United States
Environmental Protection
Agency

Office of
Solid Waste
Washington, D.C. 20460

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# Background Document for Capacity Analysis for Land Disposal Restrictions: Newly Identified Dye and Pigment Manufacturing Wastes (Proposed Rule)

## PREFACE

This report does not contain confidential business information (CBI). Data and information based on CBI has been removed from the text and replaced with statements such as "data are not included due to business confidentiality concerns."

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## List of Exhibits

# 1. INTRODUCTION

This document presents the capacity analysis that the U.S. Environmental Protection Agency (EPA) conducted to support the proposed land disposal restrictions (LDRs) for newly proposed dye, pigment, and food, drug, and cosmetic (FD&C) colorant wastes. EPA conducts capacity analyses for all newly identified hazardous wastes 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.

## 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 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 of hazardous wastes according to a strict statutory schedule.[2] 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 [RCRA §3004(m)]. Whenever possible, EPA 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. For the two dyes and pigments industry wastes proposed for listing and which are the subject of this background document, specific treatment methods are being proposed as BDAT. For these wastes, EPA did not expect numerical treatment standards to substantially reduce the toxicity of the wastes, as required by RCRA, and therefore numerical treatment standards were not proposed. Additional information regarding the development of BDAT standards is found in EPA's Best Demonstrated Available

[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)).

Technology (BDAT) Background Document for Dye and Pigment Production Wastes: Deferred Wastes. Draft proposed. June 1999. Additional information regarding how the proposed treatment standards effect the capacity analysis are found in Section 3.

If finalized, the LDRs are effective on the same date that the hazardous waste listing determinations become effective (typically six months from publication in the Federal Register), unless EPA 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 onsite treatment capacity is not available. If EPA determines (in a final rule) that adequate alternative commercial treatment capacity is available for a particular waste, the land disposal restrictions are effective on the effective date of the listings. If not, EPA establishes an alternative effective date based on the earliest date on which adequate treatment capacity will be available or two years, whichever is less. Once the variance expires, the wastes must meet the LDR treatment standards prior to being land disposed.

RCRA also allows generators to apply for extensions to the LDRs on a case-by-case basis for specific wastes generated at a specific facility for which there is not adequate capacity [RCRA section 3004(h)(3)]. EPA may grant case-by-case capacity variances to applicants who can demonstrate that: (1) no capacity currently exists anywhere in the U.S. to treat a specific waste, and (2) a binding contractual commitment is in place to construct or otherwise provide alternative capacity, but due to circumstances beyond the applicant's control, such alternative capacity cannot reasonably be made available by the effective date (40 CFR 268.5).[3]

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

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

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

## Exhibit 1-1. Summary of Land Disposal Restrictions And Related Rulemakings

| Rulemaking | Federal Register Notice | Promulgation/ Proposal Date |
|---|---|---|
| Solvents and Dioxins (surface disposed) | 51 *FR* 40572 | November 7, 1986 |
| Solvents and Dioxins (deep well injected) | 53 *FR* 28188 | July 26, 1988 |
| California List (surface disposed) | 52 *FR* 25760 | July 8, 1987 |
| California List (deep well injected) | 53 *FR* 30908 | July 26, 1988 |
| First Third Rule | 53 *FR* 31138 | August 8, 1988 |
| First Third Rule (deep well injected) | 54 *FR* 25416 | June 7, 1989 |
| Second Third Rule | 54 *FR* 26594 | June 8, 1989 |
| Third Third Rule | 55 *FR* 22520 | May 8, 1990 |
| Newly Listed Wastes and Hazardous Debris (Phase I) Land Disposal Restrictions; Final Rule | 57 *FR* 37194 | August 18, 1992 |
| Interim Final Rule for Vacated Treatment Standards | 58 *FR* 29860 | May 24, 1993 |
| Land Disposal Restrictions Phase II - Universal Treatment Standards, and Treatment Standards for Organic Toxicity Characteristic Wastes and Newly Listed Wastes (Phase II); Final Rule | 59 *FR* 47980 | September 19, 1994 |
| Land Disposal Restrictions Phase III - Decharacterized Wastewaters, Carbamate Wastes, and Spent Potliners; Final Rule | 61 *FR* 15566, 15660 | April 8, 1996 |
| Emergency Revision of the Land Disposal Restrictions (LDR Phase III) Treatment Standards for Listed Hazardous Wastes from Carbamate Production; Final Rule | 61 *FR* 43924 | August 26, 1996 |
| Emergency Extension of the K088 Capacity Variance (Phase III - Final Rule) | 62 *FR* 1992, 62 *FR* 37693 | January 14, 1997, July 14, 1997 |
| Treatment Standards for Wood Preserving Wastes, Paperwork Reduction and Streamlining, Exemptions from RCRA for Certain Processed Materials, and Miscellaneous Hazardous Waste Provisions (Phase IV - Final Rule) | 62 *FR* 25998 | May 12, 1997 |
| Clarification of Standards for Hazardous Waste Land Disposal Restriction Treatment Variances (Final Rule) | 62 *FR* 64504 | December 5, 1997 |
| Organobromine Production Wastes; Identification and Listing of Hazardous Waste; Land Disposal Restrictions; et al.; Final Rule | 63 *FR* 24596 | May 4, 1998 |
| Land Disposal Restrictions Phase IV: Final Rule Promulgating Treatment Standards for Metal Wastes and Mineral Processing Wastes; Mineral Processing Secondary Materials and Bevill Exclusion Issues; Treatment Standards for Hazardous Soils, and Exclusion of Recycled Wood Preserving Wastewaters, Final Rule | 63 *FR* 28556 | May 26, 1998 |
| Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Petroleum Refining Process Wastes; Land Disposal Restrictions for Newly Identified Wastes; et al.; Final Rule | 63 *FR* 42110 | August 6, 1998 |
| Hazardous Remediation Waste Management Requirements (HWIR-media); Final Rule | 63 *FR* 65874 | November 30, 1998 |

## 1.2 CAPACITY ANALYSIS METHODOLOGY

In evaluating the need for national capacity variances, EPA estimates the quantities of waste requiring alternative commercial treatment as a result of the LDRs and the capacity available at commercial treatment facilities to manage the restricted wastes. By comparing the capacity demand with the available commercial capacity, EPA can identify capacity shortfalls and make proposed determinations concerning national capacity variances. A first step to satisfying the goals of a capacity analysis is to make a "threshold" analysis concerning whether a national treatment capacity variance is needed for the two years following promulgation of a waste's LDR treatment standards or is not needed at all. Thus, EPA estimates the required and available commercial treatment capacity for all affected wastes and facilities, but often only to the extent needed to make this threshold analysis. For example, when upper-bound estimates of required capacity are well below lower-bound estimates of available capacity, then generally a variance is not needed and the analysis can stop. Similarly, when lower-bound estimates of required capacity far exceed the upper-bound estimates of available capacity, then often the two-year maximum capacity variance is needed. Results that are between two extremes generally require EPA to conduct further analyses.[5]

This section provides an overview of EPA's methodology in estimating required and available commercial treatment capacity.

### 1.2.1 Analysis of Required Commercial Treatment Capacity

Required commercial treatment capacity represents the quantity of wastes currently being land disposed that cannot be treated on site and will consequently need commercial treatment to meet the LDR treatment standards. 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, underground injection well, salt dome formations, salt bed formations, and underground mines and caves.

To assess 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) can present special treatability concerns because they often contain constituents (e.g.,

[5] EPA also derived estimates of affected facilities and waste quantities for the regulatory impact analysis (RIA). However, the goals of a capacity analysis and an RIA are very different, which often results in reasonable differences in methodologies, data, and results. In contrast to the capacity analysis' focus on required and available capacity during the next two years and its initial focus on threshold determinations, the RIA concentrates on estimating specific potential significant (or dominant) long-term costs and benefits of the LDR treatment standards. Thus, the RIA does not conduct a threshold analysis of treatment capacity. Furthermore, the RIA evaluates affected facilities and wastes over a much longer time frame.

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, EPA 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 onsite treatment systems.

### 1.2.2 Analysis of Available Commercial Treatment Capacity

The analyses conducted to assess available commercial treatment capacity focuses on treatment capacity projected to be available for the two years following the effective date of the final rule, starting from the baseline capacity identified from the most recent land disposal restrictions final rule. As shown in Exhibit 1-1, this was the rule finalizing listing determinations and land disposal restrictions for petroleum refining wastes (63 *FR* 42110, August 6, 1998).

Available treatment capacity can be assessed by grouping facilities into four categories:

(1) commercial - capacity available at facilities that manage waste from any facility;
(2) onsite (private) - capacity available at facilities that manage only waste generated onsite;
(3) captive - capacity available at facilities that manage only waste from other facilities under the same ownership; and
(4) limited commercial - capacity available at facilities that manage waste from a limited number of facilities not under the same ownership.

For capacity analyses, estimates on available capacity reflect available commercial capacity. The analysis of available capacity focuses on commercial facilities. Consequently, most estimates of capacity presented in this document represent commercially available capacity.

In order to assess whether to grant a national capacity variance for the wastes proposed to be listed in today's rule, EPA analyzed available commercial capacity for alternative treatment technologies capable of meeting the LDR treatment standards. This analysis included estimating the maximum or design capacity for appropriate waste management systems, and estimating the amount of waste currently going to these systems (utilized capacity). Available capacity was estimated as the difference between the maximum and utilized capacity values. For today's proposed rule, EPA analyzed the commercial capacity of combustion (including incineration and reuse as fuel) because combustion is proposed as a technology-specific treatment standard for the wastes proposed for listing.

## 1.3 SUMMARY OF CAPACITY ANALYSIS FOR TODAY'S PROPOSED RULE

For today's rule, EPA is proposing to list K167 and K168 as hazardous wastes:

- K167: Spent filter aids, diatomaceous earth, adsorbents used in the production of azo, anthraquinone (AQ), and triarylmethane (TAM) dyes, pigments, and FD&C colorants.

- K168: Wastewater treatment sludges from the production of Triarylmethane (TAM) dyes and pigments (excluding TAM pigments using aniline as a feedstock).

EPA is proposing not to list a third waste, wastewater treatment sludge from the production of anthraquinone dyes and pigments.

EPA is proposing to prohibit the land disposal of both nonwastewater and wastewater forms of hazardous wastes K167 and K168 and proposing LDR treatment standards for these wastes based on previously promulgated technology-specific standards. Specifically, the technology standard of combustion (CMBST) is being proposed as the treatment standard for nonwastewater forms of K167 and K168. The treatment train consisting of wet air oxidation (WETOX) or chemical oxidation (CHOXD) followed by carbon adsorption (CARBN) is being proposed as the treatment standard for wastewater forms of K167 and K168; alternatively treatment by combustion (CMBST) may be used (if finalized, any of the three alternatives may be used to meet the land disposal restriction requirements for wastewater forms of these wastes). The technologies of CMBST, WETOX, CHOXD, and CARBN have been previously promulgated and defined in 40 CFR §268.42.

Although EPA is proposing to list K167 and K168 as hazardous, not all facilities generating these wastes will be required to manage them as hazardous and subsequently be required to meet land disposal restrictions because concentration-based listings are proposed for these wastes. A facility may assume that its waste is hazardous as-generated. Alternatively, a facility could assess whether any of the constituents of concern would be present above certain levels using sampling and analysis results, process knowledge, or a combination. The present capacity analysis assumes that all facilities that generate these wastes would generate a hazardous waste and would be required to meet land disposal restrictions. Upon promulgation, the actual number of facilities meeting these conditions, as well as the total volume of waste, may be lower.

EPA has identified the quantity of K167 and K168 generated annually for which adequate onsite management meeting LDR requirements is not available.[6] Therefore, EPA estimates the quantity of K167 and K168 that will be managed offsite and require alternative commercial treatment. EPA initially estimated, based on 1991 data, the quantity of K167 and K168 generated annually and would require alternative commercial treatment; 1997 data indicate the quantity generated annually. Values of these quantities are not included due to business

[6] Quantities shown as tons throughout this document are short tons unless indicated otherwise.

confidentiality concerns.

To assess 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. The quantities of land disposed wastes requiring alternative commercial treatment or recovery capacity as a result of today's proposed rule are not included due to business confidentiality concerns. Exhibit 1-2 indicates that adequate treatment capacity is available for these wastes. Based on the capacity analysis, EPA is proposing not to grant a national capacity variance (NCV) from compliance with LDRs for the newly proposed dye, pigment, and FD&C wastes. As a result, LDRs will become effective on the effective date of the listings of these dye, pigment and FD&C wastes.

**Exhibit 1-2. Dye, Pigment, and FD&C Wastes Proposed for Listing: Capacity Analysis Summary**

| Waste Stream | Quantities Requiring Alternative Capacity (tons/year) | | Adequate Commercial Treatment Capacity Available? |
|---|---|---|---|
| | 1991 Data | 1997 Data | |
| K167 | Not included | Not included | Yes |
| K168 | Not included | Not included | Yes |
| Soil and Debris Contaminated with K167 or K168 | No data | No data | Yes |

Data are not included in this table due to business confidentiality concerns.

## 1.4 ORGANIZATION OF BACKGROUND DOCUMENT SUPPORTING THE CAPACITY ANALYSIS

This background document, which presents the capacity analyses conducted for the proposal of LDR standards for newly proposed dye, pigment, and FD&C wastes, is organized into four sections, as described below:

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

- **Section 2: Available Treatment Capacity.** Describes the detailed methodology and data used to estimate available commercial capacity for hazardous waste combustion (incineration) of solids and sludges.

- **Section 3: Required Capacity for Newly Listed Dye, Pigment, and FD&C Process Wastes.** Describes the detailed methodology and data used to estimate required treatment capacity for the newly proposed dye and pigment wastes (K167 and K168).

- **Section 4: Capacity Analysis Results.** Describes the results of the capacity analysis by

comparing available treatment capacity (Section 2) with required treatment capacity (Section 3).

# 2. AVAILABLE TREATMENT CAPACITY

This section presents EPA's estimates of available commercial treatment capacity for the newly proposed dye and pigment production wastes. Section 2.1 summarizes the results of EPA's analysis of commercial combustion capacity at incinerators and boilers and industrial furnaces (BIFs). Section 2.2 summarizes the available commercial capacity for other treatment technologies.

## 2.1 COMMERCIAL HAZARDOUS WASTE COMBUSTION CAPACITY

EPA is proposing the technology-specific standard of combustion as the treatment standard for nonwastewater forms of K167 and K168. Many constituents of concern in the newly proposed dye and pigment production wastes either have been demonstrated to be treated effectively by this technology to below detection, or are so structurally similar to constituents for which combustion is a technology-specific standard that they would not be more difficult to treat via combustion.

In assessing the available treatment capacity for combustion, EPA compiled data for hazardous waste incinerators, which have the sole purpose of destroying hazardous wastes, and for boilers and industrial furnaces (BIFs), which have the dual purpose of destroying hazardous wastes and deriving energy from the waste that can be then used for other industrial processes. A summary of the methodology and data is provided below.

### 2.1.1 Methodology and Data

In 1993, the Hazardous Waste Treatment Council (HWTC) and the Cement Kiln Recycling Coalition (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, the Environmental Technologies Council (ETC) submitted updates to the HWTC Survey from its members.[7] Survey responses received from incinerators are classified as confidential business information (CBI). Following the receipt of the original surveys, EPA reviewed the data submitted by each facility to evaluate the completeness, consistency, and accuracy of the information. EPA identified and reconciled data gaps and anomalies by contacting the respective HWTC or CKRC coordinators and the individual facilities in question.[8]

The data 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

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

[8] Background Document for Capacity Analysis for Land Disposal Restrictions Phase II – Universal Standards, and Treatment Standards for Organic Toxicity Characteristic Wastes and Other Newly Listed Wastes. Volume 1: Capacity Analysis Methodology and Results, Chapter 2. U.S.EPA. August 1994. (In docket for 59 FR 47980, September 19, 1994.)

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). To preserve the confidentiality of the survey and updated data, only aggregated results for these CBI data are provided.

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

following order for redistributing capacity:[9]

(1) Soils;
(2) Bulk Solids;
(3) Containerized Solids;
(4) Nonpumpable Sludges;
(5) Pumpable Sludges;
(6) Compressed Gases;
(7) Non-aqueous Liquids; and
(8) Aqueous Liquids.

Cement kiln capacity for hazardous waste is limited by air emission limits (e.g., 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. 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 the past, 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.

Once the baseline[10] available combustion estimates were calculated using the above methodology (i.e., based on information received from the facilities participating in the HWTC and CKRC surveys conducted in 1993 and updates by ETC in 1994), EPA 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., LDR Phase I wastes under variance, LDR Phase II , III, and IV wastes, and recently listed petroleum refining wastes)[11] to derive the available combustion capacity for the proposed dye and pigment manufacturing wastes. The capacity required for Phase II, III, and IV wastes, and newly listed petroleum refining process wastes were not reflected in the estimates of utilized capacity because the Phase II, III, and IV rules, and Listing/LDR rule for petroleum refining process wastes 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.

Also, when EPA finalized the LDR Phase IV rule, EPA conducted additional analysis by developing assumptions to account for the uncertainty associated with the age of the bulk of the

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[9] ibid, pages 2-10 to 2-12 to see example.

[10] "Pre-Baseline" available combustion capacity estimates are presented in Exhibit 2-1 (i.e., estimates prior to accounting for LDR Phase I, II, III, IV wastes, and recently listed petroleum refining process wastes).

[11] LDR Phase I Final Rule: 57 *FR* 37194, August 18, 1992; LDR Phase II Final Rule: 59 *FR* 47980, September 19, 1994; LDR Phase III Final Rule; 61 *FR* 15566, April 8, 1996; LDR Phase IV Final Rules: 62 *FR* 25998, May 12, 1997 and 63 *FR* 28556, May 26, 1998; Listing and LDR Final Rule for Petroleum Refining Process Wastes: 63 *FR* 42110, August 6, 1998.

data (which are now several years old) and assessing the potential trends in combustion capacity over the next two years. This additional analysis primarily involved three activities: (1) updating available capacity where possible using facility-specific CBI submitted by Rollins Environmental Services (RES) in 1996 as a public comment to the LDR Phase IV proposed rule[12], (2) applying assumptions where necessary to obtain a range of overall available capacity, and (3) researching potential impacts of upcoming maximum achievable control technology (MACT) standards.

### 2.1.2 Available Combustion Capacity

Exhibit 2-1 summarizes EPA's estimates of "pre-baseline" available commercial hazardous waste combustion (incinerators and BIFs) capacity by waste form. This exhibit also provides summarized estimates of available capacity by two broad categories of waste physical forms: (1) liquids and (2) sludges/solids. The following analysis has focused on the availability of capacity only for solids/sludges because the newly listed petroleum refining process wastes are expected to fall entirely within this broad category of physical forms.

[12] Background Document for Land Disposal Restrictions - Wood Preserving Wastes (Final Rule): Capacity Analysis and Response to Capacity-Related Comments, April 1997, pages 4-7 to 4-12.

**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 | 650 | 327 | 50 | 1,785 | 751 | 58 | 1,078 |
| TOTAL SOLIDS & SLUDGES | 734 | 450 | 39 | 298 | 187 | 37 | 638 |
| TOTAL | 1,390 | 780 | 44 | 2,083 | 938 | 55 | 1,718 |

Notes:

1. This pre-baseline capacity summary is based on survey data compiled during 1993 and 1994. For details of capacity for individual combustion units – incinerators and BIFs – refer to U.S. EPA's "Background Document for Capacity Analysis for Land Disposal Restrictions Phase III-Decharacterized Wastewaters, Carbamate and Organobromine Wastes, and Spent Potliners (Final Rule)", February 1995, Chapter 2.
2. Although estimates of available capacity for today's final rule are based on this capacity summary, the final values include adjustments for the additional capacity required due to Phases II, III and IV LDR rules. Details of adjustments are provided in the text.

As shown in Exhibit 2-1, the available sludge/solid commercial combustion capacity – prior to accounting for the capacity required due to the Phase I through IV rules – is 638,000 tons/year.[13] Post-Phase I and II, but pre-Phase III and IV, data obtained from one major treater, RES, through comments and subsequent submissions of CBI, 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 489,000 tons/year of available pre-Phase III and IV capacity,[14] with a range between about 410,000 to 568,000 tons/year.[15] For the Phase III wastes, EPA estimated that the relevant required sludge/solid combustion capacity is 4,600 tons/year. Therefore, the overall pre-Phase IV combustion capacity for sludges/solids is estimated at 484,000 tons/year; between about 406,000 to 564,000 tons/year. In the Phase IV rulemaking for wood preserving wastes, EPA estimated that approximately 9,000 tons/year of non-liquid/nonwastewater combustion capacity is required for wastes from wood preserving operations.[16] Thus, EPA estimates that approximately 475,000 tons/year (397,000 to 555,000 tons/year) of combustion capacity is available to treat wastes restricted from land disposal by the remainder of the Phase IV rulemaking. In the Phase IV rulemaking for TC metal and mineral processing wastes, EPA estimated that approximately 32,000 tons/year (8,800 to 52,000 tons/year) of combustion capacity is required.[17] Finally, as a result of the August 6, 1998 finalizing listing and LDR standards for four newly listed petroleum refining wastes (K169-K172), approximately 8,000 tons/year of sludges of combustion capacity is required.[18] Thus, EPA estimates that approximately 435,000 tons/year (337,000 to 538,000 tons/year) of combustion capacity is available to treat the newly identified dye and pigment wastes estimated to be 100,000 tons/year. Even though soil and debris contaminated with wood preserving

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[13] EPA summed the available capacity of "pumpable sludges" (78,000 tons/year), "nonpumpable 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, and then subtracting 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 pre-Phase III available capacity for incinerators and BIFs. Because most of the information used in these calculations is CBI, EPA can not 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 Phase 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 bound).

[16] Background Document for Land Disposal Restrictions - Wood Preserving Wastes (Final Rule), Capacity Analysis and Response to Capacity-Related Comments, April 1997, page 3-13

[17] U.S. Environmental Protection Agency. Capacity Analysis for Land Disposal Restrictions--Phase IV: Newly Identified Toxicity Characteristic Metal Wastes and Mineral Processing Wastes (Final Rule) Background Document. Section 3.6.10, page 3-28. April 1998.

[18] U.S. Environmental Protection Agency. Background Document for Capacity Analysis for Land Disposal Restrictions: Newly Identified Petroleum Refining Wastes (Final Rule). Section 3.3, page 3-15. August, 1998.

wastes[19] would utilize some combustion capacity, there is still more than adequate combustion capacity to treat the much lesser volume of newly proposed dye and pigment wastes.

Since the baseline combusiton capacity data were several years old, some combustion facilities have closed, others have opened, and others have made process changes affecting their capability and capacity to treat hazardous wastes.[20] Much of this information is industry proprietary in nature and cannot be quantified in this report. In addition, several facilities that had proposed expansion of thermal capacity have now abandoned their proposals.[21] Difficulties in permitting make it highly unlikely that other combustion units could be brought on-line in the near-term (i.e., within two years). Recent industry publications 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 have already, or may eventually, find the process too costly.[22] Therefore, the available combustion capacity is expected to remain relatively steady through the year 2001.

## 2.2 OTHER TREATMENT SYSTEM CAPACITIES

As discussed in Section 2.1, EPA has identified combustion as a technology which can effectively minimize the toxicity of K167 and K168 nonwastewaters. Other technologies available for the treatment of hazardous wastes include stabilization and treatment of wastewaters. Stabilization may be used where K167 or K168 is comanaged with another listed or characteristic metal bearing waste. Wastewater treatment may be necessary for wastewaters generated from treating K167 and K168 wastes. For wastewater forms of K167 and K168, EPA proposes to specify a technology specific treatment standard consisting of one of two alternatives: either a treatment train consisting of wet air oxidiation or chemical oxidation followed by carbon adsorption; or treatment by combustion.

EPA estimates available stabilization treatment capacity for wastes covered under today's proposed rule to be at several million tons per year. This estimate is based on the capacity analysis conducted for the Third Third LDR rule and an updated Capacity Data Set from the May 1990 National Survey of Hazardous Waste Treatment, Storage, Disposal and Recycling (TSDR) Survey[23]. EPA also considered data from the Biennial Reporting System (BRS) on Phase IV wastes in the proposed rule. A detailed analysis of the calculations used to derive this estimate is

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[19] Note that the two-year capacity variance for soil and debris contaminated with wood preserving wastes which was effective from May 12, 1997 (62 FR 25998) has expired.

[20] Background Document for "Capacity Analysis for Land Disposal Restrictions–Phase IV: Newly Identified Toxicity Characteristic Metal Wastes and Mineral Processing Wastes (Final Rule), April 1998," pages 2-15 to 2-17.

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

[22] ibid.

[23] U.S. EPA, Commercial Treatment/Recovery Data Set, pages 37-45, 54-57, 91-95 May 1990.

available in the LDR Phase IV background document.[24] From these calculations, EPA estimates that little additional commercial stabilization capacity will be needed. Furthermore, even if some capacity is required as a result of this proposed rule, EPA expects that the high elasticity of stabilization capacity (i.e., the little time needed to develop additional stabilization capacity) will more than counter this demand.

EPA does not expect any treatment facility (i.e. hazardous waste combustor) to generate wastewaters solely from the treatment of K167 and K168 wastes, and instead expects the facility to already generate wastewaters as a result of its treatment of other wastes. EPA expects that some (or perhaps all) treatment facilities have the capability of treating wastewaters onsite. For those remaining treatment facilities that do not have the ability to treat wastewaters, and must send its wastes offsite for treatment, EPA expects there is sufficient treatment capacity for these wastes. A detailed description of how EPA arrived at this estimation is provided in the LDR Phase IV background document.[25] Based on these calculations, EPA estimates that approximately 37 million tons of available wastewater treatment capacity are available using the 1991 BRS. This estimate compares favorably to the estimate of 47 million tons obtained from the Office of Water data. Since EPA estimates that the quantity of K167 and K168 wastewater that would require commercial offsite treatment is zero, EPA is confident that sufficient wastewater treatment capacity exists.

[24] Background Document for Land Disposal Restrictions - Wood Preserving Wastes (Final Rule): Capacity Analysis and Response to Capacity-Related Comments, April 1997, pages 2-10 to 2-11.

[25] Background Document for Land Disposal Restrictions - Wood Preserving Wastes (Final Rule): Capacity Analysis and Response to Capacity-Related Comments, April 1997, pages 2-6 to 2-10.

# 3. REQUIRED CAPACITY FOR DYE, PIGMENT, AND FD&C PROCESS WASTES

Section 3 describes how EPA conducted a capacity analysis to determine the required treatment capacity for the newly proposed K167 and K168 dye and pigment wastes. This capacity analysis incorporates data and information on K167 and K168 generation and management collected during the EPA Industry Study of dye and pigment process and treatment wastes. The overall purpose of this analysis is to estimate the new demand for commercial Subtitle C treatment/recovery capacity resulting from the proposed listing of these hazardous wastes and simultaneous promulgation of land disposal restrictions. The quantity of K167 and K168 estimated to require commercial off-site treatment capacity as a result of this analysis is then compared to the national estimate of available Subtitle C commercial treatment capacity. Based on this comparison, EPA assessed the need for a National Capacity Variance (NCV) as specified in RCRA §3004(h)(2).

Section 3.1 examines the regulatory background behind the proposed listing of K167 and K168 wastes, giving the waste code definitions for these wastes, and providing an overview of the dye and pigment industry. Section 3.2 presents the data sources used by EPA to quantify waste generation quantity and onsite capacity. Section 3.3 details the methodology and assumptions used in the capacity analysis, and presents the results of this analysis. Section 3.4 provides EPA's analyses for wastewater forms of K167 and K168. Section 3.5 provides EPA analyses of soil and debris contaminated with K167 and K168. Section 3.6 provides EPA's analyses of K167 and K168 mixed radioactive wastes. Section 3.7 concludes with a list of the references used in this section.

## 3.1 INTRODUCTION

### 3.1.1 Regulatory Background

Two previously promulgated hazardous waste regulations affected at least some facilities producing solid wastes from dye and pigment manufacturing. The Toxicity Characteristic (TC) rule was promulgated on March 29, 1990 (55 *FR* 11862) and became effective on September 25, 1990 for large quantity generators and treatment, storage, and disposal facilities. For small quantity generators, the effective date of the TC rule was March 29, 1991. The TC rule would affect a facility where one of the 'TC constituents' is present in wastes, such as the proposed dye and pigment wastes, above regulatory levels. As a result, producers of organic dyes and pigments already may be impacted by the TC rule and required to utilize hazardous waste management where dye and pigment wastes are co-managed with TC wastes. An earlier interim final rule published by EPA on May 19, 1980 listed seven solid wastes from inorganic dye and pigment manufacturing as hazardous wastes K002 through K008 (see 45 *FR* 33084). These listing were promulgated on March 29, 1980 (45 *FR* 74884). However, the 1980 rule affected only producers of inorganic dyes and pigments. The proposed K167 and K168 wastes would impact producers of organic dye and pigments.

In 1984, HSWA amended RCRA by instituting explicit new hazardous waste management requirements, including land disposal restriction (LDR) schedules for all listed hazardous wastes (Solvents and Dioxins, California List, First Third, Second Third, and Third

Third). Congress directed EPA (through HSWA) to investigate wastes generated by the organic dye and pigment manufacturing industries. A 1994 consent decree between EPA and the Environmental Defense Fund (EDF) required that EPA make listing determinations for wastes from several types of industries. The consent decree specifies that listing determinations are required for wastes as generated from the production of dyes, pigments, and FD&C colorants from three product classes: azo, anthraquinone, and triarylmethane. On December 22, 1994 (59 *FR* 66072), EPA published a proposed rule to list five wastes resulting from this industry study (K162 through K166), and to not list several other waste groupings. Listing decisions were deferred for three waste groups. The wastes with deferred listings are: 1) spent filter aids, diatomaceous earth, or adsorbents used in the production of azo, anthraquinone, and triarylmethane dyes, pigments, and FD&C colorants; 2) wastewater treatment sludge from the production of triarylmethane dyes and pigments (excluding TAM pigments using aniline as a feedstock); and 3) wastewater treatment sludge from the production of anthraquinone dyes and pigments. The listing determination for these three waste streams were deferred because insufficient waste characterization data and/or health effects data were available to support a listing decision. Two of these wastes are being proposed for listing in the current proposal: spent filter aids, and wastewater treatment sludge from production of triarylmethane dyes and pigments. The third waste, wastewater treatment sludge from the production of anthraquinone dyes and pigments, will not be proposed to be listed as hazardous in the current proposal.

The waste code definitions for the wastes proposed for listing under 40 CFR Part 261 are as follows:

- K167: Spent filter aids, diatomaceous earth, or adsorbents used in the production of azo, anthraquinone, or triarylmethane dyes, pigments, or FD&C colorants.

- K168: Wastewater treatment sludges from the production of triarylmethane dyes and pigments (excluding triarylmethane pigments using aniline as a feedstock).

It is important to note that an individual facility generating these wastes may not necessarily be required to manage the waste as hazardous, due to implementation conditions proposed for promulgation. These implementation conditions require the generator to determine if certain constituents exceed the proposed risk-based concentration levels also known as “listing concentrations”. A concentration-based listing specifies constituent-specific levels in a waste that causes the waste to become a listed hazardous waste. EPA used risk assessment tools developed to support the hazardous waste identification program to determine the potential risks associated with the constituents of concern in dye and pigment wastes and the resulting listing concentrations. EPA proposes that a generator should determine representative concentrations for the constituents of concern in their waste streams by sampling and analysis, unless the generator can use process knowledge to demonstrate that certain constituents are not present in the waste. If all of the constituents of concern are not present, or are below risk-based concentration levels, then the waste would not be a hazardous waste. A facility may also elect not to analyze its waste and manage it as hazardous.

### 3.1.2 Dye and Pigment Industries Overview

In its capacity analysis, EPA identifies the facilities potentially generating K167 and K168 to assess onsite treatment capacity as discussed in Section 3.3.3. The number of such facilities, and the geographic location, is not included due to business confidentiality concerns. The names of these facilities are not included due to business confidentiality concerns. The end-user markets for dyes and pigments are not included due to business confidentiality concerns.

## 3.2 DATA SOURCES

### 3.2.1 RCRA §3007 Questionnaire

EPA's Office of Solid Waste (OSW) developed a detailed RCRA §3007 questionnaire for distribution to dye and pigment manufacturing facilities, collecting data based on calendar year 1991. The survey was sent to facilities in 1992. Data were automated into a database; excerpts of this database are not included due to business confidentiality concerns.

The 1992 survey requested, among other information, waste management and quantities. The waste quantity, management method, transportation costs, and management location (on site or off site) were provided. The section was used to define the scope of the residual waste codes and the impact of listing and LDRs on these facilities. These data were used in both the capacity and economic analyses.

In Spring 1998, EPA collected updated information from those dye and pigment manufacturing facilities reporting the generation of the three wastes (i.e., TAM sludges, AQ sludges, and filter aids) for which the listing determination was deferred in the 1994 proposed rule. Information regarding the facilities that received and returned questionnaires is not included due to business confidentiality concerns. Facilities responded to this survey by providing revised waste generation and management information for these wastes for calender year 1997.

To account for the possible uncertainty in solely relying on the 1997 waste quantities, the capacity analysis presents data derived from both the 1991 and 1997 surveys. An explanation of how these data were used is provided in Section 3.3.1.

### 3.2.2 Biennial Reporting System

Data from the 1995 Biennial Reporting System (BRS) were used to evaluate available onsite treatment capacity. BRS contains onsite treatment or management practices for hazardous wastes generated in the U.S., including hazardous wastes generated by organic dye and pigment manufacturers. As discussed in Section 3.3.3 below, EPA obtained BRS data for all facilities reporting the generation of K167 or K168 wastes. The data were evaluated to determine which facilities had onsite hazardous waste incinerators, capable of accepting wastes likely to be similar in form to K167 and K168 (i.e., solids or sludges). The management practice of incineration was investigated because a technology-specific standard of combustion is proposed for K167 and K168 wastes.

## 3.3 METHODOLOGY, ASSUMPTIONS, AND PRELIMINARY RESULTS

In conducting the capacity analysis for K167 and K168 dye and pigment process wastes, EPA estimated the quantities and summarized the physical and chemical characteristics of the wastes that will require hazardous waste commercial treatment and/or recovery as a result of the LDRs. The method that EPA developed for the K167 and K168 dye and pigment process wastes capacity analysis is comprised of three steps:

1. Estimate the annual quantity of K167 and K168 generated (Section 3.3.1). Data for this estimate was obtained from the 1992 RCRA 3007 survey and the 1998 update for waste generation and current management practices (treatment, storage, disposal, and recycling) of K167 and K168. Section 3.3.1 presents details about which data were selected for inclusion in the estimates and how these values could be affected by a facility's findings and/or decisions.

2. Estimate the annual quantity of waste currently meeting LDR standards (Section 3.3.2). Several waste management methods presently conducted, such as Subtitle C incineration, would likely satisfy the LDR treatment standards. The quantity being managed in this fashion can be subtracted from the required commercial treatment capacity.

3. Estimate the annual quantity with onsite treatment or recovery availability (Section 3.3.3). A few dye and pigment manufacturers may have onsite treatment ability (such as Subtitle C incineration) that can result in all, or most, of the facility's generated K167 and K168 volume being managed onsite and not requiring commercial treatment capacity.

The results of these three steps, to determine how much offsite commercial capacity is required to manage generated K167 and K168, are not presented due to business confidentiality concerns. The derivation of the quantities is discussed in Sections 3.3.1 to 3.3.3.

### 3.3.1 Step 1: Estimating Annual Generation Quantity of K167 and K168

In conducting its capacity analysis, EPA used the quantities obtained from the 1991 and 1997 surveys. Annual hazardous waste generation quantities were developed on a plant specific level for each newly listed waste. The number of facilities reporting generation of filter aids and TAM sludges using 1991 and 1997 is not presented due to business confidentiality concerns. Waste quantities and management practices for filter aids and TAM sludges based on 1991 and 1997 data are not included due to business confidentiality concerns.

EPA used these quantities as the starting point for its capacity analysis. In this initial step, the reported annual generation quantities of wastes generated from filter aids (K167) and TAM sludges (K168) for 1991 and 1997 were totaled. These quantities are not presented due to business confidentiality concerns. For its 1991 estimates, EPA used the quantities reported by the facilities directly from the 1991 data. For its 1997 estimates, EPA used the quantities reported by the facilities using the 1997 update, with the following additions. For facilities

reporting waste generation in 1991 and 1997, but only providing a 1991 waste quantity, this 1991 generation quantity was assumed to be applicable for 1997 as well. These totals for 1991 and 1997 are not included due to business confidentiality concerns. The actual quantity of K167 and K168 generated could be less, because some facilities may find that their waste does not have listing constituents of concern above the risk concentration levels specified in the proposed rule. Additionally, facilities may elect to modify their process to reduce or eliminate the use of certain constituents that would cause their waste to meet the criteria for K167 and K168.

EPA estimates of the quantity of K167 and K168 generated in 1991 and 1997 are not included due to business confidentiality concerns.

### 3.3.2 Step 2: Estimating Annual Quantity Currently Meeting LDR Standards

The various management methods reported in the questionnaire for 1991 and 1997 K167 and K168 are not included due to business confidentiality concerns.

A technology-specific standard of combustion is being proposed for nonwastewater forms of K167 and K168. Additionally, facilities may manage wastes in a manner where land disposal restrictions are not applicable (e.g., recycling). An attempt was made to distinguish between those activities expected to comply with the proposed LDR standards and those which require change (and thus may affect commercial demand). Many practices will clearly be discontinued upon the effective date of LDRs (or before). Other practices will clearly continue with no incremental impact on commercial capacity. However, other practices may or may not continue. Examples of each type of management are not included due to business confidentiality concerns. If the listing is finalized as being contingent upon the concentrations of contaminants in the waste, facilities would be required to determine, on a facility-specific basis, whether their waste should be managed as hazardous and require treatment.

For purposes of this capacity analysis, EPA assumes that all wastes generated would require treatment to meet LDRs. The total annual quantities of filter aid and TAM sludges meeting LDR standards in 1991 and 1997 (as well as the quantities generated by individual facilities) are not included due to business confidentiality concerns. The assumption that all generated wastes must be treated to be LDR compliant may result in overstating commercial capacity requirements. The quantity associated with each particular management method assumed to meet LDR standards (and thus subtracted from the quantity assumed to require off-site commercial management) is not included due to business confidentiality concerns.

The frequency of land disposal is not presented due to business confidentiality concerns. The annual quantities associated with this practice must be included in the capacity analysis as a result of the land disposal restrictions. Other methods that are expected to continue following promulgation of the LDR treatment standards would not be subject to the LDRs and will not be used in calculating the quantity requiring offsite commercial treatment. Examples of such management are not included due to business confidentiality concerns. Information on underground injection is not included due to business confidentiality concerns.

### 3.3.3 Step 3: Estimating Annual Quantity with Onsite Treatment or Recovery

**Availability**

A technology-specific standard of combustion is proposed for nonwastewater forms of K167 and K168. This technology is available onsite at several facilities, although not necessarily in use for these particular wastes. The 1995 Biennial Reporting System (BRS) were used to identify such facilities.

The 1995 BRS could only be used in identifying the management methods of similar hazardous wastes, because K167 and K168 are only proposed for listing and would not be noted as such in the BRS. EPA used the 1995 BRS to determine the types of onsite treatment conducted by dye and pigment facilities; the names of these facilities are not included due to business confidentiality concerns. The onsite hazardous waste management methods used by these facilities, for any hazardous wastes, include the following:

- Solvent recovery
- Incineration of liquids, solids, and sludges
- Inorganic treatment of wastewaters
- Biological and carbon treatment of organics in wastewaters
- Neutralization
- Landfill
- Direct discharge to POTW
- No onsite treatment performed.

If LDRs for the wastes proposed for listing are promulgated, a generator may elect to treat their wastes onsite to comply with LDRs. For this analysis, EPA has assumed that only facilities that have reported using onsite incineration for any waste treated in 1995 would be capable of meeting the LDRs for the proposed wastes. The number of facilities, and their names, that report using onsite incineration are not presented due to business confidentiality concerns. Further analysis of the data found that most of the hazardous wastes incinerated were in liquid form. The number of facilities, and their names, that report using onsite incineration for combustion of solids or sludges are not presented due to business confidentiality concerns. EPA assumes that such facilities would be able to incinerate K167 and K168 and would therefore not require offsite commercial capacity. The quantity of K167 or K168 waste generated and could be combusted onsite is not presented due to business confidentiality concerns. At facilities that reported only the incineration of liquids, EPA assumed that combustion of solids was not appropriate; they were assumed to require offsite commercial treatment for the purposes of the capacity analysis. The numbers of facilities conducting these practices are not included due to business confidentiality concerns.

### 3.3.4 Results

The quantity of K167 and K168 that EPA estimates could be generated is not included due to business confidentiality concerns. The quantities of wastes that are presently managed in a manner that would comply with the proposed LDRs are not included due to business confidentiality concerns; the number of generators with the demonstrated ability to incinerate wastes similar to K167 and K168 is not included due to business confidentiality concerns. The

quantity of these newly identified dye and pigment wastes (K167 and K168) that may require offsite commercial treatment is not included due to business confidentiality concerns.

In Section 2, EPA estimated that the commercially available sludge and solid combustion capacity is at least 300,000 tons per year and sufficient to treat the lesser volume of these wastes which would newly require treatment. Therefore, EPA is proposing to not grant a national capacity variance for these listed wastes. Because EPA is proposing a treatment technology for these wastes, rather than a treatment level, all wastes would require treatment using the prescribed combustion technology. EPA is proposing a technology-specific treatment standard, and therefore combustion (as defined in 40 CFR 268.42) would be required to treat K167 and K168.

EPA expects that commercial facilities will be able to accept K167 and K168 on the effective date of the listing (if finalized). Such facilities are already permitted to treat, store, and dispose hazardous waste; to manage K167 and K168 they must request permit modifications (see 40 CFR 270.42(g)). This provision states that a permittee may continue managing the newly listed wastes by following certain requirements, including submitting a Class 1 permit modification request by the date on which the waste or unit becomes subject to the new regulatory requirements (i.e., the effective date of the final rule), complying with the applicable standards of 40 CFR parts 265 and 266 and submitting a Class 2 or 3 permit modification request within 180 days of the effective date.

## 3.4 WASTEWATERS

The available data sources indicate that there are no quantities of K167 and K168 wastewaters that will require alternative commercial treatment. Therefore, there may not be any demand for off-site shipment of any wastewaters generated. Furthermore, even if there is a need for generators to ship wastewater off site, there is adequate wastewater treatment capacity available (see Section 2.2.2 of this report). EPA is proposing to not grant a national capacity variance for these wastewaters.

EPA has previously determined that landfill leachate is a hazardous waste if it is generated from the disposal of a hazardous waste, by virtue of the "derived-from" rule in 40 CFR 261.3(c)(2). Such a listing applies to leachate derived from wastes disposed before the effective date for a hazardous waste listing (i.e., before the wastes became hazardous wastes). For K169-K172 petroleum refining wastes (the most recently finalized hazardous waste listing decision), EPA has temporarily deferred regulation of landfill leachate and gas condensate derived from such wastes (see 64 *FR* 6806; February 11, 1999).

In the case of the proposed K167 and K168 wastes, EPA is similarly proposing to temporarily defer landfill leachate and gas condensate derived from these two wastes. If this determination was later finalized, then the quantity of wastewater forms of K167 and K168 would continue to be low. Even if the temporary determination ended, many landfills previously used for the disposal of dye and pigment wastes would not generate hazardous waste leachate. This is because they do not have leachate collection systems, or it is not known if the disposed

dye and pigment wastes had constituent concentrations above the risk levels of concern; in the absence of such data, the leachate would not be assumed to be classified as K167 or K168.

## 3.5 CONTAMINATED SOIL AND DEBRIS

In addition to the process wastes generated from dye and pigment facilities on a routine basis, EPA also considered the quantity of contaminated soil and debris present at these facilities. For soil and debris contaminated with the newly listed wastes, EPA is proposing to not grant a national capacity variance. EPA believes that the majority of contaminated soil and debris can and will be managed on-site and therefore would not require substantial off-site commercial treatment capacity. Therefore, EPA is proposing to not granting a national capacity variance to hazardous soil and debris contaminated with the newly listed wastes covered under this rule.

EPA believes that a number of factors will help maintain adequate LDR treatment capacity for soil and debris contaminated with newly listed wastes. First, if the contaminated soil is not excavated (e.g., in-situ treatment), then the LDRs will not be applied to these wastes in the first place. If disturbed, contaminated soil can be managed onsite through use of a corrective action management unit (CAMU) and temporary unit (TU). This allows an area of a facility to be remediated without triggering LDR standards, if the remediated material is placed back into the area following remediation. This rule was finalized on February 16, 1993 (58 *FR* 8659) and is codified in 40 CFR Part 264 Subpart S. In these cases, the volume of soil requiring offsite treatment may be small. Also, if necessary, a facility can apply for a case-by-case extension or a treatability variance to manage or treat these wastes. Additionally, there are new technologies becoming available to treat contaminated soil and debris that still might require further treatment. According to U.S. EPA's Capacity Analysis Background Document for Phase IV Wastes (U.S. EPA, 1998), currently there are 108 venders using innovative treatment technologies to treat contaminated soils on-site. The innovative treatment technologies being used are as follows: soil vapor extraction, thermal desorption, ex-situ bioremediation, in-situ bioremediation, soil washing, solvent extraction, dechlorination as well as other innovative treatment technologies.[26]

Second, for those contaminated soils for which the LDRs are triggered, recent EPA action will decrease demand for BDAT treatment capacity. Specifically, in the final Phase IV LDR rule (63 *FR* 28556, May 26, 1998), EPA promulgated alternative LDR treatment standards (10 times the universal treatment standard (UTS) or 90 percent reduction) for soils contaminated with hazardous wastes. EPA believes that these less stringent treatment standards will increase the availability of capacity to treat soil contaminated with newly listed refinery wastes. EPA recognizes that implementation of the alternative soil treatment standards probably will not be immediate because States are not required to adopt less stringent RCRA rules and because there will be some time between the selection and actual implementation of remedial treatment technologies. Nevertheless, EPA believes that these alternative treatment standards will provide another viable option for facilities with contaminated soils to comply with LDR requirements.

[26]US EPA Background Document for Capacity Analysis for Land Disposal Restrictions-Phase IV: Toxicity Characteristic Metal Wastes and Newly Identified Mineral Processing Wastes (Final Rule). Pages E-50 through E-72 April 1998.

Third, the LDRs also provide flexibility in selecting treatment methods for debris contaminated with the newly listed dye and pigment process wastes. EPA previously identified 17 different treatment methods as BDAT for hazardous debris; these methods fall into one of three categories: extraction (e.g., abrasive blasting, liquid or vapor phase solvent extraction, thermal desorption), destruction (e.g., biodegradation, chemical oxidation, thermal destruction), or immobilization (e.g., macroencapsulation or microencapsulation). 57 *FR* 37194 (Aug. 18, 1992). Hazardous debris that has been treated using one of the specified extraction or destruction technologies and that does not exhibit a hazardous waste characteristic after treatment, is no longer a hazardous waste and need not be managed in a Subtitle C facility. Hazardous debris contaminated with a listed waste that has been treated by one of the specified immobilization technologies is still a hazardous waste and must be managed in a Subtitle C facility (see 40 CFR 268.45(c)). The hazardous debris rule also gives generators the option of treating the debris to the waste-specific treatment standards for the waste contaminating the debris, although the treated debris must then continue to be managed as a hazardous waste. EPA believes that this flexible approach for contaminated debris helps ensure adequate treatment capacity for these materials.

Finally, given the current state of uncertainty surrounding certain pending EPA and Congressional actions, LDR treatment capacity for contaminated media is likely to remain adequate for at least the next few years. For example, a lawsuit challenging the final CAMU rule has been pending since 1993. The parties to the litigation have so far agreed to put the case on hold until EPA promulgated the final HWIR rule for contaminated media (i.e., the HWIR Media rule, published on November 30, 1998). Until the CAMU litigation is resolved, there may continue to be some degree of unwillingness by hazardous waste generators to initiate voluntary remedial activities under the flexible approach authorized by the CAMU rule. Similarly, EPA believes that existing uncertainty over how the HWIR Media rule may alter LDR requirements for contaminated media has resulted in a general decrease in the pace of some remediation activities. Moreover, several bills are pending in Congress that would amend RCRA to provide EPA and the States with greater flexibility with respect to LDR treatment requirements for contaminated media. This uncertainty over regulatory requirements, in turn, has contributed to a decrease in the demand for commercial treatment for contaminated media.

## 3.6 MIXED RADIOACTIVE WASTES CONTAMINATED WITH K167 AND K168

EPA identified no quantity of K167 and K168 destined for treatment as mixed radioactive wastes. EPA is proposing to not grant a national capacity variance for mixed radioactive wastes or for soil and debris contaminated with mixed radioactive wastes.

## 3.7 REFERENCES FOR THIS SECTION

Kirk-Othmer Encyclopedia of Chemical Technology. "Dyes and Dye Intermediates." Volume 8, 1993.

U.S. Environmental Protection Agency. Background Document for Capacity Analysis for Land Disposal Restrictions- Phase IV: Toxicity Characteristic Metal Wastes and Newly Identified

Mineral Processing Wastes. Final Rule. April 1998.

U.S. Environmental Protection Agency. Best Demonstrated Available Technology (BDAT) Background Document for Dye and Pigment Manufacturing Wastes: Deferred Listings. Proposed. June 1999.

U.S. Environmental Protection Agency. Background Document for Identification and Listing of the Deferred Dye and Pigment Wastes. June 1999.

Additional references are not included due to business confidentiality concerns.

# 4. CAPACITY ANALYSIS RESULTS

This section presents the results of capacity analysis for alternative commercial treatment of the newly identified dye and pigment process wastes (K167 and K168). A brief summary of these results was presented in Section 1 of this document (see Exhibit 1-2). The capacity analysis itself is based on the assessment of available treatment capacity (Section 2) and the required capacity necessary for treating K167 and K168 (Section 3). This section compares EPA's estimates of required capacity to that commercially available for these wastes proposed to be listed.

EPA expects that it is technically feasible to apply a technology standard of combustion to nonwastewater forms of K167 and K168. This technology is currently available commercially and at generating facilities, and is being used to manage other similar hazardous wastes (e.g., other organic sludges and solids) prohibited from land disposal.

The commercial treatment capacity required for K167 and K168 is expected to be met predominantly by incineration capacity available for solids and non-pumpable sludges. EPA anticipates that some K167 and K168 wastes as generated may not be amenable to all types of combustion units (e.g., incinerators, cement kilns and other BIFs) available commercially due to high water or low heat content. Such wastes may be dewatered to such an extent that they may become non-pumpable. Additionally, some of the commercial incinerators are equipped with feeding systems suitable for liquid wastes or pumpable sludges. In addition, some K167 and K168 generated may not have adequate heating value or BTUs to allow their treatment at cement kilns. The Sham Recycling Policy Guideline specifies a minimum heating value of 5,000 BTU per pound for waste fuels to cement kilns. These limits may be superseded as cement kilns comply with the BIF rules (56 *FR* 7134, February 21, 1991) and obtain a permit to receive low-BTU wastes. Despite these restrictions, cement kilns and other BIFs can provide additional capacity for non-pumpable K167 and K168 by blending the wastes with other fuels to make a pumpable material, suitable for combustion in these units.

The annual quantities of K167 and K168 requiring commercial treatment are not included due to business confidentiality concerns. As given in Section 2, the estimated available sludge/solids combustion capacity is at least 300,000 tons per year. Therefore, there will be adequate commercial capacity available to meet the combustion demand required for K167 and K168 if these wastes are listed as hazardous. As also given in Section 2 above, there is substantial capacity available (more than 1 million tons per year) for stabilization of metal constituents in residuals generated from the management of these wastes at commercial incinerators, if such treatment is required (treatment would be required if, for example, the wastes are commingled with other hazardous wastes that contain metals).

Because the capacity analysis indicates that adequate commercial treatment capacity exists to meet the proposed technology-based land disposal restrictions of combustion, EPA is not proposing to grant a national capacity variance for nonwastewater forms of K167 and K168. The available data sources indicate that there are no quantities of K167 and K168 wastewaters that will require alternative commercial treatment. Therefore, EPA is also not proposing to grant a national capacity variance for wastewater forms of K167 and K168.

Based on survey results, no quantities of K167 or K168 are managed in underground injection units, or in wastewater treatment systems that contain land-based units (i.e., surface impoundments). EPA requests comments concerning any of these wastes managed in surface impoundments. EPA notes that any newly listed dye and pigment wastes that are managed in a newly regulated surface impoundment (i.e., an impoundment that becomes subject to RCRA regulation as a result of the new waste listing) may continue to be managed in the impoundment for up to four years, provided that the impoundment is in compliance with the groundwater monitoring requirements of 40 CFR 265, Subpart F within 12 months after promulgation of the new waste listing (40 CFR 268.14). After four years, surface impoundments must meet the RCRA minimum technology requirements (MTRs). Surface impoundments also may continue to treat wastes that do not meet LDR treatment standards if the surface impoundments are in compliance with 40 CFR 268.4 (the surface impoundment exemption), or if facilities obtain no-migration variances for the units (40 CFR 268.44). Under the surface impoundment exemption, owners or operators must follow specific sampling and testing, removal, subsequent management, and recordkeeping requirements. Therefore, EPA proposes not to grant a national capacity variance for nonwastewater and wastewater forms of these wastes, either surface disposed or underground injected.

EPA believes that most soil and debris contaminated with K167 and K168 can and will be managed on-site (if generated) and therefore would not require substantial off-site commercial treatment capacity. As discussed in detail in Section 3.5, if the contaminated soil is not excavated (e.g., treated in-situ), then the LDRs will not be applied to these wastes in the first place. If disturbed, contaminated soil may be managed onsite as a corrective action management unit (CAMU) and temporary unit (TU). Other factors will also limit the demand for commercial treatment capacity for contaminated soil and debris contaminated with these wastes, including the alternative treatment standards promulgated under the Phase IV LDR rule (63 *FR* 28556, May 26, 1998) and the "debris rule" codified in LDR Phase I (57 *FR* 37194, Aug. 18, 1992). EPA believes that adequate capacity will be available for contaminated soil affected by today's proposed rule. Therefore, EPA is not proposing to grant a national capacity variance for these wastes. However, EPA recognizes that some wastes could possess unique properties that make them more difficult to treat than the wastes on which the standards are based. In such cases, the affected party may petition EPA for a treatability variance per 40 CFR 268.44. In addition, EPA established a new site-specific, risk-based variance for the technology-based alternative soil treatment standards promulgated in Phase IV. This variance can be used when treatment to concentrations of hazardous constituents are greater (i.e., higher) than those specified in the alternative soil treatment standards is shown to minimize short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could "cap" the technology-based treatment standards (see 63 *FR* 28606, May 26, 1998).

In summary, EPA is not proposing to grant a national capacity variance for nonwastewater or wastewater forms of K167 or K168. EPA is not proposing to grant a national capacity variance for K167 or K168 managed by surface impoundment or underground injection. EPA is not proposing to grant a national capacity variance for soil and debris contaminated with K167 or K168 wastes. EPA estimates that there are no generated quantities of mixed radioactive wastes contaminated with K167 and K168 or soil and debris contaminated with these radioactive

mixed waste and EPA is not proposing to grant a national capacity variance for such wastes. Therefore, if finalized, the LDR standards become effective when the K167 and K168 listing becomes effective. If facilities believe such a variance is warranted, the affected party may request a capacity variance extension per 40 CFR 268.5 on a case-by-case basis.