, EPA believed that its Combustion Strategy would alleviate this problem. Many commenters to the proposed rule stated that new available capacity for F032 wastes will not become available due to the stigma associated with dioxins and requested that EPA explain how the Combustion Strategy will address the stigma associated with dioxins and furans [Beazer East (23); Penta Task Force (32); American Wood Preservers Institute (39); Chemical Waste Management (48); J.H. Baxter (58); HWMA (97)]. Beazer East and American Wood Preservers Institute both believe that given the current public sentiment a new permit for incineration of dioxins and furans will never be issued (23:4,8-10; 39:24-26). Penta Task Force stated that dioxin emissions are not the real problem behind the treatment industry's reluctance to accept dioxin/furan containing-wastes, but that the real issue is a reluctance by incineration facilities to analyze their ash and residuals for dioxin/furans because they are likely to exceed the 1 ppb standard stated in the proposed rule (32:2-3). Chemical Waste Management, J.H. Baxter, and the Hazardous Waste Management Association all stated that the Agency's Combustion Strategy will not alleviate public concern over dioxins (48:38; 58:4-5; 97:18).

Response:

In today's rule EPA is not requiring the combustion of F032 wastes in a "six 9's" destruction and removal efficiency combustion device. Therefore, facilities may combust F032 wastes at any RCRA facility regulated under CFR Part 266 or 264, Subpart O without having to monitor the concentrations of dioxins and furans left behind in the combustion residues. This alternative should eliminate the stigma types of concerns raised by commenters. In addition, facilities may also combust F032 wastes in combustion devices regulated under CFR Part 265, Subpart O units, provided the residues meet the applicable standards for each regulated dioxin or furan constituent, or make a demonstration that their combustion is at least equivalent to that required of permitted incinerators or Part 266 BIFs, in which case these interim status incinerators would also have the option of not monitoring for dioxins in combustion residue. Under EPA's Combustion Strategy, EPA has directed permit writers to determine whether the combustion of low level dioxin wastes is being conducted in a manner that is protective of human health and the environment. EPA believes that the final approach to F032 wastes is consistent with this Combustion Strategy by providing a compliance alternative for those units required to comply with standards assuring good combustion efficiency, or that demonstrate such efficiency. Furthermore, as seen in Chapter 2 of this background document, the Agency accounts for the potentially lower available combustion capacity resulting from the treatment standards chosen for F032 wastes and still finds ample capacity available.

Comments:

See next page.

Commenter: Beazer East
Comment Number: 23
Page Number: 4

As discussed in greater detail below, the Agency's proposed LDR for dioxin/furan congeners (hereinafter referred to as "dioxin/furan") as constituents of F032 LDR lacks scientific justification and will create insurmountable disposal problems. For example, EPA has determined that its proposed one part per billion ("ppb") concentration limit for dioxin/furan can be achieved by incineration, without considering the consequence of only one incinerator being licensed in the United States to accept such waste. Furthermore, EPA has intentionally, through its Draft Combustion Strategy For Combustion of Hazardous Waste, May 1993 ("Combustion Strategy"), created significant impediments to the issuance of new permits for additional hazardous waste incinerators. Moreover, as Beazer has consistently maintained in its previous comments, the public simply refuses to tolerate the risks of new incineration, particularly with respect to the more controversial substances such as PCBs or dioxins. Under these circumstances, any thought of obtaining a new permit for an incinerator which would be used to incinerate dioxin/furan is unfathomable.

Commenter: Beazer East
Comment Number: 23
Page Number: 8

II. EPA HAS FAILED TO CONSIDER THE TECHNICAL, ECONOMICAL AND PRACTICAL IMPACTS OF THE PROPOSED LDRs ON REMEDIATION

EPA's Proposed Rule fails to consider a number of critical issues related to the remediation of wood treating sites. These issues involve LDRs for F032, F034 and F035 as discussed below.

A. The Proposed LDRs for Hazardous Waste No. F032 Will Create Insurmountable Disposal Problems.

1. Dioxin/Furan should not be regulated constituents under the F032 LDR.

Regulation of dioxin/furan as constituents under the F032 LDR is scientifically unwarranted. One of the first LDRs for dioxin/furan-containing wastes was established by EPA for F027.[2] EPA established the F027 LDR at 1 ppb (in leachate) and is now arbitrarily applying the 1 ppb standard to F032.

EPA's characterization of F027 as acutely hazardous was based on trace levels of hexachlorodioxins. See *Toxicological Profile for Pentachlorophenol*,

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[2] EPA established LDRs for the "dioxin-wastes" F020-23 and F026-28 in one rulemaking on January 14, 1986. 51 Fed. Reg. 1602.

Commenter: Beazer East
Comment Number: 23
Page Number: 9

May 1994, Agency for Toxic Substances and Disease Registry (ATSDR). EPA considers hexachlorodioxins as potent animal carcinogens. Id. This characterization of hexachlorodioxins is not technically founded and is even refuted by the results of a bioassay performed by the National Toxicity Program ("NTP") in 1989, the results of which were reported in NTP-TR-349 and in NIH Publication 89-2804 (the "NTP cancer bioassay"). As noted in a November 27, 1991 letter from Vulcan Chemicals to EPA (the "Vulcan Letter") (obtained from the RCRA docket), the NTP cancer bioassay on penta conclusively demonstrated that any cancer response observed in exposed laboratory animals was due to the toxic overexposure of the test animals to penta and not to the trace amounts of hexachlorodioxin present. See the Vulcan Letter, p.3.

Moreover, the EPA's Science Advisory Board's ("SAB's") recent evaluation of EPA's draft dioxin risk reassessment documents has sharply criticized EPA's reliance on the standard default assumption of a linear non-threshold model for carcinogenic risk and has called for a substantial rewrite of the assessment. The SAB concluded that one major weakness of the assessment was that the presentation of scientific findings portrayed in the draft conclusions was not balanced and exhibited a tendency to overstate the evidence of danger.

Accordingly, Beazer believes that EPA currently is without sufficient scientific bases for regulating dioxin/furan as a constituent of F032.

Commenter: Beazer East
Comment Number: 23
Page Number: 10

RECOMMENDATION:

Given that EPA has yet to scientifically demonstrate and support the risk from low level exposure to dioxin/furan, Beazer recommends that EPA exclude dioxin/furan from regulation as part of the F032 LDRs until agreement on the scientific underpinnings of this regulatory action is achieved.[3]

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[3] Beazer has serious doubts regarding the Agency's rote reliance on technology-based standards to meet LDRs. The Agency has discretion to utilize either a risk-based or technology-based standard, American Petroleum Institute v. EPA, 906 F.2d 729 (D.C. Cir. 1990) and in the case of dioxin/furan, Beazer believes that a site-specific risk-based standard is more appropriate on both a scientific and practical basis. If EPA retains dioxin/furan as an indicator parameter for F032, the standard should not be identical for all congeners. EPA has determined that 2,3,7,8-TCDD is the most toxic of the dioxin/furan congeners. 51 Fed. Reg. 1732. In order to assess the risks posed by dioxin/furan other than 2,3,7,8-TCDD, EPA adopted an interim procedure for assessing the risks to human health based on toxicity equivalency factors ("TEFs") which permits the conversion of any dioxin/furan congener into an equivalent concentration of 2,3,7,8-TCDD or Toxicity Equivalents ("TEQs"). Id. In 1989, EPA adopted the International TEFs which are presented below for the six dioxin/furan congeners in the proposed LDRs for F032.

Compound	Toxicity Equivalent Factor
Tetrachlorodibenzo-p-dioxins (2,3,7,8-TCDDs)	1.0
Pentachlorodibenzo-p-dioxins (2,3,7,8-PeCDDs)	0.5
Hexachlorodibenzo-p-dioxins (2,3,7,8-HxCDDs)	0.1
Tetrachlorodibenzo-p-furans (2,3,7,8-TCDFs)	0.1
Pentachlorodibenzo-p-furans (2,3,4,7,8-TCDFs)	0.5
Hexachlorodibenzo-p-furans (2,3,7,8-HxCDFs)	0.1

See *Interim Procedures for Estimating Risks Associated With Exposures to Mixtures of Chlorinated Dibenzo-p-dioxins and -dibenzofurans (CDDs and CDFs).* U.S. Environmental Protection Agency, Risk Assessment Forum, Washington D.C. EPA/625/3089/016 (1989).

All of the dioxin/furan congeners shown above exhibit significantly less toxicity than 2,3,7,8-TCDD. The one congener that is associated with pentachlorophenol, HxCDDs, is 10 times less toxic than 2,3,7,8-TCDD. Clearly, the proposed LDR treatment standard for nonwastewaters of 1 ppb for all the listed dioxins/furans other than possibly 2,3,7,8-TCDD is not consistent with the risks identified in the recent scientific literature associated with each of the congeners. Moreover, EPA has acknowledged that dioxin/furan wastes are immobile. 51 Fed. Reg. 1602 (January 14, 1986). Thus, the risk associated with F032 wastes placed in a secure Subtitle C landfill is dramatically different than the residential risk scenario EPA has utilized to develop dioxin/furan action levels.

Commenter: American Wood Preserves Institute
Comment Number: 39
Page Number: 24

EPA IGNORES THE STIGMA ASSOCIATED WITH DIOXIN AND FURAN WASTES

EPA states that incineration should be able to meet the proposed treatment standards for organic wastewaters and non-wastewaters.[45] However, this ignores the stigma associated with dioxin and furan wastes.

EPA is aware of the dioxin and furan waste stigma and has acknowledged this it directly and indirectly on several occasions. In 1991, the Agency noted that "the commercial hazardous waste treatment industry tends to shy away from these (dioxin-containing) wastes, thus resulting in unnecessary delays in such treatment."[46] The Agency also acknowledged that incineration capacity is limited and "the possibility of increased capacity in the future is constrained by EPA's "Draft Strategy for Combustion of Hazardous Waste", issued in May 1993.[47]

Presently, there is only one incinerator permitted to accept dioxin-containing wastes in the United States – Rollin's APTUS facility in Coffeyville, Kansas. EPA has not issued standards dealing with particulate matter and dioxins/furans under its combustion strategy. Given the strong public resistance to new incinerators, and the huge costs associated with permitting a six-9's facility (several millions of dollars), additional incineration capacity for these wastes is not likely.

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[45] 60 FR 43685 (August 22, 1995).
[46] See, Advanced Notice of Proposed Rulemaking (ANPR) "Land Disposal Restrictions: Potential Treatment Standards for Newly Identified and Listed Wastes and Contaminated Soils", 56 FR 55160, 55179 (October 24, 1991).
[47] See, "Presumptive Remedies for Soil, Sediments, and Sludges at Wood Treater Sites Quick Fact Sheet (Draft)" (November 1994).

Commenter: American Wood Preserves Institute
Comment Number: 39
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COMMENT:

AWPI believes that sufficient incineration capacity does not exist to meet the actual volumes of F032 wastes.

Commenter: American Wood Preserves Institute
Comment Number: 39
Page Number: 26

While not disputing that the technology has been demonstrated, AWPI questions how EPA can state that it is "available." Only one site (APTUS) is permitted to accept dioxin-containing wastes with a 19,500 to 24,500 tons per year capacity. Of that amount, 70 percent is dedicated to TSCA-regulated PCB waste leaving 5,850 to 7,350 tons per year capacity available for other waste streams.[50]

COMMENT:

If one assumes that the APTUS facility will dedicate the remaining 30 percent capacity exclusively to burning F032 waste, and assuming the high end of the capacity range (7,350 tons per year), the APTUS facility comes up short by 15,750 tons per year. One six-9's facility does not constitute "available" technology.

Commenter: Penta Task Force
Comment Number: 32
Page Number: 2

As EPA is aware, there is a stigma associated with wastes containing dioxins and furans. In the past, when the Agency has attempted to set treatment standards for dioxin and furan constituents in wastes, commercial treatment facilities have refused to accept the wastes and the result has been a severe shortfall in treatment capacity. In the case of chlorinated aliphatic hydrocarbon manufacturing ("F024") wastes, the situation was sufficiently grave to require EPA to alter the regulatory standard to delete the dioxin and furan limits and to offer incineration as an alternative treatment standard.

EPA now suggests that its proposed combustion strategy will solve the stigma problem. The Penta Task Force disagrees. The standards contemplated under the combustion strategy have not yet been proposed and, even under the most ambitious rulemaking schedule, would not be in place in time to address the capacity shortages that are expected to result from the present rulemaking. More importantly, the combustion strategy is targeted at reducing dioxin emissions and, as such, does not address the real problem behind the treatment industry's refusal to accept wastes that are governed by dioxin and furan treatment standards -- the reluctance of incineration facilities to analyze their ash and other combustion residuals for dioxins and furans. As EPA is aware, the residuals from combustion of certain chlorinated wastes that are currently handled by these facilities are likely to contain dioxins and furans at appreciable levels far above the 1 part-per-billion ("ppb") standard for dioxin and furan constituents contemplated in the

Commenter: Penta Task Force
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proposed rule. It is this fact, not the levels of dioxins and furans in incinerator emissions, that accounts for the treatment industry's reluctance to accept wastes regulated by dioxin/furan treatment standards. Moreover, as we show, even after combustion units are upgraded to meet the new standards contemplated by EPA's combustion strategy, the residues contained in the air pollution control devices at the "upgraded" units are still likely to exceed the 1 ppb dioxin/furan limits.

Commenter: Chemical Waste Management
Comment Number: 48
Page Number: 38

Furthermore, it is not clear to CWM how the Agency's Combustion Strategy will alleviate this problem as the Agency states it will. The establishment of stricter dioxin and furan requirements on combustion facilities will still not alleviate the dioxin myth in the eyes of the public that has been perpetuated by the Agency.

Commenter: J.H. Baxter
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EPA currently does not have adequate information about the economic impact of this proposal on the wood treating industry. There have been several requests made to EPA to defer or forego the regulation of PCDD and PCDF in F032 wastestreams based on the belief that regulation of surrogate constituents such as pentachlorophenol, total suspended solids and oils and greases, in F032 will provide adequate treatment. EPA received no data in support of these proposals and, therefore, has proposed to regulate dioxin constituents.

Now EPA in the discussion of its compliance with the regulatory impact analysis requirements of Executive Order 12866 has requested better information on potentially impacted facilities, waste volumes and constituents, concentrations, additional treatment requirements and treatment costs. Further, other cost estimates used by EPA in its regulatory analysis of the impact of the Phase II Land Disposal Restrictions are based on industries that use wastewater treatment surface impoundments and other wastewater practices not used in the wood preserving industry, and consequently which have no applicability to the economic impact on the wood preserving industry of these regulations.

J.H. Baxter requests that EPA defer a decision on regulating dioxin constituents in F032 wastestreams until it obtains better information to estimate accurately the economic impact on the wood preserving industry, and particularly on the small facilities in that industry. Additionally, EPA should

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defer this decision until it has information to determine whether the extraordinary increases in disposal costs that would be associated with a dioxin standard would be commensurate with any additional protection for the public derived from the standard.

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Secondly, the Agency has not adequately considered the extent of the existing capacity to combust this waste as supported by the Agency's own statement that, "EPA has identified one commercial facility currently permitted to combust wastes that may have PCDD and PCDF constituents with concentrations one to two orders of magnitude higher than those levels found in F032" (60 FR 43682). This statement contradicts the Agency's capacity analysis which indicates that there is sufficient incineration capacity for wood preserving waste streams. Currently, there may be incineration capacity for the F034 wastes; however, that capacity does not include capacity for dioxins and furans that are proposed as BDAT for F032. Furthermore, it is not clear how the Agency's Combustion Strategy will alleviate this problem as asserted by the Agency. The establishment of stricter dioxin and furan requirements on combustion facilities will still not alleviate the myth in the eyes of the public that dioxin is the most toxic compound known to man and that no exposure is acceptable. As a result, the Agency should reevaluate this position and either promulgate a two-year national capacity variance or remove the dioxins and furans from the F032 treatment standards.

4.6 NO ALTERNATIVE DIOXIN/FURAN TECHNOLOGIES ARE COMMERCIALLY AVAILABLE

Summary:

Several commenters noted that none of the alternative technologies proposed by EPA for dioxin and furan wastes have been developed to a commercial scale, are permitted, and are capable of meeting the standards for these constituents [Beazer East (23); Penta Task Force (32); American Wood Preservers Institute (39)]. Beazer East described problems associated with each proposed technology (BCD technology, Shirco infrared thermal process, Hubber supercritical oxidation process, pyrolitic destruction, APEG and KPEG processes, ultraviolet photolysis, biotreatment) (23:12-17). Penta Task Force stated that EPA is unjustified in reliance on non-demonstrated, innovative technologies to resolve capacity shortfall for treatment of dioxin and furan wastes, and provided a detailed evaluation of alternative non-combustion technologies for the treatment of F032 wastes (32:19-21, Att.A). American Wood Preservers Institute stated that of the 13 identified dioxin and furan treatment technologies, only one (a rotary kiln incinerator) has been developed, permitted, and used on a site cleanup (39:25).

Response:

Given the treatment standards being finalized today, EPA has determined that adequate capacity exists to treat the newly listed wood preserving wastes (other than soil and debris; see Section 4.9). In addition to traditional combustion treatment technologies, facilities may also use alternative non-combustion technologies to meet these standards. Any non-combustion treatment capacity that can meet the LDRs for the newly listed wood preserving wastes will serve to increase the available treatment options for these wastes. However, even if there is no capacity available for the alternative technologies cited in the proposed rule, there should not be a capacity shortfall for the newly listed wood preserving wastes (see Sections 4.3 through 4.5).

EPA does agree, however, that a capacity shortfall will exist for soil and debris contaminated with the newly listed wood preserving wastes. As described in Chapter 2 of this document, EPA estimates that the required treatment capacity for contaminated soils and debris is over 100,000 tons per year while the maximum available treatment is likely less than 50,000 tons per year. For this and other reasons (discussed in Chapter 3), EPA is granting a two-year variance for soil and debris contaminated with the newly listed wood preserving wastes.

Comments:

See next page.

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3. **The proposed LDR for F032 will force incineration as the only treatment alternative.**

Beazer believes the selection of incineration as the Best Demonstrated Available Technology ("BDAT") is arbitrary and erroneous, because although the technology may be "demonstrated," it is clearly "not available." EPA's forced incineration mandate does not realistically consider the issues associated with public resistance, capacity, cost, or commercial viability. Although EPA states in the Proposed Rule that the LDR level can be met using "any available technology," 60 Fed. Reg. 43680, Col. 3., and although Beazer believes that flexibility in treatment technology selection is imperative for both wastewaters and nonwastewaters, as discussed in these comments, just saying it "doesn't make it so." The reality of the performance capabilities of alternative treatment technologies (other than incineration) associated with dioxin/furan treatment leads to the unescapable conclusion that the only arguably "available" technology to meet the proposed Universal Treatment Standards ("UTSs") is incineration and its "availability" is seriously limited or non-existent as discussed more fully below.

To Beazer's knowledge, no alternate technologies have been developed to commercial scale that are permitted and capable of meeting the nonwastewater dioxin/furan UTSs of 1 ppb. The alternate technologies noted in the Proposed Rule are not options for remediation. These technologies are evaluated in the Dioxin Treatment Technologies-Background Paper (U.S. Congress, Office of Technology Assessment ("OTA"), OTA-BP-O-93, Nov. 1991) (the "Dioxin Treatment Document") wherein OTA notes that of thirteen identified types of dioxin/furan

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treatment technologies in development, only one, rotary kiln incineration, has been tested, permitted, and actually used on a site clean-up for dioxins/furans. Dioxin Treatment Document, p.13. Two other technologies (liquid injection incineration and fluidized bed incineration) were built and tested, but both are incineration technologies and neither has been used in a dioxin/furan site clean-up. Id. pp. 17 & 19. Neither technology has been directly available to U.S. sites because the former is a sea-based process for treating only thin slurries and combustible liquid wastes and the other is a European developed and tested technology that has not yet been permitted for destruction of dioxins/furans. Id. The remaining thermal and non-thermal technologies noted in the Dioxin Treatment Document (which include those noted in the Proposed Rule) were all in either the research, bench scale, or pilot scale stages of development and have significant limitations as noted below.

a. BCD Technology

EPA has asked for comment on the use of BCD technology and other technologies to treat dioxin/furan. 60 Fed. Reg. 43681, Col. 3. Beazer does not believe that the BCD technology has been sufficiently demonstrated to warrant its inclusion in the list of candidate nonwastewater treatment technologies. Our information suggests that EPA researchers, at its Risk Reduction and Engineering Lab ("RREL/ORD"), advised that demonstration tests at two sites have resulted in evidence that the dechlorination process in the "liquid reactor" is not successfully performing, specifically for dechlorinating dioxin/furan. A test in 1993 indicated that

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dioxin/furan could be removed from soils, but the off-gas stream treatment could not be evaluated due to analytical interferences.[4] A recent 1995 test in Region X was terminated due to the inability of the process to meet the air emissions standards for dioxins/furans. Id.

b. Shirco Infrared Thermal Process

The Agency has suggested in the Proposed Rule that the Shirco infrared thermal process can be used to treat dioxin/furan. 60 Fed. Reg. 43681. This process was tested by EPA in 1987 for destruction of PCBs. Id. However, Beazer found no data in EPA's Superfund Innovative Technology on-line database regarding use of the technology for destruction of dioxins/furans. Indeed, the Dioxin Treatment Document indicates that although infrared destruction has advanced to commercial use in Germany, no permitted facilities exist in the United States for destruction of dioxins/furans. Dioxin Treatment Document, p. 26.

c. Hubber Supercritical Oxidation Thermal Process

The Agency also suggests that the Hubber supercritical oxidation process can be used to treat dioxin/furan wastes. 60 Fed. Reg. 43681, Col. 3. According to the Dioxin Treatment Document, however, the Hubber supercritical oxidation thermal process referred to in the Proposed Rule can only be used to treat liquid wastes and perhaps finely ground, thin slurries. Dioxin Treatment Document,

[4] Teleconferences with Terrance Lyons of ORD/RREL on 8/15/95 and 10/25/95.

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p. 60. It has not been tested at a commercial scale on any solid wastes or even the proposed thin slurries, thus further limiting its appropriateness as a viable technology. Id.

d. Pyrolitic Destruction

Pyrolitic destruction is another technology that EPA believes is capable of treating dioxin/furan wastes. Id. Like the Hubber process, pyrolitic destruction of dioxin/furan has the same limitations in that it can only treat liquid wastes and perhaps finely ground, thin slurries (with a viscosity similar to 30 wt. motor oil). The technology is being pursued by only one company and has not been demonstrated at commercial scale for destruction of dioxin/furan. Dioxin Treatment Document, p. 60.

e. APEG and KPEG Processes

In the Proposed Rule, EPA requests comments on whether the APEG or KPEG processes can be used to meet the dioxin/furan LDRs. Id. The APEG and KPEG processes were introduced in the 1980s and found application at commercial scale for dechlorinating organic fluids and oils. However, the treatment of nonwastewaters has not progressed successfully since its introduction. As an example, a Region VI CERCLA site in Houston mobilized a full scale APEG treatment system owned by Galson Research Corporation six or seven years ago and was unable

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to meet the treatment requirements for PCBs. The unit was demobilized and Galson has not pursued the technology further.

f. Ultraviolet Photolysis

EPA has also requested information on the use of ultraviolet photolysis in treating dioxin/furan. 60 Fed. Reg. 43682, Col. 1. The use of ultraviolet photolysis for destruction of dioxin/furan in soils requires dissolution of the dioxin/furan from the soil into a solvent extract and subsequent destruction of the dioxin/furan in the liquid solvent. This technology will face the same developmental difficulties impeding the development of critical fluid extraction for soils (material handling and agglomeration) and for the BCD liquid reactor (destruction of the dissolved dioxins/furans in the solvent extract to levels low enough to allow recycle of the solvent). Further, the process has not yet been demonstrated at commercial scale.

g. Biotreatment

Finally, the Agency proposes the use of biotreatment for wastewater. 60 Fed. Reg. 43681, Col. 1. Beazer contacted several water treatment equipment manufacturers to verify that the proposed treatment standards could be achieved with the specified technologies. Zimpro, the manufacturer of one of the most effective wastewater biotreatment systems available had no data to support removal of dioxin/furan to the proposed UTS levels. Because the ability of biotreatment to achieve the very stringent dioxin/furan UTS levels for wastewater was

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not confirmed by Beazer's contacts with equipment vendors, Beazer requests that EPA provide performance data to confirm the assertion made above regarding biotreatment of wastewaters.

RECOMMENDATION:

Beazer recommends that EPA critically and realistically re-evaluate the technologies which it has suggested are alternatives to incineration. These technologies have not been demonstrated as effective treatment for dioxin/furan congeners and EPA should not imply that they are "available." By setting standards that can only be met using incineration, EPA is improperly excluding other viable treatment systems for wood preserving site remediation waste, and placing the regulated community in the untenable position of having no workable options for managing remediation waste containing F032.

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E. EPA Can Not Properly Rely Upon Alternative Technologies To Solve The Capacity Problem.

EPA's contractor has acknowledged that because incineration capacity for dioxin/furan wastes is severely limited, EPA has sought to identify alternatives to

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incineration as BDAT for F032 wastes. See Memorandum from J. Castellanos, Versar, to J. Labiosa, EPA, Evaluation of Management Alternatives to Incineration for Dioxin/Furan-Contaminated F032 Wastes (June 30, 1992) (Dkt. No. F33P-S0318). As part of that effort, EPA has considered various chemical, non-incineration thermal, physical, and biological methods as potential BDAT alternatives. None of the alternate treatment methods evaluated by EPA can serve as BDAT for F032 wastes, because not a single one of these alternatives is a "demonstrated" treatment technology. As EPA has explained:

> its [BDAT] determinations should not be based on emerging and innovative technologies. This would be in violation of the intent of the statute as indicated in the legislative history . . . . To be considered a "demonstrated" treatment technology for purposes of the final rule, a full scale facility must be known to be in operation for the waste or similar wastes.

51 Fed. Reg. 40,572, 40,588 (Nov. 7, 1986).

Because, as the background documents make clear, the various alternative technologies are not in commercial operation, they cannot be BDAT for F032 wastes. Indeed, in each case, the data considered by the Agency on a given alternate technology pertains only to laboratory or bench-scale tests or pilot scale tests on dissimilar waste streams (generally PCB-contaminated soils). See June 30, 1992 Castellanos Memo (summaries of tests on APEG method (laboratory tests only); SEA MARCONI method (experimental); pyrohydrolytic dechlorination method (bench-scale experiments); UV photolytic methods (pilot-scale experiments); UV oxidation method (bench-scale); in-situ verification method (bench, pilot and field tests); in-situ stabilization method (laboratory

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study); thermal desorption method (bench-scale); infrared heating method (mobile pilot unit); and electric pyrolysis method (field test)). As the Office of Technology Assessment has noted: "[a]lthough some alternatives look promising and have been shown effective in laboratory settings (or in application to other pollutants), none have received enough development and testing to make them viable for large-scale treatment of dioxin contamination today." Office of Technology Assessment, Background Paper -- Dioxin Treatment Technologies, at 8 (Nov. 1991); see, id., Table 1-5 at 8 (table summarizing development status of dioxin treatment technologies). (These matters are more fully discussed in the attached report entitled "Evaluation of Non-Combustion Technologies for the Treatment of Pentachlorophenol Wood Treating Wastes" (Tab 1).) In short, reliance on these emerging technologies to solve the significant cost and capacity problems associated with the proposed standards would be unjustified.

Commenter: Penta Task Force
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Evaluation of Non-Combustion Technologies for the Treatment of Pentachlorophenol Wood Treating Wastes

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November 16, 1995

Background

As a result of implementation of the Phase IV Land Disposal Restriction Rule, the US-EPA is considering promulgation of standards for tetra-, penta-, and hexa-chlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/F) in the residues from the treatment of pentachlorophenol wood treating wastes (F032). A maximum of 1 ppb for the total concentration of all listed isomers in the treatment residue has been proposed as the standard. Thermal treatment via cement kiln recycling or incineration has long been the treament of choice for these wastes. However, this standard will be difficult for thermal treatment methods to achieve due to formation of PCDD/F as combustion by-products. Consequently, costly retreatment and reanalysis of each waste residue will likely be required. The US-EPA has identified other technologies that they believe are capable of achieving the 1ppb standard. They are:

- Infrared Incineration
- Pyrolysis
- Supercritical Oxidation
- Base Catalyzed Decomposition
- UV Photolysis.

Unfortunately, some of these processes are quite old but have not been widely implemented, others have been shown to be effective on specific waste streams, while others are still in the developmental stages. The purpose of this review is to evaluate the potential effectiveness of each of these technologies for reducing the concentration of PCDD/F in

pentachlorophenol wood treating wastes to less than 1ppb.

Infrared Incineration

So-called infrared incineration was originally introduced by Shirco Infrared Systems. In the late 1980's they filed for bankruptcy and sold or licensed their units to various organizations including the ECOVA Corp. of Richmond Washington. In the Shirco Infrared Incineration System, solid waste materials are fed on a metering conveyor where they are heated by infrared heating elements to volatilize, oxidize, or pyrolyze the more volatile or reactive components of the waste. Originally, the system was designed to operate without an afterburner for treatment of non-RCRA soils and wastes. However, concern over emissions of toxic pollutants resulted in an addition of an afterburner to the system design. The temperature of the metering conveyor is typically varied from 900 to 1600 F depending upon the volatility or stability of the components of the waste feed material that needs to be treated.

The advantage of the Shirco design is that it can treat a wide range of types of solid wastes in a cost effective manner because of the low energy costs associated with the metering conveyor. However, its chief advantage and main reason for its continuing viability, is its transporatability for on site treatment of contaminated soils. When the wastes have high moisture contents, the process becomes slower and more costly because de watering is required before treatment.

Because the technology has been available for some 10 years, there is considerable treatment data available, including data on treatment of PCDD/F containing materials. A summary of the availble data is presented in table 1.

Table 1
PCDD/F Treatment Results for the Shirco Infrared Incinerator

Site	PCDD/F in Residue (ppb)	Removal Efficiency (%)
Florida Steel	16.3	---
Twin-Cities	82.8	---
Tibbets	<0.385	>94.4
Times Beach	<0.035	>99.98

Examination of this data reveals that the proposed regulatory standard of 1ppb was achieved in only two of the four case studies. In addition, the concentration of PCDD/F in the waste was typically 10 to 100 ppb which is much lower than the anticipated levels in F032 which could be greater than 1000 ppb. Thus it is not clear that the removal efficiency for PCDD/F is sufficient for

the F032 waste.

However, a possibly even more severe limitation apparently exists which makes the discussion of treatment efficiency almost academic. The sludge and treatment solution wastes have high liquid contents and thus are not suitable candidates for treatment by infrared incineration. While it is possible that a "drying" unit could be added to the process, this is not a proven technology and certainly not routine or cost effective. Thus it does not appear that infrared incineration can be used for treatment of pentachlorophenol wood-treatment wastes.

Pyrolysis

Pyrolysis is a variation of thermal treatment in which the waste materials are thermally degraded under oxygen starved or oxygen depleted conditions. This is contrast to combustion in which the waste is oxidized under stoichiometric or oxygen rich conditions resulting the in the support of a visible flame. One of the more successful variations on this process is the Texaco Syngas Inc. Entrained-Bed Gasification System.

The process operates at high temperatures, 2200 to 2800 F,and pressures above 20 atmospheres. Wastes are pumped in a slurry form to a gasification chamber which converts the waste to a gas consisting of mainly carbon monoxide and hydrogen in the case of a hydrocarbon waste and, additionaly, hydrogen chloride in a chlorine containing waste. Slag is produced that is collected in a lockhopper.

The process, in principle, is supposed to produce no hydrocarbons heavier than methane. In fact, analysis of emission data from the MRL tests indicate that significant quantities of reaction by-products were observed. These products were prinicipally PAHs with concentrations typically in the range of 1 to 100 ug/m3 in the syngas. Total PCDD/Fs of 0.042 ng/m3 were also observed in the effluent. Data on the slag residue was not available; however, the presence of PAHs and PCDD/F in the effluent gas are indicative of the presence of the same chemicals in the slag residue.

Conclusive data on the effectiveness of the process for acheiving < 1ppb of PCDD/F in the residue is not available. However, the technology does not appear to be useful for treating woodtreating wastes. The developers state that the waste must be a liquid or slurry of fine, suspendable particles containing 30 to 60 percent liquid. The nature of woodtreating wastes thus appears to preclude their treatment by this technique, as these wastes contain larger particles and wood splinters that would require major pretreatment and grinding to be a usable feed.

Supercritical Oxidation

Supercritical water oxidation (SCWO) is a process in which waste materials are oxidized in a reactor containing supercritical water and an oxidant such as air, oxygen, or hydrogen peroxide. Since the critical point of water is 374 C at 221 atmospheres, the temperature and pressure in the reactor must exceed these values. The process has been the focus of numerous academic studies and consequently, the fundamentals of the process and the kinetic behavior are relatively well characterized.

SCWO processes have the advantages that supercritical water is an excellent solvent for many chemicals and oxidation rates are extremely rapid. The solvation properties are due to the nature of water above its critical point which transform it into a moderately polar, dense gas. The rapid oxidation properties are due to the increased number of free radicals that are formed.

Both continuous and batch processes have been designed. However, scale-up of the process has some rather severe limitations. Since the waste material has to be introduced into a supercritical reactor, preheating in a pressure sealed line is required. This limits the nature and amount of material that can be processed. Corrosion of the reactor is a severe problem. High chlorine wastes exacerbate the problem even further. A major engineering challenge has been the solubility of salts. Above the critical point of water, inorganic salts are not very soluble and methods for removal to prevent their buildup in the reactor must be instituted.

Performance data on real wastes for SCWO appears to be scarce, especially for chlorine containing waste streams. The process has gained prominence as a method for treating nerve agents and rocket fuels which are non-chlorinated. High destruction efficiencies (>99.9%) have been reported for pentachlorophenol and PCBs. Limited data is availble fro PCDD/F. In a treatability on pulp and paper mill sudge, residue concentrations and destruction efficiencies were determined for operation at 450 C and 500 C. At the lower temperature, the PCDD/F concentration in the residue was 0.090 ppb (destruction efficiency of >96%). At the higher temperature, the residue concentration was only 0.011 ppb. These residue concentrations are obviously very low; however, the starting concentration was only 0.674 ppb, which is already below the proposed regulatory limit. Thus it is not clear if the technology is capable of treating wastes with 10 to 1000 ppb of PCDD/F in the waste material.

Based on the lack of data demonstrating the effectiveness in destroying PCDD/Fs and the difficulty in handling chlorinated wastes, this technology cannot be considered as demonstrated or appropriate for treatment of wood treating wastes.

Base Catalyzed Decomposition

Base catalyzed decompostion (BCD) is a general term applied to treatment of wastes using an inorganic alkali to strip chlorine and other halogens from organic waste materials. This technology is based on the use of potassium/polyethylene glycolate (KPEG) reagent to destroy PCBs which was subsequently also applied to destruction of other waste materials using either potassium or sodium alkali and polyethylene glycolate (APEG) as the reagent. The function of the polyethylene glycolate was to protect the alkali from hydroysis by any water that was present in the waste materials. However, it was found that APEG reagents only partially dechlorinated organic wastes (i.e. producing lower less chlorinated PCBs, chlorobenzenes, PCDD/Fs, etc.). Consequently, "non-PEG" containing reagents were developed that resulted in improved destruction efficiencies. These new "BCD" technologies operated at 300-350 C to volatilize water and increase their reaction rate.

The claims of developers concerning the efficiency of this process in destroying halogenated wastes and PCDD/Fs are promising. Soils spiked with PCDD/Fs had the concentration reduced from 2000 ppb to below 1 ppb using KPEG for treatment times of 1 to 2 hours. Identical results were reported for another TCDD spiked soils treated with KOH/DMSO reagent for 1-7 days. TCDD in a 2,4-D/2,4,5-T waste was reduced from 1300 ppb to non-detectable levels using KPEG and reaction times of 2 days. Some failures have also been reported. Proprietary K-400, KM-350, and K-120 reagents only reduced TCDD at the Timberline Stables and Denny Farm Sites in Missouri by 12 to 45% for treatment times of 7 to 28 days.

Although the process appears to be generally quite efficient in destroying halogenated chemicals, it applicability is severly limited by its inability to destroy non-halogenated wastes. This is a severe limitation for the pentachlorophenol wood treating wastes that also contain a number of polynuclear aromatic hydrocarbons (PAHs). Thus if BCD is used for these wastes, it will have to be used in conjunction with other treatment technologies for the non-halogenated pollutants. Sequential treatment by at least two technologies will severly increase the cost and time associated with the treatment of these wastes. If both treatment technologies are not present at the same site, additional on-road transportation will be required. Considering the complexity and variability of the F032 wastes streams, the used of BCD in combination with other treament technologies appears inappropriate.

UV Photolysis

Over the past 10 to 15 years a number of innovative waste treatment technologies have been introduced based on UV photolysis. The basic process involves irradiating the waste with light

with wavelengths in the 190 to 300 nm range and inducing photochemical decompostion. A photoactive catalyst or oxidizer is necessary for the destruction of most organic wastes. This is because most waste chemicals either do no efficiently absorb light at the wavelength emitted by the radiation source, or they do not decompose efficiently once they are photoexcited. Catalyst/oxidizer systems include: ozone, hydrogen peroxide, ozone/hydrogen peroxide, iron (II) complexes/hydrogen peroxide (i.e. Fenton's Reagent), titanium dioxide, and titanium dioxide/hydrogen peroxide/ozone. In addition, it has been shown that mildly elevated gas-phase temperatures (200-500 C) can significantly increase the rate of photodecompostion in the gas-phase.

Some of these processes are reasonably effecient for destruction of chlorinated hydrocarbons which decompose by elimination of chloride ion or radical. Certain PCDD/F isomers are also quite photo-chemically labile. Hydrocarbons tend to be much less photochemically reactive, especially in non-catalyzed systems.

One can debate the merits of each type of photochemical process that has been developed or proposed and document the measured efficiencies of each process variation on each waste type. However, these technologies are inherently non-applicable to wood treating wastes because these wastes do not transmit light. For a photocatalytic process to work, one must design a reactor that allows the waste molecule, the light, and the catalyst to be at the same place at the same time. This is a difficult task for a transparent waste but is impossible for a highly turbid waste. Wood treating wastes contain large quantities of dirt and wood fiber. Without severe dilution they are opaque to light. Dilution may make some of the wastes marginally treatable; however, the waste volume would need to be increased on the order of 100 fold and consequently the throughput and cost of treatment would concomittantly increase.

In summary photochemical treatment methods are only applicable to non-turbid waste waters or air streams. They are clearly inappropriate for non-waste water F032 wastes.

Commenter: American Wood Preservers Institute
Comment Number: 39
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ALTERNATIVE TECHNOLOGIES TO INCINERATION DO NOT EXIST

EPA states that "any available technology can be used to meet the LDR level.[48] All of the so-called "alternatives" were evaluated by the Office of Technology Assessment (OTA) in 1991. Of the thirteen identified dioxin and furan treatment technologies, only one (rotary kiln incineration) had been developed, permitted and used on a site cleanup.[49]

COMMENT:

AWPI is unaware of any alternative technology that has been developed to commercial scale, permitted to receive, and capable of meeting the 1 ppb PCDD and PCDF UTSs.

4.7 INSUFFICIENT VITRIFICATION CAPACITY EXISTS FOR NEWLY LISTED WOOD PRESERVING WASTES

Summary:

The proposed treatment standards for arsenic in wood preserving wastes are based on vitrification. Two commenters [Beazer East (23) and American Wood Preservers Institute (39)] expressed concern that there is no available vitrification capacity for wood preserving wastes. Beazer East stated that only one facility in the U.S., Marine Shale Processors, uses vitrification in a tested, full scale process and that this facility's regulatory status is in question. Beazer East believes that the availability of vitrification as a treatment technology is uncertain and that stabilization should be the BDAT for arsenic in the newly listed wood preserving wastewaters (23:29-33). American Wood Preservers Institute requested that EPA identify the source for commercial vitrification (39:16).

Response:

The Agency acknowledges the commenters' statement that there is little commercially available vitrification capacity for these wastes (e.g., MSP has now ceased operation until it can obtain a hazardous waste incineration permit). However, as indicated in Chapter 2 of this document, stabilization can also meet the proposed UTS limits for arsenic. Because the treatment standards are numeric limits, facilities will be able to use stabilization to meet the LDRs for the newly listed wood preserving wastes and are not required to use vitrification as a treatment technology. Nevertheless, as discussed in Chapter 2, some vitrification capacity likely exists for wastes with high concentrations of arsenic. Therefore, as discussed in Chapters 2 and 3 of this document, EPA has determined that there is adequate stabilization capacity for wood preserving wastes.

Comments:

See next page.

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Comment Number: 23
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C. **The Proposed LDR for Hazardous Waste No. F035 Should Not Include Vitrification.**

1. **Stabilization should be BDAT for F035.**

EPA is proposing that F035 be treated using vitrification to meet LDRs. Review of the ROD Summary reveals that slag vitrification has not been specified in any of the 37 wood treating site RODs evaluated by Versar. To Beazer's knowledge, only one facility in the United States -- Marine Shale Processors ("MSP") of Morgan City, Louisiana -- utilizes vitrification in a tested, full-scale process. MSP's future regulatory status, however, remains in question. Currently, MSP is appealing EPA's rejection of MSP's Part B interim status boiler and industrial furnace permit. Due to the uncertain nature of MSP's regulatory status and potential future lack of <u>any</u> other vitrification facility, vitrification is not an "available" or appropriate treatment technology.

Vitrification was chosen for immobilization for arsenic presumably because conventional stabilization of arsenic can be somewhat problematic. As presented at the June 1995 AWMA National Meeting, studies by EPA's RREL on stabilization have shown that the variable solubility of arsenic in high and low pH ranges is easily overcome by treatability testing and proper pH control of the cement/lime mixture in the field. In this study, EPA successfully stabilized 13,000 cubic yards of arsenic soils using conventional stabilization techniques.

Stabilization of arsenic wastes is much more controllable than thermal processes because arsenic has been shown to volatilize in high temperature atmospheres such as an incinerator or slag furnace. The treatment alternatives

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Comment Number: 23
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specified in the Proposed Rule will transfer arsenic to a vapor stream where it is not accounted for as closely. See Table 3-B, Data Requirements for Thermal Desorption, in EPA's Presumptive Remedies for Soil, Sediments, and Sludges at Wood Treater Sites Quick Fact Sheet (Draft-Nov. 1994) ("[v]olatile metals (As, Cd, Cr, Pb, Zn) vaporize and are difficult to remove from emissions.")

The complexity of arsenic volatility is also noted in EPA's Summary of Generation, Disposal, and Treatment Practices for Wood Preserving Wastes F032, F034, and F035 (SAIC, May 1990). The SAIC document notes: "[b]ecause arsenic volatilizes at high temperatures, incineration may not be an applicable treatment for F032 or F034 wastes contaminated with arsenic." The arsenic volatility process limitation is applicable to both vitrification and incineration and should be addressed by the EPA before the Proposed Rule is finalized.

Moreover, vitrification technology is more complicated than portrayed in the Proposed Rule. Vitrification of arsenic wastes may require two additional treatment steps not specifically identified in the Proposed Rule. These additional steps are described in EPA's Vitrification Technologies for Treatment of Hazardous and Radioactive Waste Handbook (May 1992). The Vitrification Handbook notes: "[c]ertain waste feeds may require chemical or thermal pre-treatment to convert arsenic oxide to less volatile forms before vitrification..." Vitrification Handbook, p. 4-7. The Handbook explains that the process required is to convert the arsenic to a calcium oxide in another thermal process and then re-introduce the thermally treated mixture into the slag furnace. Id. This process is notably more complex than

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indicated in the Proposed Rule and further supports the use of the much less complex, conventional cementitious stabilization methods for arsenic wastes.

Finally, EPA's Presumptive Remedy document does not acknowledge the use of vitrification as a candidate immobilization technique. Rather, it specifically identifies "cementitious materials, including Portland cement, fly ash/lime, and fly ash/kiln dust" as the solidification methods.

RECOMMENDATION:

EPA should propose stabilization as the BDAT for arsenic based on a lack of "demonstrated and available" full-scale vitrification facilities. Stabilization of arsenic in wood treating wastes has been proven by EPA to be effective and has been previously selected by EPA as a presumptive technology for treating arsenic in F035 wastes. EPA should avoid the inevitable confusion that will arise in the field as a result of the conflicting programs and promulgate stabilization as BDAT for the F035 LDRs.

2. **The UTS for F035 nonwastewaters should be based on leachate concentration.**

EPA has established vitrification as BDAT for arsenic and stabilization as BDAT for chromium. 60 Fed. Reg. 43681. EPA has proposed that each constituent proposed for regulation in F035 (arsenic and chromium) comply with its applicable UTS in the treatment standard table at 40 C.F.R. § 268.40 as a prerequisite for land disposal. 60 Fed Reg. 43680. However, the UTSs for chromium and arsenic at 40 C.F.R. § 268.40 are designated as leachate levels, whereas, the

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UTS for chromium and arsenic in F035 as proposed are total concentrations. 60 Fed. Reg. 43682.

Beazer's experience indicates that the proposed UTSs for chromium and arsenic cannot be achieved with the specified immobilization technologies. Immobilization technologies are not designed to reduce total concentrations of metals in the waste, so the F035 LDR as drafted, cannot be met. In studies by EPA's RREL/ORD, 13,000 cubic yards of arsenic soils at the Selma Wood Treater CERCLA site were successfully immobilized using conventional stabilization techniques. In the Selma site full scale stabilization study performed by EPA's RREL/ORD, leachable standards for the metal constituents were specified in the ROD in lieu of total concentration standards. Further, the study addressed the use of leach tests other than TCLP, such as Synthetic Precipitation Leachate Procedure ("SPLP") (pending SW846 Method 1312) and distilled water leach. Beazer supports the use of these more appropriate leach tests.

EPA's RREL/ORD researchers have shown that the variable solubility of arsenic in high and low pH ranges is easily overcome by treatability testing and proper pH control of the cement/lime mixture in the field. The alternate leach tests noted above reduce the incentive of remediation contractors to create a less environmentally-sound stabilized mixture. The misguided incentive created by the TCLP test method is that by deliberately raising the pH of the stabilized waste, the contractor ensures that when the acid is added in the TCLP test, the resultant pH of the test material falls into the mid pH range where the arsenic is not water soluble.

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Thus, the stabilized waste passes the TCLP at the deliberately elevated pH level. However, because the pH of the stabilized waste is elevated, it is now in the range of higher solubility in water. This pH management for stabilized arsenic wastes actually results in a waste that leaches more in a natural water environment than it does in the TCLP acid leach test. The alternate leach procedures discussed above would mitigate the incentive to manipulate the treatability testing and result in a more environmentally protective means of managing the waste.

RECOMMENDATION:

EPA must revise the UTSs for the metal constituents to a leachable standard for all metals. Further, Beazer recommends EPA consider the use of the SPLP or distilled water leach procedure in lieu of the TCLP method to ensure the stabilized material is truly not leachable in its final environment.

Commenter: American Wood Preservers Institute
Comment Number: 39
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AWPI is puzzled at EPA's selection of vitrification as BDAT for arsenic. The Agency has recognized the potential for arsenic to volatize at high temperatures.[31]

COMMENT:

EPA should explain why it disregards this potential problem before recommending vitrification for arsenic wastes. The Agency should also explain why it disregards stabilization when EPA has successfully used this technology for arsenic at a wood treating site. AWPI is unaware of a single full-scale vitrification facility and requests that the EPA identify the source for commercial vitrification.

4.8 AVAILABLE CAPACITY DOES NOT EXIST FOR NEWLY LISTED WOOD PRESERVING WASTEWATERS

Summary:

Two commenters [Beazer East (23) and American Wood Preservers Institute (39)] stated that the proposed treatment standards for wood preserving wastewaters are not achievable in current treatment systems. Beazer East stated that the wastewater treatment standards are too low and will require construction of new wastewater treatment systems capable of meeting the standards. Beazer stated that this will result in a shutdown of remedial actions at these sites (23:5). American Wood Preservers Institute stated that standards for F032 wastewater are unachievable (39:28-29).

Response:

As discussed in detail in the BDAT background documents for this final rule, EPA has determined that the LDR treatment standards for the newly listed wood preserving wastewaters are achievable using readily available wastewater treatment practices. The Agency notes, however, that current wastewater treatment systems may have to be optimized or upgraded to meet these treatment standards, or waste may require a sequence of treatment trains to meet the standards. To allow facilities time to modify their wastewater treatment systems to be able to meet the LDR standards, EPA is granting a 90-day capacity variance for the newly listed wood preserving wastes, or on a case-by case basis if no treatment capacity exists. (EPA, however, does not believe many wastewater treatment operators will be affected by the rule. If treatment occurs in tanks, there is no land disposal. If it occurs in a surface impoundment, LDR standards need not be met assuming the impoundment meets the requirements of 3005(j)(ii), which almost all currently operating surface impoundments do.)

Comments:

See next page.

Commenter: Beazer East
Comment Number: 23
Page Number: 5

Another ramification of EPA's proposed LDRs involves the extremely low wastewater treatment standards for wood treating wastes. EPA's stringent wastewater treatment requirements (e.g., dioxin/furan levels of 0.00063 mg/l) will have a profound impact on the management of remediation of groundwater at sites. According to the regulation, the regulated community will be forced to expend valuable resources to design and construct wastewater treatment facilities capable of meeting these low limits for any wastewaters generated at sites where

Commenter: American Wood Preservers Institute
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ALTERNATIVE TREATMENT STANDARDS FOR F032 WASTES

EPA has previously acknowledged that incineration effectively destroyed dioxin and furan constituents. The Agency offered incineration as an alternative technology in the F024 rulemaking although this was in response to "industry recalcitrance" and "the Agency's desire to have industry resume treatment [of F024].[58]

COMMENT:

Recognizing the stigma associated with incineration of dioxins and furans, the limited capacity, and the inherent difficulties in analyzing for dioxin and furan

[55] Internal Memorandum, Jose Labiosa to R. Kinch and L. Rosengrant, USEPA/OSWER (undated).
[56] 53 FR 53282, 53291-53308 (December 1988) and 55 FR 50450 (December 1990).
[57] "The NTP study provides carcinogenic potency values for pentachlorophenol products... which are in the range of values associated with other wastes listed as toxic." 55 FR 50467.
[58] 55 FR 22581 (June 1, 1990).

Commenter: American Wood Preservers Institute
Comment Number: 39
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constituents, EPA should promulgate an alternative standard based on incineration in a four-9's combustion unit.

DIOXIN AND FURAN LIMITS FOR F032 WASTEWATERS ARE UNACHIEVABLE

EPA has proposed treatment standards for F032 wastewaters that were transferred from the UTSs for dioxins and furans in organic wastewater. These UTSs are based on biological treatment of wastewaters containing very low concentrations of dioxins and furans ranging from 0.00004 µg/L to 0.0118 µg/L.[59] The average concentrations of dioxin and furans in F032 wastewaters are much higher ranging from 0.9 µg/L to 60 µg/L.

COMMENT:

Given that the removal efficiency for biological treatment of the lesser concentrated was only 78 percent, AWPI does not believe that EPA can support the claim that the UTS can be met with the higher concentrations of dioxins and furans found in F032 wastewaters.

[59] See, "Universal Treatment Standards BDAT Background Document", Vol. A, Section 5.6

4.9 NATIONAL CAPACITY VARIANCE IS NEEDED FOR SOIL AND DEBRIS CONTAMINATED WITH NEWLY LISTED WOOD PRESERVING WASTES

Summary:

Many commenters support a national capacity variance for soil and debris contaminated with newly listed wood preserving wastes: Beazer East (23), Utilities Solid Waste Activities Group et al (USWAG) (35); American Wood Preservers Institute (39); Merck (47); Chemical Waste Management (48); Safety-Kleen (65); the Hazardous Waste Management Association (97); Chemical Manufacturers Association (113); Georgia Department of Natural Resources (DNR) (N13); and DuPont (N16).

Georgia DNR stated that they are cleaning up six sites under the State Superfund program that are projected to generate 150,000 tons of F032 contaminated soil, and asked that EPA consider these quantities in its capacity analysis (N13:1). DuPont also supports a capacity variance for soil contaminated with wood preserving wastes, and provides data on soil at its facilities (N16:1).

Based on an independent study, Beazer East estimates that 85.3 MM tons of soil contaminated with wood preserving wastes may require treatment to meet UTS. Beazer stated that this volume far exceeds available incineration capacity. Additionally, Beazer 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 believes that soils and similar remediation wastes pose material handling and capacity problems for most of the nonpumpable incinerators, and that only APTUS, USPCI Utah, and Rollins Environmental Services, Inc. Texas can handle significant soil volumes (23:17-22).

Rollins Environmental Services, Inc. acknowledges the data on the quantity of F032 contaminated media are incomplete and the quantity may exceed available capacity. Rollins suggests an alternative treatment standard be available, under limited circumstances (N19:2). American Wood Preservers Institute requested that the soil and debris variance be tied to the pending Hazardous Waste Identification Rule (HWIR) (39:14). Penta Task Force requested that EPA address cost and capacity issues that will arise at the end of the national capacity variance for contaminated soil and debris (32:4,15). The USWAG added that extensions to the variance should be granted if treatment capacity does not materialize in the future (35:15). Chemical Waste Management (48:36) and the Hazardous Waste Management Association (97:17-18) support a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes and state that D004-D011 wastes should also be included in the capacity variance. Merck (47:2), Safety Kleen (65:6), and Chemical Manufacturers Association (113:24) expressed general support for a national capacity variance.

Response:

In the proposed rule, EPA requested comment on the potential quantities of soil and debris contaminated with F032, F034, and F035 that exist at wood preserving facilities, including potential quantities that will be generated from the closure of surface impoundments at these facilities or by the remediation of previously closed surface impoundments and the surrounding contaminated areas. Although EPA did not have an estimate of these quantities for the proposed rule, it believed the quantities to far exceed available capacity and therefore proposed a two-year capacity variance. EPA acknowledges the commenters' support and has incorporated the data provided into its revised capacity

analysis. Furthermore, EPA has conducted additional analysis on soil and debris data obtained from Superfund Records of Decision (RODs). This analysis is presented in Chapter 3.

EPA notes that the Hazardous Waste Identification Rulemaking is on a separate schedule from this rulemaking. In determining whether to grant a national capacity variance and the appropriate duration of such a variance, if necessary, EPA considered only existing regulations. Any modifications to a variance that become necessary as a result of future rulemakings will be made as part of that rulemaking. EPA has determined that there is insufficient capacity to treat soil and debris contaminated with newly listed wood preserving wastes, and is therefore granting a two-year variance. EPA notes that as a part of this two-year variance, it will not require generators to certify to EPA that they have made a request to incineration facilities and have found that there is insufficient capacity to meet the dioxin/furan treatment standard. EPA also notes that if, at the end of the two year variance additional time is necessary for treatment capacity to become available, EPA may consider case-by-case capacity extension requests.

Comments:

See next page.

Commenter: Georgia Department of Natural Resources
Comment Number: N13
Page Number: 1

Under our state superfund program, EPD is in the process of cleaning up six abandoned wood treating facilities that will eventually generate approximately 150,000 tons of soil contaminated with F032 wastes. Even though we have not yet begun transporting these wastes for dispoal, we have already entered into substantial contractual obligations just to prepare these wastes so they can be removed for disposal. This is a significant amount of material and we are concerned that any company possessing a suitable treatment technology for F032 wastes (e.g., commercial hazardous waste incinerators) will likely be overwhelmed by such a large amount of waste.

As such, the State of Georgia respectively requests the EPA to consider this substantial amount of F032 wastes when determining whether a capacity variance for soils contaminated with FO32 wastes will be granted. Your consideration of this matter is greatly appreciated. If you have any questions regarding this matter, please contact me at 404-656-7802.

Commenter: Utilities Solid Waste Activities Group
Comment Number: 35
Page Number: 15

V. USWAG SUPPORTS THE PROPOSED CAPACITY VARIANCE FOR SOIL AND DEBRIS ASSOCIATED WITH WOOD PRESERVING WASTES.

The Agency is proposing a capacity variance for two years for soil and debris that are contaminated with wastes from newly listed wastes from wood preserving processes. 60 Fed. Reg. at 43686. USWAG agrees with EPA that there is a lack of adequate treatment capacity to meet the demand for this wastestream, and supports the Agency's proposal to grant a capacity variance. As with mixed waste, USWAG also requests that the Agency express its willingness to grant additional variances in the future should disposal options remain limited.

Commenter: Beazer East
Comment Number: 23
Page Number: 17

4. **Selection of incineration as BDAT will necessarily bring cleanups to a halt due to lack of capacity and skyrocketing treatment costs.**

a. Capacity for incineration is simply not available.

Significant quantities of soil and groundwater impacted by previous wood treating operations may require treatment and disposal, further overburdening existing waste management capacity to unmanageable levels, if media is not exempted from the proposed LDR rules. EPA's approach in the Proposed Rule serves to reveal EPA's lack of a sense of reality in addressing treatment/storage capabilities. EPA's own *National Capacity Assessment Report: Capacity Planning Pursuant to CERCLA Section 104(c)(9)* (the "CAP document"), EPA530-R-94-040

Commenter: Beazer East
Comment Number: 23
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concludes that sufficient capacity currently exists for current and projected hazardous wastes through the year 2013. This assessment grossly overestimates capacity due to the potentially large volume of additional remediation waste requiring treatment and disposal as proposed in the LDR rules and not accounted for in the CAP document. Specifically, EPA's capacity estimates do not account for the treatment and disposal of F032, F034 and F035 wastes or media as specified in the proposed LDR rules. EPA estimates that approximately 30% (310,000 tons/year) of surplus commercial capacity exists for nonpumpable incinerator wastes through the year 2013. EPA estimates that the total current nonpumpable incineration capacity is approximately 1.1 MM tons/year. Based on an independent study performed by the National Environmental Technology Application Corporation ("NETAC") for Beazer, an estimated 85.3 MM tons of soil impacted by previous wood treating operations may require treatment to UTSs under the proposed regulations. See Attachment A. Clearly, if media is not exempted from the Proposed Rule and if incineration is the only demonstrated technology, then capacity is not available to treat this quantity of material. It would take over 200 years to treat this quantity of material based on the existing incineration capacity. Even if only one quarter of the estimated 85.3 MM tons/year of soil were to be managed at off-site commercial facilities and all the remaining hazardous waste capacity was used for this material, it would take over 60 years to complete the task.

Further, EPA's "nonpumpable" capacity estimate cited in the CAP document of 1.1 MM tons/year fails to account for remediation wastes handling

Commenter: Beazer East
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limitations. Most of the RCRA-permitted incinerators which manage nonpumpable materials accept these materials only in small quantities. Based on Beazer's research, fewer than five of these facilities can actually manage truckload or railcar volumes of contaminated media. Soils and similar remediation wastes pose material handling and capacity problems for most of the nonpumpable incinerators, such as high inert content, low heating value, conveyance, and shredding. To our knowledge, only APTUS in Coffeyville, Kansas, US PCI in Utah, and Rollins' facility in Texas can handle significant soil volumes and their combined total capacity (not surplus capacity, assuming any exists) is on the order of 250,000 tons/year. Thus, even if the US PCI and Rollins incinerator in Texas were permitted to accept F032 wastes, adequate capacity for remediation wastes containing F032 would still be unavailable.

The Agency admitted in the Advanced Notice of Proposed Rulemaking (ANPR) Land Disposal Restrictions: Potential Treatment Standards for Newly Identified and Listed Wastes and Contaminated Soils (October, 1991) that "the commercial hazardous waste treatment industry tends to shy away from these [dioxin-containing] wastes, thus resulting in unnecessary delays in such treatment." 56 Fed. Reg. 55160, 55179 (October 24, 1991). EPA indicated in the ANPR that there is a high level of public concern over wastes containing the chlorodioxins and requested ideas regarding the development of F032 standards which would lessen public concern and the associated delays in treatment and disposal. Apparently, EPA has ignored these concerns. Clearly, the effect of the proposed LDR rules will heighten

Commenter: Beazer East
Comment Number: 23
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the public's concern regarding dioxin/furan thermal treatment and slow, if not halt effective remediation waste management.

As stated by EPA in the Proposed Rule, only one incinerator is permitted in the United States to accept and thermally treat dioxin-containing wastes - Rollins' APTUS facility. Recent trends have shown a decrease in incinerator permit applications, permits issued and resulting capacities. Due to public concern regarding dioxin/furan treatment, the cost of permitting and the restrictions placed by EPA on incinerators in its Combustion Strategy, it is probable that the APTUS facility will be the only facility permitted to treat dioxin-containing wastes for some time.

As stated in Presumptive Remedies for Soil, Sediments, and Sludges at Wood Treater Sites Quick Fact Sheet (Draft-Nov. 1994):

> incineration of large volumes [greater than 5,000 cubic yards] of contaminants may be prohibitively costly....There may be significant considerations with respect to compliance with ARARs and other laws....Space availability and public opposition may make this option infeasible. Consideration must be given to public reaction concerning the use of incineration because the Agency has encountered significant opposition at some sites. Commercial incineration facilities (i.e., units permitted for the incineration of hazardous wastes) may be used when off-site incineration is desirable. However, only a limited number of these facilities are available nationwide, and the possibility of increased capacity in the future is constrained by EPA's Draft Strategy for Combustion of Hazardous Waste, issued in May 1993.

Based on data collected by EPA and contained in the Resource Conservation and Recovery Information System (RCRIS) database, as of May 1, 1994, 164 incinerators were permitted or in interim status. Of these facilities, only 28 were commercial facilities; 7 of which were operating under interim status.

Commenter: Beazer East
Comment Number: 23
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More significantly, of these 28 commercial facilities, only one (APTUS) will be able to accept F032 wastes as currently proposed in the rule. Significantly, between July 1, 1993 and May 1, 1994, 7 commercial facilities canceled plans to develop new capacity and 1 commercial facility in interim status terminated operations. During this same timeframe, only 1 commercial facility submitted a new permit application. More critically, 17 facilities (both commercial and non-commercial) were closed and plans to build new facilities were canceled during this period.

In order for a treatment facility to incinerate dioxins/furans, the facility must demonstrate a destruction and removal efficiency (DRE) of 99.9999 percent. The permitting process is extremely costly and cost prohibitive for most incineration facilities. These facilities must demonstrate the 99.9999 percent DRE in a trial burn in order to obtain such a permit. Based on discussions with Rollins Environmental, these costs can range from $2,000,000-$4,000,000.

The APTUS facility will be the lone BDAT facility for destruction of dioxins/furans for some time in the future. EPA's Combustion Strategy restricted incineration facilities from obtaining Part B permits to treat dioxin-containing wastes by mandating site-specific risk assessments for all Part B facilities and placing Part B applications on hold. Further, EPA has not yet proposed emission standards for particulate matter and dioxins/furans from Hazardous Waste Combustors (HWCs) as mandated in EPA's Combustion Strategy. Once proposed, these standards must be made available to the public for review and comment prior to the time any regulatory proposal is developed. Clearly, the timeframe required for EPA to implement this

Commenter: Beazer East
Comment Number: 23
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portion of its Combustion Strategy is significant based on the current negative public perception regarding dioxin/furan incineration as well as current Combustion Strategy restrictions and lack of EPA guidance.

With regard to the selection of incineration as the primary treatment for organics, there are tremendous, and in all probability, insurmountable complexities imposed by incineration of a waste with a dioxin/furan effluent performance standard similar to the performance standard applicable to the APTUS incinerator. This difficulty was demonstrated recently in EPA Region IX, where the Agency revised the treatment method for a dioxin/furan containing waste at a CERCLA wood treater site in California to an on-site landfill because of the insurmountable problem of public resistance to incineration of the material on-site. The foregoing studies and analysis demonstrate clearly that incineration capacity is simply not "available" for wood treating site remediation wastes even today, <u>before</u> the large volume of materials resulting from the proposed LDRs would have to be incinerated. Further, there is absolutely no reason to believe that any greater capacity will become available in the foreseeable future.

Commenter: Rollins Enivironmental, Inc.
Comment Number: N19
Page Number: 2

There is a demonstratively sufficient amount of capacity to meet the proposed Dioxin/Furan treatment standards for F032 process wastes. Additionally, RES contends there is sufficient capacity to meet the proposed Dioxin/Furan treatment standards for F032 contaminated media wastes. However, since the data on the quantity of F032 contaminated media is incomplete, it is conceivable there may be a large F032 contaminated media cleanup that exceeds the capacity of facilities able to meet the Dioxin/Furan treatment standard. RES also acknowledges that some incineration facilities may not be able to meet the Dioxin/Furan treatment standard, thereby limiting the available capacity for large contaminated media projects.

Therefore, RES recommends the option of an alternative treatment standard for F032 contaminated media waste, available under limited circumstances. This option would allow an F032 contaminated media generator to utilize the alternative treatment standard under the following condition:

- The generator certifies to the EPA that a request to at least five incineration facilities indicates there is insufficient capacity to treat the F032 contaminated media while meeting the Dioxin/Furan treatment standard.

RES further recommends that EPA adopt the combination of suboptions 2 & 3 as outlined in the NODA as the alternative treatment standard. Under this recommendation, after certifying there is insufficient capacity for treatment of F032 contaminated media, a generator could utilize the alternative treatment standard of "Combustion in a Part B permitted facility that meets a Dioxin/Furan emission standard of 0.20 ng/DSCF."

Commenter: American Wood Preservers Institute
Comment Number: 39
Page Number: 14

V. TREATMENT STANDARDS FOR SOIL CONTAMINATED WITH NEWLY LISTED WASTES (60 FR 43680)

AWPI agrees with EPA's presumption that the treatment standards for as-generated wastes are generally inappropriate or unachievable for soils contaminated with hazardous wastes within the meaning of 40 CFR 268.44(a).[26] AWPI supports the proposed national capacity variance for soil and debris contaminated with Phase IV newly listed wastes.

However, the Agency has not clearly demonstrated the relationship of contaminated soil under the Phase IV LDR's and the pending Hazardous Waste Identification Rule (HWIR) for soil and debris. Will the treatment standards be compatible? Based on this potential conflict, the capacity variance for soil and debris should be tied to the implementation of the pending HWIR rule.

The Agency should ensure that the proposed treatment standards for soils will not conflict with EPA's "Presumptive Remedies for Wood Preserving Sites." AWPI believes that the proposed Universal Treatment Standards (UTSs) for F032 wastes are not consistent with the proposed presumptive remedies nor is the vitrification of arsenic wastes.

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[26] 55 FR 8759-60 (March 8, 1990).

Commenter: Penta Task Force
Comment Number: 32
Page Number: 4

Also, the same 49 wood preserving sites generate some 10,520 tons of F032-contaminated soil and debris annually and there may be untold millions of tons of contaminated soils from past operations at these sites and at former wood preserving sites that may require remediation and treatment. Although EPA has proposed a two-year national treatment variance for contaminated soil and debris, the Agency has not squarely addressed either the capacity or cost issues that necessarily will arise at the end of the variance period.

Commenter: Penta Task Force
Comment Number: 32
Page Number: 15

Moreover, some 10,520 tons of F032-contaminated soil and debris are generated annually at wood processing facilities and large volumes (perhaps as high as 102 million tons) of contaminated soils from past operations may require treatment. See Capacity Analysis, 3-10 to 3-11. Although EPA has proposed a two-year national capacity treatment variance for F032-contaminated soil and debris, neither the Capacity Analysis nor the Regulatory Impact Analysis provide any indication of the significant costs and capacity issues that necessarily will arise after the variance period ends and these contaminated soils require treatment. EPA's failure to squarely address this problem is another example of the significant conceptual problems associated with the current proposal.

Commenter: DuPont Engineering
Comment Number: N16
Page Number: 1

DuPont supports a capacity variance for TC metal wastes.

DuPont is actively engaged in remediation activities involving metal contaminated soils and debris at five locations and has identified more than 100,000 cubic yards of potentially impacted soil. Perhaps 50,000 cubic yards of this material will be managed in the next few years. Pending implementation of the recently proposed HWIR-media rule, some or all of this soil would need to managed under LDRs. In order to not create impediments to remediation, DuPont requests that the Agency grant a variance.

Commenter: Chemical Waste Management, Inc.
Comment Number: 48
Page Number: 36

The Agency is proposing a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes.

CWM supports this proposal in principal, however, it is not clear to CWM whether this includes newly identified newly identified wastes. The Agency states "EPA is proposing a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes." (See 60 Fed. Reg. at 43,686) This statement implies that the capacity variance is for all newly identified Phase IV soil and debris. This should include the newly identified D004-D011 wastes.

Commenter: Hazardous Waste Management Association
Comment Number: 97
Page Number: 17

Treatment Standards for Soil Contaminated With Newly Listed Wastes (60 FR 43680)

The Agency is proposing a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes. HWMA supports this proposal in principal; however, it is not clear whether this includes D004-D011 newly identified wastes. The Agency states that, "EPA is proposing a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes" (60 FR 43686). This statement implies that the capacity variance is for all newly identified Phase IV soil and debris, a universe which does include D004-D011 newly identified wastes. However, the Agency does not indicate that this national capacity variance is being

Commenter: Hazardous Waste Management Association
Comment Number: 97
Page Number: 18

granted to D004-D011 newly identified wastes. Neither the table in the preamble discussion (60 FR 43686) or proposed §268.30 (60 FR 43694) state that D004-D011 newly identified wastes are subject to the capacity variance.

D004-D011 newly identified wastes should also be included in this capacity variance based on the logic for granting the capacity variance for F032, F034, F035, and D004-D011 mixed with radioactive wastes. The Agency states, "It has been the Agency's experience that contaminated soils are significantly different in their treatability characteristics from the wastes that have been evaluated in establishing the BDAT standards, and thus, will generally qualify for a treatability variance for soils,....". HWMA does not see any logical reason for not granting this capacity variance for D004-D011 newly identified soil and debris while granting it for the other waste streams.

Commenter: Merck
Comment Number: 47
Page Number: 2

1) The Agency is proposing a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes. We support this proposal fully. The Agency's assertion that treatment of constituents in debris and soil streams is significantly different than treating as generated waste streams. We concur with that assertion and therefore believe that the Agency will need to carefully evaluate treatment standards for these new streams especially since they are metal bearing streams and as such are very difficult to treat as a soil or debris wastestream.

Commenter: Safety-Kleen
Comment Number: 65
Page Number: 6

13. Safety-Kleen supports the Agency's intent to provide a national capacity variance for soil and debris contaminated with Phase IV newly listed wastes.

Safety-Kleen agrees that the treatment standards for as-generated wastes are inappropriate for soil and debris contaminated with hazardous wastes. Imposing treatment that is not available in the short term will delay or interrupt remediation efforts under RCRA corrective action and other remediation and construction programs. In addition, 90-day generators of hazardous waste soils and debris would be in jeopardy of not-being able to comply with regulations because viable treatment alternatives do not exist. Safety-Kleen therefore supports granting a national capacity variance for contaminated soil and debris for the maximum time allowable.

Commenter: Chemical Manufacturer's Association
Comment Number: 113
Page Number: 24

F. CMA Supports National Capacity Variances For The Phase IV Rule.

CMA agrees with the Agency that National Capacity Variances are appropriate and necessary to allow uninterrupted manufacturing capability at many sites. The Agency's estimate of wastewaters affected by the Phase IV rule may be unrealistically low, considering that many facilities have not previously determined quantities of wastewaters which are characteristically hazardous at the point of generation. This concern emphasizes the need for national capacity variances.

TH4F-S0003.A

APPENDIX A

DATA ON AVAILABLE COMBUSTION CAPACITY

APPENDIX A

MEMORANDUM

TO: The RCRA Docket

SUBJECT: Meeting Notes with Rollins and Rollins' Highway 36
re: Rollins Incineration Capacity and Treatment of Selenium Wastes

DATE: May 7, 1996

Participants:
Mike Fusco, Rollins Environmental
Richard Grondin, Rollins' Highway 36
Mike Petruska, OSW/HWMMD/WTB
Mary Cunningham, OSW/HWMMD/WTB
Elaine Eby, OSW/HWMMD/WTB
Anita Cummings, OSW/HWMMD/WTB
C. Pan Lee, OSW/HWMMD/AIB
Suzanne Wade, Versar

DRAFT

This meeting note mainly summarized the part discussing incineration capacity and treatment problems. Rollins expressed repeatedly that there is much incineration capacity available in Rollins facilities and they can handle both process wastes and contaminated media. The second issue brought up by Rollins was the concern of not being able to meet UTS for selenium.

Rollins submitted CBI for their incineration capacity (EPA has retained two copies and the rest gave back to Rollins). Both copies had been handed to CBI Document Control Officer of OSW. Rollins stresses that they have not been utilizing the maximum available operating capacity for handling both liquids and solids wastes for recent years. They are not seeing much wastes come to incinerators, especially from Phase II wastes -- they do not dispute over our capacity analysis methodology, but express that generators may redirect materials handling in the processes and do not generate as much wastes as LDR estimated.

Rollins states that adding more binders to achieve selenium UTS is just dilution and does not incur a treatment if other metals (e.g., lead, cadmium, nickel) are also present in the wastes. They are not able to find proper agents to treat selenium down to UTS level for the wastes they received. Also, they have been seeing more concentrated wastes come to incinerators for the past 7 to 8 years because some generators may use dryer instead of filter press to reduce the waste volume and actually the wastes become more toxic due to waste minimization and present treatment problems for treaters.

Attached please see the notes prepared by WTB's contractor (Versar) for the overall discussion in the meeting.

DRAFT SUMMARY OF MEETING WITH REPRESENTATIVES OF ROLLINS ENVIRONMENTAL SERVICES (RES) TO DISCUSS COMMENTS ON PHASE IV

May 7, 1996, 10:00 - 11:30 a.m.
2800 Crystal Station
Arlington, VA
2nd Floor, Conference Room B

DRAFT

ATTENDEES

Elaine Eby, EPA/OSW/WTB
Mary Cunningham, EPA/OSW/WTB
Michael Petruska, EPA/OSW/HWMMD
C. Pan Lee, EPA/OSW/HWMMD
Anita Cummings, EPA/OSW/WTB
Suzanne Wade, Versar
Mike Fusco, RES
Richard Grondin, RES

The purpose of this meeting was for EPA and RES representatives to discuss RES comments on the Proposed Phase IV rule (proposed treatment standards for characteristic metal wastes). The primary concerns were that there currently is sufficient thermal treatment capacity for wood preserving wastes and contaminated media (in contrast to generator's claims that there is insufficient capacity), and that they cannot consistently meet the UTS for selenium and arsenic for certain wastes.

First RES stated that they currently have excess capacity that would be suitable for thermal treatment of wood preserving wastes and contaminated media. A recent (1995) EI Digest survey also shows excess capacity industry-wide. This should allow the treatment standard to be issued without a capacity variance, according to Mike Fusco of RES.

RES has a major difficulties with stabilization of selenium to UTS levels, especially when other constituents are present. The solubility of selenium is lowest at a pH of 6.5 to 7.5, but other metals such as cadmium, nickel, and lead, are highly soluble at this pH. Currently, they treat 2000 - 3000 T per yr. of all selenium-containing wastes (listed and characteristic), including K061, and with the current treatment levels must turn away some of the waste because the waste cannot be treated to the UTS concentration. RES believes 1.0 mg/L is a reasonable number for Se instead of 0.16 mg/L. This issue is bigger than TC; it is a problem for all selenium wastes (except shampoo which contains percent levels of Se but few other constituents). Other representatives from the major companies in the waste treatment industry were informally surveyed by RES. They all said Se was a problem but the volume was not high enough for them to comment.

RES also has a problem with treatment of mercury wastes that is not related to Phase IV. When the untreated concentration is greater than 260 mg/kg, the regulations require treatment by

retort; however RES would prefer to treat it using stabilization. The residue from retorting is high in chloride content, so it cannot be stabilized because of current EPA regulations; RES must send it to Canada for stabilization. They are in the process of submitting a treatability variance for this waste.

Organometallics (such as organoarsenates) can also be difficult to treat because of restrictions on combustion of metals and stabilization of organics. RES feels that arsenic is difficult but possible to stabilize. They have rejected some creosote type waste because of high organics.

RES does not have major concerns with meeting metal treatment standards for UHCs for nonwastewaters. In general, they feel that UTS for characteristic wastes are technically feasible but will cost more because of associated development and optimization costs. They also believe there will be a volume increase in treatment residuals. RES is seeing more concentrated wastes in their feed streams because of waste minimization, which can be difficult to treat. Sand (as in foundry wastes) might actually help the stabilization, like slag.

DRAFT

PHHF-50003.B

APPENDIX B

DATA ON AVAILABLE WASTEWATER CAPACITY

This appendix has two sections:

B-1: Discusses available treatment capacity at Centralized Waste Treatment facilities. The information was collected in the 1991 Waste Treatment Industry Questionnaire by the Office of Water and represents 1989 data.

B-2: Wastewater treatment systems data from the 1991 Biennial Reporting System

Appendix B-1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Memorandum

OFFICE OF WATER

To: Benjie Carroll (OS-321W)

From: Debra DiCianna
Engineering and Analysis Division (WH-552)

Date: April 30, 1993

Subject: Treatment Capacity Information from Waste Treatment Industry Project

Attached is the information you requested regarding available treatment capacity at Centralized Waste Treatment facilities. This information was collected in the 1991 Waste Treatment Industry Questionnaire by the Office of Water and represents 1989 data. Names and addresses of facilities are also listed.

All of the facilities included have received a final or interim RCRA Permit. None of the information provided pertains to waste which is underground injected. Some facilities did not supply the capacity information requested due to complex operations. Therefore, two totals are presented. One total represents the actual values reported. The second total is scaled-up to included facilities which did not submit data. Below are listed the overall totals:

1989 Reported Capacity Total:	9,669,611,960 gals/year
1989 Scaled-Up Capacity Total:	11,341,084,753 gals/year
(= Reported Capacity Total + 11 x Average Capacity)	

If you wish to obtain any additional information or have any questions, please contact me at (202) 260-7141.

cc: Tudor Davies (WH-551)
Ramona Trovato (WH-550G)
Woody Forsht (WH-552)
Bruce Kobelski (WH-550G)

FACILITY CAPACITY FOR HAZARDOUS WASTE (4/19/93)

NAME	STREET	CITY	STATE	ZIP	MAX. CAPACITY (GAL)	% USED (1989)	AMT. AVAILABLE (GAL)
ALTERNATE ENERGY RESOURCES INC	2936 WALDEN DR	AUGUSTA	GA	30904	1,657,200,000	20.02	1,493,397,560
AMERICAN CHEMICAL & REFINING CO.	36 SHEFFIELD ST.	WATERBURY	CT	06704	2,375,000	79	496,750
AMERICAN WASTE OIL CORP	44141 YOST RD	BELLEVILLE	MI	48111	6,240,000	80	1,248,000
APPROPRIATE TECHNOLOGIES II INC	1700 MAXWELL RD	CHULA VISTA	CA	92011	8,942,500	18	7,332,850
BEAVER OIL CO INC	5057 LENZI AVE	HODGKINS	IL	60525	14,000,000	20	11,200,000
BELPAR ENVIRONMENTAL OF VIRGINIA INC.	9500 HARVEST ROAD	PRINCE GEORGE	VA	23875	390,000	70	117,000
BOEING CO--AUBURN	700 15TH ST SW, MS 6840	AUBURN	WA	98001	371,895,000	42.43	214,122,960
BRUNSWICK CORP	4300 INDUSTRIAL AVE	LINCOLN	NE	68504	249,992	3	239,672
BRUSH WELLMAN INC	SOUTH PORTAGE RIVER RD	ELMORE	OH	43416	*		
CECOS INTERNATIONAL	P.O. BOX 640 L.P.O.	NIAGARA FALLS	NY	14304	*		
CECOS INTERNATIONAL INC	4979 SPRING GROVE AVE	CINCINNATI	OH	45232	23,400,000	12	20,592,000
CECOS TREATMENT CORP.	51 BRODERICK RD	BRISTOL	CT	06010	62,500,000	6.02	58,737,500
CHEM-CLEAR INC	11600 S STONY ISLAND AVE	CHICAGO	IL	60617	35,000,000	47	19,050,000
CHEM-TECH SYSTEMS	3600 EAST 26TH STREET	LOS ANGELES	CA	90023	*		
CHEMICAL MANAGEMENT INC	340 EASTERN PARKWAY	FARMINGDALE	NY	11735	7,800,000	44	4,368,000
CHEMICAL PROCESSORS INC	734 S. LUCILE ST.	SEATTLE	WA	98108	13,142,000	40.42	7,830,004
CHEMICAL PROCESSORS INC	PIER 91	SEATTLE	WA	98108	*		
CHEMICAL PROCESSORS INC	1701 ALEXANDER AVE.	TACOMA	WA	98421	17,001,200	40.56	10,102,113
CHEMICAL WASTE MANAGEMENT OF NEW JERSEY	100 LISTER AVE.	NEWARK	NJ	07105	52,500,000	23	40,471,200
CHEMICAL WASTE MANAGEMENT OF NEW YORK	1135 BAUMER RD.	MODEL CITY	NY	14107	21,024,000	73	5,678,480
CLARK PROCESSING INC.	500 S. WEST END AVE.	DAYTON	OH	45427	6,500,000	86	910,000
CLEAN HARBORS	2900 BROADWAY	CLEVELAND	OH	44115	69,000,000	65	22,080,000
CLEAN HARBORS INC.	1910 RUSSELL ST.	BALTIMORE	MD	21230	44,100,000	12	38,808,000
CONCO INC PONCA CITY	1000 S. PINE	PONCA CITY	OK	74603	720,000,000	92	57,600,000
CP CHEMICALS	34400 ZWISSIG WAY	UNION CITY	CA	94587	5,800,000	74	1,510,000
CP CHEMICALS INC	ARBOR ST	SEWAREN	NJ	07077	54,000,000	90	5,400,000
CP CHEMICALS INC	HWY 15 SOUTH INDUTR. PK	SUMTER	SC	29150	45,601,920	61	17,784,749
CROSBY & OVERTON INC	3610 W 17TH ST	LONG BEACH	CA	90813	2,340,000	100	0
CROSBY AND OVERTON INC PLANT 2	20245 76TH AVE. S.	KENT	WA	98032	20,752,000	0.5121	20,645,728
CYANOKEM	12381 SCHAEFER HWY	DETROIT	MI	48227	30,865,000	34	20,370,900
DUPONT E I DE NEMOURS, CHAMBER WORKS	ROUTE 130	DEEPWATER	NJ	08023	14,600,000,000	78	9,212,000,000
DYNEDOL INC	6520 GEORGIA	DETROIT	MI	48211	36,320,000	49.64	18,290,792
EDWARDS OIL CO	530 S ROUGE	DETROIT	MI	48217	21,800,000	80	4,320,000
ELI LILLY & CO TIPPECANOE LABS	1650 LILY RD.	LAFAYETTE	IN	47902	*		
EMPAK INC. DEER PARK	2759 BATTLEGROUND RD.	DEER PARK	TX	77536	316,411,200	35.01	205,635,039

* Facility did [illegible] provide capacity information. Considered in total incineration estimation

NAME	STREET	CITY	STATE	ZIP	MAX. CAPACITY (GAL)	% USED (1989)	AMT. AVAILABLE (GAL)
ENCYCLE/TEXAS INC.	5500 UP RIVER ROAD	CORPUS CHRISTI	TX	78407	120,500,000	29.55	84,892,250
ENVIRITE CORP	16435 S CENTRAL AVE	HARVEY	IL	60426	10,820,200	66.69	3,516,949
ENVIRITE CORP	2050 CENTRAL AVE S.E	CANTON	OH	44707	63,982,500	43.66	35,908,546
ENVIRITE CORPORATION	198 OLD WATERBURY RD	THOMASTON	CT	06787	53,500,000	29.61	37,651,650
ENVIRONMENTAL WASTE CONTROL INC	1600 PENNSYLVANIA AVE	YORK	PA	17404	30,000,000	79	6,300,000
ETICAM	27140 PRINCETON AV	WINSTER	MI	48141	60,000,000	30	42,000,000
ETICAM	2095 E NEWLANDS DR	FERNLEY	NV	89408	750,400	13.81	646,770
F&H SHIP SERVICE	25 GRAYSTONE STREET	WARWICK	RI	02886	6,000,000	42	3,480,000
HERITAGE ENVIRONMENTAL SERVICES INC	220 CHINA BASIN ST	SAN FRANCISCO	CA	94107	*		
INCO ALLOYS INTERNATIONAL INC.	3132 POMPANO ST	CHARLOTTE	NC	28216	7,500,000	72	2,100,000
INTERCONTINENTAL TERMINALS CO	3200 RIVERSIDE DRIVE	HUNTINGTON	WV	25720	*		
JOHN DEERE--COMPONENT WORKS	943 BATTLEGROUND RD.	DEER PARK	TX	77536	100,000,000	17	83,000,000
MAYTAG CO	400 WESTFIELD AVE	WATERLOO	IA	50701	43,212,440	63	15,988,603
METRO RECOVERY SYSTEMS	N 19TH AVE, E. 8TH ST. N	NEWTON	IA	50208	390,000,000	73	105,300,000
MILL SERVICE INC.	2430 ROSE PLACE	ROSEVILLE	MN	55113	15,130,000	50	7,565,000
MILL SERVICE INC. YUKON PLT.	BULGER SMITH TWP,	BULGER	PA	15019	74,200,258	56.7	32,126,712
MORRIS INDUSTRIES INC	RD. NO. 1 CEMETARY LANE	YUKON	PA	15698	164,000,000	44	91,840,000
NORTH WEST ENVIROSERVICE INC.	3215 SO BOYLE AVE	LOS ANGELES	CA	90058	477,791,120	45.09	262,355,104
OIL PROCESS CO	1500 AIRPORT WAY S.	SEATTLE	WA	98134	35,640,000	62.24	13,457,884
OSCO INCORPORATED	5756 ALBA ST.	LOS ANGELES	CA	90058	1,894,333	80.63	368,144
PEARL HBR NAVY PUBLIC WORKS CTR	408 SANTA FE PIKE BOX 1203	COLUMBIA	TN	38402	*		
PEORIA DISPOSAL CO--POTTSTOWN	NAVAL STATION AREA	PEARL HARBOR	HI	96860	*		
PETROLEUM RECLAIMING SERVICE INC.	4349 SOUTHPORT RD.	PEORIA	IL	61604	50,000,000	40.75	25,625,000
PRATT & WHITNEY AIRCRAFT GROUP MD & CPD	3003 TAYLOR WAY	TACOMA	WA	98421	15,750,000	11	14,017,500
REMTECH ENVIRONMENTAL GROUP	400 MAIN ST	EAST HARTFORD	CT	06108	1,760,666,673	25.45	1,312,576,466
ROMIC CHEM CORP	1600 CARMAN ST.	CAMDEN	NJ	08105	*		
ROSS INDUSTRIES CORPORATION	2081 BAY RD	E PALO ALTO	CA	94303	4,963,377	59	2,043,166
SOLVENT SERVICE CO INC	3600 35TH AVE N.	BIRMINGHAM	AL	35207	540,000,000	33	367,160,000
SOUTHERN CALIFORNIA CHEMICAL CO INC	1021 BERRYESSA RD	SAN JOSE	CA	95133	*		
TEKTRONIX INC.	3651 DICE RD.	SANTA FE SPRINGS	CA	90670	21,360,000	59.77	8,569,105
TN EASTMAN DIV EASTMAN KODAK	13700 SW KARL BRAUN DR.	BEAVERTON	OR	97077	407,768,113	13.27	353,674,631
TREATMENT ONE, DIV. OF SET ENVIRONMENTAL INC	EASTMAN RD	KINGSPORT	TN	37662	8,710,227	88	1,045,227
TRICIL ENVIRONMENTAL SERVICES INC	5738 CHESWOOD	HOUSTON	TX	77087	2,000,000	2	1,960,000
UNION CARBIDE AGR PROD CO INC	3640 ANTIOCH PIKE	NASHVILLE	TN	37013	69,712,000	9	61,637,920
	RTE. 25	INSTITUTE	WV	25112	2,102,000,000	57	903,860,000

* Facility did not supply capacity information. Scaled-up total incorporates estimation.

FACILITY CAPACITY FOR HAZARDOUS WASTE (4/19/99)

NAME	STREET	CITY	STATE	ZIP	MAX. CAPACITY (GAL)	% USED (1989)	AMT. AVAILABLE (GAL)
UNITED OIL RECOVERY INC.	136 GRACEY AVE.	MERIDEN	CT	06450	13,140,000	50	6,570,000
US POLLUTION CONTROL INC	5 MI. E. US 281 & 1 MI. N. OK. 15	WAYNOKA	OK	73860	6,000,000	50	3,000,000
ENVIRONMENTAL WASTE RESOURCES, INC.	130 FREIGHT ST	WATERBURY	CT	06702	38,535,860	78	8,477,889
HERITAGE ENVIRONMENTAL SERVICES INC	7901 W MORRIS	INDIANAPOLIS	IN	46231	299,290,000	30.02	209,443,142
RESEARCH OIL CO	2655 TRANSPORT RD	CLEVELAND	OH	44115	88,300,000	49	44,013,000
WASTE CONVERSION INC	2669 SANDSTONE DR	HATFIELD	PA	19440	85,985,567	60	7,197,117
					TOTAL		9,609,811,000
					AVERAGE VALUES:		
					337,065,354	46	149,224,799
					SCALE-UP TOTALS		11,941,094,759
							(65 to 76)

WASTEWATER TREATMENT SYSTEMS DATA FROM THE 1991 BIENNIAL REPORTING SYSTEM

EPA ID NUMBER	A INF QUANTITY GAL FROM BRS DATA	B MAX OPP CAP GAL FROM BRS DATA	C MAX OPP CAP GAL FROM OW SURVEY	D LIQ EFF QUAN GAL FROM BRS DATA	E NEW OPP CAPACITY FROM BRS DATA	F DIFFERENCE IN OPP CAP C-B	G AMOUNT AVAILABLE B-A
CAD050806850	1,106,843	13,250,000	1,894,333	1,082,109	0	-11,355,667	12,143,158
CAD059494310	2,281,976	27,000,000	0	2,280,000	0	-27,000,000	24,718,024
CAT080033681	4,762,512	1,207,824,000	0	4,078,584	0	-1,207,824,000	1,203,061,488
CTD000844399	360,768,560	2,283,660,000	1,760,668,673	414,810,000	0	-522,991,327	1,922,891,440
CTD001184894	574,131	1,370,500	2,375,000	571,370	0	1,004,500	796,369
CTD072138969	11,185,574	28,632,648	38,535,860	9,307,911	0	9,903,212	17,447,074
CTD990672081	60,067,991	777,777,310	1,760,668,673	60,882,904	0	982,891,363	717,709,319
ILD000666206	16,231,493	30,398,036	106,202,000	8,381,001	0	75,803,964	14,166,543
ILD064418353	1,793,987	6,240,000	14,000,000	1,704,941	0	7,760,000	4,446,013
IND006050967	2,772,124,412	50,677,025	0	2,979,115,244	0	-50,677,025	-2,721,447,387
IND093219012	53,475,694	150,804,016	299,290,000	45,735,915	0	148,485,984	97,328,322
MDD980555189	1,662,231	50,360,000	44,100,000	3,925,928	0	-6,260,000	48,697,769
MND981098478	4,597,350	8,417,487	15,130,000	2,783,240	0	6,712,513	3,820,137
NCD121700777	1,901,489	7,008,000	75,000,000	1,711,340	0	67,992,000	5,106,511
NED043534635	6,678,629	53,191,794	243,992	6,669,144	0	-52,947,802	46,513,165
NJD002141950	655,428	4,000,000	54,000,000	198,676	0	50,000,000	3,344,572
NJD002385730	10,347,456,240	14,064,054,720	14,600,000,000	10,522,748,640	0	535,945,280	3,716,598,480
NJD089216790	48,923,122	163,112,860	52,560,000	49,675,058	0	-110,552,860	114,189,738
NVD980895338	641,903	5,057,200	750,400	428,907	0	-4,306,800	4,415,297
NYD000691949	11,222,398	0	7,800,000	11,196,084	0	7,800,000	-11,222,398
NYD080336241	25,079,632	240,920,000	0	24,503,779	240,000	-240,920,000	215,840,368
OHD000724153	29,714,577	75,000,000	63,000,000	37,446,700	0	-12,000,000	45,285,423
OHD004178612	16,642,080	98,160,000	86,300,000	13,286,400	94,500,000	-11,860,000	81,517,920
OHD087433744	0	0	23,400,000	0	1,200,000	23,400,000	0
OKD007233836	570,943,381	354,285,248	720,000,000	557,166,418	0	365,714,752	-216,658,133
ORD009020231	185,493,828	728,763,458	407,788,113	577,768,882	28,902,728	-320,975,345	543,269,630
ORD980725592	39,115,200	76,867,000	407,788,113	38,985,200	0	330,921,113	37,751,800
PAD010154045	17,186,856	27,000,000	30,000,000	12,783,720	66,000,000	3,000,000	9,813,144
PAD059087072	26,770,000	981,120,000	74,200,258	53,472,500	220,544,853	-906,919,742	954,350,000
PAD085690592	1,483,895	434,280	35,985,587	127,569,600	0	35,551,307	-1,049,615
RID980906986	1,416,960	3,961,224	6,000,000	1,733,520	0	2,038,776	2,544,264
TND003376928	7,835,470,800	8,400,000,000	8,710,227	7,835,470,800	0	-8,391,289,773	564,529,200
WAD041337130	282,837,630	366,313,416	37,193,500	282,401,819	0	-329,119,916	83,475,786
WVD004325353	1,743,953,866	2,188,298,888	2,102,000,000	2,537,140,000	0	-86,298,888	444,345,022
WVD076826015	223,468,565	93,013,402	0	217,813,732	0	-93,013,402	-130,455,164
TOTAL	24,707,689,233	32,566,972,513	22,835,584,729	26,444,830,066	411,387,581	-9,731,387,784	7,859,283,279

Y44F-50003.C

APPENDIX C

DATA ON CURRENTLY AVAILABLE STABILIZATION CAPACITY

This appendix has three sections:

C-1: Describes the information the Agency collected from selected treaters on available stabilization capacity for Phase IV mineral processing and TC metal wastes. It includes an overview of the Agency's approach, summarizes the results, and provides phone logs.

C-2: Discusses available capacities for metal waste stabilization and metal recovery for meeting the Phase IV TC metal and mineral processing waste LDR standards.

C-3: Provides a phone log of calls to TSDs who stabilize D008 and other TC-metal hazardous wastes.

Appendix C-1

ANALYSIS OF AVAILABLE STABILIZATION CAPACITY FOR PHASE IV WASTES

This appendix describes the information the Agency collected from selected treaters on available stabilization capacity for Phase IV mineral processing and TC metal wastes. The appendix is divided into three parts. Section 1.0 provides an overview of the Agency's approach, Section 1.2 summarizes the results, and Section 1.3 provides phone logs.

1.0 Approach

The Agency's approach for evaluating available stabilization capacity for Phase IV TC metal and mineral processing wastes involved six main steps:

1. Develop interview guide;
2. Identify interviewees (e.g., commenters);
3. Conduct preliminary interviews for a few interviewees;
4. Modify interview guide to address problem areas identified in conducting preliminary interviews;
5. Finish interviews; and
6. Incorporate other information and conduct follow-up activities.

In Steps 1 and 2, EPA developed a preliminary interview guide and identified several commercial treaters and organizations who submitted comments to the proposed Phase IV rule.[1] Also, some treaters were identified from BRS data reviews[2] and previous interviews.[3] In Step 3, EPA conducted a few preliminary interviews and, based on the results, refined the draft interview guide to clarify questions and target key areas. The final phone interview guide used questions such as the following (individually tailored somewhat depending on data supplied previously):

1. How much waste do you treat? How much of this waste is hazardous, as defined under RCRA (i.e., RCRA Subtitle C wastes)? How much of the waste that your facility receives is non-hazardous, as defined under RCRA (i.e., RCRA Subtitle D wastes)? How much treatment capacity is commercial and how much is captive (i.e., your own company's)? Do you treat Phase IV mineral processing and TC metal wastes? If not, do you plan to treat these

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[1]These treaters were interviewed as follow-up to comments and thus did not count toward the limited number of non-federal employees who can be contacted pursuant to the Paperwork Reduction Act.

[2]Raghuvan, Raghu, and Jim Laurenson, Memorandum to Bill Kline and C. Pan Lee: Status Report on the Available Capacity Assessment for TC Metal and Mineral Processing Wastes. ICF Inc., June 1996.

[3]Schwartz, Stephan. Memorandum to Stan Moore and Suzanne Wade: Phone Calls to TSDs Who Stabilize D008 and Other TC-metal Hazardous Wastes. Versar Inc., May 1996.

wastes in the future?

2. Approximately what percentage of the Phase IV wastes that you treat are treated on site at your facility and what percentage is treated off site at the generator's facility (e.g., large volumes of mineral processing wastes)? What percentage of the wastes that you accept for treatment is part of a treatment train that began on a generator's facility (e.g., combustion at generator's site followed by stabilization of residuals at your facility site)?

3. What quantity (T/yr) of these Phase IV wastes can be treated to proposed UTS off site or at your facility at the present time and what quantity cannot? What quantity (T/yr) of these Phase IV wastes can be treated to UTS off site or at your facility in the future *(please specify time period (e.g., within one year))*?

4. Would there be any problems treating to individual standards? Would there be any problems when constituents are in a mixed constituent Phase IV waste stream (e.g., mixed metals)? With organic UHCs? Why? What waste streams *(please specify waste codes)*, if any, do you expect will cause you to make modifications in your treatment processes? What quantity (T/yr) of the total Phase IV wastes that you treat do these wastestreams comprise?

5. How extensive and difficult to implement would the modifications to your treatment processes be? How much time would be necessary for modifications to your treatment processes?

6. How much of which kind of <u>additional</u> Phase IV wastes (e.g., one of the wastes that may be problematic) can your facility treat? When?

7. Can you provide data to support any of the above answers?

EPA then conducted follow-up activities to fill in data gaps. To assess difficulties in meeting concentration levels, for example, EPA asked the contacts about the feasibility of meeting several hypothetical values.

Questions were faxed when requested, and follow-up calls were made through January 13, 1997.

1.2 Results

Exhibit 1 summarizes several observations that can be made from the results of this data gathering effort. These results are discussed in more detail below:

<u>Overall treatment capacity</u>

- All facilities treat TC metal or de-Bevilled mineral processing wastes.

- Ten facilities-Environmental Enterprises, Environmental Quality, EnviroSafe, GNI, Heritage Environmental Services, PDC, Rollins, and both of the CWM facilities-conduct 100 percent of the treatment on site at their facility. One facility, Environmental Technologies, Inc., conducts about half of its treatment off site.

- Current treatment at facilities ranges from 15,000 tons/year to 300,000 tons/year.

- Current available capacity of facilities ranges from 140,000 tons/year to 1,159,000 tons/year.

Modifications to treatment processes

- All but the smallest two[4] treaters interviewed-both of the Chemical Waste Management (CWM) facilities, Environmental Quality, Environmental Technologies, Inc., EnviroSafe, GNI, LWD Inc., PDC, and Rollins Environmental Services-commented that no modifications would need to be made to their treatment processes or minimal time (e.g., four weeks) is required for very minor modifications. Environmental Enterprises and Heritage Environmental Services noted that it may take two to five years, primarily due to changing their permits.

- Most facilities commented that the exact time needed and difficulty to implement changes in treatment processes will vary depending on the degree of changes.

- Both of the CWM facilities noted that it would cost approximately $1,000 per waste stream to develop new treatment recipes.

Additional treatment needed

- Both of the Chemical Waste Management (CWM) facilities, Environmental Enterprises, GNI, and Heritage Environmental Services gave a range of 20 to 100 percent of their TC metal waste streams that have constituents above TC or UTS levels that require additional treatment.

- Heritage Environmental Services and GNI noted that meeting the original proposed standard for cadmium would require treatment modification because it is difficult to stabilize it in a mixed constituent waste stream.

- Heritage Environmental Services and CWM in Carlyss, LA indicated that

[4] In terms of known or estimated utilized or available capacity.

meeting the original proposed standard for lead would require treatment modification because it is difficult to stabilize it in a mixed constituent waste stream and leaching rates vary depending on pH.

- GNI, Rollins Environmental Services, and CWM in Carlyss, LA indicated that meeting the original proposed standard for selenium would require treatment modifications because it is hard to stabilize it in a mixed constituent waste stream and leaching rates vary depending on pH.

- Heritage Environmental Services, Rollins Environmental Services and CWM in Carlyss, LA indicated that meeting the original proposed standard for chromium would require treatment modifications because it is hard to stabilize it in a mixed constituent waste stream and leaching rates vary depending on pH.

- Three facilities noted that treating organic UHCs would require treatment modifications. Heritage Environmental Services will incinerate those waste streams while Environmental Enterprises and PDC will send it to another facility for treatment. Two facilities-Environmental Quality and LWD Inc.-specifically stated that organic UHCs can be readily treated to UTS.

EXHIBIT 1
SUMMARY OF PHONE LOG RESULTS

							Additional Treatment Needed for:							
	Degree of Difficulty		Maximum Pratical Capacity				Individual Standards							
Treater	Time	Cost	On site	Off site	Utilized Capacity	Need for Other Treatment	Cd	Pb	Se	Cr	As	Ni	Mixed Constituents	Organic UHCs
Chemical Waste Management Carlyss, LA	Minimal	Initial $1000/ waste stream; additional $5-20/ton	200,000 gal/dy (234,000 tons/yr[a])			75% incinerated to meet organic LDRs		X	X	X			X	X
Chemical Waste Management Oakbrook, IL	6 mths	Initial $1000/ waste stream				Incineration of organics		X	X	X			X	
Environmental Enterprises	3-5 yrs(due to permit modifications)				15,000 tons/yr	Incineration of organics								X
Environmental Quality, Inc. Detroit, MI	Minimal		360,000-450,000 tons/yr		300,000 tons/yr									
Envrionmental Technologies, Inc. King of Prussia, PA	4 wks		70,000 tons/yr	70,000 tons/yr		Low-level radioactive/TC metal wastes								
EnviroSafe	Minimal		150,000-200,000 tons/yr		Ohio: 1,000 tons/dy (260,000 tons/yr[a]) Idaho: 100,000 tons/yr	Organic UHCs								X
GNI (Disposal Systems) Deer Park, TX	Minimal		1,159,000 tons/yr		333,000 wet tons of liquid wastes/yr 2,400 tons of solids/yr		X		X		X		X	
Heritage Envrionmental Services Indianapolis, IN	2 yrs				29,800 tons/yr[b]	Incineration of organic UHCs	X	X		X		X	X	X
LWD Inc. Calvert City, KY	Minimal				38,962 tons in 1995								X	
PDC Peoria, IL	Minimal				41,557 tons/yr[b]	Prior treatment of organic UHCs								X
Rollins Environmental Services Deer Trail, CO	Minimal		200,000 tons/yr		100,000-125,000 tons/yr	Send selenium-bearing wastes off site			X	X				
aEPA estimate														
bFrom 1993 BRS. See Attachment A-1														

1.3 Phone Logs

Mr. Chuck Grant
Environmental Manager
Chemical Waste Management
Location: Carlyss, LA
Phone: 318-583-3774
Fax: 318-583-4615
Interview conducted by: Gillian Foster
Date of interview: August 23, 1996

Mr. Grant responded that their facility does treat Phase IV wastes, and plans on continuing treatment in the future. Approximately 25 percent of the wastes are treated to LDR standards, while 75 percent of the wastes are incinerated to meet organic LDRs, but need metals stabilization. Approximately 200,000 gallons/day of waste can be treated to UTS on site at the facility. Their facility will need to implement modifications to the types and quantities of reagents needed to treat various waste types in their stabilization facility. The time needed to modify recipes for treatment should be minimal. They estimate that it will cost approximately $1000 per waste stream to develop new recipes. It is also estimated to increase treatment costs from $5 to $20 per ton. Approximately 20 to 30 percent of TC metal only waste streams have constituent concentrations above TC or UTS levels that would require additional or modified treatment. For these waste streams, meeting individual standards for selenium, chromium, and lead are going to be problematic. They recommend that the limit be set at 3.0 ppm TCLP for all three metals. They will not be able to treat TC metal-only wastes with organic UHCs because of Subpart CC.

Mr. Mitch Hahn
Chemical Waste Management
Location: Oakbrook, IL
Phone: 630-572-8800
Interview conducted by: Gail Shaw
Date of interview: September 10, 1996
Date of follow-up interview: January 2, 1997

Mr. Hahn responded that only hazardous waste is received for treatment at their facility, and Phase IV wastes are treated. Treatment is 100 percent on site. They have fixed stabilization tanks at their landfills. The quantity of Phase IV wastes that can be treated to UTS depends on the treatment method. Approximately 70 to 80 percent of the wastes can meet the lower UTS levels for metals, while 20 to 30 percent will require development of new treatment recipes (e.g., different ratios of stabilization agents). Of these 20-30%, 5-10% can not meet the lower standards and will not be accepted by this

facility. Applying UHC standards will increase the metal bearing waste streams going to incinerators (i.e., for organics), but there is ample capacity. There will be problems treating some of the wastes to individual standards. Difficulties with a mixed constituent waste stream depend on the metals, which have different stabilization levels and varying rates of leaching depending on pH. The facility does not know exactly what the impact of organic UHC will be on metal bearing waste streams because those waste streams have never needed to be identified. There will be no modifications made to the physical treatment process. However, all of the waste codes with lowered treatment levels will need to have thier treatment recipies looked at to determine if any modifications need made. The difficulty of implementing modifications will vary depending on the difficulty of changes. First, a bench-scale test will be performed in the lab (requiring several days), then at the production level. It could take approximately 6 months to implement recipe modifications depending on when the facility receives the waste streams. The estimated cost is $1000/profile to re-evaluate and develop a new recipe. Refer to the comments on the proposed rule submitted to EPA for supportive data.

In a follow-up call, Mr. Hahn said that they will not have to change any of their actual physical processes. The lower the standards are, the more difficult it will be to modify the recipes. He noted that meeting the hypothetical UTS levels for barium (D005), chromium (D007), lead (D008), selenium (D010), antimony, nickel, thallium, and vanadium would be easier than what was proposed in the August 1995 proposed rule. Only minor modifications to the treatment recipes, requiring several weeks, may be needed. The facility is working on new data.

Mr. Gary Davis
Vice President
Environmental Enterprises
Phone: 513-541-1823
Fax: 513-541-1638
Interview conducted by: Gail Shaw
Date of interview: September 23, 1996
Date of follow-up interview: January 7, 1997

Mr. Davis responded that their facility treats approximately 15,000 tons/year. Approximately 50 percent is hazardous, while the other 50 percent is non-hazardous. He noted that 100 percent of treatment capacity is commercial. They treat Phase IV wastes; 100 percent are treated on site at the facility, and no wastes are part of a treatment train. Less than 50 percent of these Phase IV wastes can be treated to UTS at the present time. In the future, Mr. Davis estimated it could take three to five years to be able to treat to UTS (primarily because the permit would need to be changed). He noted that generally there would be no problems treating to individual standards. Treating a mixed constituent waste stream that has no organic UHCs is not problematic; however, treating a mixed constituent waste stream with organics will be difficult. They will need to be

sent off site to an incinerator. Mr. Davis could not estimate what modifications, if any, would need to be made to treatment processes. He estimated it could take several years, primarily due to changing the permit for part B. The facility can accept very little or no additional Phase IV wastes because they are currently close to capacity. The facility can provide supporting data if requested.

In a follow-up call, Mr. Davis noted that meeting the hypothetical UTS levels for barium (D005), chromium (D007), and lead (D008) would require modifications to both the treatment process and the treatment recipes. Each constituent would require six months to one year to implement the changes. Meeting the UTS levels for antimony and vanadium would need modifications to their treatment recipes, requiring one year to implement. The proposed UTS level for cadmium (D006) could not be met by the facility. Those waste streams would have to be sent off site for treatment. Mr. Davis noted that a UTS level of 0.20 mg/L for cadmium would not be achievable; however, a UTS level of 0.50 mg/L could be met.

Mr. Scott Maris
Technical Manager
Environmental Quality
Location: Detroit, MI
Phone: 313-699-6230
Fax: 313-699-3499
Interview conducted by: Gail Shaw
Date of interview: September 17, 1996
Date of follow-up interview: January 8, 1997

Mr. Maris responded that their facility treats 300,000 tons/year. Approximately 50 percent is hazardous, while the other 50 percent is non-hazardous. He noted that 100 percent of the treatment capacity is commercial. They do treat Phase IV waste; 100 percent of what is received on site is treated, and no percentage of the wastes are part of a treatment train. All of the Phase IV wastes can be treated to UTS at the present time and the same is expected in the future. The facility expects no problems treating to individual standards or a mixed constituent waste stream. Also, there will be no problems treating organic UHCs; their facility uses the process of chemical oxidation, with bleach being a common oxident. No modifications will need made to the treatment process. The facility can accept another 20-50 percent of additional Phase IV wastes, increasing available capacity to 360,000-450,000 tons/year.

In meeting the hypothetical UTS levels, Mr. Maris confirmed in a follow-up call that the facility would have no difficulties. The levels are all the same or higher than the UTS levels they are currently meeting.

Mr. Joseph DeSipio and Mr. Rick Valiga
Principal
Environmental Technologies, Inc.
Location: King of Prussia, PA
Phone: 610-354-9050
Fax: 610-354-9851
Interview conducted by: Gillian Foster and Gail Shaw
Date of interview: August 27, 1996
Date of follow-up interview: January 2, 1997

Mr. DeSipio responded that the facility treats 65 percent de-Bevilled wastes and 25 percent TC metals. They also treat a small amount of biological wastes. The facility uses a three-phase treatment system consisting of physical sizing, chemical leaching with acids and reagents, and liquids processing. They extract metals out of the aqueous waste stream into usable concentrations that are sent to industrial processing facilities. The wastewater is neutralized and discharged into the sewer. Solid waste residue is then returned to the soil. In general, approximately 50 percent of the wastes treated are treated off site and 50 percent are treated on site. The interviewee believed that the percentage of wastes accepted at the facility that is part of a treatment train begun at the generator 's facility is low. The interviewee estimated that the facility could provide 70,000 tons annually of off site capacity and 70,000 tons annually of on site capacity for typical metal wastes. The only problematic waste stream is TC metal wastes that are also low-level radioactive wastes. The facility does not currently treat these wastes. However, Mr. DeSipio indicated that the facility is planning to treat them in the future. The plant would need 4 weeks to be retrofitted to accept low-level radioactive/TC metal wastes. The de-watering systems for the soils that pass through would need to be expanded to handle incresed quantities. The facility can accept almost no additional Phase IV wastes. They expect all individual standards to be met.

In a follow-up call, Mr. Valiga said that the facility would have no difficulties meeting the hypothetical UTS levels. He noted in particular that antimony, beryllium, nickel, thallium, vanadium, and zinc would create no treatment difficulties because they are easily soluble.

Mr. Rod Bartchy
Vice President of Public Affairs
EnviroSafe
Phone: 1-800-523-0781, ext. 5470
Fax: 215-956-5438
Interview conducted by: Gail Shaw
Date of interview: September 25, 1996
Date of follow-up interview: January 13, 1997

Mr. Bartchy commented that their facility in Ohio treats 1,000 tons/day of primarily hazardous waste, depending on the level of business. 20,000 tons/year of capacity is available for Phase IV wastes. The facility in Idaho has the design capacity to treat up to 110,000 tons/year of primarily hazardous waste. The facility usually treats less than 50,000 tons/year in terms of actual receipts. 40,000 tons/year of capacity is available for Phase IV wastes. He noted that 100 percent of treatment capacity is commercial. They do treat Phase IV TC metal wastes; 100 percent of Phase IV wastes are treated on site at the facility, and a minority of wastes may be part of a treatment train. Most of these Phase IV wastes meet the UTS at the present time, and would not be a problem in the future. There would be no problems treating to individual standards or treating a mixed constituent waste stream. However, the facility can not treat organic UHCs. No modifications will need made to the treatment process except perhaps minor additive changes. Mr. Bartchy estimated the facilities could currently accept another 150,000 - 200,000 tons of additional Phase IV wastes. The facility can provide supporting data if requested.

In a follow-up call, Mr. Bartchy said that the facility would have no difficulties meeting the hypothetical UTS levels.

Mr. Warren Norris
Sales Manager
GNI (Disposal Systems)
Location: Deer Park, TX
Phone: 713-930-0350
Fax: 713-930-2511
Interview conducted by: Gillian Foster
Date of interview: August 21, 1996
Date of follow-up interview: Left messages January 2 and January 8, 1997

Mr. Norris responded that their facility treats mineral processing wastes and wastes that fail the TC metals only. The facility does not conduct off site treatment, only on site at the facility. None of the wastes are pretreated before reaching the site. The facility accepts liquid wastes that undergo oil removal (reclaimed for heat value), dewatering, and filtration. The liquid phase is deep well injected. The facility holds a

no-migration petition variance. The solid phase is stabilized on site or shipped off site for incineration. The facility manages 333,000 wet tons of liquid wastes before treatment per year. The facility has a capacity of 1,159,000 tons per year. The facility also manages 2,400 tons of solids per year. All volumes are approximate. None of the waste streams will cause the facility to make modifications in their treatment process. Approximately 50-75 percent of TC metal waste streams have constituent concentrations above TC or UTS levels. Mr. Norris expects that all TC and UTS standards will be able to be met for the TC metal waste streams. He noted that cadmium stabilization is difficult, although not impossible. Selenium does not stabilize well, and arsenic is very soluble and leaches readily. The facility handles arsenic by mixing the waste with aqueous wastes or water and then deep wells the arsenic containing liquid phase.

Mr. Terry Farrell
Heritage Environmental Services
Location: Indianapolis, IN
Phone: 317-486-2726
Fax: 317-249-2046
Interview conducted by: Gillian Foster
Date of interview: August 20, 1996
Date of follow-up interview: Left message January 8

Mr. Farrell responded that their facility does not treat a significant volume of de-Bevilled wastes, if at all, and they do not accept TC organic waste streams. Approximately 60 percent of the wastes they stabilize are generated by their on site treatment facility. This facility treats plating wastes, acids, and caustic liquid wastes through metals precipitation and treatment. The treated wastewater is then filtered in a filter press that generates a liquid, which is discharged to a sewer, and a filter cake, which is stabilized and disposed in a landfill. About 40 percent of their waste stream is filter cake that arrives from off site for stabilization and disposal. In order to meet the UTS for underlying organics, the facility has two options: 1) pre-screen waste materials against organics and refuse those waste streams; 2) undergo a "significant facility expansion" by adding a treatment process to the treatment train that will address organics (e.g., chemical oxidation, or thermal treatment). The second option could take two years for the permit modification approval process, engineering, and construction. The time period would depend upon the type of permit modification that is required (e.g., Class I, II, or III). Almost 100 percent of the TC metal waste streams have constituent concentrations above TC or UTS levels that would require additional or modified treatment. Metals with organic UHCs are problematic at this facility. Their process is geared towards handling characteristic metals only. At the least, additional analytical expense would incur. Mr. Farrell believes that Phase IV would force waste streams to incineration because many waste metal waste streams would need to be incinerated for the organic UHCs. In a mixed constituent waste stream, nickel is the hardest constituent to stabilize. Lead, chromium, and cadmium follow nickel in stabilization difficulty.

Cyanides present in the filter cake received from off site could require oxidation or chlorinating to meet the UTS.

Ms. Kim Knotts
Environmental Coordinator
LWD Inc.
Location: Calvert City, KY
Phone: 502-395-8313
Fax: 502-395-8153
Interview conducted by: Gail Shaw
Date of interview: September 17, 1996
Date of follow-up interview: January 2, 1997

Ms. Knotts responded that in 1995, their facility treated 35,320 tons of hazardous waste through incineration. Another 10 percent was non-hazardous. Additionally, 3,642 tons of hazardous waste and non-hazardous waste was treated through chemical stabilization (35 percent being non-hazardous). She noted that 99 percent of the treatment capacity is commercial. The facility does treat Phase IV waste; 100 percent can be treated to UTS at the present time and the same is expected in the future. The facility expects no problems treating to individual standards. There will be also be no problem treating organic UHCs; the facility will vary their stabilization process, using different chemicals to drive off the organics. Treatment problems may occur with mixed metals. No modifications will need to be made to the treatment process, except minor changes in stabilization processes for mixed metals. A few weeks will be necessary for these minor modifications.

In a follow-up call, Ms. Knotts noted that the facility has not tried to meet levels as restrictive as the hypothetical UTS levels.

Mr. Mark Rein
Assistant VP of Environmental Affairs
PDC
Location: Peoria, IL
Phone: 309-688-0760
Fax: 309-688-6801
Interview conducted by: Gail Shaw
Date of interview: September 17, 1996
Date of follow-up interview: January 2, 1997

Mr. Rein responded that the facility receives only hazardous waste for treatment.

Phase IV wastes (30-40 percent of the waste stream) are treated; 100 percent of wastes received on site are treated. Approximately 30-40 percent of the waste stream is part of a treatment train. He noted that 90 percent of Phase IV wastes can be treated to UTS at the present time and the same is expected in the future. No problems are expected in treating to individual standards or a mixed constituent waste stream. There will be a problem with organic UHCs. Their facility does not have the capability to treat UHCs. They are treated off site at another facility prior to being received at this facility. No modifications will be made to the treatment process. Refer to the comments on the August 1995 proposed rule submitted to EPA for supporting data.

In meeting the hypothetical UTS levels, Mr. Rein commented that the facility would have no difficulties except with lead (D008). For this constituent, the treatment recipes would need to be modified, requiring approximately one month.

Mr. Richard Grondin
Technical Manager
Rollins Environmental Services
Location: Deer Trail, CO
Phone: 970-386-2293
Fax: 970-386-2262
Interview conducted by : Gillian Foster
Date of interview: August 21, 1996
Date of follow-up interview: January 10, 1997

Mr. Grondin responded that 1 percent of their facilities' total waste stream is de-Bevilled wastes. Approximately 50 percent of the total waste stream is TC for metals only wastes. The facility does not conduct off site treatment, only on site at the facility. Twenty percent of its solid waste stream is comprised of incinerator residuals received from off site. Rollins provides stabilization, chemical precipitation, chemical reduction, chemical oxidation, and on site disposal in a Subtitle C landfill. The facility presently receives approximately 100,000 tons to 125,000 tons per year of waste that can be treated to UTS. The total capacity at the facility is approximately 200,000 tons per year. Approximately 99 percent of the waste stream is solid waste and only 1 percent is liquid waste. Treating selenium (D010) through stabilization to UTS is impossible at this facility. They generally exclude waste streams with high concentrations of selenium—currently five to ten tons per year. D010 wastes comprise less than 1 percent of the total waste treated at the facility. The UTS level for selenium is unachievable due to several factors: 1) selenium is an emphoteric metal; it is leachable in many matrices at both low and high pHs; 2) selenium cannot be reduced or oxidized efficiently; 3) the optimum pH for selenium stabilization is between 6 and 7. However, at pH 6-7, all other TC metals will readily leach from the matrix at levels above the TCLP and UTS standards. As a result, many selenium bearing wastes are sent to Canada for disposal. Mr. Grondin believed that the Phase IV LDRs would result in more D010 waste shipped

to Canada for disposal. In treating chromium (D007), the facility will have to increase the amount of reagent used, thus increasing the cost. D007 wastes comprise 10 percent of the total waste stream. Generally though, no extensive modifications to the treatment processes will be necessary. Except for selenium, there should be no problem treating all other TC metal wastes and de-Bevilled wastes to UTS.

In meeting the hypothetical UTS levels, Mr. Grondin commented that the facility would have no difficulties except with selenium (D010), which could not be treated. For this constituent, he noted that a UTS level of 5.7 would be achievable.

In addition to phone conversations, a site visit to Deer Trail was conducted by Mr. Howard Finkel, Project Manager at ICF Incorporated, on August 20, 1996.

ICF
CONSULTING GROUP

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June 14, 1996

MEMORANDUM

To: Bill Kline and C. Pan Lee, EPA

From: Raghu Raghavan and Jim Laurenson

Subject: Status Report on the Available Capacity Assessment for TC Metal and Mineral Processing Wastes.

This memorandum addresses available capacities for metal waste stabilization and metal recovery for meeting the Phase IV TC metal and mineral processing waste LDR standards. We are currently conducting the following activities:

- We are combining and substantially updating the discussion of available commercial treatment capacity given in the background document for the capacity analyses supporting the proposed LDR rule.
- We have conducted a preliminary review of the biennial reporting system (BRS) for 1993 to identify commercial facilities providing metal waste stabilization and metal recovery capacities.
- We have compiled BRS information on the maximum operational capacity and utilized capacity for various treatment systems providing stabilization or metal recovery at these facilities.
- We have compared the BRS information with the results of the capacity analysis performed for the Third Third LDR rule (1990).
- We are in the process of contacting companies who are operating selected commercial facilities to improve our data and understanding of the available capacity for the wastes affected by the proposed rule.

The remainder of this memo presents our preliminary results of the BRS data review and our activities concerning the contacting of facilities.

A facility required to submit the BRS must complete a separate and independent Form PS for each on-site hazardous waste treatment, disposal, or recycling process system that was existing and operational, for which there were plans to build and start operations, or that was in the closure process. The information given in Form PS includes estimates of the maximum operational and actually used capacities for each system type available on site. After a preliminary review and comparison of data given in the Form PS in 1991 and 1993 BRS, we

decided to focus on the RCRA capacity related information and other data given in Form PS in 1993 BRS for the following metal recovery and stabilization systems:

- Metal Recovery Systems
  - M011 High temperature metals recovery
  - M012 Retorting
  - M013 Secondary Smelting
  - M014 Other metals recovery (e.g., ion exchange, reverse osmosis, acid leaching, etc.)
  - M019 Metals recovery - type unknown

- Stabilization
  - M111 Stabilization/Chemical fixation using cementitious and/or pozzolanic materials
  - M112 Other stabilization
  - M119 Stabilization - type unknown

By using the information given in Form PS to define the commercial capacity availability of each system, we were able to list separately the facilities having commercially available and non-commercial capacities for metal recovery and stabilization. The following lists are attached with this memo as an illustration of the preliminary results of maximum and utilized RCRA capacities that we obtained from use of Form PS in the 1993 BRS:

- Commercial stabilization systems and capacities;
- Non-commercial stabilization systems and capacities;
- Commercial metal recovery systems and capacities; and
- Non-commercial metal recovery systems and capacities.

The attached preliminary tables have been analyzed further by comparing their contents with information on the utilization of capacity given in other forms — Forms WR and GM — in the 1993 BRS. As mentioned before, the BRS information was compared with the results of the capacity analysis performed for the Third Third LDR rule.

Based on the analysis of 1993 BRS completed to-date, it seems that there are nearly 30 operational facilities providing commercial stabilization capacity. The utilized capacity for stabilization appears to be approximately 750,000 tons per year. The maximum operational capacity at these commercial facilities has yet to be confirmed. (For example, the attached table on commercial stabilization indicates that several facilities reported maximum capacities that far exceeded utilized capacities. These data must be confirmed through personal contacts of the facilities or by using other reliable sources of information.) However, it seems that the available stabilization capacity would be more than the previous estimate of 1 million tons per year. The 1993 BRS information also showed that additional stabilization capacity is utilized and available at nearly 60 non-commercial facilities. As for metal recovery, nearly 60 commercial facilities have reported the utilization of approximately 600,000 tons of capacity in 1993. Additional capacity for metal recovery is also being provided at nearly 120 non-commercial facilities. The maximum operational capacity at commercial metal recovery facilities must also be confirmed. (As with stabilization capacity, the attached table on commercial metal recovery shows large differences between maximum and utilized capacities.)

At present, we are trying to improve the data obtained from BRS on maximum operational and utilized capacities for commercial stabilization and metal recovery. It is necessary, however, to improve upon the quality of these numbers through a limited number of phone contacts of selected facilities. It is also necessary to obtain at least some qualitative information addressing the logistics and applicability of existing technologies to meet the UTS for newly identified mineral processing wastes and other TC metal wastes.

We have selected the following six companies to discuss the available capacity for metal waste stabilization:

1. Laidlaw Environmental Services,Inc.
2. Rollins Environmental Services
3. Chemical Waste Management
4. Peoria Disposal Company
5. Gibson Environmental
6. Republic Environmental Systems, Inc.

The first three companies operate commercial hazardous waste landfills in different states and commented on the proposed Phase IV LDR rule. Most of these landfills were reported in EPA's Commercial Treatment/Recovery Data Set (May 1990) and in the 1993 BRS to have stabilization capacity on site. The last three companies listed above were also reported in BRS to have large capacities for metal waste stabilization. All of these companies may be interested in providing available capacity on stabilization for some of the hazardous waste affected by Phase IV LDRs.

We have selected the following six companies to discuss the available capacity for metal recovery:

1. INMETCO, Inc.
2. Quemetco, Inc.
3. Revere Smelting and Refining Corp.
4. Recontek Inc.
5. ETICAM Process
6. Encycle Texas Inc.

INMETCO provided comments on the proposed Phase IV LDR rule. The next two companies showed high utilization of secondary smelting capacity at their facilities. The last three companies were selected due to the need for confirming that they are active in processing a wide range of metal-bearing hazardous wastes, as reported in the capacity analysis background document supporting the proposed rule. We are expecting to resolve some of the major discrepancies between maximum and utilized capacities shown in the attached table on commercial metal recovery systems (e.g., Phibro-Tech, Inc.) without contacting the facilities.

We are asking one or more of the following questions (depending on the information already provided or expected) after contacting the right person in each of these companies:

- What is the maximum capacity for stabilization and/or metal recovery installed at each of the facilities operated by the company? How was this capacity measured?

- When was the facility originally built? What kind of technology confirmation was required before designing, building, or starting operations at the facility?

- What is the current utilization of capacity at each facility? What percentage of capacity is utilized for commercial purposes? Are there any limitations in the use of commercial capacity? What is the non-commercial capacity used for?

- What are the types of capacities available? For example, is stabilization technology based on physical encapsulation or chemical fixation? As another example, what are the metals recovered from the wastes? Are there any technical limitations in the use of technology(ies) used at the facility?

- What types of industries/wastes are being provided with commercially available treatment capacity? Newly-identified mineral processing wastes? Other TC metals required to meet UTS?

- Will the company be interested in building and/or operating on-site metal waste stabilization or metal recovery facilities for selected new customers? Has the company considered or provided similar services in the past? What are the logistics and economic considerations in developing this additional capacity?

In addition to contacting these companies, we are in the process of contacting a few selected trade associations to confirm our new findings on the availability of commercial stabilization or metal recovery capacity, and the feasibility of building new waste treatment capacities on site. We also plan to discuss these topics with some technical specialists in metal waste stabilization or metal recovery. For example, we plan to contact one of the authors of the attached paper on chemical fixation, Gregory Indelicato, to discuss the applicability of new techniques in chemical fixation for hazardous waste treatment.

Please call Raghu Raghavan at 703-934-3417 or Jim Laurenson at 703-934-3648 if you have any questions on this memorandum.

Commercial Stabilization Systems and Capacities [1]
(Basis:1993BRS-Form PS)

Facility	Facility Name	System Code	Maximum RCRA Capacity	Utilized RCRA Capacity
COD991300484	HIGHWAY 36 LAND DEVELOPMENT CORP	M111	40,000,000	17,233
CAD980883177	GIBSON ENVIRONMENTAL	M111	1,752,000	47,231
ILD000805812	PEORIA DISPOSAL CO INC	M111	1,167,640	41,557
PAD085690592	REPUBLIC ENVIRONMENTAL SYSTEMS, INC.	M111	547,500	8,862
UTD991301748	USPCI - GRASSY MOUNTAIN FACILITY	M111	468,000	14,880
ALD000622464	CHEMICAL WASTE MANAGEMENT	M111	428,442	57,370
MID000724831	ENVOTECH MANAGEMENT SERVICES, INC	M111	385,804	142,132
IND093219012	HERITAGE ENVIRONMENTAL SERVICES, INC	M111	350,000	29,800
MID074259565	DYNECOL INCORPORATED	M112	224,648	27,243
PAD059087072	MILL SERVICE INC - BULGER	M111	175,000	-
GAD096629282	CWM RESOURCE MANAGEMENT INC	M112	132,919	423
PAD004835146	MILL SERVICE INC - YUKON	M111	130,088	9,558
KYD985073196	LWD SANITARY LANDFILL, INC.	M111	120,000	656
NYD049836679	CWM CHEMICAL SERVICES, INC.	M111	106,392	60,822
OKD065438376	U.S. POLL. CONTROL, INC.-LONE MOUNTAIN	M111	95,200	93,568
OHD045243706	ENVIROSAFE SERVICES OF OHIO INC	M111	80,000	56,500
OHD980568992	ENVIRITE CORPORATION	M112	75,000	41,056
MID096963194	CHEM-MET SERVICES INCORPORATED	M111	73,502	19,960
ILD010284248	CID RECYCLING & DISPOSAL FAC	M111	67,200	2,843
IDD073114654	ENVIROSAFE SERVICES OF IDAHO, INC	M111	52,000	10,920
IND078911146	CHEMICAL WASTE MANAGEMENT OF INDIANA INC	M111	50,700	34,197
PAD010154045	ENVIRITE CORPORATION	M112	50,000	32,267
CTD072138969	ENVIRONMENTAL WASTE RESOURCES INC	M111	40,000	1,323
OHD083377010	ENVIRONMENTAL ENTERPRISES INC	M111	25,200	16,200
OHD000816629	SPRING GROVE RESOURCE RECOVERY INC	M111	15,230	2,116
IND984874230	ROANOKE WASTEWATER TREATMENT PLANT	M111	14,900	7,450
CTD089631956	EAST COAST ENVIRONMENTAL SERVICES	M111	5,000	22
NVT330010000	US ECOLOGY INC	M111	670	40,810
OKD000402396	PERMA-FIX TREATMENT SERV., INC.	M111	107	21
OKD082708371	HUGO RAILCAR	M111	55	32
GAT000001971	GEORGIA DEPARTMENT OF TRANSPORTATION	M111	8	8
OKD007224702	BARTLETT-COLLINS GLASS CO.	M111	4	4
CAT080010101	APPROPRIATE TECHNOLOGIES 11, INC.	M111	-	4
CAT080033681	CHEM-TECH SYSTEMS, INC.	M111	-	-
ILD000608471	CLEAN HARBORS OF CHICAGO INC	M111	-	-
LAD000777201	CHEMICAL WASTE MANAGEMENT	M111	-	50,973
NED981117153	HOUSTON J-M CORPORATION	M111	-	-
OKD096648837	NORRIS SUCKER ROD	M111	-	1
CAD021774559	AMERICAN BRASS & IRON FOUNDRY	M111	-	273
	TOTAL QUANTITY FOR COMMERCIAL FACILITIES		46,633,208	868,312

Louisiana, Texas

[1] Data in this memorandum has not undergone extensive review by the Agency.

Non Commercial Stabilization Systems and Capacities
(Basis: 1993 BRS-Form PS)

Facility	Facility Name	System Code	Maximum RCRA Capacity	Utilized RCRA Capacity
ID4890008952	USDOE IDAHO NAT'L ENGINEERING LABORATORY	M111	360,000	-
MID005356860	GMC, INLAND FISHER GUIDE	M111	190,360	107,871
LAD010395127	ROLLINS ENVIRONMENTAL SERVICES	M111	130,000	65
ALD003397569	ACIPCO (AMERICAN CAST IRON PIPE COMPANY)	M111	60,034	2,000
CAD009151671	E I DUPONT DENEMOURS & CO	M111	50,000	18,080
ALD046481032	SANDERS LEAD COMPANY, INC.	M111	44,777	26,019
ILD006271696	OLIN CORP.	M112	40,320	1,309
ILD005263157	NORTHWESTERN STEEL & WIRE #2	M111	35,092	27,192
CAD009114919	CHEVRON USA PRODUCTS CO, RICHMOND REFIN	M111	31,590	-
AZ4570024055	DAVIS MONTHAN AFB	M111	25,000	24,167
LAD008184137	SCHUYLKILL METALS CORP	M111	25,000	10,499
IND005146683	THE FORD METER BOX CO., INC.	M112	15,000	1,721
NCD986181451	MANNINGTON CERAMIC TILE	M111	12,000	7,935
OHD032271975	MARION STEEL COMPANY	M112	4,500	3,277
NYD980779540	WEST VALLEY DEMONSTRATION PROJECT	M111	2,865	906
ALD983191966	VIRGINIA CAROLINA CHEMICAL SO	M111	2,500	2,500
VAD065417008	GRIFFIN PIPE PRODUCTS CO	M111	2,300	1,236
IND064708845	KUNKLE FOUNDRY CO.,INC.	M111	1,125	244
GAD033842543	TRI-STATE STEEL DRUM INC	M111	1,040	175
CO7890010526	U.S. DEPARTMENT OF ENERGY - ROCKY FLATS	M111	831	-
ALD095688875	ZENECA INC-COLD CREEK	M112	500	244
FLD984243097	BIO MEDICAL SERVICE CORP	M112	459	137
NM0890010515	U.S. DOE LOS ALAMOS NATIONAL LABORATORY	M111	173	60
MOD006308407	A.B. CHANCE COMPANY ALLEN STREET COMPLEX	M111	150	52
IND121581698	WABASH NATIONAL CORPORATION	M112	117	11
PAD004329835	PENNZOIL PRODUCTS CO ROUSEVILLE REFINERY	M111	100	65
CAD982412165	TOPPAN WEST, INC	M111	75	5
PAD041731670	CERDEC CORP - DRAKENFELD PRODUCTS	M111	75	23
MOT300010022	A C F IND SHIPPERS CAR LINE DIVISION	M111	40	10
MSD033353129	THE CLARION LEDGER	M111	34	34
MSD097909485	RELIABLE ELECTRIC UTILITY PROD	M111	25	12
FLD982120024	BOSTON WHALER INC	M112	24	24
IND056041213	LEER MIDWEST	M111	4	4
OKD000758557	CHROMALLOY DIVISION-OK	M111	3	24
GAD098583909	HERCULES INC OXFORD PLANT	M112	0	0
MOD981709272	IT ANALYTICAL SERVICES ST. LOUIS	M111	0	0
CTD981063431	PFALTZ & BAUER INC	M111	0	0
DC8170024311	NAVAL RESEARCH LABORATORY	M112	0	-
KSD007150477	GNB INCORPORATED	M111	-	170
OKD001824564	AMERICAN AIRLINES, M & E CENTER	M111	-	187
OKD007220148	AMERICAN AIRLINES, COMPOSITE CENTER	M111	-	38
OKD081398612	UNIT PARTS COMPANY	M111	-	212
OKT410010797	GEA RAINEY PLANT #II	M111	-	7
CAD001216548	JOSLYN JENNINGS CORP	M112	-	-
CAD056160336	LITTON IND ELECTRON TUBE DIV.	M112	-	-
CAD982324154	COMPOSITE STRUCTURES	M112	-	-
CO7890010526	U.S. DEPARTMENT OF ENERGY - ROCKY FLATS	M112	-	-
MED001097237	SNS PLASTICS CO INC	M112	-	8
OKD000829440	ZINC CORPORATION OF AMERICA	M112	-	3
VAD003444379	VIRGINIA METALCRAFTERS INC	M112	-	-

Non Commercial Stabilization Systems and Capacities
(Basis: 1993 BRS-Form PS)

MOD985821719	MIDAMERICAN TRUCK MAINTENANCE	M119	-	-
OKD000829440	ZINC CORPORATION OF AMERICA	M119	-	3
MD6150004095	NATIONAL INSTITUTES OF HEALTH	M111	-	0
MD6150004095	NATIONAL INSTITUTES OF HEALTH	M112	-	0
	TOTAL FOR NON-COMMERCIAL FACILITIES		1,036,112	236,526

Commercial Metal Recovery Systems and Capacities
(Basi: 1993 BRS - Form PS)

Facility	Facility Name	System Code	Maximum RCRA Capacity	Utilized RCRA Capacity
NYD981182769	KBF POLLUTION MANAGEMENT INC	M019	4,035,363	1,757
CAD008488025	PHIBRO-TECH, INC.	M014	2,322,554	608,199
PAD002395887	HORSEHEAD RESOURCE DEVELOPMENT CO INC	M011	300,000	270,000
PAD990753089	GENERAL BATTERY CORP - READING COMPLEX	M013	83,600	3,894
MND006148092	GOPHER SMELTING & REFINING COMPANY	M013	48,000	60,251
ILD984766279	RECONTEK INC	M014	48,000	357
CAD069124717	MICRO METALLICS CORPORATION	M011	28,050	39
ALD046481032	SANDERS LEAD COMPANY, INC.	M013	25,000	5,200
PAD981038227	WORLD RESOURCES COMPANY	M014	24,250	20,446
MOD059200089	DOE RUN CO BUICK SMELTER	M013	21,175	1,339
PAD981110570	HORSEHEAD RESOURCE DEVELOPEMENT CO INC	M011	20,000	1,216
CAD088504881	KINSBURSKY BROTHERS INC.	M014	15,980	10,500
MND981098478	U.S. FILTER RECOVERY SERVICES, INC.	M014	8,655	418
CAD070148432	DREW RESOURCE CORPORATION	M014	8,501	3,346
CAD069124717	MICRO METALLICS CORPORATION	M014	5,976	31
MND985746569	RECYCLIGHTS, INC.	M014	5,622	610
LAD057109449	UOP - SHREVEPORT PLANT	M014	2,600	726
ILD005087630	UNITED REFINING & SMELTING CO	M011	2,500	126
IND093219012	HERITAGE ENVIRONMENTAL SERVICES, INC	M014	2,105	6
CAD001968361	LEARONAL INC	M014	1,142	100
NYD001325661	LEARONAL, INC.	M014	1,004	46
LAD981152903	NEW ORLEANS SILVERSMITHS	M014	890	157
FLD984217877	CHEMICAL POLLUTION CONTROL INC	M019	842	683
MID985567114	CYANO CORPORATION OF MICHIGAN INC.	M014	788	190
NYD048148175	MERCURY REFINING COMPANY INC	M012	510	311
PAD002390961	BETHLEHEM APPARATUS CO INC	M012	375	350
PAD987367216	ADVANCED ENVIRONMENTAL RECYCLING CORP	M012	345	172
OHD061614673	DAYTON WATER SYSTEMS	M014	259	197
CAD981689953	LESHER COMMUNICATIONS INC.	M014	209	23
ILD005087630	UNITED REFINING & SMELTING CO	M014	209	5
CAD982440273	BAY PHOTO LAB INC.	M014	186	80
CAD069138899	J&B ENTERPRISES	M014	133	53
NYD001325661	LEARONAL, INC.	M011	125	6
ILD000675249	AMERICAN CHEMICAL & REFINING	M014	104	52
KS1571924140	MCCONNELL AIR FORCE BASE	M014	104	-
LAD087029872	ALFRED'S PROCESSOR SALES/SERVICE	M014	100	39
PAD089352983	FEDERATED-FRY METALS	M013	83	83
MND981002470	ELECTROCHEMICALS, INC	M014	78	64
MAD000650051	WINDFIELD ALLOY INC.	M014	38	1
NYD086225596	AT&T NASSAU PLACE	M014	38	29
CAD981424732	QUICKSILVER RECYCLING INC	M019	36	32
IND005226949	REMOTE CONTROLS INC.	M014	27	27
NYD086225596	AT&T NASSAU PLACE	M011	25	12
RID001200609	PEASE & CURREN INC	M019	22	7
AZT050010685	ALLIED PRECIOUS METALS RECYCLING CO.	M013	20	60
CAD981424732	QUICKSILVER RECYCLING INC	M014	5	-
RID001200252	TECHNIC INC	M011	5	4
MAD000650051	WINDFIELD ALLOY INC.	M013	3	0

Commercial Metal Recovery Systems and Capacities
(Basi: 1993 BRS - Form PS)

RID001200252	TECHNIC INC	M019	2	84
NYD071600100	STATE UNIVERSITY OF NY AT BINGHAMTON	M014	1	0
CAD069138899	J&B ENTERPRISES	M011	0	0
NYD030485288	REVERE SMELTING & REFINING CORPORATION	M013	-	114,362
CAD981160948	PHIBRO-TECH, INC. AKA ENTECH RECOVERY, I	M014	-	560
PAD087561015	INMETCO INC	M011	-	40,168
CAD982411993	MERCURY TECHNOLOGIES INTERNATIONAL	M012	-	-
IND000199653	QUEMETCO, INC.	M013	-	148,548
RID981886104	GANNON & SCOTT INC	M013	-	6
COD983788688	ENVIROSERVE INC.	M014	-	-
IND984891994	BOLIDEN METECH, INC	M014	-	64
MID985619824	NORTRU INCORPORATED	M014	-	-
RID063890214	BOLIDEN METECH INC	M014	-	153
RID981886104	GANNON & SCOTT INC	M014	-	32
IND000718130	REFINED METALS CORPORATION	M013	-	-
MOD030712822	SCHUYLKILL METALS CORPORATION	M013	-	-
CAD981978752	PASADENA CITY COLLEGE	M014	-	-
CAD982523102	PHOTOTEK	M014	-	-
TXD084281575	TEXAS INSTRUMENTS, INC.	M014	-	-
TXD981514383	ALPHA OMEGA RECYCLING, INC.	M014	-	-
TXD988079307	FUJI TRUCOLOR	M014	-	-
TX6213820529	LONGHORN ARMY AMMUNITION PLANT	M014	-	-
	TOTAL QUANTITY FOR COMMERCIAL FACILITIES		7,015,635	1,295,222

Non Commercial Metal Recovery Systems and Capacities
(Basis: 1993 BRS- Form PS)

Facility	Facility Name	System Code	Maximum RCRA Capacity	Utilized RCRA Capacity
LAD008184137	SCHUYLKILL METALS CORP	M013	350,000	6,417
IND000717959	GENERAL BATTTERY/EXIDE CORPORATION	M013	240,000	132,923
CAD008344285	DICEON ELECTRONICS INC	M014	127,284	58,687
MAD990886301	ALTRON INCORPORATED	M014	123,853	82,877
CAD980816763	VELIE CIRCUITS INC.	M014	114,679	110,509
MND050730175	HARD CHROME INC	M014	112,594	170,898
CAD983601360	SOUTH BAY CIRCUITS INC	M014	107,381	76,755
PAD990753089	GENERAL BATTERY CORP - READING COMPLEX	M013	106,400	4,956
IAD984568204	UNIVERSAL CIRCUITS INCORPORATED	M014	106,255	38,729
MID006409387	PLASTIC PLATE I	M014	92,160	43,536
MNT280010257	NICO PRODUCTS INC	M014	85,488	54,712
MND980700900	BUREAU OF ENGRAVING, INC - INDUSTRIAL DV	M014	84,762	42,400
CAD008492951	HUGHES MISSILE SYSTEMS CO	M014	72,448	130
MND045976107	PRO-TECH INC	M014	72,195	28,731
MND116224288	PROFESSIONAL PLATING INC	M014	45,872	19,187
PAD005031448	ERIE PLATING COMPANY	M014	45,746	45,746
NJD011417516	PLASTI CLAD METAL PRODUCTS INC	M014	43,853	6,649
MND981089832	UNIVERSAL CIRCUITS, INC.	M014	43,716	25,761
MID981090509	LACKS, AIRLANE	M014	42,952	42,952
FLD004092839	GULF COAST RECYCLING INC	M013	41,000	27,513
CAD983654633	TRUST PRINTED CIRCUITS	M014	33,361	17,608
MND980681589	AVTEC FINISHING SYSTEMS INC	M014	30,901	10,587
MND006481287	JOYNER'S SILVER AND ELECTROPLATING	M014	29,633	15,638
IND980898522	CUSTOM CIRCUITCRAFT, INC.	M014	26,022	15,613
CT4170022020	US NAVAL SUBMARINE BASE	M014	25,500	23
GAD070330576	GNB BATTERY TECHNOLOGIES	M013	25,200	24,010
RID059735761	ADVANCED CHEMICAL COMPANY	M014	18,657	827
ARD981908890	NUCOR YAMATO STEEL	M011	17,000	12,427
CAD009680232	GRAPHIC RESEARCH INC	M014	16,971	2,286
MND006219232	MICOM CORP	M014	13,136	11,259
NYD001273242	QUEENS PLATING COMPANY INC	M014	7,500	1,088
NHD982202673	ABC FABRICATORS INC	M014	6,844	3,332
PAD002116994	TORPEDO WIRE & STRIP INC	M014	4,918	624
MND053422762	UNIVERSAL CIRCUITS INC	M014	4,170	3,963
NYD041293127	R D SPECIALTIES INC	M014	3,753	4
AZD980896310	CONTINENTAL CIRCUITS	M014	3,700	751
MND085114890	TELEX COMMUNICATION INC	M014	3,508	718
AZD980816276	TALLEY DEFENSE SYS	M014	3,123	0
IND075954222	DIVERSFIELD SYSTEM INC.	M014	2,752	440
MAD001411081	RAYTHEON COMPANY	M014	2,717	1,368
MND006253801	SUPERIOR PLATING INC	M014	2,365	647
NYD052782497	NEWSDAY, INC.	M014	2,180	3
MND079731519	UNISYS CORPORATION	M014	1,719	3
CAD982519423	SAN JOSE MERCURY NEWS	M014	1,344	-
MND980615496	ROSEMOUNT AEROSPACE INC.	M014	1,043	518
AZD063274609	CONTINENTAL CIRCUITS CORP	M014	1,000	216
KYD985083625	APPALACHIAN REGIONAL MEDICAL CENTER	M014	957	11
CAD982436172	MULTILAYER TECHNOLOGY, INC.	M014	911	193

Non Commercial Metal Recovery Systems and Capacities
(Basis: 1993 BRS- Form PS)

KYD074047556	GE AIRCRAFT ENGINES	M014	822	21
CAD983600339	KAISER FOUNDATION HOSPITALS	M014	651	580
DED003913266	OCCIDENTAL CHEMICAL CORPORATION	M012	600	153
GAD980847479	HITACHI CHEMICAL ELECTRO-PRODUCTS INC	M014	506	404
KYD130399363	HUMANA HOSPITAL-UNIVERSITY OF LOUISVILLE	M014	450	24
MOD985801380	MONSANTOA COMPANY	M014	436	108
KYD074051202	LEXINGTON CLINIC	M014	420	24
CAD063110605	CHEVRON PETROLEUM TECH. CO.	M014	415	9
CAD071557029	THE GRASS VALLEY GROUP, INC.	M014	410	98
ALD008163388	OCCIDENTAL CHEMICAL CORPORATION	M012	400	120
MAD981063001	CPC INCORPORATED	M014	375	129
MND981089790	WEST PUBLISHING COMPANY	M014	365	123
MND985668227	PRECISION DIVERSIFIED IND., INC.	M014	311	217
CA2170023152	USNAVY CHINA LAKE NAVAL AIR WPNS STN	M014	288	288
MND083467688	MAYO FOUNDATION	M019	280	240
OKD055943286	GRAPHIC ELECTRONICS	M014	271	-
PAD134752583	BURNDY CORP	M014	258	67
PAD980554570	OSRAM SYLVANIA INC - WARREN	M014	252	39
NHD986466688	CIRCUIT CONNECT INC	M014	250	188
FL2800016121	USAF CAPE CANAVERAL STATION	M014	218	37
NYD045201688	AMERICAN BOARD CO	M014	209	197
MAD001014174	AGFA DIVISION, MILES INC,	M014	204	33
ALD004019642	OCCIDENTAL ELECTROCHEMICALS CORP.	M012	200	88
MDD121338297	CARROLL COUNTY ITEMS	M014	163	16
NYD082788126	GEOMETRIC CIRCUITS, INC.	M014	150	83
PAD003004587	ATOTECH USA INC - STATE COLLEGE	M014	133	21
CAD108148958	SAINT JOSEPH MEDICAL CENTER	M014	125	63
NYD045606480	3M PRINTING & PUBLISHING	M014	125	11
CAD047784574	KETEMA A&E	M014	119	3
LAD062666540	PIONEER CHLOR ALKALI COMPANY	M014	115	33
CAD008314908	SOLAR TURBINES INC-HARBOR DRIVE FACILITY	M019	110	22
CTD983876814	COMPONENT TECHNOLOGIES, INC.	M019	92	64
CAD047297593	NATIONAL SMELTING & REFINING	M014	91	-
NYD002241982	HADCO CORPORATION	M014	87	15
OHD004174827	R.R. DONNELLEY & SONS COMPANY	M014	87	46
MND058330473	ADVANCED FLEX, INC. - PLANT 1	M014	87	13
MAD086538394	RAYTHEON COMPANY	M014	78	9
MNT280010414	UNIVERSITY OF MINN MPLS CAMPUS	M014	66	59
KYD981854987	ST. JOSEPH HOSPITAL	M014	65	32
KYD045739471	AMERICAN GREETINGS CORPORATION	M014	62	3
MND000819268	ALLIANT TECHSYSTEMS, INC T.C. AMMUN.	M014	60	20
NYD049838568	EXCEL PRECISION, INC.	M014	59	14
AKD000643239	BP EXPLORATIOIN ALASKA INC PRUDHOE BAY	M014	58	55
CTD001183763	CIRCUIT WISE INC	M014	54	2
KYD068324037	LEXINGTON HERALD LEADER COMPANY	M014	50	17
NYD987000759	COLOR DATA EAST	M014	50	9
MND982425589	STAR TRIBUNE NEWSPAPER	M014	48	5
CAD076243815	TELEDYNE AIRCRAFT PRODS-CAST PRODS OPS	M014	44	37
NHD081255788	ADVANCED CIRCUIT TECHNOLOGY	M014	42	31
KYD985085166	OUR LADY BELLEFONTE HOSPITAL	M014	40	34

Non Commercial Metal Recovery Systems and Capacities
(Basis: 1993 BRS- Form PS)

KY6210020479	USAARMC AND FORT KNOX	M014	38	28
KYD144303864	HARDIN MEMORIAL HOSPITAL	M014	35	25
MND982639775	T.R.C. CIRCUITS INC.	M014	34	7
COD981549413	SAS CIRCUITS INC	M014	33	18
CTD001159557	COMBUSTION ENGINEERING, INC.	M014	32	1
KYD006383665	GATEWAY PRESS INC.	M014	30	12
PA0890090004	US DOE - BETTIS ATOMIC POWER LAB	M014	30	0
MND006147102	QUEBECOR PRINTING INC.	M014	30	15
MAD991289505	CHILDREN'S HOSPITAL CORP.	M014	28	17
CAT080031461	CSUF	M014	25	1
CAD983576760	PROGRESSIVE CIRCUIT PROD	M014	25	1
GA7360015450	VA MEDICAL CENTER	M014	23	8
KYD068135516	HIGHLANDS REGIONAL MEDICAL CENTER	M014	23	23
MD3750832062	FREDERICK CANCER RESEARCH AND DEVELOPN	M014	22	1
MND048166672	INSTANT WEB, INC	M014	22	12
CAD080129000	GENENTECH INC	M014	21	2
FL6800014585	USNASA KENNEDY SPACE CENTER	M014	21	15
NYD033490640	ANDIN INTERNATIONAL	M014	20	7
FLD060240207	MARTIN MARIETTA MISSILE SYSTEMS	M014	18	5
CAT000618603	CHEVRON RESEARCH & TECHNOLOGY	M014	18	1
CA2890012584	LAWRENCE LIVERMORE NATIONAL LABORATOR	M014	18	1
CAD009220898	TELEDYNE RYAN AERONAUTICAL	M014	18	0
COD085270270	BALL AEROSPACE & COMMUNICATIONS GROUP	M014	16	2
FLD004100152	E-SYSTEMS ECI DIV	M014	16	0
UTD980959191	HERCULES AEROSPACE	M014	15	6
MND081138604	ALLIANT TECHSYSTEMS PROVING GROUND	M019	15	0
MND981536006	LITHO SPECIALTIES, INC.	M014	14	12
MED037719846	US DEPRTMENT OF VETERAN AFFAIRS	M014	13	1
CA7170024528	USNAVY NAVAL WEAPONS STN CONCORD	M014	13	1
MND980826457	MCF-STILLWATER	M014	12	0
CTD001183763	CIRCUIT WISE INC	M019	12	1
FLD980841746	MARTIN MARIETTA ELECTRONIC SYSTEMS	M014	12	1
MS6210809871	WATERWAYS EXPERIMENT STATION	M014	11	1
KYD980844757	RIVERPORT IMAGING	M014	10	3
KY5170024173	NAVAL ORDNANCE STATION	M014	10	2
MND985703024	SOURCE, INCORPORATED	M019	10	7
CAT000617597	USC HEALTH SCIENCES CAMPUS	M014	10	8
NYD043835081	AIR TECHNIQUES INC	M014	10	3
FL2570024404	USAF PATRICK	M014	10	7
MDD050793926	TOWSON STATE UNIVERSITY	M014	9	1
VAD000820712	UNIVERSITY OF VIRGINIA	M014	9	5
ME8170022018	US NAVAL AIR STATION	M014	9	1
MND985684620	IMPRESSIONS INC.	M014	8	5
CAD075301390	TELEDYNE AIRCRAFT PRODUCTS	M014	8	7
FLD984225821	HEALTHSOUTH DOCTORS'HOSPITAL	M019	8	6
MND041786930	ADVANCED FLEX, INC. - PLANT 2	M014	8	6
MND985667047	QUEBECOR PRINTING ST. CLOUD, INC.	M014	7	6
FLD004104105	HONEYWELL INC	M014	7	1
KYD985095140	GOOD SAMARITAN HOSPITAL	M014	6	3
MOD071999783	UMSL DANGEROUS CHEMICALS STORAGE BLDG	M014	6	1

Non Commercial Metal Recovery Systems and Capacities
(Basis: 1993 BRS- Form PS)

ME9570024522	US AIR FORCE BASE - LORING	M014	5	2
NYD002235182	MARTIN MARIETTA CORP AIR FORCE PLNT#59	M014	5	1
NYD981875461	PEPSI-COLA COMPANY	M014	5	8
MND985677210	CONTAINER GRAPHICS CORP	M014	4	2
MAD041710609	TECH-ETCH, INC.	M014	4	1
NMD041358904	NEW MEXICO INST. OF MINING & TECHNOLOGY	M014	4	2
CAT000613372	KCA ELECTRONICS INC.	M014	3	1
KSD980852669	UNIVERSITY OF KANSAS	M014	3	1
CAD099457061	MAGNAVOX ELECTRONIC SYSTEMS CO	M014	3	0
CA1800005034	USNASA AMES RESEARCH CENTER	M014	3	177
CAT000617589	USC UNIV PARK CAMPUS	M014	3	2
MND000819292	ADVANCED FLEX, INC. - PLANT 3	M014	2	1
FL8170023792	USN COASTAL SYSTEMS CENTER	M014	2	0
CAT080033392	CALIFORNIA STATE UNIVERSITY NORTHRIDGE	M014	2	-
MND980792642	MANKATO STATE UNIV	M014	2	1
CAD072518517	BECKMAN INSTRUMENTS INC	M014	2	2
VAD046960449	BABCOCK & WILCOX CO N N F D	M014	1	1
ME7170022019	PORTSMOUTH NAVAL SHIPYARD	M019	1	1
CAD079622569	AEROJET ELECTRONIC SYSTEMS PLANT	M014	1	-
MAD001027325	GARE INCORPORATED	M014	1	0
FLD064824030	MCDONNELL DOUGLAS MISSILE PRODUCTION	M014	1	0
MAD001423631	NORTHEASTERN UNIVERSITY	M014	1	0
NYD000810986	CORNELL UNIVERSITY LIFE SAFETY	M014	1	0
CAD009587700	TELEDYNE ELECTRONIC TECHNOLOGIES	M014	0	0
CAD047791421	CARPENTER TECH. CORP. -SPECIAL PROD. DIV	M014	0	0
MO4213820489	LAKE CITY ARMY AMMUNITION PLANT	M014	0	0
MID041793589	PARLIN INDUSTRIES INCORPORATED	M014	0	0
CTD010174613	KLOCK CO DIV OF WICKES CO INC	M014	0	0
CA1170090020	USNAVY PT LOMA NAVAL COMPLEX	M014	0	0
NYD000799239	SYRACUSE UNIVERSITY (QUAD)	M014	0	2
KSD007233323	KANSAS PLATING INC	M014	0	0
NY6360010312	VAMC - NORTHPORT	M014	0	0
MAD071723563	NEW ENGLAND DEACONESS HOSPITAL	M014	0	0
NHD073976904	GENCORP POLYMER PRODUCTS	M014	0	0
CAD066233966	QUEMETCO, INC.	M013	-	1,609
PAD002330165	EAST PENN MFG CO	M013	-	146
CAD000628032	AIRCRAFT X-RAY LABORATORIES, INC	M014	-	3
CAD001425206	RAYTHEON COMPANY ESD	M014	-	-
CAD008319089	CHROMALLOY ADV TURBINOLOGY	M014	-	-
CAD020530846	GDE SYSTEMS INC	M014	-	-
CAD028878015	STANFORD UNIVERSITY HOSPITAL	M014	-	-
CAD069130995	HEWLETT-PACKARD COMPANY	M014	-	-
CAD980673347	U.S. CIRCUIT, INC.	M014	-	-
CAD980737837	SACRAMENTO BEE	M014	-	-
CAD980885941	ALLERGAN MEDICAL OPTICS	M014	-	-
CAD981385958	AMBITECH, INC	M014	-	-
CAD982417172	NAPA PIPE CORP	M014	-	-
CAD982484826	UNIVERSAL CIRCUITS	M014	-	-
CAD990843716	ILC TECHNOLOGY	M014	-	-
CAT000646257	FLIGHT ACCESSORY SERVICE DIV. OF HAWKER	M014	-	-

Non Commercial Metal Recovery Systems and Capacities
(Basis: 1993 BRS- Form PS)

COD082657420	SCHLAGE LOCK COMPANY	M014	-	-
CTD018695999	AEROSPACE METALS	M014	-	-
DED002337806	NVF COMPANY	M014	-	34
KSD116030909	COLT TECHNOLOGY CORPORATION	M014	-	-
MAD001032358	GLOBE NEWSPAPER CO.	M014	-	14
MID047153077	PRODUCTION PLATED PLASTICS INCORPORATE	M014	-	-
MND006159149	THE JOHN ROBERTS COMPANY	M014	-	6
MND006258115	JAPS-OLSON CO.	M014	-	5
MND985667807	ADVANCED FLEX, INC. - PLANT 2	M014	-	-
NED007281728	LINCOLN PLATING COMPANY	M014	-	-
NED986387041	SUPRA COLOR LABS INCORPORATED	M014	-	-
NYD986875326	HERAEUS PMR	M014	-	39
PAD005031497	AMERICAN TINNING & GALVANIZING CO	M014	-	-
PAD014299523	WEINSTOCK CONESTOGA INC	M014	-	1
PAD987377504	INTERNATIONAL ENVELOPE CO	M014	-	-
VTD001075886	MERIDEN STINEHOUR PRESS	M014	-	-
ALD000826958	AUBURN UNIVERSITY	M019	-	0
CAD009584210	CALIF INSTITUTE OF TECHNOLOGY	M019	-	-
CAD982324154	COMPOSITE STRUCTURES	M019	-	-
CTD002592020	BEAVER BROOK CIRCUITS INC.	M019	-	-
CTD023869423	COMPONENTS TECHNOLOGIES, INC	M019	-	-
CTD099762015	INTERMAGNETICS GENERAL CORP	M019	-	-
CT0572826873	CT ARMY NATIONAL GUARD BRADLEY BASE	M019	-	-
DED003930799	E.I. DUPONT CHESTNUT RUN	M019	-	1
MIT270012198	GRAND HAVEN BRASS FOUNDRY	M019	-	-
MND985668227	PRECISION DIVERSIFIED IND. INC.	M019	-	-
GU9170090022	USNAVY NAVAL HOSPITAL COMPLEX	M014	-	-
KSD007237241	BOEING COMPANY, THE	M014	-	-
	TOTAL QUANTITY FOR NON-COMMERCIAL FACILITIES		2,361,290	1,150,491

Chemical fixation increases options for hazardous waste treatment

THE HAZARDOUS AND SOLID WASTE AMENDMENTS (HSWA) to the Resource Conservation and Recovery Act (RCRA) govern the manner in which hazardous materials are managed. Disposing RCRA hazardous wastes on or in the land is no longer an accepted remedial option. This land disposal restriction requires that all listed and characteristic hazardous wastes (as defined by RCRA) must be treated according to specified standards before they are disposed [*40 CFR 268.40*]. These treatment standards define technologies and concentration limits. Hazardous wastes that do not meet the standards are prohibited from being disposed on land, such as in landfills, surface impoundments, land treatment units, injection wells, and mines or caves.

BY GREGORY J. INDELICATO AND GARY A. TIPTON

The Environmental Protection Agency (EPA) permits land disposal of some hazardous waste streams provided the toxicity or mobility of the specific hazardous constituents has been reduced to required treatment standard concentrations. Such is the case with hazardous wastes exhibiting toxicity characteristics (TCs) as identified in *40 CFR 261.24*. Specifically, wastes contaminated with arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver — known as the RCRA metals — fall under the standard.

Given these TC concentration limits, EPA gives generators the ability to choose from several treatment technologies. The standard to which the effectiveness of other treatment technologies for a specific waste is composed is called the best demonstrated available technology.

Remedial options. Treatment generally is the only option for metal-containing listed wastes and wastes that include any RCRA metals in concentrations exceeding the TC treatment standard. There are several non-treatment methods; however, their applicability is limited. These include:

- *Reclassification of the material, followed by disposal.* This involves obtaining a variance to classify the waste as hazardous and dispose it as non-hazardous. Although reclassification is an inexpensive alternative, it is being phased out as variances expire and are not renewed.
- *Disposal in a permitted hazardous waste facility.* The waste is transported as hazardous waste to a hazardous-waste disposal facility, where it is treated and disposed. The advantage of this method is that the waste can be removed from the site quickly. However, the waste still must be treated to meet pre-disposal treatment standards; in addition, transportation, and offsite treatment and disposal of hazardous waste can be costly and increase the generator's risk of exposure to liability.
- *Reclamation and recycling.* As long as the waste contains specific metals in concentrations high enough for recovery, recycling is an attractive option, eliminating long-term liability and reducing the volume of waste generated. However, this method may not be viable if concentrations are not at threshold levels.

Thus, generators usually are forced to treat metal-contaminated waste using an accepted treatment technology, such as solidification and stabilization processes, thermal decomposition, sorbents, osmotic and ion-exchange methods, and flocculation and precipitation.

Solidification/stabilization. This common process treats waste by physically or chemically immobilizing the constituents, diminishing their effective mobility and toxicity. Many solidification and stabilization processes use cementing or encapsulation to immobilize contaminants. A variety of materials — such as portland cement and other calcium-based cements, silicates and other siliceous materials, and even asphaltics and waxess — are used as binders to stabilize the metals, or surround or incorporate the metals in a matrix.

In cement-based approaches, wastes are mixed directly with cement or similar setting materials; the metals then are incorporated and bound in the cement. The pH increases as the cement cures, and most multivalent cations are converted into insoluble hydroxides or carbonates. However, metal hydroxides and carbonates are insoluble only over a narrow pH range; as the curing process continues and pH increases, the solubility of these metal compounds will increase as well.

Another approach is to add a siliceous material with lime, cement, gypsum and other suitable setting agents. Siliceous material includes fly ash, blast furnace slag, and calcium, sodium or potassium silicates. Portland cement and lime are the most commonly used setting agents. Under proper conditions, a reaction will take place between the silica-rich material and the polyvalent metal ions, yielding a weakly bonded metal-silica material.

Various materials generally present in typical waste streams can inhibit the effectiveness of solidification/stabilization; these materials include sulfates, organics (oil and solvents, for example) and many of the metals being treated. The materials prevent or retard the curing process, reducing the strength and durability of the treated waste and increasing the susceptibility for leaching of the contaminants.

Treated wastes also are highly susceptible to changing chemical conditions, such as lower pH. Simple cemented wastes are subject to leaching in the presence of even mildly acidic solutions such as rainwater, thereby rendering the process ineffective for immobilizing the metals. As the matrix breaks down, the encapsulated material will begin to leach. Similarly, the matrix, if not processed properly, can retain a large amount of water that is not chemically bound. This can structurally weaken the final product, making it susceptible to leaching. Over time, the water will migrate out of the treated waste material and, in the process, leach out the metals.

Other solidification processes vary in applicability and effectiveness. Many of the thermoplastic processes — such as asphaltic, bitumen and paraffin-based methods — are costly and have limited compatibility with many waste streams.

These methodologies are enhanced if the contaminants can be chemically stabilized or "fixed" in the molecular structure of the solidified product. The applicability and effectiveness of the various chemical fixation protocols available depend on the nature of the contaminants, their concentrations, the matrix, other metal interactions and interferences, and physical and chemical parameters. These factors must be understood fully to maximize treatment effectiveness.

Chemical fixation. Chemical fixation is a treatment process that employs reagents

CONTINUED

CASE STUDY

Chemical fixation of dewatered sludge from an electronics/specialty parts manufacturer

Parameter	Untreated waste (mg/kg)	Treated waste (TCLP: mg/l)	Treatment standards (TCLP: mg/l)
Aluminum	2,610.00	0.70	—
Arsenic	2.93	<0.01	5.00
Barium	12.00	<1.00	100.00
Cadmium	<0.40	<0.01	1.00
Chromium	51,800.00	1.90	5.00
Copper	20,300.00	<0.01	—
Lead	20,900.00	<0.01	5.00
Magnesium	202.00	0.15	—
Mercury	<0.03	0.003	0.20
Nickel	1,510.00	0.12	—
Selenium	1.70	<0.01	—
Silver	206.00	<0.01	—
Tin	643,000.00	3.20	—
Zinc	116.00	0.07	—

Note: Volume increase was less than 20%.

designed for the specific contaminant or contaminants in the waste stream. Using the pozzolanic material as a silica source, the metal-affected waste is remineralized as non-leachable metal silicates. The physicochemical reaction process, which involves hydration, sorption, molecular cross-linking and other reactions, ultimately produces a monolithic, calcium-metal silicate material with potentially high structural strength.

Chemical fixation uses predetermined treatment protocols based on the contaminants in the waste stream. The protocols specify the volumes, concentrations and proper sequencing of proprietary reagents, and emphasize appropriate mixing and reaction times for each step. Special attention is given to matrix interferences and interactions involving metal solubility, such as ionic strength, valence state, redox potential, pH and competing ions. It may be necessary to reduce the toxicity of specific contaminants (for example, hexavalent chromium or cyanide) before chemical fixation takes place. In other cases, the chemical activity of such specific metals as cadmium, mercury and arsenic may need to be stabilized or modified: this is especially true for metals that complex with organics.

Reaction kinetics must be optimized to ensure effective fixation of the contaminants in the waste stream. Several types of reagents can be added to induce and facilitate the chemical fixation process. These include:

- Mixing agents, which facilitate the dispersion of organics and help incorporate the metal(s) into the mixture;
- Inhibitors, which are used to slow hydration reactions so the slower silicate complexing reactions can occur;
- Complexing agents, which facilitate reactions between amorphous silica and the metal contaminants; and
- Accelerators, which increase the rate of the silicate reactions as the inhibitors are consumed.

Series of reactions. When properly combined, the metals-affected waste, fixing agents and proprietary chemicals (as determined by the appropriate protocol) produce a series of reactions. First, calcium silicates from the pozzolanic material begin to decompose, releasing calcium oxide and silica. Then, the calcium hydroxide is precipitated with the hydrated calcium silica gel under conditions that allow silica complexes to form.

Next, proprietary chemicals (selected based on the contaminants present) are added to the waste stream, increasing the viscosity of the mixture. This acts as an effective interparticule lubricant, which accelerates the homogenization of the mixture and simultaneously decelerates the diffusivity of other components in the cementation reaction.

At this point, the calcium oxide and calcium silicates hydrate while other chemicals dehydrate, generating cross-linkage among particles and dehydrated molecules. This helps prevent volume expansion in the solidified mixture. In this stage, the cementation reaction begins to accelerate.

Next, the hydrated calcium silica gel and crystals physically and chemically entrap the contaminants within the solidified matrix. Many of the metal components are incorporated into the crystalline structure through ion exchange, substitution, solid solution and complexing processes. Some fine inorganic particles are encapsulated physically within the macropores and micropores of the silicate matrix, while some metals are absorbed on the surface of the crystals and the particles of the fixing agent. Contaminant entrapment and encapsulation are enhanced naturally by the cage-like structure associated with the previously formed cross-linked molecules.

Finally, the dissolved or dispersed organic components are physically trapped and encapsulated in the macropores and micropores of the solidified mixture matrix, or are absorbed or chemisorbed on the surfaces of these pores through dipole-dipole interaction, London-force attraction or hydrogen bonding. Remaining components are incorporated chemically into the matrix through a variety of processes, which can include complex formation, chemical (covalent) bonding and cross-linkage formation. The process overcomes the tendency of organic waste components to inhibit the cementation reaction.

The solidified mixture produced by this process has much greater density and mechanical strength, which results in substantially lower leaching rates of the final waste product; 28-day, unconfined compressive strengths of more than 4,000 pounds per square inch (psi) have been achieved in some treated organic sludges, with as much as 12,000 psi in non-organic

CONTINUED

CASE STUDY

Chemical fixation of municipal incinerator ash

Metals	Ash mean* (ppm)	Treatment standard (TCLP: mg/l)	Field trial results 24-hour cure (mg/l) SW-A1	SW-A2	Field trial results 28-day cure (mg/l) SW-1	SW-2
Cadmium	19.65	1.00	ND	ND	ND	ND
Chromium	95.30	5.00	ND	ND	ND	ND
Lead	1,028.00	5.00	2.30	2.00	ND	ND
Nickel	105.00	20.00	ND	ND	ND	ND
Zinc	1,453.00	250.00	0.22	0.17	0.05	ND

ND = non-detectable
*The mean was calculated from samples taken on six different days.
SW-A1 and SW-1: mixture of 10% fly ash, 90% bottom ash, pozzolans, reagents
SW-A2 and SW-2: mixture of fly ash, pozzolans, reagents

materials. Characteristically, an increase in the density of a solid indicates diminished permeability, eliminating any substantial mobility of hazardous components within the solidified waste. The increased mechanical strength also minimizes the generation of additional surfaces from micro- and macro-fissures resulting from structural failure. Water penetration and the subsequent transport of soluble metals constituents are, therefore, minimized.

CASE STUDY

Chemical fixation of lead oxide catalyst waste

Parameter	Untreated waste	Bench scale results	Field test results	Treatment standards
Lead (total)	[illegible]			
Lead (TCLP)	810.00 mg/l	0.50 mg/l	0.79 mg/l	5.00 mg/l
Volume increase	not applicable	–20%*	–15%*	not applicable

*Negative volume increase reflects decrease in volume because of densification of material through processing and solidification.

Note: Treated waste [illegible] subsequently was disposed as non-hazardous.

Chemical fixation advantages. There are distinct advantages in using this proprietary chemical fixation process:

- It can be used to treat a wide range of waste streams;
- There is minimal increase in the volume of the treated waste; and
- The process is relatively inexpensive.

Unlike many conventional solidification processes, chemical fixation can treat a wide range of waste streams, including complex, multicontaminant inorganic wastes and the typically hard-to-treat, organically contaminated wastes. Waste streams treated successfully by this process include soils contaminated by heavy metals, organically contaminated soils, electroplating sludges, paint-sludge wastes, sandblasting grit contaminated by heavy metals, API separator oils and sludges, petroleum tank bottoms, wastes containing polychlorinated biphenyls (PCBs), asbestos wastes, and incineration ash.

Con•fi•dence\ *n* a: faith or belief that one will act in a right, proper, or effective way . . .

(Webster's Ninth New Collegiate Dictionary)

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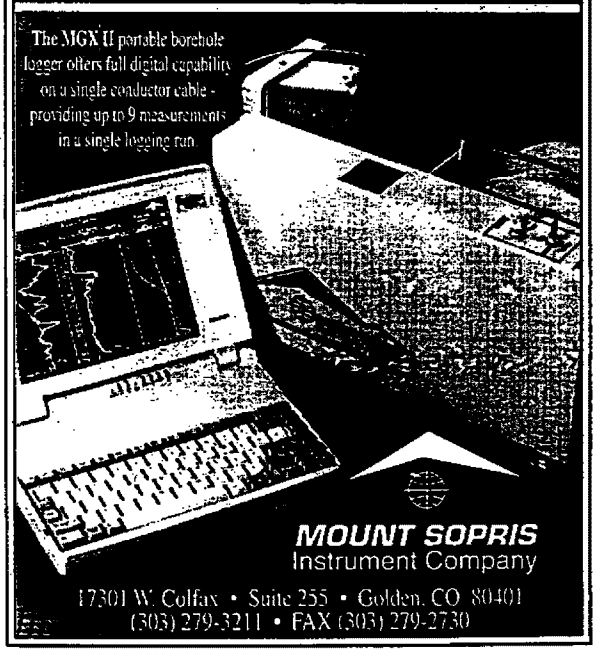

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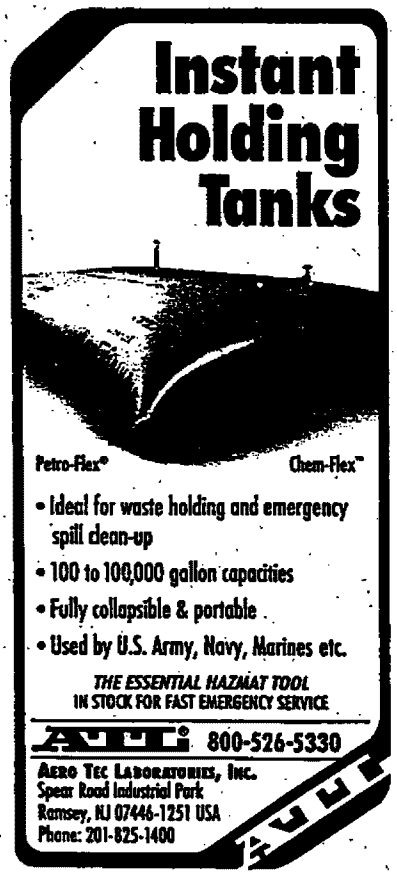
Mix formulations can be modified to accommodate specific waste streams so that the waste takes an active role in the cementation phase of stabilization. Some wastes even function as chemical reagents, assisting in their own stabilization by contributing to physical hardening, thereby reducing or eliminating permeation and leaching concerns. Also, by altering the design of the mix, processed waste can be poured as a plastic solid similar to concrete and cast into blocks, super sacks, rolloff boxes and other forms suitable for disposal. The processed waste also can be stabilized into a final state with a soil-type texture. In either form, low solubility reduces the potential for leaching to a negligible degree. The resulting treated waste yields analytical results below EPA's TC leaching procedures.

Chemical fixation can treat a wide range of waste streams, including multicontaminant inorganic and hard-to-treat organic wastes, at relatively low cost and with minimal volume increase.

Typical solidification/stabilization processes add cement to the mixture, increasing the volume of the waste. Chemical fixation limits volume expansion of the resultant waste material. Because disposal charges at most landfills are based on volume, this translates into significant savings. In one test, a 65-percent organic oily waste sludge that was solidified showed an increase in volume of less than 50 percent. In another test, soil containing PCBs at 30 parts per million was treated with chemical fixation, with a resulting 15-percent volume reduction and a 28-day compressive strength of 3,250 psi. When compared to the costs for treatment and disposal of hazardous waste, treatment processes and subsequent disposal of non-hazardous waste is significantly less expensive.

Chemical fixation can be customized for a facility's specific hazardous waste treatment and disposal program. Years of development and application has resulted in an extensive data base of treatment reactions for metal-contaminated wastes. More than 700 waste streams have been evaluated and successfully treated. More than 400 waste streams have been treated successfully in bench-scale testing, and more than 100 waste streams have been treated in field applications. □

Gregory J. Indelicato is manager of emergency and remediation services for CURA Inc. (Dallas). Gary A. Tipton is an environmental consultant in Houston. Readers wishing to obtain further information on the chemical fixation process can contact Indelicato at 800/486-7117, ext. 220.



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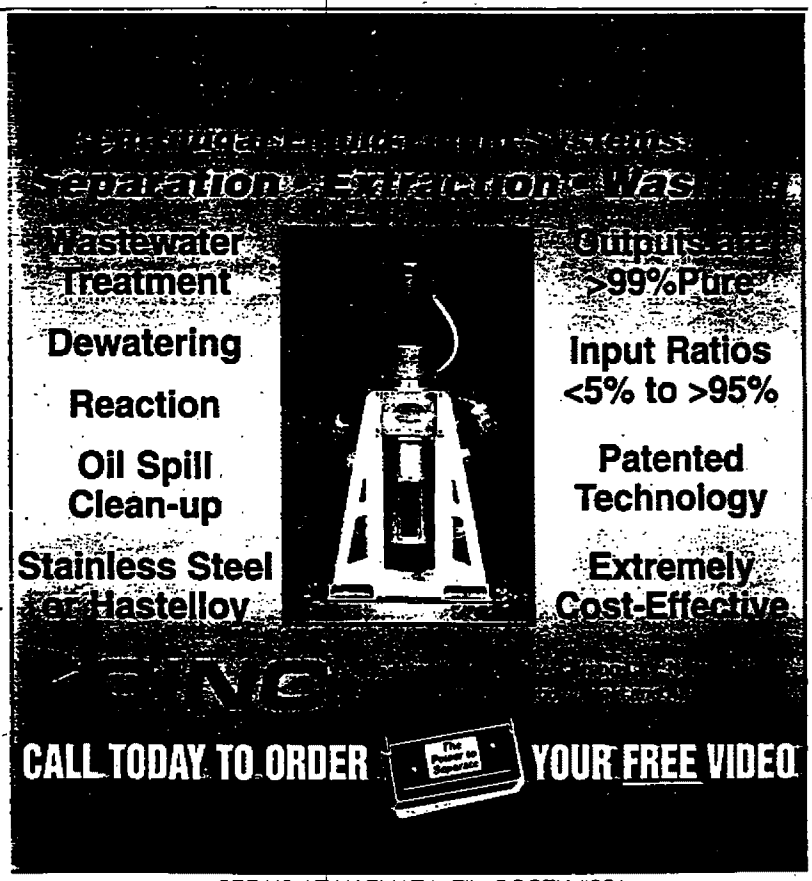

SEE US AT HAZMAT INT'L, BOOTH #351

Circle No. 306 on Reader Service Card

TO: Joel Moore, Suzzane Wade

FROM: Stephen Schwartz

SUBJECT: Phone Calls to TSDs Who Stabilize D008 and Other TC-metal Hazardous Wastes

DATE: 13 May 96

At your request I contacted commercial Treatment, Storage, Disposal (TSD) facilities in EPA Regions 5 and 6 in order to determine if they perceived that there would be any problem to stabilize brass/bronze foundry TC-metal hazardous wastes to Universal Treatment Standard (UTS) levels. More specifically, I asked if they could use conventional stabilization technology to treat foundry sand-type D008 (TC for Lead), including the lead and all Underlying Hazardous Constituents (UHCs), to the UTS levels. Further, I requested any treatability data that the TSDs might have to support their contention that they could perform the required treatment. Attached is a list of the TSDs contacted. Also attached are the records of the telephone contacts, including the details of their telephone responses.

Nine TSDs were contacted, seven of which actually performed stabilization of TC-metal wastes, either on-site, or shipped to one of their facilities elsewhere in the country.

Of the two facilities that did not stabilize wastes, one is primarily a Deepwell disposer, and if they received such waste they would subcontract its treatment. The second of the two did not manage foundry-type wastes, or any other bulk solids, but mostly managed drummed waste.

In general, each of the seven facilities that performed the requested stabilization said that they manage foundry sand D008 wastes, or wastes that they believed were similar. Each said that they didn't believe that there were any significant problems in producing the necessary pozzolonic recipe to stabilize the waste in question to all applicable UTS levels, including the lead component. (Most seemed familiar with the UTS requirement for lead of 0.37 ppm TCLP, rather than the current D008 lead requirement of 5.0 ppm.) One facility said they do this type of stabilization to UTS levels routinely, and find no difficulty 90% of the time. (Initially they were only able to hit all UTS levels about 70% of the time, but have since improved.)

NAME, ADDRESS/PHONE OF FIRM: Chem. Waste Mgmt 318/582-2169
7170 John Brannon Rd.
Carlyss, LA 70663

CONTACT PERSON: Renée Dellon DATE: 10 May

1 - Do you receive non-wastewater wastes from brass/bronze foundries? Do you receive similar wastes? If similar, why are they similar?
Typical foundry waste contains fine sand particles contaminated with a few percent lead, zinc, copper.

Yes, they receive brass/bronze foundry wastes & similar wastes

2 - If so, do you stabilize those wastes with pozzolonic-type stabilizing agents?
Yes they stabilize w/ cement/H_2O mixtures — each tailored to the client.

3 - If so, what typical mix of water/stabilizer/waste do you use?
See above (2)

4- To what TCLP levels are you able to stabilize the BDAT/TC metals? CAN WE HAVE DATA FOR UNTREATED/TREATED METAL CONSTITUENTS? They reach TC & UTS levels — & she believes they can meet UHC levels for all metals, even the primary T.C. metal. Won't release data

5- Would you forsee problems in treating these wastes to TC/UTS levels?
See (4) above

-- NUCLEAR CONTAINMENT SERVICES (LA). INC.
P.O. BOX 73877
BATON ROUGE, LA 70137 302/426-3166

CONTACT PERSON: FRED GURDESS DATE: 10 MAY '96
~~RICHARD GRANSBURG COLORADO~~ 970/386-2293

1 - Do you receive non-wastewater wastes from brass/bronze foundries? Do you receive similar wastes? If similar, why are they similar?

Typical foundry waste contains fine sand particles contaminated with a few percent lead, zinc, copper.

STAB./LANDFILL FOUNDRY WASTE IN COLORADO.

TALKED TO COLORADO — THEY DO STAB. BRASS/BRONZE FOUDRY WASTES & OTHER D008s

2 - If so, do you stabilize those wastes with pozzolonic-type stabilizing agents?

YES USE CONVENTIONAL POZZOL. MIXTURES

3 - If so, what typical mix of water/stabilizer/waste do you use?

VARIOUS RECIPES — NOT PROPRIETARY

4- To what TCLP levels are you able to stabilize the BDAT/TC metals? CAN WE HAVE DATA FOR UNTREATED/TREATED METAL CONSTITUENTS?

CAN MEET ALL METAL UTS LEVELS, EVEN LEAD, TYPICALLY LEAD IS NO PROBLEM. WON'T RELEASE DATA

5- Would you forsee problems in treating these wastes to TC/UTS levels?

NO PROBLEMS — HE'LL PROVE IT IF WE SEND SAMPLE

NAME/ADDRESS/PHONE OF FIRM: Silverline Corp
16455 S. Center Ave.
Harvey, IL 60426

CONTACT PERSON: David Reyes 708/596-7040

DATE: 10 May 96

↳ He'll have someone call from York, PA

1 - Do you receive non-wastewater wastes from brass/bronze foundries? Do you receive similar wastes? If similar, why are they similar?

Typical foundry waste contains fine sand particles contaminated with a few percent lead, zinc, copper.

Yes — Get brass foundry wastes.

2 - If so, do you stabilize those wastes with pozzolonic-type stabilizing agents? Yes, but somewhat proprietary

3 - If so, what typical mix of water/stabilizer/waste do you use?

See (2) above

4- To what TCLP levels are you able to stabilize the BDAT/TC metals? CAN WE HAVE DATA FOR UNTREATED/TREATED METAL CONSTITUENTS? No problem — Get to detection levels — no data avail.

5- Would you forsee problems in treating these wastes to TC/UTS levels?

See (4) above

NAME OF FIRM: AETS/Chem. Waste Mngmnt
W124 N9451 Boundary Rd.
Menomonee Falls, WI 53051 414/255-6655

CONTACT PERSON: Fran Koumtz DATE: 10 May 96

1 - Do you receive non-wastewater wastes from brass/bronze foundries? Do you receive similar wastes? If similar, why are they similar?
Typical foundry waste contains fine sand particles contaminated with a few percent lead, zinc, copper.

Yes they get brass foundry wastes

2 - If so, do you stabilize those wastes with pozzolonic-type stabilizing agents? Straight w/ conventional ass. RCRA

3 - If so, what typical mix of water/stabilizer/waste do you use?
(see (2) above

4- To what TCLP levels are you able to stabilize the BDAT/TC metals? CAN WE HAVE DATA FOR UNTREATED/TREATED METAL CONSTITUENTS? Currently treat D008 - lead to <5 ppm TCL
No data available

5- Would you forsee problems in treating these wastes to TC/UTS levels?

Doesn't think that treating to UTS is a problem.

NAME/ADDRESS/PHONE OF FIRM: Heldage Environ. Servs.
7901 W. Morris St.
Indianapolis, IN 46231 317/243-0811 x

CONTACT PERSON: Darcy Ray DATE: 10 Nov/96

1 - Do you receive non-wastewater wastes from brass/bronze foundries? Do you receive similar wastes? If similar, why are they similar?

Typical foundry waste contains fine sand particles contaminated with a few percent lead, zinc, copper.

Believe they can handle this — don't know if they actually do handle foundries.

2 - If so, do you stabilize those wastes with pozzolonic-type stabilizing agents? Use cement type stuff — use pug-mill

3 - If so, what typical mix of water/stabilizer/waste do you use?

Conventional — separate testing

4- To what TCLP levels are you able to stabilize the BDAT/TC metals? CAN WE HAVE DATA FOR UNTREATED/TREATED METAL CONSTITUENTS?

Treat to F006 code LDR values — believe they can treat — they have a model — no data avail

5- Would you forsee problems in treating these wastes to TC/UTS levels?

Believe they can meet standards for UTS.

NAME/ADDRESS/PHONE OF FIRM: GNI Group (Disposal Systems)
P.O. Box 1914
Deer Park, TX 77536
713/930-2538

CONTACT PERSON: Bob Griffith
Wheeler Norris

DATE: 10 May 96

1 - Do you receive non-wastewater wastes from brass/bronze foundries? Do you receive similar wastes? If similar, why are they similar?

Typical foundry waste contains fine sand particles contaminated with a few percent lead, zinc, copper.

Not much foundry waste, but do have sand blast Pb debarkening waste.

They're a local outfit, Slop stabilized stuff to Chem. Waste Mngmnt.

2 - If so, do you stabilize those wastes with pozzolonic-type stabilizing agents? Yes

3 - If so, what typical mix of water/stabilizer/waste do you use?

Conventional pozzolonics (fly ash, lime kiln dust, cement dust, silica, kaolin, powders)

4- To what TCLP levels are you able to stabilize the BDAT/TC metals? CAN WE HAVE DATA FOR UNTREATED/TREATED METAL CONSTITUENTS?

Can treat — but don't have data to give.

5- Would you forsee problems in treating these wastes to TC/UTS levels?

Believe they can treat all stuff to UTS levels. Pass 90% of time.

NAME/ADDRESS/PHONE OF FIRM: Clean Harbors of Chicago
11800 Stony Island Ave.
Chicago, IL 60617
312/646-6202

CONTACT PERSON: Che Doran (Sales)
Tim Getzloff

DATE: 10 May 96

1 - Do you receive non-wastewater wastes from brass/bronze foundries? Do you receive similar wastes? If similar, why are they similar?

Typical foundry waste contains fine sand particles contaminated with a few percent lead, zinc, copper.

Would [illegible] in Cincinnati — [illegible] someone call me.

Yes, the situation [illegible] foundry [illegible] (although sand is not TC [illegible])

2 - If so, do you stabilize those wastes with pozzolonic-type stabilizing agents? Yes

3 - If so, what typical mix of water/stabilizer/waste do you use?

Whatever recipe works.

4- To what TCLP levels are you able to stabilize the BDAT/TC metals? CAN WE HAVE DATA FOR UNTREATED/TREATED METAL CONSTITUENTS?

Whatever client needs, they can meet — but no data available

5- Would you forsee problems in treating these wastes to TC/UTS levels?

No.

[illegible], STORAGE, AND DISPOSAL FACILITIES CONTACTED

1 - GNI Group (Disposal Systems)
P.O. Box 1914
Deer Park, TX 77536

Mr. Warren Norris - 713/930-2588

2 - Clean Harbors of Chicago
11800 Stoney Island Avenue
Chicago, IL 60617

Mr. Tim Getzloff - 312/646-6202

3 - AETS/Chemical Waste Management
W124 N9451 Boundary Road
Menomonee Falls, WI 53051

Mr. Alan Koumtz - 414/255-6655

4 - Heritage Environmental Services
7901 W. Morris Street
Indianapolis, IN 46231

Ms. Darcy Ray - 317/243-0811 ext.1483

5 - Envirite Corp.
16435 S. Center Avenue
Harvey, IL 60426

Mr. David Reyes - 708/596-7040

6 - Rollins Environmental Services (LA), Inc.
P.O. Box 73877
Baton Rouge, LA 74137

Fred Gurdess - 302/426-3168 &
Richard Grondan - 970/386-2293 (Colorado facility)

7 - Chemical Waste Management
7170 John Brannon Road
Carlyss, LA 70663

Ms. Renee Dillion - 318/583-2169

8 - Treatment One
5743 Cheswood
Houston, TX 77087

Ms. Shiela Armstrong - 502/327-8860 (Louisville, KY facility)

THEY DO NOT HANDLE BULK SOLIDS, INCL. FOUNDRY SAND WASTES.

[illegible] Service Company
P.O. Box 709
Texas City, TX 77592

Ms. Tracy Holister - 409/945-3301

DEEPWELL FACILITY. THEY WOULD SUBCONTR
NONWASTEWATERS.

PH4F-50003.D

APPENDIX D

DATA ON AVAILABLE VITRIFICATION CAPACITY

This appendix has two sections:

D-1: Provides a phone log of vitrification facilities and vendors the Agency contacted.

D-2: Describes the vitrification technology, its applicability, limitations/constraints, and availability/costs.

PHONE LOGS OF VITRIFICATION FACILITIES

Mr. Matt Haas
Geosafe Corporation
Location: Richland, WA
Phone: 509-375-0710
Interview conducted by: Gail Shaw
Date of interview: March 7, 1997
Date of follow-up interview: April 11, 1997

Mr. Haas believes that their facility may be the only supplier of in-situ vitrification. They currently have one system operating which has an available capacity of 15,000 tons/year. The facility can readily expand its operations to three systems if the demand arises. Therefore, their current maximum capacity would be 45,000 tons/year.

Mr. Doug Rosholt
MSE Technology Applications
Location: Butte, MT
Phone: 406-494-7100
Interview conducted by: Gail Shaw
Date of interview: March 7, 1997
Date of follow-up interview: April 11, 1997

Mr. Rosholt responded that their commercial facility supplies plasma vitrification. The unit's available capacity is 2,000 tons/year; that is also their maximum capacity.

Ms. Yvonne Eglanton
Vortech Corporation
Location: Collegeville, PA
Phone: 610-489-2255
Interview conducted by: Gail Shaw
Date of interview: March 7, 1997

Ms. Eglanton responded that their corporation is a vendor of vitrification technology equipment.

Mr. Matt Mede
Retech
Location: Ukiah, CA
Phone: 707-462-6522
Interview conducted by: Gail Shaw
Date of interview: March 7, 1997

Mr. Mede responded that their corporation is a vendor of vitrification technology equipment.

Appendix D-2

ATTACHMENT TO MEMORANDUM FROM BILL KLINE (U.S. EPA)
TO ICF INCORPORATED, MARCH 17, 1994

Vitrification

1. Process Description

Vitrification is the process by which contaminated soils a... converted into chemically inert and stable glass and crystalline materials by a thermal treatment process operating at a temperature of 2000 degrees F to 2800 degrees F. This technology is primarily intended for the treatment of heavy metals; however, an organics content of up to 20% can be handled. A high current of electricity is passed through electrodes inserted into the contaminated soil. The heat causes a melt that gradually works downward through the soil. Organic constituents are destroyed while the inorganic contaminants are immobilized in the high compressive strength glass-like or ceramic end product. A volume reduction of 20% to 45% is achieved. Types of vitrification processes include glass-melting furnaces, ~~high-temperature fluid-~~ wall reactors.

2. Waste Applicability

Vitrification was originally tested as a means of immobilizing low level radioactive metals. However, it can be applied to a wide range of contaminants. The process destroys nitrates and partially decomposes sulfate compounds. Fluoride and chlorine compounds are dissolved into the glass materials up to their limits of solubility. Wastes containing heavy metals, PCBs, for example, will either fuse or vaporize.

3. Limitations/Constraints

Vitrification processes are very energy intensive (800-1000 kw/ton), requiring temperatures up to 2500 degrees F for fusion and melting of the waste-silicate matrix. Commercial waste management companies may not have built vitrification processes because: vitrification is only specified as BDAT for a few relatively small-volume hazardous wastes, there is little, if any operating experience with the process, and RCRA permitting officials have essentially no experience with this process. Total organic concentrations are limited to 20% by weight. Also, inorganic debris is limited to a maximum of 20% by volume.

4. Availability/Capacity/Costs

At this time, vitrification processes have not been widely accepted. As mentioned above, this may be due to the high operation costs, technical complexity of the process, and difficulty in obtaining permits. The cost of this process can go up to $1000 per ton, with an average cost in the range of $400-$600 per ton of soil. The following companies* are believed to provide vitrification processes:

1. B&W Nuclear Environmental Services, Inc.; pilot-scale

unit: 200 lb/hour

2. DOE/Battelle Memorial Institute's Pacific Northwest Laboratory; pilot scale; 3 units constructed, 6 other units planned: 10-25 tons/day
3. Electro-Pyrolysis, Inc.: pilot-scale unit: 100-500 lb./hour
4. EM&C Engineering Assoc.; bench-scale; hoped to go full-scale in 1993
5. Geosafe Corp.; full-scale unit: 4-6 tons/hour; 1 unit constructed, 1 other unit planned
6. J.M. Huber Corp.
7. Penberthy Electromelt International, Inc.
8. Pyrogenics, Inc.
9. Stir-Melter, Inc.(subsidiary of Glasstech, Inc.); full-scale unit: 2 tons/hour
10. Texaco Syngas, Inc.; full-scale unit: 2-4 tons/hour
11. Thagard Research Corp.
12. Western Product Recovery Group, Inc.: full-scale unit: 600-1000 lb./hour; 1 planned unit
13. Vortec Corp.: pilot-scale unit: 20 tons/day
14. Vulcan Resources, Ltd.
15. Westinghouse Electric Corp.

* NOTE: Many of the above-mentioned bench-scale/pilot-scale systems for each of the treatment technologies were reported as being such nearly a year ago. Thus, it is quite feasible that at least some of these systems are now commercially available as full-scale systems.

YH4F-50003. E

APPENDIX E

COMMENTER DATA

EXHIBIT E-1
COMMENTS SUBMITTED IN RESPONSE TO THE ANPRM

Commenter	Issues Addressed	Data Submitted
Koppers Industries, Inc.	F032/34 wastewaters are usually discharged to POTWs.	None.
Vulcan Chemicals	F032 wastes may be difficult to treat because of dioxins.	None.
American Wood Preserving Institute	Wood preserving waste generation and management. The number of wood preserving plants has declined. F035 wastewaters are recycled in process.	None.
James Graham Brown Foundation	Remedial actions at former wood preserving plants owned by the foundation.	One site has 8,000 cubic yards of contaminated soil.
Beazer East	Remedial actions at wood preserving sites. Incineration capacity will be overwhelmed by contaminated soil. F032 wastes may contain dioxins and be very difficult to treat. Impact of LDRs on closed wood preserving sites.	At 31 wood preserving sites, 2,180,800 cubic yards of contaminated soil was removed. The entire wood preserving universe could generate 85,300,000 cubic yards of contaminated soil through remedial actions.
Hazardous Waste Treatment Council	F032 wastes may contain dioxins and be very difficult to treat.	None.
Beazer East (Second Comment)	Biotreatment for wood preserving soils is currently prohibited as land disposal.	One remedial site in Montana has 75,000 cubic yards of contaminated soil and rock.

EXHIBIT E-2

COMMENTS TO THE PHASE IV PROPOSED RULE (60 FR 43654, May 10, 1996)

Comment Number	Commenter Name
1	Grady-White Boats
2	Olympic Boat Company
3	Sunfish Laser
4	Larson Boats
5	Arctco Inc.
6	Regal Marine Industries
7	Godfrey Marine
8	Florida Department of Environmental Protection
9	National Marine Manufacturers Association
10	Coalition on West Valley Nuclear Wastes
11	Blue Water Boats, Inc.
12	Coastal Corporation
13	New York State Department of Environmental Conservation
14	Silver Coalition
15	BP Oil
16	Universal Forest Products
17	Eastman Kodak
18	Mobil Oil Corporation
19	ASARCO Incorporated
20	Exxon Company, USA
21	Georgia-Pacific Corporation
22	Phelps Dodge Corporation
23	Beazer East, Inc.
24	Union Camp Corporation
25	Magma Copper Company
26	The TDJ Group
27	Rollins Environmental
28	Texas Utilities Services, Inc.
29	The Acrylonitrile Group, Inc.
30	National Petroleum Refiners Association
31	Department of Energy
32	Penta Task Force
33	Carbon Disulfide Panel/Chemical Manufacturers Association
34	Underground Injection Control Task Group/Chemical Manufacturers Association
35	Utility Solid Waste Activities Group, Edison Electric Institute, American Public Power Association, National Rural Electric Cooperative Association
36	American Iron and Steel Institute
37	Natural Gas Pipeline Company
38	Association of Battery Recyclers
39	American Wood Preservers Institute

EXHIBIT E-2

COMMENTS TO THE PHASE IV PROPOSED RULE (60 FR 43654, May 10, 1996)

Comment Number	Commenter Name
40	Interstate Natural Gas Association of America
41	Sterling Chemicals
42	Monsanto
43	Lead Industries Association, Inc.
44	American Forest and Paper Association
45	Battery Council International
46	National Mining Association
47	Merck & Co., Inc.
48	Chemical Waste Management, Inc.
49	Molten Metal Technology
50	Natural Gas Pipeline Company of America (Identical to 37)
51	State of Ohio Environmental Protection Agency
52	Pacific Gas and Electric Company
53	Texaco
54	Total Petroleum, Inc.
55	American Industrial Health Council
56	Westinghouse Electric Corporation
57	Richard L. Anderson
58	J.H. Baxter and Co.
59	Exxon Chemical Americas
60	American Dental Association
61	BP Chemicals
62	Remediation Technologies, Inc.
63	Laidlaw Environmental Services
64	Dow Chemical Company
65	Safety-Kleen Corporation
66	American Petroleum Institute
67	Horsehead Resource Development Company, Inc. and Zinc Corporation of America
68	Amerada Hess Corporation
69	Steel Structures Painting Council
70	Doe Run Resources Corporation
71	Synthetic Organic Chemical Manufacturers Association
72	Non-ferrous Founders' Society
73	Outboard Marine Corporation
74	Department of Defense
75	Elf Atochem North America, Inc.
76	The Society of the Plastics Industry, Inc.
77	American Foundrymen's Society
78	Battery Council International
79	The Society of the Plastics Industry, Inc. (Identical to 76)
80	Eastman Chemical Company
81	Rohm & Haas Company
82	Brush Wellman, Inc.

EXHIBIT E-2

COMMENTS TO THE PHASE IV PROPOSED RULE (60 FR 43654, May 10, 1996)

Comment Number	Commenter Name
83	Steel Manufacturers Association
84	Specialty Steel Industry of North America
85	Environmental Defense Fund
86	American Gas Association
87	Doe Run Resources Corporation (Identical to 70)
88	Texas Utilities Services, Inc. (Identical to 28)
89	Hazardous Waste Implementation Task Force of the Association of State and Territorial Solid Waste Management Officials
90	The Cadmium Council
91	FMC Corporation
92	Union Carbide Corporation
93	Heritage Environmental Services, Inc.
94	General Motors Corporation
95	General Electric Company
96	International Metals Reclamation Company, Inc.
97	Hazardous Waste Management Association (HWMA)
98	New York State Department of Environmental Conservation (Identical to 13)
99	State of Ohio Environmental Protection Agency (Identical to 51)
100	Phillips Petroleum Company
101	Oregon Department of Environmental Quality
102	Chevron
103	Ciba-Geigy Corporation
104	Specialty Steel Industry of North America (Identical to 84)
105	Steel Manufacturers Association (Identical to 83)
106	Pharmaceutical Research and Manufacturers of America
107	Uniroyal Chemical Company
108	S2 Yachts
109	Ford Motor Company
110	American Foundrymen's Society
111	Specialty Steel Industry of North America
112	Steel Manufacturers Association
113	Chemical Manufacturers Association
114	Gradient Corporation
115	Courtaulds Fibers
116	Occidental Chemical Company (OxyChem)
117	Boston Whaler
118	FMC Corporation
119	Rohm and Haas Company
L001	University of Rochester
L002	Distilled Spirits Council of The United States
LXXX	FMC Corporation

EXHIBIT E-2

COMMENTS TO THE PHASE IV PROPOSED RULE (60 FR 43654, May 10, 1996)

Comment Number	Commenter Name
LXXX	Penta Task Force

EXHIBIT E-3
COMMENTS TO THE PHASE IV PROPOSED RULE
NOTICE OF DATA AVAILABILITY (61 FR 21418)

Comment Number	Comment Name
N1	Environmental Technologies International, Inc.
N2	Battery Council International and Association of Battery Recyclers
N3	Vulcan Chemicals (Penta Task Force)
N4	Eastman Kodak Company
N5	National Mining Association
N6	RSR Corporation
N7	The Silver Council
N8	Battery Council International and Association of Battery Recyclers
N9	Dow Chemical Company
N10	Environmental Defense Fund
N11	Vinyl Institute
N12	Beazer East, Inc.
N13	Georgia Dept. of Natural Resources
N14	Environmental Technology Council
N15	Cement Kiln Recycling Coalition
N16	DuPont Engineering
N17	FMC Corporation
N18	Chemical Waste Management, Inc.
N19	Rollins Environmental, Inc.
N20	CONDEA Vista Company
N21	J.H. Baxter & Company

1H4F-50003.F

Appendix F
COMMUNICATION LOGS

MEMORANDUM

DATE: February 19, 1997

TO: Docket

FROM: C. Pan Lee, OSW/HWMMD/AIB

SUBJECT: Phone Conversation with Steve Ladner of Kerr-McGee (405/270-2625)

Mr. Steve Ladner has great concern on capacity determination status about soil and debris contaminated with F034. He represents a wood treating company, Kerr-McGee and is from its headquarters at Oklahoma City, Oklahoma.

Mr. Ladner noted that his company has seven facilities and been in wood treating business for 80 to 90 years. He added that 5 out of 7 sites used to use surface impoundments (SI) for processing wastewater but the facilities excavated and closed all SI's ten to twelve years ago. He emphasizes that these sites still have big areas contaminated with F034 surrounding these closed SI's due to possible extensive migration of contaminants. His company had provided comments to American Wood Preservers Institute (AWPI) who submitted its comment (P42A-0039) in response to the LDR Phase IV proposed rule (published August 22, 1995).

Its seven operating wood treating facilities are around residential areas and located in the following places:

(1) Madison, Illinois,
(2) Indianapolis, Indiana,
(3) Columbus, Mississippi,
(4) Springfield, Missouri,
(5) Dalles, Oregon,
(6) Avoca, Pennsylvania, and
(7) Texarkana, Texas.

None of them are Superfund sites, but 4 out of 7 facilities are under various stages of corrective action process with on-going investigation phase as minimum. Mr. Ladner noted that the sites are in different planning stages, for example, Regions/states are in the process of reviewing some corrective action plan (CAP) and the facilities have no control on clean-up levels for contaminants and time table of clean-up approved by EPA or states. He added that quite extensive contaminated areas really make sites clean-up difficult. Mr. Ladner is aware that a CAMU allows an area of a facility to be remediated without triggering LDR standards if the remediated material is placed back into the area, but asserted that also there is existing legal interpretation issue of whether the contaminated areas are definitely designated as a big CAMU. He would guess at least a few thousands tons of hazardous soil and debris could be generated if excavated for disposal due to the immediate effective date of the LDR standards. The sites would have to plan very differently to comply with regulatory requirements with immediate effective date or with a delayed effective date to the Phase IV LDR standards. He indicated that it can cost about $500/ton to cover landfilling, transportation, and other miscellaneous expenses if the sites have to ship contaminated soil and debris for off-site disposal and four or five times more for incineration.

DATE: January 16, 1997

SUBJECT: Phone Log with Jim Brown re: NODA Comment Letter (P42A-00013)

FROM: C. Pan Lee, Staff, OSW/HWMMD/AIB

TO: Docket

Mr. Jim Brown (Technical staff, Environmental Protection Division (EPD), Georgia Department of Natural Resources; phone: 404/657-8600) has provided me with some detailed information regarding the quantity and wood preserving wastes mentioned in EPD's comment letter (P42A-00013) in response to Notice of Data Availability for LDR Phase IV Proposed Rule (61 FR 21418; May 10, 1996).

Mr. Brown noted that EPD has been negotiating contracts for removal of soil contaminated with wood preserving wastes (F032, F034 and/or F035) or has ongoing Superfund cleanup activities in coordination with EPA Region IV for six abandoned wood treating facilities in the next two years. He provided the following information:

(1) Escambia site, Brunswick, Georgia:

Excavate about 100,000 tons of soil contaminated with F032 and F034 mixture from spill at storage, production and drippage areas. Of the 100,000 tons of soil contaminated with F032 and F034, 30,000 tons had been removed and the rest will be removed within next two years or so.
This site has closed two surface impoundments (S.I.) which was used to treat F035 wastewater. Mr. Brown added that the excavated soil contaminated with F035 from the impoundments is currently stored in another cell and amounts to about 20,000 tons. The 20,000 tons of contaminated soil will be removed within next two years.
Besides a lot of volatile creosote compounds in the contaminated soil (to be conservative, also identified as F034), the concentration levels of other contaminants in the hazardous soil are as follows:
pentachlorophenol -- 8 mg/kg (passed TCLP and therefore, not D037 wastes)
arsenic -- 170 mg/kg in total composition (TCLP: 0.25 mg/l)
chromium -- 190 mg/kg in total composition (TCLP: 0.19 mg/l)

(2) Of the 12,000 tons of soil contaminated with F032, F034 and F035 mixture in another site, Mr. Brown noted that EPD has removed around 10,000 tons.
(3) The rest of contaminated soil are under contract negotiation for its excavation and removal.

In summary, Mr. Brown confirmed that about 130,000 tons (150,000 minus 40,000 equals 110,000 tons of soil contaminated with F032 and/or F034 plus 20,000 tons of soil contaminated with F035) in total will be removed in next two years or so. He also noted that no K001 contamination in these soil and that EPD does not want on-site treatment for contaminated soil in these sites because all six sites are around the residential areas.

DATE: January 10, 1997

SUBJECT: Phone Log on Comment Letter of Georgia Department of Natural Resources

FROM: C. Pan Lee, Staff, OSW/HWMMD/AIB

TO: Docket

I called Mr. Harold Reheis (phone: 404/656-4713), Director, Environmental Protection Division (EPD), Georgia Department of Natural Resources on January 10, 1997 to gain some details regarding his comment letter submitted in response to LDR Phase IV -- Notice of Data Availability (61 FR 21418; May 10, 1996). His assistant, Mr. David Word, answered the phone since Mr. Reheis was not in. Mr. Word noted that EPD had some characteristics information of six abandoned wood treating facilities and would ask technical staff of EPD to answer my questions.

DATE: July 24, 1996

SUBJECT: Meeting Summary with Members of AWPI

FROM: C. Pan Lee, OSW/HWMMD/AIB

TO: Docket File

AWPI and its members came to the EPA for a 1997 Biennial Reporting meeting (the main purpose of the meeting) in which Dave Bussard, Sara Rasmussen, Robert Buchard, Dave Levy and I of the EPA participated. I had asked the representatives from wood treaters for some questions at the end of their meeting regarding wastewater management practices of wood preserving wastes, especially F032, F034, and F035 in the LDR Phase IV.

Mr. Stephen Smith, Environmental Manager of Koppers, Inc. (Headquarter: Pittsburgh, PA, phone: 412/227-2677) noted that CCA plants (which may generate F035) had no wastewater generated. He added that three quarters of oil-borne plants (i.e., using cresol, PCP for wood preserving) used to use surface impoundments (S.I.) in managing wastewater but now no one use S.I. and all their facilities have switched to use tanks or an enclosed system. Since wood preserving wastes identified as F032, F034, and/or F035 will be impacted by LDR Phase IV if managed in a non-MTR S.I. or other land-based units without meeting LDR standards, Mr. Smith noted again that their facilities do not have a wastewater management problem. He added that a couple of plants in Pennsylvania and West Virginia do send their F-code wastewaters to Chambers Work, New Jersey (about 10 trucks per year) when generating.

DATE: January 21, 1997

SUBJECT: Phone Log with Beth Sheldrake, Region X of EPA

FROM: C. Pan Lee, OSW/HWMMD/AIB

TO: Docket

Beth Sheldrake provided the following site information in relation to soil contaminated with wood treating wastes.

Oesers Company in Washington State was proposed as one of NPL sites on December 23, 1996. It has a total area of 23.5 acres and has been treating wood since the late 1930's.
The wastes include discarded product, contaminated soil and debris, and possibly sludges and other wastes from a groundwater pump and treat system.
The contaminants in the site have PCP and creosote. Dioxin is possibly an issue. Ms. Sheldrake noted that total concentration of PCP could be as high as 165 ppm and that they did not run TCLP test for PCP. She also mentioned that 23 gallons of discarded creosote is on the site.
She estimated that about 5,000 tons of soil and debris contaminated with F032 and F034 from the most contaminated area (hot spots including some from waste pond on the site) will be excavated and removed for disposal if the rule becomes effective in 90 days after the treatment standards for wood preserving wastes in the LDR Phase IV is promulgated. She does not anticipate in-situ treatment will be used for the highly contaminated area. Also, she indicated that they definitely will excavate the 5,000 tons [for treatment?-- uncertain] even though they won't know the types of remediation for this site until several years later.

From: JUDI SCHWARZ
To: DCCS01.DCCSPO2.LEE-CPAN
Date: 12/13/96 2:46pm
Subject: Wood treater LDR - need info! -Reply -Forwarded

Here is another SF wood treater cleanup site in this region. If you need more information, please contact Beth Sheldrake at 206 553-0220.

Even though Beth does not have volume numbers at this time, and we are trying to remove and dispose off-site the most grossly contaminated material prior to April, sites like this one make an important point - namely, new wood treater sites that will require extensive cleanup are still showing up. If I remember correctly, neither the Federal nor the state SF nor RCRA programs were aware of the extent of environmental problems at this facility until the past year.

CC: SHELDRAKE-BETH

From: PETER RUBENSTEIN
To: RTPMAINHUB:DCWIC01:DCCS01.DCCSPO2(LEE-CPAN)
Date: 12/19/96 2:46pm
Subject: wood treater LDR - need info! -Reply -Forwarded -Reply -Reply

Wyckoff Soil OU (used to be named Wyckoff Facility OU)
1) K001 is NOT one of the waste codes for this material
2) ROD in 1998, RD in 1998-99, RA start in 1999
3) Non-time critical removal action underway this February, removal of asphalt and pipe, not soils.
4) If all of the contaminated soils are removed it will be approximately 12 acres x 10'. However, this very unlikely. Most likely treated/capped in place.

TH4F-50003.G

Appendix G

BIENNIAL REPORTING SYSTEM REPORT

1993 BRS Wood Preserving Data -- Extracted From the Reporting Data Base

Facility Name	EPA ID	Waste Codes	Assigned Wood Preserving Code	Origin	Source	Form	System	EPA ID of Off-Site Manager	Tons Generated
ARCO ALASKA, INC. PRUDHOE BAY	AKD991281221	D001D018F003F005F035	F035	1	A94	B202	M141	WAD058367152	1.62
WALKER-WILLIAMS LUMBER COMPANY	ALD003326444	D004D007F035	F035	1	A29	B409	M125	ALD983177015	5.80
WALKER-WILLIAMS LUMBER COMPANY	ALD003326444	D004D007F035	F035	1	A29	B409	M125	TND000645770	0.60
WALKER-WILLIAMS LUMBER COMPANY	ALD003326444	D004D007F035	F035	1	A49	B302	M125	ALD983177015	14.63
KOPPERS INDUSTRIES, INC. (MONTGOMERY)	ALD004009403	F032F034	F032	1	A92	B301	M132	SCD070375985	158.11
KOPPERS INDUSTRIES, INC. (MONTGOMERY)	ALD004009403	F032F034	F032	1	A59	B319	M132	SCD070375985	3.96
KOPPERS INDUSTRIES, INC. (MONTGOMERY)	ALD004009403	F032F034	F032	1	A69	B301	M132	SCD070375985	137.34
KOPPERS INDUSTRIES, INC. (MONTGOMERY)	ALD004009403	D004D007F035	F035	1	A92	B302	M132	GAD000821934	4.88
KOPPERS INDUSTRIES, INC. (MONTGOMERY)	ALD004009403	F032F034	F032	1	A49	B102	M032		30,519.90
T.R. MILLER MILL COMPANY, INC.	ALD008161416	D037F032	F032	1	A92	B409	M132	SCD070375985	1.80
T.R. MILLER MILL COMPANY, INC.	ALD008161416	D037F032	F032	1	A92	B409	M141	TND000645770	3.00
T.R. MILLER MILL COMPANY, INC.	ALD008161416	D004D007F035	F035	1	A92	B302	M141	GAD000821934	9.40
HUXFORD POLE & TIMBER COMPANY, INC.	ALD008185407	D004D007F035	F035	1	A59	B302	M141	TND000645770	1.00
HUXFORD POLE & TIMBER COMPANY, INC.	ALD008185407	F032	F032	1	A59	B301	M141	TND000645770	1.40
HUXFORD POLE & TIMBER COMPANY, INC.	ALD008185407	F032F034	F032	1	A49	B102	M122		510.66
HUXFORD POLE & TIMBER COMPANY, INC.	ALD008185407	F032F034	F032	1	A49	B102	M124		1,960.73
BALDWIN POLE & PILING COMPANY, INC.	ALD031490501	F032	F032	1	A49	B102	M085		150.10
SEAMAN TIMBER COMPANY, INC.	ALD034046730	F034	F034	1	A92	B409	M043	ALD031499833	1.44
SEAMAN TIMBER COMPANY, INC.	ALD034046730	F034	F034	1	A92	B409	M132	ALD000622464	32.00
SEAMAN TIMBER COMPANY, INC.	ALD034046730	F034	F034	1	A99	B219	M122		4,250.00
STALLWORTH TIMBER COMPANY, INC.	ALD058223371	F032	F032	1	A19	B401			0.95
STALLWORTH TIMBER COMPANY, INC.	ALD058223371	F034	F034	1	A19	B402			0.95
LOUISIANA-PACIFIC CORPORATION	ALD095687786	D004D007F035	F035	1	A09	B301	M119	ALD000622464	0.32
GREAT SOUTHERN WOOD PRESERVING	ALD095702817	F035	F035	1	A92	B519	M111	TND000614321	0.50
GREAT SOUTHERN WOOD PRESERVING	ALD095702817	F035	F035	1	A92	B519	M111	TND000645770	3.50
WALKER-WILLIAMS LUMBER CO., INC.	ALD981023773	D004D007F035	F035	1	A49	B302	M125	ALD983177015	3.25
WALKER-WILLIAMS LUMBER CO., INC.	ALD981023773	D004D007F035	F035	1	A49	B302	M125	TND000645770	3.90
BALDWIN POLE AND PILING CO INC	ALD982114704	D004D007F035	F035	1	A59	B302	M061	TND991279480	2.98
BALDWIN POLE AND PILING CO INC	ALD982114704	D004D007F035	F035	1	A59	B302	M125	ALD983177015	5.63
BALDWIN POLE AND PILING CO INC	ALD982114704	F035	F035	1	A59	B114	M032		364.56
KOPPERS INDUSTRIES INC	ARD006344824	F032F034	F032	1	A49	B102	M091		24,956.47
KOPPERS INDUSTRIES INC	ARD006344824	F032F034	F032	1	A09	B603	M132	SCD070375985	61.72
KOPPERS INDUSTRIES INC	ARD006344824	F032F034	F032	2	A63	B301	M132	SCD070375985	114.03
SENTINEL INDUSTRIES INC	ARD047335096	D004D007F035	F035	1	A09	B302	M137	LAD000777201	0.24
SENTINEL INDUSTRIES INC	ARD047335096	D004D007F035	F035	1	A09	B302	M137	NCD000648451	0.27
SENTINEL INDUSTRIES INC	ARD047335096	D004D007F035	F035	1	A09	B302	M137	TND981922826	0.54
WEYERHAEUSER COMPANY	ARD067671313	F032	F032	1	A89	B407	M132	ALD000622464	144.17
J.H. BAXTER & CO.	CAD000625731	D004F035	F035	1	A09	B113	M111	ORD089452353	6.25
J.H. BAXTER & CO.	CAD000625731	D004F034F035	F034	1	A09	B603	M061	LAD079464095	2.50
HUGHES AIRCRAFT CO, ELECTRO OPTICAL	CAD000633230	D001F035	F035	1	A19	B203	M051	CAD008302903	6.63
ROCKWELL INTL TELECOMM DIV	CAD008371437	D001D035F003F035	F035	1	A05	B204	M061	ILD099202681	105.04
JH BAXTER & CO	CAD008480204	F032	F032	1	A09	B603	M061	LAD079464095	0.21
JH BAXTER & CO	CAD008480204	D004F035	F035	1	A09	B113	M111	CAD000633164	0.50
JH BAXTER & CO	CAD008480204	D004F035	F035	1	A09	B113	M111	ORD089452353	1.25
KOPPERS INDUSTRIES INC	CAD009112087	F032F034	F032	1	A09	B409	M132	IDD073114654	8.00
KOPPERS INDUSTRIES INC	CAD009112087	D004D007F035	F035	1	A09	B302	M111	IDD073114654	0.60
KOPPERS INDUSTRIES INC	CAD009112087	F032F034	F032	1	A49	B102	M091		9,662.88
ET, INC.	CAD009559618	D007D008F035	F035	1	A21	B319	M141	CAD009452657	0.68
SELMA TREATING CO	CAD029452141	D037F032F035	F032	1	A92	B319	M132	CAT000646117	27.00

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Facility Name	EPA ID	Waste Codes	Assigned Wood Preserving Code	Origin	Source	Form	System	EPA ID of Off-Site Manager	Tons Generated
ANACOMP, INC.	CAD051612802	F003F005F035	F035	1	A92	B409	M043	CAD009452657	17.98
COAST WOOD PRESERVING, INC.	CAD063015887	F035	F035	1	A60	B319	M119	CAT000646117	1.84
THUNDERBOLT WOOD TREATING CO.	CAD085857928	F035	F035	1	A60	B316	M119	CAD059494310	23.70
LAIDLAW ENV SVC LOKERN	CAD980675276	D005D006D007D008D009D018D037D0	F034	1	A94	B301			4.21
TURLOCK IRRIGATION DISTRICT	CAD981367691	F034	F034	2	A69	B301	M132	IDD073114654	208.64
ATCHISON, TOPEKA & SANTA FE RY CO.	CAD981460066	D004D007D037F032	F032	2	A69	B609	M132	CAT000646117	26.97
ROSEBURG FOREST PRODUCTS	CAD982324519	F034	F034	2	A61	B219	M132	IDD073114654	3.00
ADVANCED STRUCTURES, INC.	CAD982437378	D001F005F035	F035	1	A06	B203	M041	CAT080010101	8.45
FONTANA WOOD PRESERVING INC	CAT000611079	F035	F035	1	A60	B319	M119	UTD991301748	14.75
BRODERICK INVESTMENTS CO	COD000110254	F032F034	F032	2	A61	B409	M132	IDD073114654	101.64
KOPPERS (BEAZER EAST INC)	COD007077175	D004D007F035	F035	1	A59	B302	M141	IND000781609	3.25
KOPPERS (BEAZER EAST INC)	COD007077175	F034	F034	1	A59	B301	M132	IDD073114654	16.99
KOPPERS (BEAZER EAST INC)	COD007077175	F034	F034	1	A59	B301	M132	UTD991301748	9.27
KOPPERS (BEAZER EAST INC)	COD007077175	F032F034F035	F032	1	A59	B301	M132	UTD991301748	12.75
KOPPERS (BEAZER EAST INC)	COD007077175	F034	F034	1	A75	B219	M032		776.86
KOPPERS (BEAZER EAST INC)	COD007077175	F034	F034	1	A75	B219	M085		12,216.16
UNIVERSAL FOREST PRODUCTS	COD121409775	D004D007F035	F035	1	A60	B316	M132	IND000645770	3.86
SOUTHERN WOOD PIEDMONT CO	FLD004053450	F032	F032	2	A63	B319	M032	LAD981057706	76.05
SOUTHERN WOOD PIEDMONT CO	FLD004053450	F032	F032	2	A63	B102	M091	IND981922826	30.73
SOUTHERN WOOD PIEDMONT CO	FLD004053450	F032	F032	2	A69	B301	M032	LAD981057706	104.67
KOPPERS INDUSTRIES,INC.	FLD004057535	D004D007F035	F035	1	A75	B402	M111	ALD000622464	4.80
KOPPERS INDUSTRIES,INC.	FLD004057535	D004D007F035	F035	1	A75	B402	M141	GAD000821934	10.00
KOPPERS INDUSTRIES,INC.	FLD004057535	F032F034	F032		A09	B603	M132	SCD070375985	1.38
KOPPERS INDUSTRIES,INC.	FLD004057535	D002F032F034F035	F032	2	A61	B514	M132	SCD070375985	46.75
ROBBINS MFG CO	FLD004089231	D004D007F035	F035	1	A31	B519	M111	GAD000821934	22.40
DICTAPHONE CORP	FLD087332433	D001D008F001F005F035	F035	1	A21	B409	M043	ARD069748192	0.30
CLAY ELECTRIC COOPERATIVE	FLD982117996	D037F032	F032	2	A53	B310	M141	FLD981474802	0.80
SUNBELT FOREST PRODUCTS,CORP.	FLD984194316	D004D007F035	F035	1	A92	B316	M111	ALD000622464	4.31
PERRY LUMBER CO,INC.	FLD984206250	F035	F035	1	A09	B316	M132	ALD983177015	3.60
PERRY LUMBER CO,INC.	FLD984206250	F035	F035	1	A09	B316	M132	SCD070375985	13.94
USNAS JACKSONVILLE	FL6170024412	D001F003F005F035	F035	1	A21	B211	M049	IND000614321	0.94
SOUTHERN WOOD PIEDMONT CO-MACON	GAD003264074	F032	F032	2	A69	B301	M032	LAD981057706	15.60
LANGDALE FOREST PRODUCTS CO	GAD003300506	D004D007F035	F035	1	A38	B319	M111	ALD000622464	52.27
WILLIAM C MEREDITH CO	GAD003323805	F032	F032	1	A59	B102	M077		223.60
WILLIAM C MEREDITH CO	GAD003323805	F032	F032	1	A49	B102	M077		832.03
WILLIAM C MEREDITH CO	GAD003323805	F032	F032	1	A59	B102	M077		441.10
WILLIAM C MEREDITH CO	GAD003323805	F032	F032	1	A49	B102	M077		178.18
WILLIAM C MEREDITH CO	GAD003323805	F032F034	F032	2	A63	B301	M132	SCD070375985	43.81
WILLIAM C MEREDITH CO	GAD003323805	F032	F032	1	A51	B401	M132	SCD070375985	2.15
WILLIAM C MEREDITH CO	GAD003323805	F032	F032	5	A75	B102	M122		1,213.18
SOUTHERN WOOD PIEDMONT CO -	GAD051034387	F032	F032	2	A69	B301	M032	LAD981057706	8,956.60
SOUTHERN WOOD PIEDMONT CO-EAST	GAD067560870	F032	F032	2	A63	B319	M032	LAD981057706	17.30
SOUTHERN WOOD PIEDMONT CO-EAST	GAD067560870	D018F032	F032	2	A63	B219	M051	LAD981057706	8.70
SOUTHERN WOOD PIEDMONT CO-EAST	GAD067560870	F032	F032	2	A69	B301	M032	LAD981057706	7.20
GEORGIA-PACIFIC PEARSON	GAD082831736	D004D007F035	F035	2	A53	B302	M132	ALD000622464	6.05
GEORGIA-PACIFIC PEARSON	GAD082831736	D004D007F035	F035	1	A92	B302	M132	ALD000622464	7.70
ATLANTIC WOOD INDUSTRIES INC	GAD084914787	F032	F032	1	A09	B409	M132	SCD070375985	6.04
ATLANTIC WOOD INDUSTRIES INC	GAD084914787	F034	F034	1	A09	B409	M132	SCD070375985	96.23
ATLANTIC WOOD INDUSTRIES INC	GAD095815015	D004D007F035	F035	1	A09	B302	M132	ALD000622464	11.75

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Facility Name	EPA ID	Waste Codes	Assigned Wood Preserving Code	Origin	Source	Form	System	EPA ID of Off-Site Manager	Tons Generated
ATLANTIC WOOD INDUSTRIES INC	GAD095815015	D004D007F035	F035	1	A09	B302	M141	ALD983177015	2.28
ATLANTIC WOOD INDUSTRIES INC	GAD095815015	D004D007F035	F035	1	A09	B302	M141	GAD000821934	4.17
ATLANTIC WOOD INDUSTRIES INC	GAD095815015	D004D007F035	F035	1	A89	B119	M032		3,073.66
VARN WOOD PRESERVING	GAD981230345	D004D007F035	F035	1	A92	B302	M132	ALD000622464	0.23
VARN WOOD PRESERVING	GAD981230345	D004D007F035	F035	1	A92	B302	M132	NCD000648451	0.89
VARN WOOD PRESERVING	GAD981230345	D004D007F035	F035	1	A92	B302	M132	TND981922826	0.60
GEORGIA-PACIFIC STERLING	GAD984320952	D004D007F035	F035	1	A92	B302	M132	ALD000622464	7.70
GEORGIA-PACIFIC STERLING	GAD984320952	D004D007F035	F035	2	A53	B302	M132	ALD000622464	4.95
HAWAII WOOD PRESERVING COMPANY	HID980883185	D004D007F035	F035	1	A35	B319	M132	IDD073114654	90.61
MIDPAC LUMBER CO	HID981164569	D004D007F035	F035	1	A09	B409	M111	IDD073114654	1.00
MIDPAC LUMBER CO	HID981164569	F035	F035	1	A37	B114	M032		128.86
L D MCFARLAND COMPANY	IDD009062597	F032	F032	1	A59	B301	M111	ORD089452353	3.68
L D MCFARLAND COMPANY	IDD009062597	F032	F032	1	A60	B609	M061	TND991279480	2.10
L D MCFARLAND COMPANY	IDD009062597	F032	F032	1	A60	B609	M061	ARD981057870	2.10
UNIVERSITY OF IDAHO MOSCOW	IDD075746271	D037F032	F032	1	A69	B301			45.10
ENVIROSAFE SERVICES OF AMERICA INC	IDD984669119	F034	F034	2	A69	B301	M125	IDD073114654	101.80
USDA FS THORN CK ADMIN SITE	ID0000036186	F032	F032	2	A69	B301	M132	IDD073114654	39.20
USDA FHA GAMMETT FARM	ID0122307614	F032	F032	2	A69	B301	M132	IDD073114654	21.73
USDA MCARTHUR FARM	ID7122307617	F032	F032	2	A69	B301	M132	IDD073114654	21.73
PEORIA DISPOSAL CO INC	ILD000805812	F034	F034	5	A77	B305	M132		96.21
BEAZER EAST INC	ILD000819946	F032F034	F032	2	A09	B606	M111	SCD070375985	9.62
VALSPAR CORP	ILD002525723	D001F003F005F035	F035	1	A57	B606	M061	ILD087157251	21.34
KERR-MCGEE CHEMICAL CORP	ILD020367561	F034	F034	1	A56	B301	M132	ILD000805812	28.85
KERR-MCGEE CHEMICAL CORP	ILD020367561	F034	F034	1	A56	B301	M141	ILD981097819	1.34
CASSWOOD TREATED PRODUCTS INC	ILD060861978	F035K001	F035	2	A69	B301	M141	ILD980502744	54.11
UNION PACIFIC RAILROAD	ILD984856583	F034	F034	2	A69	B301	M132	OKD065438376	7,954.08
KOPPERS INDUSTRIES, INC.	ILD990817991	F034	F034	1	A92	B402	M132	SCD070375985	27.08
KOPPERS INDUSTRIES, INC.	ILD990817991	F034	F034	1	A49	B102	M032		2,356.52
KOPPERS INDUSTRIES, INC.	ILD990817991	F034	F034	1	A49	B102	M081		2,356.52
UNIVERSAL FOREST PRODUCTS, INC.	IND064702160	D004D007F035	F035	1	A09	B302	M141	IND000781609	0.77
UNIVERSAL FOREST PRODUCTS, INC.	IND064702160	F035	F035	1	A59	B319	M132	ALD000622464	10.82
KERR-MCGEE	IND072081078	F034	F034	2	A53	B301	M132	ILD009848193	106.08
APTUS INCINERATION, CHEMICAL	KSD981506025	F001F002F003F004F005F006F007F008F0	F032	1	A74	B409	M042		0.26
APTUS INCINERATION, CHEMICAL	KSD981506025	F001F002F003F004F005F006F007F008F0	F032	1	A74	B409	M043		72.58
BROWN WOOD PRESERVING CO INC	KYD000830711	D004D007F035	F035	1	A60	B316	M019	GAD000821934	1.22
BROWN WOOD PRESERVING CO INC	KYD000830711	D004D007F035	F035	1	A60	B316	M019	IND000781609	4.27
BROWN WOOD PRESERVING CO INC	KYD000830711	D004D007F035	F035	1	A60	B316	M132	ALD000622464	7.01
KOPPERS INDUSTRIES	KYD006383392	F034	F034	1	A59	B219	M132	SCD070375985	18.34
KOPPERS INDUSTRIES	KYD006383392	F034	F034	1	A59	B409	M132	SCD070375985	7.94
KOPPERS INDUSTRIES	KYD006383392	F034	F034	1	A63	B301	M132	SCD070375985	107.04
EASTERDAY TIE & TIMBER COMPANY	KYD985077502	F034	F034	1	A92	B301	M043	KYD088438817	563.70
CHEMICAL WASTE MANAGEMENT	LAD000777201	D034D035D036D037D038F006F019F02	NOT	1	A94	B003	M132		2.70
CHEMICAL WASTE MANAGEMENT	LAD000777201	D029D030D031D032D033D034D035D0	NOT	1	A53	B316	M132		1,012.20
INTERNATIONAL PAPER	LAD008077315	F034	F034	1	A92	B409	M049	ALD031499833	95.76
PPG INDUSTRIES INC - LAKE CHARLES FAC	LAD008086506	D019D022D029D032D033D039D040F0	F034	1	A09	B409	M043	ARD069748192	2.25
MADISONVILLE WOOD PRESERVING CO	LAD008171191	F034	F034	1	A38	B606	M042	LAD981057706	0.94
COLFAX CREOSOTING COMPANY	LAD008184616	F034	F034	2	A53	B301	M132	LAD000777201	24.00
COLFAX CREOSOTING COMPANY	LAD008184616	F032F034	F032	2	A53	B301	M132	LAD000777201	182.40
COLFAX CREOSOTING COMPANY	LAD008184616	F032F034	F032	1	A89	B205	M078		26,854.81

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Facility Name	EPA ID	Waste Codes	Assigned Wood Preserving Code	Origin	Source	Form	System	EPA ID of Off-Site Manager	Tons Generated
DURAWOOD TREATING COMPANY	LAD069524981	F034	F034	2	A53	B301	M132	LAD000777201	42.70
DURAWOOD TREATING COMPANY	LAD069524981	F034	F034	1	A89	B205	M078		14,024.07
LAIDLAW ENVIRONMENAL SERVICES	LAD079464095	D004D007D018D037F032F034F035	F032	5	A99	B601	M052	LAD981057706	30.33
ELDER WOOD PRESERVING CO INC	LAD083451856	D004D007F035	F035	1	A49	B319	M132	NCD000648451	1.10
ELDER WOOD PRESERVING CO INC	LAD083451856	D004D007F035	F035	1	A49	B319	M132	TND981922826	21.80
ELDER WOOD PRESERVING CO INC	LAD083451856	D004D007F035	F035	1	A49	B519	M132	LAD000777201	2.70
SUPERIOR TIE & TIMBER CO	LAD980622054	F034	F034	1	A92	B301	M043	LAD010395127	18.80
ARCADIAN FERTILIZER, L.P.	LAD980875934	D001D008D035F005F035	F035	1	A21	B211	M053	LAD079464095	1.50
ARCADIAN FERTILIZER, L.P.	LAD980875934	D001D008D035F005F035	F035	1	A21	B211	M141	TXD982290140	0.50
KOPPERS IND INC/FORMERLY MID-SOUTH	LAD985171594	F034	F034	1	A49	B102	M123		2,551,197.00
KOPPERS IND INC/FORMERLY MID-SOUTH	LAD985171594	F034	F034	1	A38	B402	M061	OKD089761290	337.66
DIS-TRAN PRODUCTS INC	LAT230012478	F032	F032	1	A99	B102			12,760.63
POLAROID CORPORATION	MAD058060476	D001F002F003F005F035	F035	1	A21	B319	M141	MAD000604447	0.36
CHESAPEAKE BUILDING PRODUCTS CO	MDD038871562	D004D007F035	F035	1	A89	B319	M132	ALD000622464	3.00
CHESAPEAKE BUILDING PRODUCTS CO	MDD038871562	D004D007F035	F035	2	A56	B319	M132	ALD000622464	6.00
CHESAPEAKE BUILDING PRODUCTS CO	MDD038871562	D004D007F035	F035	2	A56	B319	M132	NYD049836679	8.40
ATLANTIC WOOD INDUSTRIES INC.	MDD095415840	D004D007F035	F035	1	A09	B302	M141	ALD981023492	21.27
ATLANTIC WOOD INDUSTRIES INC.	MDD095415840	D004D007F035	F035	1	A09	B302	M141	GAD000821934	9.51
LONG LIFE TREATED WOOD,INC	MDD980690838	D004D007F035	F035	1	A92	B302	M141	GAD000821934	4.40
REISTERTOWN LUMBER COMPANY, THE	MDP000007779	D001D037F032	F032	1	A59	B219	M041	NJD053288239	2.89
US EPA - SOUTHERN MARYLAND WOOD	MDP000008026	F032	F032	2	A61	B407	M042	IDD073114654	15.50
US EPA - SOUTHERN MARYLAND WOOD	MDP000008026	F032	F032	2	A61	B407	M042	KYD088438817	11.90
US EPA - SOUTHERN MARYLAND WOOD	MDP000008026	F032	F032	2	A61	B407	M042	SCD044442333	59.18
GH BASS & CO	MED001102508	D001F005F035	F035	1	A49	B211	M141	MAD000604447	0.29
WEYERHAEUSER COMPANY	MID038783239	D004D005F035	F035	1	A49	B319	M132	ALD000622464	4.75
WEYERHAEUSER COMPANY	MID038783239	D004D005F035	F035	2	A69	B319	M132	WID003967148	3.00
MARVIN LUMBER AND CEDAR CO.	MND006164511	F032	F032	1	A69	B301	M043	ILD980502744	1.65
MARVIN LUMBER AND CEDAR CO.	MND006164511	F032	F032	2	A69	B404	M043	ILD980502744	0.80
ANDERSEN CORPORATION	MND006167332	D001F032	F032	5	A38	B409	M043	LAD010395127	2.17
ANDERSEN CORPORATION	MND006167332	D001D037F032	F032	2	A69	B219	M041	LAD010395127	0.20
ANDERSEN CORPORATION	MND006167332	F032	F032	2	A65	B301	M132	OKD065438376	5.55
ANDERSEN CORPORATION	MND006167332	F032	F032	2	A69	B404	M125	AZD982441263	40.00
ANDERSEN CORPORATION	MND006167332	F032	F032	2	A56	B307	M132	OKD065438376	4.60
REILLY TAR & CHEMICAL CORP NPL SITE	MND981196462	F034	F034	1	A61	B301	M111	IND078911146	12.05
KERR-MCGEE CHEMICAL CORPORATION	MOD007129406	F034	F034		A57	B402	M132	ILD000805812	18.30
INTERNATIONAL PAPER	MOD007129935	F032	F032	1	A53	B407	M061	ALD031499833	48.00
INTERNATIONAL PAPER	MOD007129935	F032	F032	1	A53	B407	M132	OKD065438376	99.19
INTERNATIONAL PAPER MIDWEST TREATING	MOD980863112	D004D007F035	F035	1	A38	B301	M132	MOD980962849	6.50
INTERNATIONAL PAPER MIDWEST TREATING	MOD980863112	D004D007F035	F035	1	A38	B301	M132	TND000614321	5.50
KOPPERS INDUSTRIES, INC.	MSD007027543	F032F034	F032	1	A49	B102	M091		31,458.30
KOPPERS INDUSTRIES, INC.	MSD007027543	F032F034	F032	1	A59	B301	M132	SCD070375985	84.22
KOPPERS INDUSTRIES, INC.	MSD007027543	F032F034	F032	2	A63	B314	M132	SCD070375985	1.29
INTERNATIONAL PAPER COMPANY	MSD980600084	F032	F032	1	A38	B603	M061	MOD980962849	2.20
INTERNATIONAL PAPER COMPANY	MSD980600084	F032	F032	1	A38	B603	M061	TND991279480	38.66
INTERNATIONAL PAPER COMPANY	MSD980600084	F032	F032	1	A38	B603	M132	ALD000622464	22.35
INTERNATIONAL PAPER COMPANY	MSD980600084	F035	F035	1	A92	B302	M132	TND000645770	0.75
KERR-MCGEE CHEMICAL CORP.	MSD990866329	F034	F034	1	A69	B301	M132	ALD000622464	39.90
BN PARADISE TIE PLANT	MTD000716787	F034K001	F034	5	A64	B409	M132	UTD991301748	28.68
IDAHO POLE COMPANY	MTD006232276	F032	F032	1	A60	B219	M061	TND991279480	1.29

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Facility Name	EPA ID	Waste Codes	Assigned Wood Preserving Code	Origin	Source	Form	System	EPA ID of Off-Site Manager	Tons Generated
IDAHO POLE COMPANY	MTD006232276	F032	F032	1	A59	B301	M132	ORD089452353	9.48
IDAHO POLE COMPANY	MTD006232276	F032	F032	1	A59	B219	M061	ARD981057870	0.43
BN SOMERS TIE PLANT	MTD053038386	F034	F034	2	A61	B409	M132	ORD089452353	1,458.20
REAL LOG HOMES	MTD071754055	D032D037D041D042F032	F032	1	A37	B201	M041	WAD000812909	3.51
GRANITE TIMBER INC.	MTD986069508	F027F032	F032		A38	B601			0.15
MONTANA POLE & TREATMENT - NPL SITE	MTD986073583	F032	F032	1	A62	B404	M039	PAD000736942	40.69
DURABLE WOOD PRESERVERS, INC	NCD003173358	D004D007F035	F035	1	A63	B302	M141	GAD000821934	1.80
DURABLE WOOD PRESERVERS, INC	NCD003173358	D004D007F035	F035	1	A69	B119			58.31
COASTAL LUMBER CO	NCD003191079	D004D007F035	F035	1	A92	B302	M123		1,669.53
COASTAL LUMBER CO	NCD003191079	D004D007F035	F035	5	A92	B302	M119	ALD000622464	1.19
COASTAL LUMBER CO	NCD003191079	D004D007F035	F035	5	A92	B302	M119	TND981922826	0.25
COASTAL LUMBER CO	NCD003191079	D004D007F035	F035	5	A92	B302	M141	ALD983177015	1.66
COASTAL LUMBER CO	NCD003191079	D004D007F035	F035	5	A92	B302	M141	NCD000648451	1.40
COASTAL LUMBER CO	NCD003191079	D004D007F035	F035	2	A53	B302	M119	ALD000622464	0.95
UNIVERSAL FOREST PRODUCTS, INC	NCD055133029	D004D007F035	F035	1	A91	B319	M131	ALD000622464	1.03
UNIVERSAL FOREST PRODUCTS, INC	NCD055133029	D004D007F035	F035	1	A91	B319	M131	TND981922826	0.52
UNIVERSAL FOREST PRODUCTS, INC	NCD055133029	D004D007F035	F035	1	A91	B319	M141	NCD000648451	0.77
QUALITY FOREST PRODUCTS, INC.	NCD084173830	D004D007F035	F035	1	A99	B119	M039		249.80
QUALITY FOREST PRODUCTS, INC.	NCD084173830	D004D007F035	F035	5	A99	B119	M132	TND981922826	0.25
QUALITY FOREST PRODUCTS, INC.	NCD084173830	D004D007F035	F035	5	A99	B119	M141	NCD000648451	0.73
GENERAL WOOD PRESERVING COMPANY,	NCD093137636	D004D007F035	F035	1	A49	B319	M141	GAD000821934	7.98
PEE DEE TIMBER COMPANY	NCD982080152	D004D007F035	F035	1	A38	B302	M132	ALD000622464	0.37
PEE DEE TIMBER COMPANY	NCD982080152	D004D007F035	F035	1	A38	B302	M141	NCD000648451	0.51
PEE DEE TIMBER COMPANY	NCD982080152	D004D007F035	F035	1	A38	B302	M141	TND981922826	0.89
FOUR SEASONS ENVIRONMENTAL, INC.	NCD991277732	D004F035	F035	1	A19	B319	M141	NCD000648451	2.00
WEYERHAEUSER CO.	NCD991278540	D004D007F035	F035	1	A60	B302	M141	NCD980842132	5.30
WEYERHAEUSER CO.	NCD991278540	D004D007F035	F035	2	A53	B301	M141	NCD980842132	1.80
BEAR CREEK SITE C/O FOUR SEASONS	NCT000002392	F035	F035	1	A53	B409	M141	NCD980842132	0.35
XVIII ABN CORPS & FORT BRAGG	NC8210020121	D001D035F035	F035	1	A51	B310	M141	LAD010395127	0.41
HUGHES BROTHERS INCORPORATED	NED007273279	F032	F032		A76	B205	M124		55.94
BEAZER EAST, INC.	NHD001084979	F032F034F035	F032	2	A69	B310	M131	SCD070375985	1.52
BEAZER EAST, INC.	NHD001084979	F032F034F035	F032	2	A69	B310	M131	SCD070375985	4.54
JEWELL ELECTRICAL INSTRUMENTS	NHD046312591	D001F005F035	F035	1	A21	B211	M141	MAD000604447	1.68
MERCK & CO INC	NJD001317064	D001F003F005F035	F035	1	A34	B204	M061	KYD053348108	31.73
MERCK & CO INC	NJD001317064	D001F003F005F035	F035	1	A34	B204	M061	OHD093945293	46.84
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F034F035F037F038K031K044K045K047K	NOT	5	A75	B607	M101		485.34
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F034F035F037F038K031K044K045K047K	NOT	5	A75	B607	M132		35,372.66
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F034F035F037F038K031K044K045K047K	NOT	1	A71	B310	M132		4.25
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F034F035F037F038K031K044K045K047K	NOT	1	A71	B310	M132		3.20
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F034F035K031K044K045K047K071K084	NOT	1	A89	B319	M101		2.94
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F034F035K031K044K045K047K071K084	NOT	1	A89	B319	M132		143.06
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F001F002F003F004F005F006F007F034F0	NOT	5	A74	B303	M101		43.54
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F001F002F003F004F005F006F007F034F0	NOT	5	A74	B303	M132		43.54
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F001F002F003F004F005F006F007F008F0	NOT	1	A59	B304	M132		30.24
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F001F002F003F004F005F006F007F008F0	NOT	5	A74	B404	M101		173.64
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F001F002F003F004F005F006F007F008F0	NOT	5	A74	B404	M132		286.62
E. I. DUPONT - CHAMBERS WORKS	NJD002385730	F001F002F003F004F005F006F007F008F0	NOT	5	A74	B404	MDK	TXD055141378	19.26
QUALITY FOREST PRODUCTS INC	NJD982528465	D004D007F035	F035	1	A92	B302	M141	NCD000648451	0.33
QUALITY FOREST PRODUCTS INC	NJD982528465	D004D007F035	F035	1	A92	B302	M141	NYD049836679	2.28

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Facility Name	EPA ID	Waste Codes	Assigned Wood Preserving Code	Origin	Source	Form	System	EPA ID of Off-Site Manager	Tons Generated
SIEMENS STROMBERG CARLSON	NMD056773765	D001F002F003F005F035	F035	1	A21	B209	M061	OKD000632737	0.63
NEVADA WOOD PRESERVING	NVD982030520	F032F035K001	F032	1	A92	B319	M132	NVT330010000	61.91
OSMOSE WOOD PRESERVING, INC.	NYD002112944	F034	F034	1	A92	B406	M141	NYD049253719	3.30
GENERAL RAILWAY SIGNAL CORP	NYD057939506	D001D035F002F003F035	F035	1	A99	B001	M041	MAD000604447	0.20
SIERRA TECHNOLOGIES INC	NYD980769848	F002F003F005F035	F035	1	A09	B202	M041	OHD066060609	0.46
PACKAGING CORPORATION OF AMERICA	OHD005439815	D001F003F005F035	F035				M999	IND006419212	29.37
PACKAGING CORPORATION OF AMERICA	OHD005439815	D001F003F005F035	F035				M999	OHD048415665	4.14
BEAZER EAST	OHD068911494	F032F034F035	F032				M999	OHD004178612	36.32
BEAZER EAST	OHD068911494	F032F034F035	F032				M999	SCD070375985	7.73
ABX AIR INC	OHD099867038	F001F035	F035				M999	KYD053348108	0.70
ABX AIR INC	OHD099867038	F001F035	F035				M999	OHD980700942	2.50
HOCKING STATE FOREST WOOD TREATING	OHD980996128	D037F032	F032				M999	KSD981506025	2.92
HOCKING STATE FOREST WOOD TREATING	OHD980996128	D037F032	F032				M999	KSD981506025	74.00
DEPARTMENT OF THE AIR FORCE	OH7571724312	D001D007D018D022D038F005F035	F035				M999	NCD000648451	0.13
THOMASON LUMBER & TIMBER CO.	OKD007335524	F032F034	F032	2	A69	B301	M119	OKD065438376	208.00
L D MCFARLAND COMPANY	ORD009026600	F032	F032	2	A69	B301	M111	ORD089452353	2.58
J H BAXTER & CO EUGENE	ORD009032400	D004F035	F035	1	A09	B519	M111	ORD089452353	19.29
J H BAXTER & CO EUGENE	ORD009032400	D004F032	F032	1	A09	B603	M061	IND991279480	6.26
J H BAXTER & CO EUGENE	ORD009032400	D004F032	F032	1	A09	B603	M061	LAD079464095	15.28
J H BAXTER & CO EUGENE	ORD009032400	F035	F035	2	A99	B302	M132	CAD000633164	7.52
PERMAPOST PRODUCTS COMPANY INC	ORD009041187	D001D037F032	F032	1	A38	B301	M043	LAD981057706	0.81
PERMAPOST PRODUCTS COMPANY INC	ORD009041187	D001D007D037F032	F032	1	A38	B301	M043	LAD981057706	7.44
PERMAPOST PRODUCTS COMPANY INC	ORD009041187	D001D007D037F032	F032	1	A38	B301	M061	OKD089761290	5.46
TAYLOR LUMBER & TREATING INC	ORD009042532	D004F035	F035	1	A60	B519	M132	ORD089452353	3.01
TAYLOR LUMBER & TREATING INC	ORD009042532	F032F034	F032	1	A60	B609	M132	ORD089452353	13.78
TAYLOR LUMBER & TREATING INC	ORD009042532	F032F034F035	F032	1	A49	B609	M132	ORD089452353	15.29
KERR MCGEE CHEMICAL CORP	ORD009049412	F034	F034	1	A51	B205	M132	ORD089452353	15.36
BURLINGTON NORTHERN RR DANT & RUSS	ORD030796619	F032	F032	2	A61	B402	M132	ORD089452353	6,424.19
CONRAD WOOD PRESERVING COMPANY	ORD980975320	F035	F035	1	A38	B302	M111	ORD089452353	13.15
CONRAD WOOD PRESERVING COMPANY	ORD980975320	F035	F035	1	A99	B102	M032		2,958.90
COOS BAY LUMBER CO	ORD982656290	D004D006D007F035	F035	1	A91	B319	M132	ORD089452353	0.46
COOS BAY LUMBER CO	ORD982656290	D004D007F035	F035	1	A92	B302	M111	ORD089452353	1.15
COOS BAY LUMBER CO	ORD982656290	D004D007F035	F035	1	A92	B302	M111	ORD980981682	1.61
COOS BAY LUMBER CO	ORD982656290	D004D007F035	F035	1	A99	B119	M124		346.90
ALLWEATHER WOOD TREATERS	ORD987187929	D004D007F035	F035	1	A37	B119	M032		599.85
ALLWEATHER WOOD TREATERS	ORD987187929	D004D007F035	F035	1	A38	B316	M101		0.67
ALLWEATHER WOOD TREATERS	ORD987187929	D004D007F035	F035	1	A38	B316	M111	ORD089452353	0.74
KOPPERS INDUSTRIES INC	PAD056723265	F034	F034	1	A49	B102	M081		1,719.78
KOPPERS INDUSTRIES INC	PAD056723265	F034	F034	1	A49	B102	M089	NJD002385730	451.73
KOPPERS INDUSTRIES INC	PAD056723265	F034	F034	1	A49	B102	M089	NJD089216790	3,996.08
KOPPERS INDUSTRIES INC	PAD056723265	F034	F034	1	A09	B606	M132	SCD070375985	17.21
KOPPERS INDUSTRIES INC	PAD056723265	F034	F034	1	A59	B301	M132	SCD070375985	4.34
LITTON SYSTEMS INC - ELECTRON DEVICE DIV	PAD058445313	D001D035F005F035	F035	1	A21	B203	M141	MDD980554653	3.65
KERR-MCGEE CHEMICAL	PAD094228988	F034	F034	2	A59	B603	M111	ILD000805812	23.52
WHETSELL LUMBER CO	PAD987390010	D004D007F035	F035	1	A92	B319	M079	TND981922826	0.30
WHETSELL LUMBER CO	PAD987390010	D004D007F035	F035	1	A92	B319	M141	NCD000648451	0.35
USEPA CERCLA HAVERTOWN	PAP000006909	F035	F035	2	A61	B208	M041	SCD044442333	18.77
USEPA CERCLA HAVERTOWN	PAP000006909	F035	F035	2	A61	B102	M125	OHD004178612	33.23
BORICUA WOOD PROCESSING, INC.	PRD090564477	D004D007F035	F035	1	A19	B302	M132	ALD000622464	2.63

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Facility Name	EPA ID	Waste Codes	Assigned Wood Preserving Code	Origin	Source	Form	System	EPA ID of Off-Site Manager	Tons Generated
NAVAL CONSTRUCTION BATTALION CENTER	RI6170022036	F034	F034	2	A61	B301	M132	MID048090633	179.55
KOPPERS INDUSTRIES INC	SCD003353026	F032	F032				M099	SCD070375985	1,338.42
KOPPERS INDUSTRIES INC	SCD003353026	F035	F035				M099	ALD000622464	1.02
KOPPERS INDUSTRIES INC	SCD003353026	F035	F035				M099	GAD000821934	8.47
CM TUCKER LUMBER CORP	SCD003362050	F035	F035						1,749.06
SOUTHERN WOOD PIEDMONT CO	SCD049690001	F032	F032				M099	LAD981057706	14.69
SOUTHERN WOOD PIEDMONT CO	SCD049690001	D007D018F032	F032				M099	LAD981057706	50.90
OSMOSE WOOD PRESERVING INC	SCD987571742	D004D007F035	F035				M099	NCD000648451	0.17
OSMOSE WOOD PRESERVING INC	SCD987571742	D004D007F035	F035				M099	NCD061263315	0.33
OSMOSE WOOD PRESERVING INC	SCD987571742	D004D007F035	F035				M099	NCD061263315	0.50
OSMOSE WOOD PRESERVING INC	SCD987571742	D004D007F035	F035				M099	ALD000622464	18.50
NEWBERRY COUNTY PUBLIC WORKS	SCD987595667	F034	F034				M099	SCD070375985	10.16
WHEELER LUMBER OPERATIONS	SDD061536843	F032F034	F032	1	A59	B301			9.50
GULF LUMBER COMPANY-TENNESSEE	TND000825737	D004D007F035	F035				M137	ALD000622464	7.92
SOUTHERN WOOD PIEDMONT COMPANY	TND003327400	F034	F034				M029	LAD981057706	2.08
LANGDALE FOREST PRODUCTS COMPANY	TND003493103	D004D007F035	F035				M132	ALD000622464	0.86
LANGDALE FOREST PRODUCTS COMPANY	TND003493103	D004D007F035	F035				M132	SCD070375985	4.64
LANGDALE FOREST PRODUCTS COMPANY	TND003493103	D004D007F035	F035				M137	TND000645770	0.06
SOMERVILLE/AT&SF RAILWAY CO.	TXD000778621	F034	F034	2	A29	B409	M132	OKD065438376	19.00
SOMERVILLE/AT&SF RAILWAY CO.	TXD000778621	F034	F034			B409	M132	OKD065438376	337.00
CONROE CREOSOTING CO.	TXD008091951	F034	F034	1	A29	B219	M052	TXD000742304	0.29
CONROE CREOSOTING CO.	TXD008091951	F034	F034	1	A29	B219	M132	TXD008078560	37.75
CONROE CREOSOTING CO.	TXD008091951	F035	F035	1	A29	B219	M132	TXD008078560	1.04
CONROE CREOSOTING CO.	TXD008091951	F032	F032			B219	M052	TXD000742304	0.26
CONROE CREOSOTING CO.	TXD008091951	F032	F032			B219	M132	TXD008078560	2.59
TEXAS ELECTRIC COOPERATIVES, INC.	TXD041468836	F034	F034	1	A27	B219	M134	LAD000778514	253.40
TEXAS ELECTRIC COOPERATIVES, INC.	TXD041468836	F034	F034	1	A27	B219	M134	TXD000719518	112.05
TEXAS ELECTRIC COOPERATIVES, INC.	TXD041468836	F034	F034				M132	LAD000777201	196.13
WOOD PROTECTION CO.	TXD059345116	F032	F032	1	A53	B301	M032	LAD981057706	173.16
W.J. SMITH WOOD PRESERVING CO.	TXD066368879	F034	F034			B409	M132	OKD065438376	7,785.00
EXXON CORP-GROGAN LUMBER MILL	TXD988073649	D037F032	F032				M132	LAD000777201	131.72
EXXON CORP-GROGAN LUMBER MILL	TXD988073649	D037F032	F032				M132	LAD000777201	525.85
WOOD PRESERVERS INC	VAD003113750	D004D007F035	F035	1	A38	B319	M132	GAD000821934	19.80
BEAZER MATERIALS & SERVICES,INC	VAD003121977	F034	F034	2	A63	B102	M089	NJD089216790	36.00
BEAZER MATERIALS & SERVICES,INC	VAD003121977	F034	F034	2	A63	B102	M089	SCD070375985	20.24
BEAZER MATERIALS & SERVICES,INC	VAD003121977	F034	F034	2	A63	B301	M132	SCD070375985	7.42
KOPPERS INDUSTRIES INC	VAD003125770	F034	F034	1	A49	B102	M081		5,896.88
KOPPERS INDUSTRIES INC	VAD003125770	F034	F034	1	A59	B301	M132	SCD070375985	14.07
THE BURKE-PARSONS-BOWLBY CORP	VAD005027560	F034	F034	1	A59	B319	M111	MID000724831	12.83
THE BURKE-PARSONS-BOWLBY CORP	VAD005027560	F034	F034	1	A59	B319	M111	MID980615298	0.91
THE BURKE-PARSONS-BOWLBY CORP	VAD005027560	F035	F035	1	A59	B301	M111	MID000724831	11.65
AUTOMOTIVE INDUSTRIES INC	VAD005358726	D001F003F005F035	F035	1	A58	B209	M051	MDD980554653	5.47
ANDERSON LUMBER COMPANY	VAD041282930	F035	F035	2	A51	B101	M141	GAD000821934	0.23
ANDERSON LUMBER COMPANY	VAD041282930	D004D007F035	F035	2	A08	B302	M141	ALD983177015	3.33
COMMONWEALTH WOOD PRESERVERS INC	VAD081057697	F035	F035	1	A35	B302	M132	NCD061263315	1.80
BLUE RIDGE WOOD PRESERVING INC	VAD153383898	F035	F035	1	A92	B319	M132	NCD000648451	0.25
BLUE RIDGE WOOD PRESERVING INC	VAD153383898	F035	F035	1	A92	B319	M132	NCD061263315	1.00
ATLANTIC WOOD INDUSTRIES	VAD981108798	D004D007F035	F035	1	A09	B302	M141	GAD000821934	15.67
ATLANTIC WOOD INDUSTRIES	VAD981108798	D004D007F035	F035	1	A09	B302	M141	NCD000648451	10.94

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Facility Name	EPA ID	Waste Codes	Assigned Wood Preserving Code	Origin	Source	Form	System	EPA ID of Off-Site Manager	Tons Generated
ATLANTIC WOOD INDUSTRIES	VAD981108798	D004D007F035	F035	1	A89	B119	M019		1,949.32
UNIVERSAL FOREST PRODUCTS	VAD981744444	D004D007F035	F035	1	A09	B319	M131	ALD000648451	3.35
UNIVERSAL FOREST PRODUCTS	VAD981744444	D004D007F035	F035	1	A09	B319	M131	NCD000648451	3.35
ATLANTIC WOOD INDUSTRIES INC	VAD990710410	F034	F034	2	A69	B409	M132	SCD070375985	12.95
BURLINGTON ENVIRONMENTAL, INC.	WAD000812909	D026D037F032	F032				M999	ORD089452353	4.24
CASCADE POLE & LUMBER CO.	WAD008958357	F032	F032			B409	M999	ORD089452353	216.70
PACIFIC SOUND RESOURCES	WAD009248287	F034	F034			B609	M999	WAD058367152	0.17
PACIFIC SOUND RESOURCES	WAD009248287	F035	F035			B519	M999	WAD058367152	0.22
BROOKS MANUFACTURING CO.	WAD009249475	F032	F032				M999	ORD089452353	0.22
BROOKS MANUFACTURING CO.	WAD009249475	F032	F032				M999	ORD089452353	12.23
CASCADE POLE COMPANY	WAD009263179	F032	F032			B409	M999	ORD089452353	0.88
WEYERHAEUSER COMPANY - EVERETT SITE	WAD009273129	F032	F032	2		B409	M999	ORD089452353	19.77
J.H. BAXTER & CO	WAD053823019	D018F032	F032			B219	M999	LAD079464095	28.25
J.H. BAXTER & CO	WAD053823019	D018F032	F032			B219	M999	TND991279480	6.00
WESTERN WOOD PRESERVING CO	WAD055498232	D004F035	F035			B319	M999	ORD089452353	1.69
WESTERN WOOD PRESERVING CO	WAD055498232	D026D037F034	F034			B319	M999	ORD089452353	1.65
NORTHWEST ENVIROSERVICE, INC.	WAD058367152	D004F035	F035			B319	M999	IDD073114654	0.43
NORTHWEST ENVIROSERVICE, INC.	WAD058367152	F034	F034			B409	M999	IDD073114654	1.39
BURLINGTON ENVIRONMENTAL, INC.	WAD092300250	D008D037F032	F032				M999	WAD000812909	2.09
BURLINGTON ENVIRONMENTAL, INC.	WAD092300250	D037F032	F032				M999	WAD991281767	0.42
BURLINGTON ENVIRONMENTAL INC KENT	WAD991281767	D026D037F032F034F035	F032				M999	ORD089452353	3.43
CHEMICAL WASTE MGMT INC-CONTROLLED	WID003967148	F032	F032	2	A59	B001	M999	SCD044442333	0.25
KOPPERS INDUSTRIES INC	WID006179493	F032	F032	1	A49	B102	M091		1,311.01
KOPPERS INDUSTRIES INC	WID006179493	F032	F032	1	A49	B102	M081	WID000495028	1,311.01
KOPPERS INDUSTRIES INC	WID006179493	F032	F032	1	A99	B301	M132	SCD070375985	1.96
KOPPERS INDUSTRIES INC	WID006179493	F034	F034	1	A99	B301	M132	SCD070375985	3.92
Koppers Industries, Inc	WVD003080959	F032F034	F032	1	A49	B102	M125		13,297.44
Koppers Industries, Inc	WVD003080959	F032F034	F032	1	A49	B102	M081	NJD089216790	171.48
Koppers Industries, Inc	WVD003080959	F032F034	F032	1	A09	B402	M132	SCD070375985	16.68
Koppers Industries, Inc	WVD003080959	F032F034	F032	1	A29	B301	M132	SCD070375985	47.58
UPPR LARAMIE TIMBER TREATING PLANT	WYD061112470	F032	F032	2	A63	B301	M132	UTD991301748	50.34

KHHF-50003.1

Appendix H

METHODOLOGY FOR ESTIMATING QUANTITY OF SOIL AND DEBRIS CONTAMINATED WITH WOOD PRESERVING WASTES

Volume of Wood Preserving Remediation Waste Requiring Combustion Under the Phase IV Land Disposal Restrictions

In this Appendix, EPA presents a low-end and high-end estimate[59] of the quantity of wood preserving waste requiring additional combustion capacity using a revised version of a direct estimate approach.[60] EPA identified 21 RODs signed between 1991 and 1993 that contain information on soil and debris volumes at wood preserving sites. EPA used the information contained in these RODs, as well as the 30 RODs identified in the Beazer East analysis[61], to develop these estimates.[62] (See Attachment 1 to the February 14, 1997 memorandum included in this appendix.) EPA has excluded three wood preserving sites from this analysis, presented in Exhibit 1, because treatments other than combustion are indicated in the RODs for these sites and because they are contaminated only with chromium copper arsenate (CCA) and other metals; EPA has thus assumed that combustion would not be used to treat remediation wastes from these sites.

Exhibit 1
Wood Preserving Site RODs Contaminated Only with CCA or Other Metals

ROD Date	Site Name	Contaminants	Volume of Soil or Sediment Managed Ex-situ (yd^3)	Source
Sep-87	Palmetto Wood Preserving	CCA	19,900	Beazer
Sep-89	Burlington Northern, Montana	Metals	11,700	Beazer
Sep-91	Valley Wood Preserving	Metals	15,000	ICF

Using the Superfund RODs signed between 1986 and 1993, EPA constructed a direct estimate of the annual volume of soil and debris from wood preserving sites that might be combusted under the status quo and following the Phase I LDRs. To do this, EPA first directly summed the volumes of excavated soil and debris from RODs signed in the same year. Because remedial actions do not often begin immediately after the ROD signature date, but are delayed as the remedial design (RD) is completed, EPA had to develop an estimate of the time from signature of a ROD to the beginning of a remedial action (RA). The Brookings Institution estimates that it takes an average of approximately 18 months from the issuance of the ROD to complete the remedial design, after which the remedial action can begin.[63] For this analysis, EPA assumed a delay of two years from the issuance of the ROD to the beginning of remedial action.

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[59] The terms "low-end" and "high-end" rather than lower bound and upper bound have been used to reflect the possibility that the actual quantities lie outside this range.

[60] For a detailed history of the methodology, see in this Appendix "Methodology and Data Sources for Estimating the Volume of Wood Preserving Waste Requiring Combustion Under the Phase IV Land Disposal Restrictions," memorandum to Bill Kline, EPA/OSW (cc: C. Pan Lee, EPA/OSW) from Scott Breffle and Jim Laurenson, ICF Incorporated, January 29, 1997 and "Updated Results for Estimating the Volume of Wood Preserving Waste Requiring Combustion Under the Phase IV Land Disposal Restrictions," memorandum to Bill Kline, EPA/OSW (cc: C. Pan Lee, EPA/OSW) from Scott Breffle and Jim Laurenson, ICF Incorporated, February 14, 1997.

[61] The table presented in the Beazer East comment includes 31 RODs. However, the two November 1986 RODs for Mid-South Wood Products appear to be duplicates.

[62] Information on these RODs is presented in Attachment 1 of the February 14, 1997 memorandum included in this Appendix (see footnote 2).

[63] Thomas W. Church and Robert T. Nakamura, Cleaning Up the Mess, Implementation Strategies in Superfund, The Brookings Institution, 1993, page 8.

Once remedial action begins, actual soil excavation can proceed relatively quickly. Small sites may be excavated within months, while large sites may take two or three years. The Brookings Institution estimates that the completion of a remedial action (other than long-term maintenance, such as groundwater pump and treat) takes an average of 25 months. For this analysis, EPA assumed that the excavations would take an average of two years. Thus, EPA estimates that the total period of time from the signing of a ROD to the completion of a remedial action is approximately four years. As a result of these two assumptions about remedial pace, a site associated with a ROD signed in 1988, for example, would generate soil in 1990 and 1991 (i.e., in years two and three following the ROD date of signature.)

EPA has calculated a low-end and a high-end estimate for the volume of soil and debris requiring additional combustion capacity (i.e., the volume that will require combustion above and beyond the volume that is currently being combusted). To estimate the current (i.e., baseline or pre-LDR) volumes being combusted, EPA examined the RODs for volumes that were planned to be combusted and, using the assumptions about the remedial pace discussed above, distributed these volumes over the appropriate years. The results are presented in Exhibit 2. Because the most recent RODs used in this analysis were issued in 1993, the remedial actions have already been completed, based on the above assumptions. Nevertheless, the data can be used to project the future trend in annual volumes of soil and debris being excavated from wood preserving sites.

The second column of Exhibit 2 presents the total volume of soil and debris that was planned for combustion for each of the ROD years that EPA examined. The subsequent columns use the two assumptions discussed above regarding initiation and completion of remediation to estimate when

Exhibit 2
Annual Ex-Situ Soil and Debris Volumes from Wood Preserving Site Remedial Actions Planned for Combustion During 1989 to 1995

		Expected Annual Volume (cubic yards)						
ROD Signature Date	Ex-Situ Volume (cubic yards)	1989	1990	1991	1992	1993	1994	1995
1986	9,000	4,500						
1987	170,000	85,000	85,000					
1988	131,000		65,500	65,500				
1989	0			0	0			
1990	98,000				49,000	49,000		
1991	0					0	0	
1992	2,930						1,465	1,465
1993	24,930							12,465
Annual Volume		89,500	150,000	65,500	49,000	49,000	1,465	13,930
Average Annual Volume		59,842						

the volumes from each year ought to have been excavated and combusted. As Exhibit 2 shows, the projected annual volume ranges from 1,465 cubic yards in 1994 to 150,000 cubic yards in 1990. Because of the uncertainty associated with our assumptions about the remedial pace and the lack of any discernible trends to use for projections, EPA used the average annual volume to estimate the baseline volumes using combustion over the next two years. This baseline annual volume of soil and debris requiring combustion under the status quo is 59,842 cubic yards, resulting in a quantity of approximately 72,000 tons per year over the next two years (using a conversion factor of 1.2 tons per cubic yard).

To calculate the low-end estimate of the required additional combustion capacity, EPA estimated the portion of soil and debris planned for treatment using methods other than combustion prior to promulgation of the LDRs that would likely be combusted under the LDRs. Historically, media contaminated with dioxins and furans has been the most likely to be treated using combustion. For this rule, the UTS limits promulgated for organics and for dioxins and furans regulated in nonwastewater forms of F032 waste are based on the performance of combustion technologies. As discussed in the BDAT background document, EPA believes that non-thermal treatment technologies may be optimized to meet the UTS limits within the context of a treatability variance under 268.44(h)[64], but that the feasibility of such treatment technologioes may require the use of treatment trains to meet the UTS standards. Optimizing treatments or developing treatment trains can take time. In addition, EPA believes that the alternative combustion treatment standard for dioxins and furans in F032 waste, because it waives the testing requirement, will provide a strong incentive to combust these wastes even if non-combustion treatment technologies are viable and effective alternatives. Because of this incentive, the possible time required to develop and optimize non-thermal tratment trains, and because treatability variances are not likely be immediately available following promulgation of the LDRs, EPA assumed that all soil and debris contaminated with dioxins and furans that is not currently being combusted would be combusted under the LDRs. The second column of Exhibit 3 presents these volumes of media contaminated with dioxins and furans by the year in which the ROD was signed. Using the above assumptions about remedial pace, Exhibit 3 distributes over the appropriate years the volumes of media that EPA assumes will shift to combustion. As with the baseline estimate, EPA used the average annual volume

Exhibit 3
Annual Ex-Situ Soil and Debris Volumes from Wood Preserving Site Remedial Actions Expected to Shift to Combustion During 1989 to 1995

		Expected Annual Volume (cubic yards)						
ROD Signature Date	Ex-Situ Volume (cubic yards)	1989	1990	1991	1992	1993	1994	1995
1986	93,000	46,500						
1987	0	0	0					
1988	16,100		8,050	8,050				
1989	293,000			146,500	146,500			
1990	0				0	0		
1991	25,000					12,500	12,500	
1992	78,120						39,060	39,060
1993	254,650							127,325
Annual Volume		46,500	8,050	154,500	146,500	12,500	51,560	127,325
Average Annual Volume		83,721						

projected using this method to estimate a low-end additional required combustion capacity over the next two years. As seen on the last line of Exhibit 3, the additional required combustion capacity is estimated

[64] See Section 6.5 of Final Best Demonstrated Available Technology Background Document for Wood Preserving Wastes - F032, F034, and F035 for a discussion of the UTS limits and the performance of remedial treatment technologies.

to be 83,721 cubic yards per year, resulting in a quantity of about 100,000 tons per year over the next two years.[65]

For the high-end estimate, rather than estimate what portion of soil and debris would shift to combustion, EPA assumed that the total volume of media (excluding media contaminated only with CCA and other metals) currently not being combusted would be combusted under the LDRs. As seen in Exhibit 4, the projected annual volume ranges from 55,100 in 1993 cubic yards to 505,750 cubic yards in 1989. As with the baseline and low-end estimates, EPA used the average annual volume projected using this method to estimate required combustion capacity over the next two years. As seen on the last line of Exhibit 4, this average annual volume of soil and debris potentially requiring additional combustion capacity is 217,594 cubic yards per year, resulting in a quantity of about 260,000 tons per year over the next two years.

Exhibit 4
Expected Annual Ex-Situ Soil and Debris Volumes During 1989 to 1995 from Wood Preserving Site Remedial Actions

		Expected Annual Volume (cubic yards)						
ROD Signature Date	Ex-Situ Volume (cubic yards)	1989	1990	1991	1992	1993	1994	1995
1986	1,011,500	505,750						
1987	0	0	0					
1988	231,200		115,600	115,600				
1989	338,700			169,350	169,350			
1990	85,200				42,600	42,600		
1991	25,000					12,500	12,500	
1992	104,520						52,260	52,260
1993	465,570							232,785
Annual Volume		505,750	115,600	284,950	211,950	55,100	64,760	285,045
Average Annual Volume		217,594						

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.[66] 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. (See the February 14, 1997 memorandum in this appendix for a discussion of Beazer East's estimate). As discussed in Section 3.6.2 of this Background Document, however, EPA determined that the low-end estimate of required alternative treatment capacity was greater than available capacity, and therefore the Agency did not develop a high-end estimate of the quantity of soil and debris contaminated with newly identified wood preserving wastes that would require additional alternative treatment capacity.

[65] Given that this quantity only includes Superfund NPL sites, the quantity might properly be considered a lower-bound rather than a low-end estimate. See the next section.
[66] See February 19, 1997 phone log in Appendix F detailing EPA discussions with Steve Ladner of Kerr-McGee.

Thus EPA calculates that between about 100,000 and 260,000 tons per year of contaminated soil and debris from wood preserving sites will require additional combustion capacity over the next two years.

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February 14, 1997

MEMORANDUM

TO: Bill Kline, EPA/OSW

CC: C. Pan Lee, EPA/OSW

FROM: Scott Breffle and Jim Laurenson

SUBJECT: Updated Results for Estimating the Volume of Wood Preserving Remediation Waste Requiring Combustion Under the Phase IV Land Disposal Restrictions

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We have completed our review and analysis of data on excavated soil, sediment, and debris[67] at wood preserving sites contained in Records of Decision (RODs) signed between 1991 and 1993. Based on these data and ROD data contained in the Beazer East comment, this memorandum presents a range of estimates of required combustion capacity for wood preserving wastes subject to the pending Phase IV land disposal restrictions (LDRs). The basic methodology and preliminary results for this analysis are described in two previous memoranda.[68]

Results

We have developed two ranges of estimates of the required alternative combustion capacity for wood preserving remediation wastes. Our first set of estimates includes several refinements of the Beazer East methodology such that we've now labeled it the "Beazer East-based" approach. This update also incorporates into the analysis the more recent ROD data that we have obtained. Our second set of estimates is calculated directly based on the excavated soil volume for all wood preserving RODs in each year and an estimate of the average duration of a Superfund remedial action. Each of these two ranges of estimates is discussed below.

Beazer East-Based Analysis

In our January 31, 1997 memorandum, we presented information on soil, sediment, and debris volumes for 9 of the 19 wood preserving sites RODs signed between 1991 and 1993 that we had

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[67] The excavated portion of the soil, sediment, and debris, and not the in-situ portion, is potentially subject to LDRs and thus combustion.

[68] "Methodology and Data Sources for Estimating the Volume of Wood Preserving Waste Requiring Combustion Under the Phase IV Land Disposal Restrictions, memorandum to Bill Kline, EPA/OSW (CC: C. Pan Lee, EPA/OSW) from Scott Breffle and Jim Laurenson, ICF, January 29, 1997; and "Preliminary Results for Estimating the Volume of Wood Preserving Remediation Waste Requiring Combustion Under the Phase IV Land Disposal Restrictions," memorandum to Bill Kline, EPA/OSW (CC: C. Pan Lee, EPA/OSW) from Scott Breffle and Jim Laurenson, ICF, January 31, 1997.

identified. We have since identified two additional wood preserving site RODs and have examined the full text of all 21 RODs for information on soil, sediment, and debris volumes. The information contained in these RODs as well as the 30 RODs used in the Beazer East analysis[69] are presented in Attachment 1.

The methodology presented in the Beazer East comment to calculate the potential volume of soil, sediment, and debris requiring combustion was to calculate the average volume of these media managed ex-situ at each site and then extrapolate this average to the universe of wood preserving sites to obtain a total volume. Using RODs signed between 1986 and 1990, Beazer East reported an average volume per site of approximately 84,000 cubic yards. In our January 31, 1997 memorandum, we reported that the RODs signed between 1991 and 1993 also yielded an average of about 84,000 cubic yards, but cautioned that this average was based on only nine of the 19 RODs that we had identified. We have now completed review of these 19 RODs, as well as the two additional RODs recently identified, for information on the volume of soil, sediment, and debris managed ex-situ. For this analysis, we have excluded six wood preserving sites, presented in Exhibit 1, because treatments other than combustion are indicated in the RODs for these sites and because they are contaminated only with chromium copper arsenate (CCA) and other metals; we've thus assumed that combustion would not be used to treat remediation wastes from these sites.

Exhibit 1
Wood Preserving Site RODs Contaminated Only with CCA or Other Metals

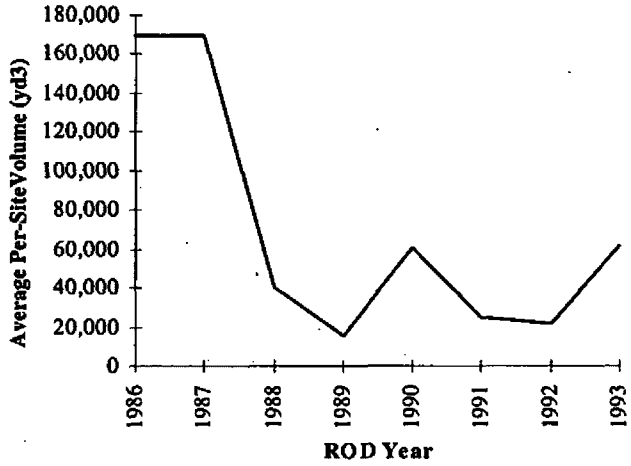
ROD Date	Site Name	Contaminants	Volume of Soil or Sediment Managed Ex-situ (yd^3)	Source
Sep-87	Palmetto Wood Preserving	CCA	19,900	Beazer
Jun-89	Cape Fear Wood Preserving	CCA	30,500	Beazer
Sep-89	United Creosoting	CCA	93,000	Beazer
Sep-89	Koppers, Oroville, CA	CCA	200,000	Beazer
Sep-89	Burlington Northern, Montana	Metals	11,700	Beazer
Sep-91	Valley Wood Preserving	Metals	15,000	ICF

The resulting average per-site volume of soil, sediment, and debris planned for ex-situ management each year is presented in Exhibit 2. As seen in Exhibit 2, the volumes of these media projected to be managed ex-situ were significantly higher in 1986 and 1987, at approximately 170,000 cubic yards per site, relative to subsequent years. Among the RODs signed in 1986 was one site with a projected ex-situ volume of soil of 800,000 cubic yards, as seen in Attachment 1. Only one wood preserving site ROD was signed in 1987, which planned for ex-situ management of 170,000 cubic yards.

The Beazer East comment projected an average volume of soil, sediment, and debris managed ex-situ at wood preserving sites of about 84,000 cubic yards per site. Removing the sites that are contaminated only with metals or CCA raises the average per site to about 87,500 cubic yards. As seen

[69] The table presented in the Beazer East comment includes 31 RODs. However, the two November 1986 RODs for Mid-South Wood Products appear to be duplicates.

Exhibit 2
Average Per-Site Volume of Soil, Sediment, and Debris Planned for Ex-Situ Management at Wood Preserving Sites



in Exhibit 3, when the RODs signed between 1991 and 1993 are incorporated, the average falls to about 70,000 cubic yards per site. The average volume for the RODs signed between 1991 and 1993 is even less, at about 44,000 cubic yards per site. When RODs back to 1988 are included (i.e., excluding 1986 and 1987), the average per-site volume remains at about 44,000 cubic yards. Therefore, using the assumption that the worst (i.e., largest remediation waste volume) wood preserving sites have been remediated, we used the 1988 to 1993 average to project to the universe of sites.

Exhibit 3
Average Per-Site Volume of Soil, Sediment, and Debris Projected for Ex-Situ Management

RODs Considered	Average Volume Projected to be Managed Ex-Situ per Site (cubic yards)
1986-1990	87,555
1986-1993	69,829
1991-1993	43,840
1988-1993	44,506

Using the average per-site volume of 44,500 cubic yards reduces Beazer East's estimate of the total volume potentially requiring combustion by almost half, from 85.3 million cubic yards to approximately 45.2 million cubic yards of soil, sediment, and debris.[70] As discussed in our previous memoranda, using this total to estimate the volume potentially requiring combustion over the next two years is still likely to be overestimated for two reasons. First, although long-term trends remain difficult to discern, Exhibit 2 indicates that the average per-site volumes requiring excavation may be declining. Thus, the eventual total of soil, sediment, and debris requiring excavation over all wood preserving sites is likely to be less than 45 million cubic yards. Second, there is no chance that all 45.2 million cubic

[70] This calculation uses Beazer East's estimate that approximately 85 percent of the estimated 1,200 wood preserving sites will require excavation of contaminated soil and sediment as part of a cleanup remedy.

yards will be excavated over the next two years. Nevertheless, if remediation of, say, a tenth of the sites were underway, and soil excavation were evenly distributed over the next ten years,[71] the volume potentially requiring combustion over the next two years would be approximately 450,000 cubic yards per year (45.2 million cubic yards x 0.1/10 years). Thus, the upper bound estimate of wood preserving soil, sediment, and debris requiring combustion during the next two years (using the Beazer East approach) is approximately 450,000 tons per year (using a conversion factor of 1 ton per cubic yard).

We next calculated a pre-LDR or baseline estimate using the Beazer East-based approach. Nine of the 51 RODs (17.6 percent) examined recommended combustion as the treatment method. The average volume per site of soil, sediment, and/or debris that requires combustion at these sites is 48,444 cubic yards. Using Beazer East's methodology, about 10 million cubic yards (1,200 sites x 0.176 x 48,444 cubic yards) of soil could require combustion. Once again, however, this volume is not likely to be seen in the next two years, and all future sites may not require the same level of remediation as current sites. If remediation of, say, a twentieth of the sites were underway, and soil excavation were evenly distributed over the next ten years, the baseline estimate of the volume potentially requiring combustion over the next two years would be approximately 50,000 cubic yards per year (10 million cubic yards x 0.05/10 years), or 50,000 tons per year.

To estimate the low-end quantity requiring additional combustion capacity, we developed a ratio of additional combustion over baseline combustion using all of the ROD data in Attachment 1 and an assumption similar to the one used more rigorously and described in more detail in the next section. Briefly, this assumption is that contaminated media planned for bioremediation, critical fluid extraction, or thermal desorption would need combustion under the LDRs, while media planned for other management would not be combusted. The calculated ratio is $894{,}090 yd^3/435{,}930 yd^3 = 2.05$, and therefore the estimated low-end quantity of soil, sediment, and debris contaminated with newly listed wood preserving wastes requiring additional combustion capacity is approximately 100,000 tons per year. Subtracting the baseline combustion quantity from the upper-bound combustion quantity results in an estimated high-end quantity of soil, sediment, and debris contaminated with newly listed wood preserving wastes requiring additional combustion capacity of approximately 400,000 tons per year.

Thus, the Beazer East approach, with our assumptions, results in a quantity of waste requiring additional combustion ranging between 100,000 and 400,000 tons per year over the next two years. The estimate generated by this approach is subject to many uncertainties, however. Beazer East's approach, as described in previous memoranda, assumes that all wood preserving sites will undergo remediation in the near future, and that the quantity of soil, sediment, and debris removed at each site will be similar to that removed at current wood preserving Superfund sites. Neither assumption is likely to be realized. We have tried to correct this assumption by assuming that remediation wastes will be generated by between a tenth and twentieth of the total number of wood preserving sites over the next ten years. This assumption itself is subject to significant uncertainty. In addition, the Beazer East methodology does not factor out of the analysis the current quantity of soil, sediment, and debris that requires combustion. This quantity is treated with current capacity, and should not be considered as part of the quantity that will require additional treatment capacity over the next two years. We therefore incorporated an assumption regarding this additional capacity. The approach described in the next section attempts to address these shortfalls more thoroughly.

[71] The average duration of remedial actions at nonfederal sites proposed to the Natioanl Priorities List (NPL) was reported as 9.6 years in "Analyzing the Duration of Cleanup at Sites on Superfund's National Prioroties List," March 1994, Congressional Budget Office.

Direct Estimation

As a supplement/replacement of the Beazer East methodology, we constructed a direct estimate of the annual volume of soil, sediment, and debris from wood preserving sites that might be combusted. To do this, we first directly summed the volumes of excavated soil, sediment, and debris from RODs signed in the same year. Because remedial actions do not often begin immediately after the ROD signature date, but are delayed as the remedial design (RD) is completed, we had to develop an estimate of the time from signature of a ROD to the beginning of a remedial action (RA). The Brookings Institution estimates that it takes an average of approximately 18 months from the issuance of the ROD to complete the remedial design, after which the remedial action can begin.[72] For this analysis, we assumed a delay of 2 years from the issuance of the ROD to the beginning of remedial action.

Once remedial action begins, actual soil excavation can proceed relatively quickly. Small sites may be excavated within months, while large sites may take two or three years. The Brookings Institution estimates that the completion of a remedial action (other than long-term maintenance, such as groundwater pump and treat) takes an average of 25 months. For this analysis, we assumed that the excavations would take an average of two years. Thus, we estimate that the total period time from the signing of a ROD to the completion of a remedial action is approximately four years. As a result of these two assumptions about remedial pace, a site associated with a ROD signed in 1988 for example, would generate soil in 1990 and 1991 (i.e., in years two and three following the ROD date of signature.)

We have calculated a low-end and a high-end estimate for the volume of soil, sediment, and debris requiring additional combustion capacity (i.e., the volume that will require combustion above and beyond the volume that is currently being combusted). To estimate the current (i.e., baseline or pre-LDR) volumes being combusted, we examined the RODs for volumes that were planned to be combusted and, using the assumptions about the remedial pace discussed above, distributed these volumes over the appropriate years. The results are presented in Exhibit 5. Because the most recent RODs used in this analysis were issued in 1993, the remedial actions have already been completed, based on our assumptions. Nevertheless, the data can be used to project the trend in annual volumes of soil, sediment, and debris being excavated from wood preserving sites.

The second column of Exhibit 5 presents the total volume of soil, sediment, and debris that was planned for combustion for each of the ROD years that we examined. The subsequent columns use the two assumptions discussed above regarding initiation and completion of remediation to estimate when the volumes from each year ought to have been excavated and combusted. As Exhibit 5 shows, the projected annual volume ranges from 1,465 cubic yards in 1994 to 150,000 cubic yards in 1990. Because of the uncertainty associated with our assumptions about the remedial pace, we used the average annual volume projected using this method to estimate the baseline volumes using combustion over the next two years. This baseline annual volume of soil, sediment, and debris requiring combustion is 59,776 cubic yards, resulting in a quantity of approximately 60,000 tons per year over the next two years.

To calculate the low-end estimate of the required additional combustion capacity, we estimated the portion of soil, sediment, and debris planned for treatment using methods other than combustion that would be combusted under the LDRs. We based our estimate on the current treatment technology being applied to the media. We assumed that soil, sediment, or debris to be treated using bioremediation, critical fluid extraction, or thermal desorption would contain sufficient concentrations of

[72] Thomas W. Church and Robert T. Nakamura, Cleaning Up the Mess, Implementation Strategies in Superfund, The Brookings Institution, 1993, page 8.

Exhibit 5
Annual Ex-Situ Soil, Sediment, and Debris Volumes from Wood Preserving Site Remedial Actions Planned for Combustion During 1989 to 1995

		Expected Annual Volume (cubic yards)						
ROD Signature Date	Ex-Situ Volume (cubic yards)	1989	1990	1991	1992	1993	1994	1995
1986	9,000	4,500						
1987	170,000	85,000	85,000					
1988	131,000		65,500	65,500				
1989	0			0	0			
1990	98,000				49,000	49,000		
1991	0					0	0	
1992	2,930						1,465	1,465
1993	25,000							12,500
Annual Volume		89,500	150,000	65,500	49,000	49,000	1,465	13,965
Average Annual Volume		59,776						

wood preserving wastes such that combustion would be needed under the LDRs. In contrast, we assumed that soil, sediment, or debris to be managed using land disposal, soil washing, stabilization/solidification/ fixation would not be combusted under the LDRs. Based on our assumption about remedial pace, Exhibit 6 distributes over the appropriate years the volumes of media that we assume will shift to combustion. As with the baseline estimate, we used the average annual volume projected using this method to estimate a low-end additional required combustion capacity over the next two years. As seen on the last line of Exhibit 6, the additional required combustion capacity is estimated to be 90,186 cubic yards per year, resulting in a quantity of about 90,000 tons per year over the next two years.

Exhibit 6
Annual Ex-Situ Soil, Sediment, and Debris Volumes from Wood Preserving Site Remedial Actions Expected to Shift to Combustion During 1989 to 1995

		Expected Annual Volume (cubic yards)						
ROD Signature Date	Ex-Situ Volume (cubic yards)	1989	1990	1991	1992	1993	1994	1995
1986	101,500	50,750						
1987	0	0	0					
1988	165,000		82,500	82,500				
1989	15,200			7,600	7,600			
1990	85,200				42,600	42,600		
1991	25,000					12,500	12,500	
1992	78,120						39,060	39,060
1993	424,070							212,035
Annual Volume		50,750	82,500	90,100	50,200	55,100	51,560	251,095
Average Annual Volume		90,186						

For the high-end estimate, rather than estimated what portion of soil, sediment, and debris would shift to combustion, we assumed that the total volume media (excluding media contaminated only with CCA and other metals) currently not being combusted would be combusted under the LDRs. As seen in Exhibit 7, the projected annual volume ranges from 50,200 in 1992 cubic yards to 505,750 cubic yards in 1989. As with the baseline and low-end estimates, we used the average annual volume projected using this method to estimate required combustion capacity over the next two years. As seen on the last line of Exhibit 7, this average annual volume of soil, sediment, and debris potentially requiring additional combustion capacity is 170,379 cubic yards per year, resulting in a quantity of about 170,000 tons per year over the next two years.

Thus, using direct estimation, we calculate that between about 90,000 and 170,000 tons per year of contaminated soil, sediment, and debris from wood preserving sites will require additional combustion capacity over the next two years. In comparison, our calculations and assumptions designed to improve the Beazer East approach estimate that between about 100,000 and 400,000 tons per year of soil, sediment, and debris would require additional combustion over the next two years. Both ranges contain significant uncertainty, however. In addition to the caveats discussed previously, for example, both ranges depend on the assumption regarding planned treatments that are expected to shift to combustion under the LDRs. Some of these shifts may not occur and thus the amounts of additional required combustion capacity conceivably could be lower than estimated. On the other hand, land disposal, which for purposes of this analysis is not expected to shift to combustion, could actually indicate that constituent concentrations are very high such that combustion would be needed under LDRs. Other caveats involve the extent to which all remediation sites have been captured. For example, the Beazer East-based methodology accounts for non-ROD sites, while the current approach for the direct estimate does not.

Exhibit 7
Expected Annual Ex-Situ Soil, Sediment, and Debris Volumes During 1989 to 1995 from Wood Preserving Site Remedial Actions

		Expected Annual Volume (cubic yards)						
ROD Signature Date	**Ex-Situ Volume (cubic yards)**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
1986	1,011,500	505,750						
1987	0	0	0					
1988	231,200		115,600	115,600				
1989	15,200			7,600	7,600			
1990	85,200				42,600	42,600		
1991	25,000					12,500	12,500	
1992	104,520						52,260	52,260
1993	465,570							232,785
Annual Volume		505,750	115,600	123,200	50,200	55,100	64,760	285,045
Average Annual Volume		170,379						

Possible Next Steps

Several next steps could be taken to strengthen this analysis. For example:

- The assumptions regarding the length of time before remediation begins and ends following the ROD could be improved. Alternatively, a sensitivity analysis could be conducted to determine the relative importance of these parameters.

- The assumptions regarding which non-combusted wastes will shift to combustion could be examined. As indicated above, this assumption could be resulting in either an under- or over-estimation.

- The handling of the universe of sites, especially for the direct approach, could be improved to include non-ROD sites. Improvements here, however, would only increase the additional combustion required capacity.

* * *

Please call Scott at (703) 934-3917 or Jim at (703) 934-3648 if you have any questions or comments on this memorandum.

Attachment 1
List of Wood Preserving Site Record's of Decision, 1985 to 1993

ROD Date	Site Name	Principal Contaminants	Volume of Soil or Sediment Managed Ex-situ (yd^3)	Treatment Method	Source	Comment
Sep-85	American Creosote, Pensacola, FL	PCP	0	NA	Beazer	No contaminated soil
May-86	Hocomonco Pond	Creosote	30,000	RCRA disposal	Beazer	
May-86	Reilly Tar, St. L, Minnesota	PAH	800,000	RCRA disposal	Beazer	
Jun-86	Burlington Northern Minnesota	Creosote	8,500	Bioreactor	Beazer	
Sep-86	Coleman	PCP	9,000	Incineration	Beazer	
Sep-86	United Creosoting	CCA, Dioxin	93,000	Critical fluid extraction	Beazer	
Nov-86	Mid-South Wood Products	PAH, PCP, CCA	80,000	RCRA disposal	Beazer	
Mar-87	Bayou Bonfouca	PAH	170,000	Incineration	Beazer	
Sep-87	Palmetto Wood Preserving	CCA	19,000	Soil Washing	Beazer	
Mar-88	L.A. Clarke & Sons	Creosote	112,000	Landfarming, Bioreactor	Beazer	
Apr-88	Brown Wood Preserving	Creosote, PCP	11,200	Land treatment, off-site disposal	Beazer	
Jun-88	N. Cavalcade Street	Creosote	0	NA	Beazer	22,300 cubic yards managed in-situ
Jun-88	Broderick Wood Products	PCP, Dioxins	31,000	Incineration	Beazer	
Jun-88	South Maryland Wood Treating	Creosote, PCP	100,000	Incineration	Beazer	
Sep-88	Selma Treating	CCA, Dioxins, Furans	16,100	Stabilization	Beazer	
Sep-88	Koppers/Texarkana	PCP, CCA	19,400	Soil Washing	Beazer	
Sep-88	S. Cavalcade Street	CCA, PAH	19,500	Soil Washing	Beazer	
Sep-88	American Creosote, Jackson, TN	PCP	23,000	Bioreactor	Beazer	
Dec-88	Libby GW (Champion Int.)	Metals, VOCs	30,000	Bioreactor	Beazer	
Jun-89	Koppers, Galesburg	PCP	15,200	Bioreactor	Beazer	
Jun-89	Cape Fear Wood Preserving	CCA	30,500	Soil Washing	Beazer	
Sep-89	Havertown PCP	PCP	0	Unknown	Beazer	Undetermined volume (out of 40,000 cy of soil)
Sep-89	Burlington Northern, Montana	Metals	11,700	Bioreactors	Beazer	
Sep-89	United Creosoting	CCA	93,000	Critical fluid extraction	Beazer	
Sep-89	Koppers, Oroville, CA	CCA	200,000	Soil Washing	Beazer	
Sep-90	American Creosote, Pensacola, FL	PCP	0	NA	Beazer	No contaminated soil
Sep-90	Baxter/Union Pacific Tie	Creosote, PCP	0	Not defined	Beazer	Undetermined volume (out of 700,000 cy of soil)
Sep-90	Arkwood, Inc.	PCP, PNA, Dioxins	21,000	Incineration	Beazer	
Sep-90	Texarkana Wood Pres. Co.	PCP, Creosote	77,000	Incineration	Beazer	
Sep-90	Moss-Am. Kerr McGee Oil	PAH	85,200	Bioreactor	Beazer	
Sep-91	Macgillis & Gibbs Co/Bell Lumber & Pole	PCP, PAHs, metals	0	NA	ICF	Sludge only (100,000 gallons)
Sep-91	Havertown PCP Site	PCP, PAHs, metals, VOCs	0	NA	ICF	Groundwater
Sep-91	Valley Wood Preserving	Metals	15,000	Fixation	ICF	

ROD Date	Site Name	Principal Contaminants	Volume of Soil or Sediment Managed Ex-situ (yd^3)	Treatment Method	Source	Comment
Sep-91	Saunders Supply Co.	Dioxins, PCP, metals	25,000	Low temp thermal desorption, off-site disposal	ICF	
Mar-92	Koppers Co., Inc. Texarkana	PCP, VOCs, PAHs, metals	19,400	Soil washing	ICF	Range of 3,300 to 19,400 cy reported.
Mar-92	Broderick Wood Products	VOCs, PAHs, dioxins, metals	59,120	Bioremediation	ICF	
Jun-92	Reilly Tar & Chemical (Indianapolis)	VOCs, other organics	0	NA	ICF	Groundwater
Jul-92	Benfield Industries, Inc.	VOCs, PAHs, metals	0	NA	ICF	No data
Sep-92	Joseph Forest Products	Metals, inorganics	0	NA	ICF	No data
Sep-92	Wyckoff Co./Eagle Harbor	PAHs, metals	7,000	Dredge, land disposal	ICF	Range of 1,000 to 7,000 cy reported.
Sep-92	Idaho Pole Co	Dioxins, PAHs, inorganics	19,000	Bioremediation	ICF	
Dec-92	Koppers Morrisville Plant	Dioxins, phenols	2,930	Incineration	ICF	
Feb-93	Popile, Inc.	Creosote, PCP	165,000	Biological land treatment	ICF	
Apr-93	American Creosote Works	PAHs, phenols	25,000	Incinerate (tars and sludge)	ICF	
Jun-93	Renkotil VA Wood Pres. Div.	VOCs, PAHs, metals, dioxin	70	Incineration (K001)	ICF	
Jun-93	Renkotil VA Wood Pres. Div.	VOCs, PAHs, metals, dioxin	5,150	Low temperature thermal desorption	ICF	
Jun-93	Renkotil VA Wood Pres. Div.	VOCs, PAHs, metals, dioxin	7,200	Excavate and consolidate	ICF	
Jun-93	American Crossarm & Conduit	PCP, PAH, dioxin	34,300	Solidification and disposal	ICF	
Sep-93	Reilly Tar & Chemical (St. Louis Park)	PAHs	0	NA	ICF	Groundwater
Sep-93	Reilly Tar & Chemical (Indianapolis)	VOCs, organics	45,920	Low temperature thermal desorption	ICF	
Sep-93	Montana Pole and Treating	PAHs, organics, metals	208,000	Bioremediation	ICF	

January 29, 1997

MEMORANDUM

TO: Bill Kline, EPA/OSW

CC: C. Pan Lee, EPA/OSW

FROM: Scott Breffle and Jim Laurenson

SUBJECT: Methodology and Data Sources for Estimating the Volume of Wood Preserving Waste Requiring Combustion Under the Phase IV Land Disposal Restrictions

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This memorandum presents our methodology and data sources for refining the estimates of required combustion capacity for wood preserving wastes subject to the pending Phase IV land disposal restrictions (LDRs). We plan to have preliminary results by Thursday or Friday of this week.

1. Methodology

We are refining the estimate of soil contaminated with newly listed wood preserving wastes (presented in Section 3.4 of the draft wood preserving capacity background document) in three ways:

1. updating the projected volumes of excavated wood preserving wastes that were presented in response to the ANPRM by Beazer East, Incorporated[73] using more recent Superfund Records of Decision (RODs);

2. refining the Beazer East methodology by estimating the annual excavated soil and sediment volumes directly, based on the excavated soil volume for all RODs in each year and an estimate of the average duration of a Superfund remedial action; and

3. incorporating new data obtained from the Biennial Reporting System (BRS) and other commenter data.

1.1 Update of Beazer East Estimate

To update the estimate of wood preserving wastes potentially requiring combustion, we are first duplicating the methodology of Beazer East using more recent ROD data. The Beazer East analysis used RODs from 1982 to 1990. We will incorporate RODs from wood preserving sites from 1991 to the most recent RODs that are obtainable. The basic methodology used by Beazer East is as follows:

1. Determine the number and percentage of wood preserving site RODs examined that have contaminated soil and sediment (i.e., excluding sites with only contaminated ground water);

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[73] "Wood Treating Review Project," memorandum to Beazer East, Inc. from National Environmental Technology Applications Corporation, December 2, 1991, RCRA Docket No. CSP-00020.A.

2. Determine the number and percentage of wood preserving site RODs that have contaminated soil and sediment that will undergo excavation;[74]

3. Calculate the total volume (across all RODs) of wood preserving site soil and sediment to be excavated;

4. Based on steps 2 and 3, calculate the average volume to be excavated per site among those wood preserving sites requiring soil and sediment excavation; and

5. Based on an estimate of total number of wood preserving sites in the United States, extrapolate to a national total waste quantity using the percentage of sites with contaminated soil and sediment, the percentage of sites requiring excavation, and the average volume per site (i.e., step 1*step 2*step 4*the total number of wood preserving sites in the United States).

This methodology produces an upper-bound estimate (and possibly an unreasonable upper-bound estimate; see Section 1.2) of total soil and sediment requiring combustion by assuming that all soil and sediment that is managed ex-situ, including the portion that undergoes non-thermal treatment, will need to be combusted. In addition, this methodology essentially assumes that all wood preserving sites in the United States will generate excavated remediation volumes similar to volumes excavated at current Superfund sites, and that these remediations will occur in the near future.

Our revised estimate may differ from that provided by Beazer East because more recent RODs may indicate that more or less volume is being treated ex-situ. For example, the earlier Superfund RODs could have addressed sites that are larger or more contaminated than sites addressed by more recent RODs. As a result, future volumes of soil and sediment that require combustion may be less than that projected by Beazer East. We may be able to refine the upper-bound volume requiring combustion by estimating the fraction of currently excavated soils and sediments that may be treated by methods other than combustion to meet the LDRs. For example, wood preserving sites that are contaminated with only F035 wastes (i.e., inorganics) will not use combustion as a treatment method. These volumes of F035 wastes can be subtracted from the upper-bound estimate. The RODs that are being reviewed will generally contain data on current treatment methods.

Next, we plan to estimate the subset of the total volume of soil and sediment that will require treatment within the next two years. That is, many of the sites represented by the RODs likely have already excavated and treated their soils and sediments, while some sites are likely to take longer than the two-year variance window to implement that portion of the ROD. Analysis conducted for the Hazardous Waste Identification Rule for Contaminated Media (HWIR-Media) has generated estimates of the total volume and number of Superfund sites expected to be remediated annually over the next five years. This information, in conjunction with an estimate of the relative proportion of wood preserving site RODs to the total number of RODs, can be used to estimate the volume of excavated soil and sediment that will require treatment within the next two years.

A lower-bound estimate of the total required combustion capacity will be estimated by assuming that, at a minimum, all volumes currently being excavated and combusted will continue to be treated in that manner after the LDRs are effective. We may be able to refine this lower-bound volume by adding soil and sediment to this volume using assumptions about what proportion of waste undergoing non-thermal treatment will require combustion.

[74] It is the excavated portion of the soil and sediment that is potentially subject to LDRs and thus combustion.

Finally, another possible refinement includes subtracting possible K001 and D037 wastes undergoing combustion from the upper-bound and lower-bound estimates.

1.2 Directly Estimate the Annual Volume of Soil and Sediment Excavated from Wood Preserving Sites

As a supplement to—and possbly a replacement of[75]—the Beazer East methodology, we will use the data from the previous analysis (Section 1.1) to construct a direct estimate of the annual volume of soil and sediment expected to be excavated from wood preserving sites. To do this, we will directly sum the volume of excavated soil and sediment from RODs signed in the same year. Because Superfund remediation actions are likely to span more than one year, however, each annual volume will be spread over an appropriate number of years. The final estimate of the annual volume of excavated soil and sediment from wood preserving sites will be a sum of the volumes from remedial actions begun in the recent past years as well as the current year. We will use data contained in the HWIR-Media proposed rule (which came from a Report to Congress on the Superfund Program) to estimate the average length of Superfund remedial actions.

2. Data Sources

2.1 Records of Decision

We have currently identified approximately 20 RODs signed between 1991 and 1993 that address contamination at wood preserving sites, or sites where wood preserving operations were conducted. We are in the process of extracting from these RODs information on volumes of soil and sediment, and the recommended treatment methods. These RODs are contained on a March 1995 CD-ROM disc[76] that ICF possesses.

More recent RODs can be obtained by purchasing a newer version of the above CD-ROM disc ($325). Alternatively, we plan to investigate the quality of information that can be obtained through on-line databases such as the Right to Know Network (RTK-Net), which houses the CERCLA Superfund Information System (CERCLIS) and National Priority List (NPL) databases.

2.2 BRS WR Form

We are currently reviewing data submitted on the BRS waste received (WR) form in an effort to refine the estimates of soil and sediment requiring treatment. The WR form will provide information on wood preserving wastes received from off-site, and may capture volumes of wood preserving wastes that were not reported on the BRS GM form, such as wastes from small quantity generators or wastes that were assigned the wrong treatment method by the generator. A tally of the total quantity of wood preserving wastes requiring land disposal will provide an upper-bound estimate of wood preserving wastes requiring treatment under the LDRs.

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[75] A detailed review of the Beazer East methodology indicates that several unreasonable assumptions have been used to estimate total soils. For example, Beazer East essentially assumes that all wood preserving sites will undergo remediation in the near future, and that the quantity of soil removed at each site will be similar to that removed at current wood preserving Superfund sites. Neither assumption is likely to be realized.

[76] EPA Superfund Records of Decision on CD-ROM, National Technical Information Service (NTIS), PB95-593551FCD, March 1995.

2.3 Corrective Action

Information on the volumes of soil and sediment from RCRA corrective actions is limited. While RCRIS theoretically contains data on volumes at RCRA corrective action sites, in practice that data are frequently missing from the files or are ambiguous. Furthermore, based on a brief review of the Corrective Action Regulatory Impact Analysis database, relatively few wood preserving sites appear to be undergoing RCRA corrective action compared to Superfund remediation. We therefore propose at this time to not use corrective action data to estimate soil and sediment volume potentially subject to combustion.

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Please call Scott at (703) 934-3917 or Jim at (703) 934-3648 if you have any questions or comments on this memorandum.