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Agency

Office of
Solid Waste
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Background Document for Capacity Analysis for Land Disposal Restrictions: Paint Production Wastes (Proposed Rule)

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List of Abbreviations and Acronyms

BDAT	Best Demonstrated Available Technology
BIF	Boiler and Industrial Furnace
BRS	Biennial Reporting System
BTU	British Thermal Unit
CAMU	Corrective Action Management Unit
CARBN	Carbon Adsorption treatment standard (40 CFR 268.42)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHOXD	Chemical or Electrolytic Oxidation treatment standard (40 CFR 268.42)
CMBST	Combustion treatment standard (40 CFR 268.42)
EDF	Environmental Defense Fund
EPA	U.S. Environmental Protection Agency
FR	Federal Register
HSWA	Hazardous and Solid Waste Amendments of 1984
HWIR	Hazardous Waste Identification Rule
LDRs	Land Disposal Restrictions
MSW	Municipal Solid Waste
MTRs	Minimum Technological Requirements
NHWCS	National Hazardous Waste Constituent Survey
NPDES	National Pollutant Discharge Elimination System
POTW	Publically Owned Treatment Works
RCRA	Resource Conservation and Recovery Act of 1976
RCRIS	Resource Conservation and Recovery Act Information System
TC	Toxicity Characteristic
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TRI	Toxic Chemicals Release Inventory
TSS	Total Suspended Solids
TU	Temporary Unit
USC	United States Code
UTS	Universal treatment standard
WETOX	Wet Air Oxidation treatment standard (40 CFR 268.42)
WWTF	Wastewater Treatment Facility

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 paint production wastes. EPA is proposing to list as hazardous two wastes from paint production and to concurrently set LDR treatment standards for these wastes. EPA is simultaneously proposing to add one constituent to the list of universal treatment standards and to add two constituents to the list of F039 constituents with treatment standards. 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.

This background document, which presents the capacity analyses conducted for the proposal of LDR standards for newly proposed paint production 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 assess available commercial capacity for hazardous waste treatment applicable to these wastes.

- **Section 3: Required Treatment Capacity for Paint Production Wastes.** Describes the generation and management of these newly proposed wastes, the constituents of concern, quantity generated, the quantity that currently meets the LDRs, and relevant waste management methods, and the detailed methodology and data used to assess required treatment capacity for newly proposed paint production wastes (K179 and K180).

- **Section 4: Required Treatment Capacity for Wastes Impacted by Changes in UTS and the F039 List.** Estimates the generation quantity of wastes subject to these proposed treatment standard revisions.

- **Section 5: Capacity Analysis Results.** Describes the results of the capacity analysis by comparing available treatment capacity (Section 2) with required treatment (Sections 3 and 4).

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[1] The LDRs are effective when the listings and LDRs are 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)).

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.[2] Under HSWA, EPA must promulgate regulations restricting the land disposal of hazardous wastes according to a strict statutory schedule. Also, for any hazardous wastes identified or listed after November 8, 1984, EPA must promulgate LDR prohibitions and treatment standards within six months of the date of identification or final listing (RCRA Section 3004(g)(4), 42 U.S.C. 6924(g)(4)). 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.

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 otherwise-applicable date and establishes a different date (not to exceed two years beyond the statutory deadline) because of a lack of available treatment capacity [see RCRA Section 3004(h)(2)]. Section 3001(e)(2) of RCRA requires EPA to determine whether to list as hazardous 'paint production wastes' (among other wastes unrelated to the paint manufacturing industry). In 1989, the Environmental Defense Fund (EDF) sued EPA (EDF v. Reilly, Civ. No. 89-0598 D.D.C.) in part for failing to meet these statutory deadlines. EPA and EDF entered into a consent decree, which has been amended several times to revise dates. The consent decree sets out a series of deadlines for promulgating RCRA listing decisions, including a requirement to propose a hazardous waste listing determination for paint production wastes. The wastes specified in the consent decree relevant to paint production are as follows:

- solvent cleaning wastes
- water/caustic cleaning wastes
- wastewater treatment sludge
- emission control dust or sludge
- off-specification production wastes.

EPA's investigation of the wastes generated by the paint production industry included information from site visits and from survey evaluation. As part of the survey development process, EPA went on nine site visits to paint manufacturing facilities throughout the country (however, EPA did not collect samples of waste streams generated by these facilities). EPA

[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)).

conducted a sampling survey under authority of RCRA Section 3007, 42 USC 6927.[3] The survey effort included (1) the identification of facilities potentially generating the wastes, and (2) the development, distribution, and assessment of an extensive industry-wide RCRA Section 3007 survey. These activities were conducted in early 2000; the data collected represented facility activities from 1998.

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 or wastes have not been managed in a way meeting LDR standards. If EPA expects that adequate alternative commercial treatment capacity is available for a particular waste, the land disposal restrictions are effective when the new hazardous waste listings become effective. 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; <u>and</u> (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).[4]

HSWA's schedule divided hazardous wastes into three broad categories: solvent and dioxin wastes; California list wastes;[5] 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, 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

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[3] See Federal Register notices 64 FR 46375 (August 25, 1999) and 64 FR 71135 (December 20, 1999) announcing EPA's data collection request submitted to the Office of Management and Budget (OMB). A copy of the questionnaire is available in the public docket for today's proposed rule and on the Internet (www.epa.gov/epaoswer/hazwaste/id/paint/index.htm). This information collection request was approved by the OMB, Clearance Number 2050-0168 (expiration date: June 30, 2001).

[4] 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).

[5] 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.

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)].

Exhibit 1-1 lists proposed rules which are relevant to the LDR program. These rules are included because if they are finalized they would affect the capacity analysis for paint production wastes.

Exhibit 1-1. Summary of Land Disposal Restrictions and Related Rulemakings		
Rulemaking	**Federal Register Notice**	**Promulgation/ Proposal Date**
Final Rules		
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

Exhibit 1-1. Summary of Land Disposal Restrictions and Related Rulemakings		
Rulemaking	**Federal Register Notice**	**Promulgation/ Proposal Date**
Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Chlorinated Aliphatics Production Wastes; Land Disposal Restrictions for Newly Identified Wastes; CERCLA Hazardous Substance Designation and Reportable Quantities; Final Rule	65 *FR* 67067	November 8, 2000
Proposed Rules		
Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Dye and Pigment Industries; Hazardous Waste Listing Determination Policy; and CERCLA Hazardous Substance Designation and Reportable Quantities; Proposed Rule	59 *FR* 66072	December 22, 1994
Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Dye and Pigment Industries; Land Disposal Restrictions for Newly Identified Wastes; CERCLA Hazardous Substance Designation and Reportable Quantities; Proposed Rule	64 *FR* 40192	July 23, 1999
Hazardous Waste Management System; Identification and Listing of Hazardous Waste: Inorganic Chemical Manufacturing Wastes; Land Disposal Restrictions for Newly Identified Wastes; and CERCLA Hazardous Substance Designation and Reportable Quantities; Proposed Rule	65 *FR* 55683	September 14, 2000

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. The first step in satisfying the goals of a capacity analysis is to make a "threshold" analysis, which dictates 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.[6]

[6] EPA will also derive estimates of affected facilities and waste quantities for the Economic Assessment for the Proposed Concentration-Based Listing of Wastewaters and Non-wastewaters from the Production of Paints and Coatings (EA). Both the capacity analysis and EA start with the same database from paint production wastes. However, the goals of a capacity analysis and an EA are very different, which often results in reasonable differences in methodologies, data, and results (if any). 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 EA concentrates on estimating specific potential significant (or dominant) long-term costs and benefits of both the listings and the LDR treatment standards. Thus, the EA does not conduct a threshold analysis of treatment capacity.

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 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 waste streams and their quantities under different management practices. Further, EPA identifies the waste streams potentially affected by the LDRs by types of land disposal units, including surface impoundments, waste piles, land treatment units, landfills, and underground injection wells. Not all of these disposal methods are used for the paint production wastes; only those land disposal methods reported to be used for these paint production wastes are addressed in the capacity analysis.

To assess the type of alternative capacity required to treat the affected wastes, EPA conducts a "treatability analysis" for each waste stream. Based on the waste's physical and chemical form and information about prior management practices, EPA assigns the quantity of affected waste to an appropriate technology (i.e., a technology that can meet the treatment standards). For treatment standards proposed as numerical standards, more than one technology may be applicable. For treatment standards with proposed technologies as methods of treatment, only the specified technologies are applicable because they are technologies that are allowed to be used for compliance with LDRs.[7] 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., organics and metals) requiring different types of treatment. To treat these wastes, EPA develops a treatment train that will effectively 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.

For this analysis, EPA identified the quantities of waste requiring alternative treatment for the entire industry. EPA did not further evaluate if facilities could alternatively manage their wastes in onsite treatment systems. In such an approach, EPA may use data from the Biennial Reporting System to get an indication of facilities' capability of onsite hazardous waste management activities. Incorporating such information would lead to a lower estimate of waste quantities requiring alternative treatment.

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[7] With one exception, numerical treatment standards are proposed for all constituents in K179 and K180 paint production wastes. Technology standards are proposed for formaldehyde in K180 wastewaters; such wastes must be treated using wet air oxidation (WETOX) or chemical or electrolytic oxidation (CHOXD) followed by carbon adsorption (CARBN); or combustion (CMBST)).

1.2.2 Analysis of Available Commercial Treatment Capacity

The analyses conducted to estimate available commercial treatment capacity focuses on treatment capacity projected to be available for the two years following the effective date of the final rule (if the rule is finalized as proposed). For these analyses, EPA typically used estimates derived from data using the Biennial Reporting System. EPA assumed that available capacity calculated using these methods would approximate the available capacity for the two years following the effective date (if the rule is finalized as proposed).

Available treatment capacity can be analyzed 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 on site;
(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 determination of available capacity focuses on commercial facilities. Consequently, most estimates of capacity presented in this document represent commercially available capacity.

1.3 SUMMARY OF CAPACITY ANALYSIS FOR PROPOSED RULE

EPA is proposing to list two wastes that are generated during the manufacture of paints. EPA is proposing K179 and K180 as follows:

- K179: Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section. Paint manufacturing waste solids are: (1) waste solids generated from tank and equipment cleaning operations that use solvents, water and or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K179 by paint manufacturers are not covered by this listing, but such liquids are subject to the K180 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.

- K180: Paint manufacturing waste liquids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section unless the wastes are stored or

treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K180 by paint manufacturers are not covered by this listing, but such solids are subject to the K179 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.

The proposed constituents and concentration levels identified for K179 and K180 are listed in Exhibits 1-2 and 1-3, respectively.

Exhibit 1-2. Constituents and Concentration Levels of Concern For K179, Paint Manufacturing Waste Solids

Constituent	Chemical Abstracts No.	Concentration Levels (mg/kg)
Acrylamide	79-06-1	310
Acrylonitrile	107-13-1	43
Antimony	7440-36-0	2,300
Methyl isobutyl ketone	108-10-1	73,000
Methyl methacrylate	80-62-6	28,000

Exhibit 1-3. Constituents and Concentration Levels of Concern For K180, Paint Manufacturing Waste Liquids

Constituent	Chemical Abstracts No.	Concentration Levels (mg/L)
Acrylamide	79-06-1	12
Acrylonitrile	107-13-1	9.3
Antimony	7440-36-0	390
Methylene chloride	75-09-2	4500
Ethylbenzene	100-41-4	11,000
Formaldehyde	50-00-0	82,000
Methyl isobutyl ketone	108-10-1	340
Methyl methacrylate	80-62-6	2,100
n–Butyl alcohol	100-42-5	41,000
Styrene	100-42-5	4,600
Toluene	108-88-3	1,200
Xylene (mixed isomers)	1330-20-7	3,900

Today's rule concurrently proposes land disposal restrictions for the two wastes proposed for listing and also proposes modifications to the Universal Treatment Standards (UTS) and treatment standards for F039 wastes. Exhibit 1-4 contains a full listing of the proposed treatment standards in K179 and K180, and the proposed additions to UTS and F039. A summary of the types of treatment standards being proposed and the treatment technologies expected to be used in meeting the proposed treatment standards is as follows:

- Modification of UTS/F039: EPA is proposing to add the numerical standard for styrene to the Universal Treatment Standards of 40 CFR §268.48. EPA is also proposing to add two constituents to F039 treatment standards (40 CFR §268.40): acrylamide and styrene. Styrene previously had no treatment standards for any waste. Acrylamide, however, was listed on UTS but was not previously included on the list of F039 treatment standards.

- K179 and K180: EPA is proposing treatment standards for wastewater and nonwastewater forms of K179 and K180. The treatment standards are different for each category (nonwastewater or wastewater); EPA requires generators to identify whether their wastes is in a wastewater or nonwastewater form by examination of the total suspended solids and total organic carbon contents, as defined in 40 CFR §268.2 (d) and (f) (i.e., wastewaters contain less than 1% by weight total organic content (TOC) and less than 1% by weight total suspended solids (TSS)). K179 represents solid sludges and solid wastes associated with paint production. K179 wastes typically will be designated as nonwastewaters due to their significant solids content. K180 is liquid waste from paint production including solvents and washwaters. K180 solvent wastes typically will be designated as nonwastewaters due to their significant organic content; K180 aqueous wastes typically will be designated as wastewaters if they have sufficiently low organic and solids contents.[8] For these wastes, EPA proposes to set treatment standards at the UTS level for antimony in K179 and K180, and for 9 of the 11 organic constituents in K179 and K180 where UTS already exist. EPA believes it is technically feasible to apply these existing numerical standards to the hazardous constituents of K179 and K180, because the waste compositions are similar to other wastes for which applicable treatment technologies have been demonstrated. For one of the organic constituents, formaldehyde, EPA is transferring technology-specific treatment standards that currently exist for U122 wastes (discarded or off-specification formaldehyde product). For this constituent, our evaluation indicates that proposing a numerical treatment standard would not be appropriate due to a lack of treatment performance data. For the other organic constituent, styrene, numerical treatment standards have not previously been developed for any waste and EPA is proposing a wastewater

[8]EPA based this assessment on engineering judgement. EPA's survey of paint production wastes did not identify wastes as wastewater or nonwastewater (i.e., wastewaters contain less than 1% by weight TOC and less than 1% by weight TSS). Similarly, the survey did not request information on the TSS or TOC composition of wastes.

standard of 0.028 mg/L based on activated sludge treatment and a nonwastewater standard of 28 mg/kg based on thermal destruction.[9]

Exhibit 1-4. Summary of Proposed Treatment Standards for Hazardous Wastes K179 and K180

Regulated Hazardous Constituent	CAS[1] Number	Proposed Wastewater Treatment Standard, Concentration in mg/L [2], or Technology Code [3]	Proposed Nonwastewater Treatment Standard	Proposed Changes
Organic Constituents				
Acrylamide	79-06-1	19	23 mg/kg [4]	K179, K180, F039
Acrylonitrile	107-13-1	0.24	84 mg/kg [4]	K179, K180
n-Butyl alcohol	71-36-3	5.6	2.6 mg/kg [4]	K180
Ethyl benzene	100-41-4	0.057	10 mg/kg [4]	K180
Formaldehyde [5]	50-00-0	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST	K180
Methanol [6]	67-56-1	5.6	0.75 mg/L TCLP	K180 [6]
Methylene chloride	75-09-2	0.089	30 mg/kg [4]	K180
Methyl isobutyl ketone	108-10-1	0.14	33 mg/kg [4]	K179, K180
Methyl methacrylate	80-62-6	0.14	160 mg/kg [4]	K179, K180
Styrene	100-42-5	0.028	28 mg/kg [4]	K180, F039, UTS
Toluene	108-88-3	0.080	10 mg/kg [4]	K180
Xylenes - mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30 mg/kg [4]	K180
Metals				
Antimony	7440-36-0	1.9	1.15 mg/L TCLP	K179, K180

1. CAS means Chemical Abstract Services.
2. Concentration standards for wastewaters are expressed in mg/L and are based on analysis of composite samples.
3. All treatment standards expressed as a Technology Code or combination of Technology Codes are explained in detail in 40 CFR 268.42 Table 1-Technology Codes and Descriptions of Technology-Based Standards.
4. Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with

[9]Alternatively, EPA is requesting comment on transferring the ethyl benzene treatment standards of 0.057 mg/L for wastewaters, and 10 mg/kg for nonwastewasters, because of its structural similarity and similar physical properties with styrene. Ethyl benzene and styrene have the same number of carbon atoms, and differ only in that styrene has one additional double bond and hence two less hydrogen atoms in its structure.

the technical requirements of 40 CFR Part 264, Subpart O, or Part 265, Subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.

5. Wastes that do not exceed the 40 CFR 261.32 listing criteria for this constituent are not subject to the treatment technology requirements, but are subject to all other numerical standards. For example, when formaldehyde is present in K180 at levels triggering the listing, formaldehyde thus must be treated by the required technologies. (The other hazardous constituents must, of course, be treated to meet the applicable numerical standards.) Wastes that do not trigger the listing based on formaldehyde are not subject to the formaldehyde technology requirement, but are subject to all other numerical standards for the other constituents.

6. Public comment is being solicited for including methanol as a listing constituent in K180. Methanol would be included as a result of a more conservative risk assessment (i.e., using probabilistic risk assessment results at the more conservative 95th percentile). The other constituents in this table were identified based on examination of the probabilistic risk assessment results at the 90th percentile).

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. Exhibit 1-5 indicates the quantities of land disposed wastes requiring alternative commercial treatment of recovery capacity as a result of the proposed rule. Exhibit 1-5 also indicates whether adequate treatment capacity is available for these wastes. Based on the results of the capacity analysis, EPA is proposing not to grant a national capacity variance for any categories of K179 and K180 wastes (e.g., nonwastewater and wastewater forms, contaminated soil and debris, etc.). EPA is also proposing not to delay the effective date for adding constituents to the lists of constituents for F039 and UTS.

Exhibit 1-5. Paint Production Wastes Proposed for Listing and Proposed Changes to UTS/F039: Capacity Analysis Summary			
Waste Stream	**Quantities Requiring Alternative Capacity (metric tons per year)**	**Type of Treatment***	**Adequate Commercial Treatment Capacity Available?**
K179 and K180 Nonwastewaters, and K180 Wastewaters	17,000	Incineration, followed by stabilization if necessary, except for formaldehyde in K180 which has a proposed technology standard of combustion (CMBST).	Yes
K179 Wastewaters	0 (none generated)	---	Yes
Soil and Debris Contaminated with K179 and K180	Minimal	---	Yes
F039/UTS Nonwastewaters **	<7,200 F039 <250,000 UTS	Combustion	Yes
F039/UTS Wastewaters**	<95,000 F039 <20,000,000 UTS	Biological treatment, oxidation, or other wastewater treatment.	Yes

*Because numerical standards are being proposed, generators may use any method (other than impermissible dilution) to meet the treatment standards. This table lists the technologies identified as BDAT or otherwise likely to be used in meeting the proposed treatment standard.
**This represents the additional capacity that may be required to treat styrene and acrylamide, as a result of their proposed addition to the UTS and F039 treatment standards. Bounding assumptions are used and therefore the estimates are expressed as 'less than.'

2. AVAILABLE TREATMENT CAPACITY

This section presents EPA's estimates of available commercial treatment capacity for selected treatment technologies applicable to paint production wastes and other wastes expected to be impacted by changes to UTS and to the list of F039 treatment standards. This information is used in subsequent sections for evaluating the availability of capacity for treatment/recovery technologies as alternatives to land disposal of the newly proposed hazardous wastes and making treatment capacity variance determinations for LDR wastes.

This section is organized into the following three sections:

- Section 2.1: Combustion Capacity
- Section 2.2: Stabilization Capacity
- Section 2.3: Wastewater Treatment Capacity.

The three technologies named above were selected because they are commonly used by the hazardous waste management industry for the treatment of nonwastewater forms of newly identified hazardous wastes and/or they are designated as best demonstrated available technologies (BDATs) for LDR wastes (e.g., combustion for organic compounds).

2.1 COMMERCIAL HAZARDOUS WASTE COMBUSTION CAPACITY

EPA is proposing numerical treatment standards, equivalent to existing or proposed universal treatment standards, for constituents present in K179 and K180 with the exception of formaldehyde. Combustion was used to develop universal treatment standards for these organic constituents. For formaldehyde, EPA is proposing a technology-specific standard of combustion. Combustion, therefore, represents a treatment technique that can (or must) be used to achieve these treatment standards.

In assessing the available treatment capacity for combustion, EPA used data provided by commercial combustion facilities from the 1995 and 1997 BRS. A summary of the results are provided in this section with a more detailed discussion included in Appendix A.

EPA used data obtained from the Resource Conservation and Recover Information System (RCRIS), the 1997 Biennial Reporting System (BRS), and the 1995 BRS to identify hazardous waste combustion facilities that are commercial and operational as of May 1999. For each facility, EPA calculated the maximum practical capacity as the amount of hazardous waste that could be handled by a facility, given constraints of a calendar year, work shifts, and permits. The maximum practical capacity was calculated using the PS (process systems) form from the 1995 BRS. Utilized capacity is identified as the amount of hazardous waste that was actually managed (i.e., the quantity managed in 1997 according to the 1997 BRS).

A description of the data and methodology are presented in Appendix A and results are summarized here. EPA identified 48 commercial combustion facilities in the nation with a combined maximum practical capacity of 2.8 million tons per year. Less than 1.3 million tons

per year of the capacity was being utilized, leaving a total available capacity of almost 1.6 (after rounding off) million tons per year. This is available capacity for liquids, pumpable sludges, solids, and non-pumpable sludges.

The total available capacity for the combustion of liquids and pumpable sludges is approximately 0.9 million tons per year. Of this capacity, approximately 0.3 million tons per year comes from incineration and 0.6 million tons per year comes from energy recovery. The total capacity for the combustion of solids and non-pumpable sludges is approximately 0.7 million tons per year. Approximately 0.6 million tons per year comes from incineration.

Some limitations of the analysis include the following (additional limitations are discussed in Appendix A):

- EPA uses facility capacity data from 1995 and waste generation and management data from 1997. No adjustments to the data are made for facilities that have opened, closed, or changed their treatment capacity since 1995. No adjustment is made for any changes in the quantities of wastes treated between 1997 and the present.

- The analysis only accounts for the treatment of hazardous wastes by combustion facilities (this is because the BRS only accounts for hazardous wastes). Such facilities also are likely to accept and treat nonhazardous wastes, which are not considered in the analysis. This would result in an overestimate of the available treatment capacity because facilities already may be using some of their remaining capacity for the treatment of nonhazardous wastes.

- The data used for identifying treatment capacity (the PS form of the 1995 BRS) is not comprehensive because facilities voluntarily provided these data. Additional facilities may have conducted similar treatment in 1995 and not be accounted for in the analysis. This would result in an underestimate of the available treatment capacity.

2.2 STABILIZATION CAPACITY

For some paint production wastes, stabilization for antimony (a metal constituent proposed for inclusion in the K179 and K180 LDR standards) may be necessary. Conventional stabilization techniques have been shown to effectively treat a wide variety of waste streams exhibiting metals, such as antimony and other inorganic contaminants. Such data were used in the Phase IV rule in promulgating the existing universal treatment standard of 1.15 mg/L TCLP for antimony in nonwastewaters. The Phase IV rule incorporated 48 data points demonstrating the performance of conventional stabilization for the treatment of antimony in various metal

waste streams, including furnace ash, incinerator ash, scrubber brine sludge, furnace baghouse dust, and stripper rinse waters.[10]

In estimating stabilization capacity, EPA used the results of the analysis presented in "Capacity Analysis for Land Disposal Restrictions Phase IV: Newly Identified Toxicity Characteristic Metal Wastes and Mineral Processing Wastes (final rule)," April 1998. For this analysis, EPA identified facilities conducting stabilization treatment activities by examining the BRS, review of public comments to the Phase IV LDR proposed rule, and review of the data used in developing an initial capacity estimate for the Phase IV final rule. EPA estimated maximum and operational capacity of a total of 61 facilities using the following methodology (more than one data source was used for some facilities so the sum of the number of facilities below do not sum to the total number of unique facilities):

- For 16 facilities, complete maximum and utilized treatment capacity data were available from the 1995 PS forms;[11]
- For 9 facilities, the 1995 BRS data did not provide adequate capacity information, so EPA used information reported by these facilities in the 1993 BRS;
- For 12 facilities, EPA received maximum and utilized treatment capacity data through direct (voluntary) correspondence with facility representatives;
- For 3 facilities, additional information was received from contact with states;
- For 24 facilities, EPA estimated the utilized capacity information based on the waste quantities reported in the WR and GM forms, and since maximum capacity information is not provided in the WR and GM forms, these capacities were calculated from the utilized capacity and the average industry utilization rate (14 percent)[12] calculated based on data from facilities that provided complete information; and
- For 1 facility the utilized capacity was estimated from its maximum capacity and based on the average industry utilization rate of 14 percent.

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[10]U.S. EPA. 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. May 26, 1998, 63 FR 28562.

[11]The PS form, which is submitted voluntarily, provides information on the capacity and quantity managed in individual treatment systems; the WR form includes the amount of waste received from offsite; and the GM form includes the amount of waste that was generated and managed onsite.

[12]As identified in the background document to the Phase IV final rule, an average industry utilization rate of approximately 14 percent (1,864,805/13,716,092 = 0.136) was calculated based on the volumes of waste being treated at the 37 facilities that submitted PS forms to the BRS or provided capacity information through direct correspondence with EPA.

A summary of the results of this analysis are provided in Exhibit 2–1. Based on this analysis, EPA estimates that as much as 18.5 million tons/year of stabilization capacity was available in 1995 for wastes restricted from land disposal restrictions (prior to the effective date of Phase IV).[13] Even if EPA restricts their analysis to facilities reporting fully commercial status, the estimate of available stabilization capacity in 1995 is still approximately 8 million tons (the difference is due to data which are missing and to facilities which report that services are available only to a specific site, company, or limited number of generators in their 1995 PS form). This estimate reflects a significant increase from the estimate of 1.1 million tons/year in the capacity analysis for the Phase IV LDR second supplemental proposed rule (62 *FR* 26041, May 12, 1997). This increase in available capacity is attributed to the use of more complete, accurate, and current commercial treatment data.

Several caveats should be noted regarding these data:

- Because the stabilized wastes are typically disposed in onsite landfills, many facilities could be reporting their landfill capacities as stabilization capacities. In such cases, the available stabilization treatment capacity values would be overestimated.

- Although many facilities identified from the BRS indicated that they were fully commercial, many other facilities with stabilization capacity did not provide such information or (more rarely) indicated they had limited commercial availability. Exhibit 2-1 presents results based on two different assumptions: one in which all facilities reporting to the BRS are fully commercial, and a second (lower) estimate that only accounts for facilities verifying that they are fully commercially available.

- Capacity information used in this analysis is primarily based on information provided by the industry in the PS, WR, and GM forms of the BRS database. Because some of the information provided in the BRS is voluntary (e.g., PS forms), these data may not accurately reflect the maximum and available treatment capacity.

- The average utilization rate of 14 percent used to calculate the utilized and available capacity for many facilities may not provide an accurate statistical representation of the national average.

- Although facilities required to submit a Biennial Hazardous Waste Report must provide both RCRA and total capacity for each onsite hazardous waste treatment, disposal, or recycling process system, they are not required to provide any information on nonhazardous wastes, wastes excluded from RCRA regulation, or

[13] Because the primary data source is the 1995 BRS, the capacity estimate is given with that year. However the estimate was supplemented with public comments and facility correspondence from 1997, as well as (for some facilities) 1993 BRS data.

wastes that do not meet the definition of solid waste. Facilities are required to report on RCRA hazardous wastes, and the utilized capacity data only refer to the hazardous waste capacity. Therefore, assumptions made about the total available capacity could result in an overestimate and significantly influence the stabilization capacity estimates.

- Another caveat is the ability of the individual facility to meet the proposed treatment standard; for example the facility may specialize in the treatment of certain types of wastes and therefore be unable to treat wastes with certain constituents. Thus available capacity could be less than estimated due to this factor.

Additional information was obtained during the Phase IV rule public comment period and in discussions with individual facilities. In general, commenters who provided information on available capacity indicated that they are not utilizing their treatment units to the maximum practical capacity.

Exhibit 2-1. Summary of Capacity for Stabilization

Technology	Maximum Capacity	Utilized Capacity	Available Capacity	Fully Commercial Available Capacity
Stabilization	19.5 million metric tons/year (21.5 million tons/year)	2.7 million metric tons/year (2.9 million tons/ year)	16.8 million metric tons/year (18.5 million tons/year)	~7.4 million metric tons/year (~8 million tons/year)

Note: available capacity is of 1997, prior to the effective date of the Phase IV rule.

2.3 WASTEWATER TREATMENT CAPACITY

Commercial wastewater treatment may be required for facilities to comply with the proposed addition of styrene to the F039 treatment standards and styrene and acrylamide to the UTS. Additionally, wastewater forms of K179 (e.g., generated as treatment residuals) and K180 may require treatment.

EPA used data, primarily from the 1995 and 1997 BRS, to estimate the commercial hazardous waste treatment capacity for wastewaters. The approach used resulted in an estimate of commercially available wastewater treatment capacity of approximately 47 million tons (42 million metric tons or 11.2 billion gallons) per year which is slightly higher than the results of earlier analyses using 1991 BRS data. Detailed results of this more recent analysis are presented in Appendix C.

EPA made estimates regarding the available capacity of wastewater treatment as a whole (e.g., technologies that treat organics and/or metals) for the Phase IV rule.[14] The Phase IV estimate was based on the results of a 1991 survey developed by EPA's Office of Water (the

[14]U.S. EPA. Background Document for Land Disposal Restrictions: Wood Preserving Wastes (final rule). April 1997. Pages 2-6 through 2-10.

Waste Treatment Industry Questionnaire), to collect information on centralized wastewater treatment capacity. The information collected during this effort represents 1989 data and includes maximum and available treatment capacity. Approximately 40 million tons (9.7 billion gallons) of wastewater treatment capacity are available each year at 65 facilities. In addition, there are 11 additional treatment facilities that were not included in this estimate because they did not supply the requested capacity information. By assigning the average available capacity of 638,000 tons per year to each of the non-reporting facilities, EPA estimated a total available commercial wastewater treatment capacity of more than 47 million tons each year. This 47 million ton per year capacity includes many types of treatment such as biological, metal treatment, etc.

EPA used the 1991 BRS to confirm this estimate of available wastewater treatment capacity. Specifically, the PS form (waste treatment, disposal, or recycling process systems) of the 1991 BRS contains information on the utilized and maximum capacity of the facility's waste treatment system. EPA found the total available wastewater treatment capacity 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 1991 BRS, these facilities had 33 million tons (7.9 billion gallons) of available capacity. Adjusting this estimate to reflect the fact that it represents an estimated 90 percent, rather than 100 percent, of the total operational capacity, approximately 37 million tons of available wastewater treatment capacity are available.

The three estimates for commercially available wastewater treatment capacity are comparable to one another. The estimate using the 1995 and 1997 BRS data resulted in an estimate of 47 million tons (42 million metric tons or 11.2 billion gallons) per year. The estimate using the 1991 Office of Water survey resulted in an estimate of approximately 40 million tons (36 million metric tons or 9.7 billion gallons) per year. The estimate using the 1991 BRS resulted in an estimate of approximately 37 million tons (34 million metric tons or 9.0 billion gallons) per year of available wastewater treatment capacity.

3. REQUIRED CAPACITY FOR PAINT PRODUCTION WASTES

3.1 INTRODUCTION

This section describes the required treatment capacity for the newly proposed K179 and K180 paint production wastes. The overall purpose of this analysis is to estimate the new demand for commercial Subtitle C treatment capacity resulting from the proposed listing of these hazardous wastes and simultaneous proposal of land disposal restrictions. The quantity of K179 and K180 estimated to require commercial offsite treatment capacity as a result of this analysis is then compared to the national estimate of available Subtitle C commercial treatment capacity (presented in Section 2). When EPA promulgates final LDR standards for these wastes, EPA will use data from the capacity analysis to assess the need for a national capacity variance from the LDRs as specified in RCRA 3004(h)(2).

This capacity analysis incorporates data and information on K179 and K180 generation and management collected during the EPA industry study of paint production wastes. Section 3.1 contains process and regulatory background information on K179 and K180. Section 3.2 describes the data sources used in estimating the quantities of K179 and K180 generated and managed. Section 3.3 presents EPA's assessment of the quantities of K179 and K180 potentially requiring commercial treatment. Sections 3.4 to 3.6 describe other aspects of the capacity analysis.

Information on the regulatory background of the K179 and K180 wastes, the processes that generate the wastes, and the proposed regulatory definitions of these wastes are presented in Section 3.1. Specifically, regulatory background for K179 and K180 is presented in Section 3.1.1, and descriptions of the processes generating the wastes are presented in Section 3.1.2.

3.1.1 Background

EDF Consent Decree

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 also directed EPA (through HSWA) to determine whether to list as hazardous 'paint production wastes' (among other wastes unrelated to the paint manufacturing industry) [RCRA Section 3001(e)(2)]. In 1989, the Environmental Defense Fund (EDF) sued EPA, in part, for failing to meet the statutory deadlines of Section 3001(e)(2) of RCRA (EDF vs. Browner; Civ. No. 89-0598 D.D.C.). To resolve most of the issues of the case, EDF and EPA entered into a consent decree, which was approved by the court on December 9, 1994 and has been amended subsequently to revise dates. The consent decree sets out a series of deadlines for promulgating RCRA listing decisions, including a requirement to propose a hazardous waste listing determination for paint production wastes. The wastes specified in the consent decree relevant to paint production are as follows:

- solvent cleaning wastes
- water/caustic cleaning wastes
- wastewater treatment sludge
- emission control dust or sludge
- off-specification production wastes.

Paint Production Wastes Proposed for Listing

The wastes proposed for listing under 40 CFR Part 261 in today's rule are generated during the manufacture of paints. These hazardous wastes are proposed to be defined as follows:

- K179: Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section. Paint manufacturing waste solids are: (1) waste solids generated from tank and equipment cleaning operations that use solvents, water and or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K179 by paint manufacturers are not covered by this listing, but such liquids are subject to the K180 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.

- K180: Paint manufacturing waste liquids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K180 by paint manufacturers are not covered by this listing, but such solids are subject to the K179 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.

The proposed constituents and concentration levels identified for K179 and K180 are listed in Exhibits 3-1 and 3-2, respectively.

Exhibit 3-1. Constituents and Concentration Levels of Concern For K179, Paint Manufacturing Waste Solids		
Constituent	**Chemical abstracts No.**	**Concentration Levels (mg/kg)**
Acrylamide	79-06-1	310
Acrylonitrile	107-13-1	43
Antimony	7440-36-0	2,300
Methyl Isobutyl Ketone	108-10-1	73,000
Methyl Methacrylate	80-62-6	28,000

Exhibit 3-2. Constituents and Concentration Levels of Concern For K180, Paint Manufacturing Waste Liquids		
Constituent	**Chemical abstracts No.**	**Concentration Levels (mg/L)**
Acrylamide	79-06-1	12
Acrylonitrile	107-13-1	9.3
Antimony	7440-36-0	390
Methylene chloride	75-09-2	4500
Ethylbenzene	100-41-4	11,000
Formaldehyde	50-00-0	82,000
Methyl Isobutyl Ketone	108-10-1	340
Methyl Methacrylate	80-62-6	2,100
N–Butyl Alcohol	100-42-5	41,000
Styrene	100-42-5	4,600
Toluene	108-88-3	1,200
Xylene (mixed isomers)	1330-20-7	3,900

3.1.2 Industry Overview

Paint Manufacturing Industry

EPA's proposed listings applies to paint and coatings manufacturers generally categorized under subcodes 28511, 28512, and 28513 of Standard Industrial Code (SIC) 2851, or North American Industry Classification System (NAICS) 325510 (subcodes -1, -4, and -7). This includes, but is not limited to, entities who manufacture: paints (including undercoats, primers,

finishes, sealers, enamels, refinish paints, and tinting bases), stains, varnishes (including lacquers), product finishes for original equipment manufacturing and industrial application, and coatings (including special purpose coatings and powder coatings). Products produced by this industry that are included within the scope of this proposed listing are referred to as "paints" and/or "coatings."

The proposed listings do not apply to miscellaneous allied products (paint and varnish removers, thinners for lacquers and other solvent-based paint products, pigment dispersions or putty) included under SIC subcode 28515 (NAICS 325510A) or artist paint, which is classified under SIC 3952 (NAICS 339942).

Regulatory Background of Previous Solid Waste Regulations Affecting Industry

Currently, paint production waste streams are regulated as hazardous waste if the waste meets one or more of the spent solvent waste listings (F001 through F005) or if they exhibit a hazardous waste characteristic (ignitability – D001, corrosivity – D002, reactivity – D003, toxicity – D004 - D043). There are currently no hazardous waste listings that specifically list paint production wastes as hazardous wastes.

Exhibits 3-3 and 3-4 summarize data on paint manufacturing facilities and hazardous wastes generated from the 1997 BRS. EPA queried the 1997 BRS database to determine the universe of paint production facilities that already generate hazardous wastes. According to this 1997 BRS query, there are 602 thousand short tons (547 thousand metric tons) of wastes generated by approximately 440 facilities in the industry. The facilities were spread throughout 37 different states, with the largest concentrations in Ohio, Pennsylvania, and Michigan. Overall, the vast majority of hazardous wastes generated are identified as characteristically hazardous or as listed spent solvents, F001 to F005.

Exhibit 3-3. Geographic Distribution of Paint Manufacturing Facilities Generating Hazardous Wastes

State	Number of Facilities	Waste Quantity, MT
Ohio	45	93,500
Pennsylvania	26	85,400
Michigan	24	72,600
Illinois	61	49,700
All others	284	301,000
Total	440	602,000

Source: 1997 BRS.

Exhibit 3-4. Hazardous Waste Codes Generated by Paint Manufacturing Facilities	
Waste Type	**Quantity, MT**
Characteristic Wastes	414,000
F001 to F005 wastes	187,000
All others	1,000
Total	602,000

Source: 1997 BRS.

Suspension of Previous Listings

On December 12, 1978 (43 *FR* 58957), EPA proposed to list as hazardous four paint production waste streams from specific (paint manufacturing) sources and two paint production waste streams from non-specific (paint application) sources. On July 16, 1980 (45 *FR* 47832), EPA promulgated an interim final rule that designated the following four paint manufacturing waste streams from specific sources as hazardous waste under 40 CFR 261.32:

- K078: Solvent cleaning waste from equipment and tank cleaning operations
- K079: Water/caustic cleaning wastes from equipment and tank cleaning operations
- K081: Wastewater treatment sludge
- K082: Emission control dust or sludge.

Public comments to this rule argued that these listings were overly broad, resulting in regulation of both hazardous and non-hazardous paint production wastes. EPA consequently re-examined the data and initial analysis on these paint production waste streams and determined that further study of these wastes was necessary before a final listing could be promulgated. On January 16, 1981 (48 *FR* 4614), the interim final rule to list these paint production waste streams as hazardous was temporarily suspended.

3.1.3 Processes Generating Paint Production Wastes

Paints and coatings are formulated to protect and decorate surfaces as well as to enhance desired surface properties such as electrical conductivity and corrosion protection. Paint and coatings may be either solvent or water-based according to desired end-use specifications.

Paint and coatings are typically produced in batches. They are made in stationary and portable equipment such as high-speed dispersion mixers, rotary batch mixers and blenders, sand mills, and tanks. Raw materials include solvents, resins (or “binders”), pigments, and additives comprised of inorganic and organic chemicals. Generally, paint manufacturing does not involve chemical reactions between the raw materials, so the finished paint consists of a mixture of the different raw materials.

Wastes generated include the following five wastes specifically identified in the 1994 consent decree:

- solvent cleaning wastes
- water/caustic cleaning wastes
- wastewater treatment sludge
- emission control dust or sludge
- off-specification production wastes.

General descriptions of these wastes are presented below (from "Listing Background Document for Paint Manufacturing Listing Determination", located in the docket for the proposed rule).

Solvent and Water/Caustic Cleaning Wastes: These wastes are generated when process equipment, tanks, and piping is cleaned. Depending on the type of paint manufactured, process equipment may be cleaned with either solvent, water, or aqueous caustic washes.

Wastewater Treatment Sludge: Paint manufacturing facilities may use onsite treatment for its generated wastewaters. Sources of wastewater include the cleaning wastes identified above, and floor washdown. A typical treatment for wastewaters involves chemical addition and gravity settling of suspended solids which generates a sludge for disposal.

Emission Control Wastes: Airborne material is generated when dry materials, such as resins and pigments, are loaded into processing equipment. Air hoods and exhaust fans help control the level of airborne particulate material released into the paint production areas. Material is collected in emission control systems such as bag houses. Through the industry survey (described in Section 3.2), paint manufacturing facilities identified generating emission control dust but none reported generating emission control sludge.

Off-Spec Product: A paint is considered off-specification if it cannot be sold "as is." For instance, if a paint is manufactured and customer demand changes, new superior products are created, or the product's shelf life expires, then the paint may be considered off-specification. In addition, off-specification product can result from operator error, equipment malfunction, improper equipment cleaning, or quality control failure during the manufacturing process. It may also include small quantities of retained product samples.

3.2 DATA SOURCES

For this capacity analysis for paint production wastes, EPA primarily used information and data from the RCRA §3007 Questionnaire. This survey was distributed to paint manufacturing facilities in Spring 2000, collecting data for the year 1998.

3.2.1 Survey Components

EPA developed an extensive questionnaire under the authority of Section 3007 of RCRA for distribution to the paint production industry. The purpose of the RCRA §3007 Questionnaire

was to gather information about solid and hazardous waste management practices in the U.S. paint production industry. EPA used this information to determine whether certain waste streams should be managed as hazardous under RCRA and added to the list of hazardous wastes under 40 CFR 261. The questionnaire included sections requesting information with respect to:

- Corporate and facility information
- Residual generation and management information
- Information for specific onsite and offsite residual management units
- Constituents present in the wastes.

EPA distributed the industry-wide survey in Spring 2000 (for calender year 1998) regarding consent decree wastes generated by each facility. Data from these responses were reviewed by EPA and are summarized in this capacity analysis for the wastes proposed for listing. For this capacity analysis, EPA primarily used information regarding residual generation and management.

3.2.2 Waste Quantity Information From Survey

The 3007 survey yielded two types of paint production waste quantity information: quantity of waste generated and quantity of waste managed. Facilities reported the quantity of listed hazardous waste, characteristically hazardous waste, and non-hazardous paint production waste generated. Facilities reported the quantity of characteristically hazardous waste and non-hazardous waste managed in waste management units, but were not required to report on the quantity of listed hazardous waste managed.

The total quantity of waste generated by facilities is not equivalent to the total quantity of managed waste reported by facilities. Factors that contribute to this discrepancy include: 1) facilities may store waste for a long period of time prior to disposing the waste; 2) facilities may also store waste for a period of time then decide to recycle the waste instead of disposing the waste; and 3) there may be undetected reporting errors in the database. Therefore, the total quantity of generated waste and managed waste reported by facilities slightly differs.

EPA based its capacity analysis on the quantities of paint production waste that facilities reported as managed in waste management units (and not the generated quantity of waste reported). When reporting quantities of waste managed, facilities reported more specific information on how the waste was managed. In addition to the type of waste managed (e.g., characteristically hazardous liquid residual from caustic washwater; nonhazardous off-specification paint production waste residual), the facilities reported the quantities of waste managed in specific types of waste management units (e.g., container storage; incineration; wastewater treatment facility). This information is more useful in assessing how much paint production waste requires additional treatment to meet the LDR standards.

Although there are slight differences in the total quantity of paint production waste generated and total quantity of paint production waste managed, these differences will not affect the result of the capacity analysis stated in Section 5.0, since the quantity of available treatment

capacity is much greater than the estimated quantity of treatment necessary for paint production waste.

3.2.3 Statistical Considerations

Overview of Approach

EPA did not send a survey to every paint manufacturing facility for two reasons. First, due to the large number of such facilities (EPA initially estimated that there are approximately one thousand paint manufacturing facilities of interest in the United States), it would have been difficult to distribute, collect, and analyze the results in a timely manner. Secondly, a complete and reliable database is unavailable for the entire paint manufacturing industry. Instead, EPA sampled a smaller number of facilities and subsequently 'scaled up' the results to reflect an industry-wide estimate.

EPA used the 1998-99 Dun & Bradstreet electronic database as the data source that would provide the most comprehensive listing of paint manufacturers in the United States. A detailed description of the D&B database, the stratification process and the selection of the facilities to receive the questionnaire is available in the following report found in the docket: "Sampling Scheme for Distributing RCRA Section 3007 Questionnaire to Paint Manufacturing Facilities, Task 6, QRT #3 Final Report, Revision 2. EPA selected those facilities identified in the Dun & Bradstreet database under various eight digit SIC codes corresponding to paint production facilities.

As mentioned above, EPA did not send a survey to each facility identified from the Dun & Bradstreet database. Instead, EPA decided to stratify the universe of paint manufacturers into discreet categories based on paint type (architectural, OEM or special purpose), sales volume (size) and TRI status (whether or not it reports to the TRI).[15] EPA also distributed the surveys in two different mailings. This resulted in the sorting of facilities into the 24 different categories identified in Exhibit 3-5. Facilities in each category were randomly selected. EPA then sent surveys to randomly selected facilities within each category in February and March of 2000.

In order to 'scale up' the results of the survey to industry-wide statistics (or 'universe' statistics) appropriate for use in the capacity analysis, EPA derived two different types of scaling factors. The first scaling factor (a weighting factor) was calculated assuming that the Dun and Bradstreet database was a complete and accurate census of the paint manufacturing industry. The second scaling factor (a universe scaling factor) was calculated based on later information indicating that the Dun and Bradstreet data underestimate the actual paint manufacturing facility population. Rather than combining the two factors, both were used sequentially in this capacity analysis to ensure consistency with other aspects of EPA's proposal for paint production wastes.

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[15] Manufacturing facilities subject to TRI reporting are required to report annual releases of toxic chemicals to waste management units and environmental media. In making the distinction between 'TRI' and 'non-TRI' facilities, EPA assumed that such facilities reporting to the TRI would also provide more information on waste constituents and management practices of concern in their RCRA 3007 survey.

The first factor (the weighting factor) accounts for the fact that different numbers of facilities were selected for survey distribution within each facility category. The second factor (the universe scaling factor) accounts for the later information indicating that the actual population of paint manufacturing facilities is greater than indicated in the Dun & Bradstreet database. While the capacity analysis ultimately uses the universe numbers, the weighted values are used in some of the intermediate calculations presented in this background document for convenience.

Details of Survey Population

EPA developed weighting factors for each of the 24 categories of facilities listed in Exhibit 3-5. The weighting factor was calculated as the number of facilities estimated to be in the population (based on the Dun & Bradstreet database) and the number of facilities which were sent a survey. These weighting factors ranged from 1.0 (indicating all facilities in a particular category were sampled) to 8.8571 (indicating that only about 1 in 8 facilities in a particular category were sampled). Based on this approach, EPA distributed the questionnaires to a total of 299 facilities. This compares to the total sampling population of 884 from the Dun & Bradstreet database.

Exhibit 3-5. Weighting Categories Used for Paint Production Wastes in RCRA 3007 Survey

Facilities in SIC Code 2851-01
Large facility, reporting to TRI, SIC 2851-01, round 1
Large facility, not reporting to TRI, SIC 2851-01, round 1
Large facility, not reporting to TRI, SIC 2851-01, round 2
Medium facility, not reporting to TRI, SIC 2851-01, round 1
Medium facility, not reporting to TRI, SIC 2851-01, round 2
Small facility, reporting to TRI, SIC 2851-01, round 1
Small facility, reporting to TRI, SIC 2851-01, round 2
Small facility, not reporting to TRI, SIC 2851-01, round 1
Small facility, not reporting to TRI, SIC 2851-01, round 2
Facilities in SIC Code 2851-02
Large, non-TRI, SIC 2851-02, round 1
Large, non-TRI, SIC 2851-02, round 2
Medium, non-TRI, SIC 2851-02, round 1
Medium, non-TRI, SIC 2851-02, round 2
Small, TRI, SIC 2851-02, round 1
Small, TRI, SIC 2851-02, round 2

Exhibit 3-5. Weighting Categories Used for Paint Production Wastes in RCRA 3007 Survey
Small, non-TRI, SIC 2851-02, round 1
Small, non-TRI, SIC 2851-02, round 2

Note: other combinations of SIC code, facility size, TRI reporting status, and survey round are theoretically possible but no facilities are represented by such combinations.

EPA revised its estimate of the population of paint manufacturing facilities, to 972 (for a more detailed analysis, see "Sampling Scheme for Distributing RCRA Section 3007 Questionnaire to Paint Manufacturing Facilities, Task 6, QRT #3 Final Report, Revision 2"). This is greater than the initial estimate of 884 facilities from the Dun & Bradstreet database. Further, as discussed below, EPA found that only a portion of the Dun & Bradstreet facilities actually manufactured relevant paint products (i.e., 187 of 292 respondents which 'scales up' to 566 of 884 Dun & Bradstreet facilities). Therefore, EPA applied an additional 'universe' factor in conjunction with the previously described weighting factor. The 'universe' factor is equal to 1.7173 which is the revised estimated population (972 facilities) divided by the population estimated to be represented in the Dun & Bradstreet database (566 facilities).

Of the 299 questionnaires EPA distributed, 292 facilities completed and returned the questionnaires to EPA. EPA found that 187 of the 292 survey respondents manufactured paint products of interest to this listing determination.[16] Of these 187 facilities, 151 manufacturing facilities generated one or more of the residuals of concern, providing information on their waste generation and management practices. The other 36 facilities reported that they either did not generate any wastes, or reported that they recycled or reused all paint residuals as feedstock in their manufacturing processes[17].

3.3 METHODOLOGY, ASSUMPTIONS, AND PRELIMINARY RESULTS FOR K179 and K180

In conducting the capacity analysis for K179 and K180 paint production wastes, EPA estimated the quantities of the wastes that will require hazardous waste commercial treatment as a result of proposed LDRs. The method that EPA developed for the K179 and K180 paint production wastes capacity analysis is comprised of two stages:

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[16] The remaining 105 respondents identified themselves either as a paint sales agent, a non-paint manufacturer, a non-paint manufacturer until after 1998, no longer a paint manufacturer, or a paint-related manufacturer not under the scope of the questionnaire.

[17] As stated in the questionnaire instructions, facilities were not required to report on any of the residuals that are used directly without reclamation as ingredients in manufacturing processes to make new products; or used directly as effective substitutes for commercial products; or returned directly to the original process from which they are generated as a substitute for raw feed stock. These residuals are excluded from the definition of solid waste. See 40 CFR 261.2.

1. Estimate the quantities of K179 and K180 waste generated and managed. 'Weighted' quantities for each waste and each management practice are presented based on the results of the RCRA 3007 surveys described in Section 3.2 of this report.

2. Estimate the quantity of waste currently meeting LDR standards. Some wastes are already managed using methods that would likely satisfy the LDR treatment standards. Additionally, some waste liquids are managed using methods that would exempt them from the proposed listings (i.e., due to the proposed exemption for wastes stored in tanks or containers prior to discharge). The quantities managed in this manner are not used in estimating the required commercial treatment capacity. The remaining quantities represent the required alternative treatment capacity.

The results of these two steps determine how much offsite commercial capacity is required to manage K179 and K180. Exhibit 3-6 summarizes the results of the analysis. The derivation of the quantities presented in Exhibit 3-6 is discussed in Sections 3.3.1 and 3.3.2.

Although EPA is proposing to list K179 and K180 as hazardous, not all facilities generating the paint production wastes identified above will be required to manage them as hazardous and subsequently be required to meet land disposal restrictions. This is because concentration-based listings are proposed for these wastes. 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 than estimated.

This analysis may further overestimate the quantity of hazardous waste requiring treatment because some paint manufacturing facilities may qualify as conditionally exempt small quantity generators (CESQGs) if they generate less than 100 kg per month of the proposed hazardous wastes. Such facilities would not be required to comply with the proposed land disposal restrictions, however waste quantities generated by all facilities were included in the capacity analysis.

The quantities requiring alternative or additional treatment could be smaller because much of the proposed paint production wastes are mixed with existing listed and/or characteristic wastes which already must meet the LDR requirements for at least some of the proposed constituents for K179 and K180 wastes. Also, most of the surveyed facilities that reported generation of waste residuals of concern under this listing determination reported that they recycled or reused the residuals to some extent. Furthermore, the capacity analysis does not account for any onsite treatment methods that generating facilities may have available, which would subsequently not require alternative commercial treatment capacity.

Exhibit 3-6. K179 and K180 Capacity Summary				
Waste Management	**Quantities Managed, Metric Tons**			
	Nonhazardous Wastes		**Hazardous Wastes [1]**	
	Weighted	**Universe**	**Weighted**	**Universe**
Total Quantity Managed	44,221	76,000	15,481	27,000
Excluded from Hazardous Waste Regulation [2]	34,168	59,000	100	200
May Require Further Commercial Treatment [3]	2,648	4,500	15,328	26,000
Requires Alternative Commercial Treatment [4]	7,405	12,700	53	100
Lower bound estimate for nonhazardous wastes: Universe quantity corresponding to 'requires alternative commercial treatment' = 12,700 MT or approximately **13,000 MT**				
Upper bound estimate for nonhazardous wastes: Universe quantity corresponding to lower bound estimate plus quantity corresponding to 'may require further commercial treatment' = 12,700 MT + 4,500 MT = **17,000 MT**				

Universe quantity equals weighted quantity times 1.7173.
[1] Characteristic hazardous waste only. Data for wastes already listed as hazardous wastes (e.g., F001) are not identified in this exhibit.
[2] Waste meets the wastewater treatment exclusion under 40 CFR 261.4(a)(1).
[3] Waste is currently burned or otherwise managed (e.g., recycled). Uncertainty exists because the residues may require additional treatment for metals, or current management may not be a Subtitle C unit.
[4] Waste is currently disposed in landfills.

3.3.1. Estimated Management Quantities of Paint Production Wastes

Facilities were required to report management of their non-hazardous waste and waste that was hazardous due to a characteristic only (or listed as F003 only).[18] The Questionnaire was structured in such a way that facilities reported the generation of specific types of waste (i.e., solvent cleaning wastes, water/caustic cleaning wastes, wastewater treatment sludge, emission control dust or sludge, and off-specification paint production waste). In addition, the Questionnaire required the generator to distinguish between liquid and solid wastes (except for off-specification paint production waste). Exhibit 3-7 shows the types of wastes that were reported in the survey, and how they were classified in the LDR capacity analysis. Exhibit 3-7 includes an assessment of whether the waste would likely be designated as K179 or K180 if the listings were finalized.

Most K179 is expected to meet the definition of a 'nonwastewater.' K180 may meet the definition of a wastewater or a nonwastewater specified in 40 CFR 268.2(d) and (f). This is because they may be comprised of either solvent or water. Wastewaters must have less than one percent total organic carbon, and solvent cleaning wastes will likely have levels greater than this.

[18] For listed hazardous waste (except F003), facilities were required to report the generation quantities but no waste management information was provided.

Exhibit 3-7. Waste Types Identified in RCRA 3007 Paint Production Waste Survey
K179 nonwastewaters [A]
sludges from caustic cleaning residual
emission control dust
emission control sludge
off-specification residual [B]
sludges from solvent cleaning waste
sludges from washwater residual
sludges from wastewater treatment
K180 wastewaters [A]
liquid residual from caustic wash water
liquid residual from wash water
K180 nonwastewaters [A]
liquid residual from solvent cleaning

A. Based on engineering judgement; the survey did not identify the TSS or TOC content of wastes, nor were wastes identified as wastewater/nonwastewater or as K179/K180.
B. Since the questionnaire did not require generators to further identify the physical characteristics of off-specification product, EPA could not immediately assess whether the waste would be wastewater or nonwastewater. However, as shown in Exhibit 3-8, almost all of the waste is managed as a solvent (e.g., combustion) or a solid (e.g., landfill), so in this analysis EPA assumes that the off-specification residual will be classified as a K179 nonwastewater.

Facilities reported the quantities of waste treated and disposed in both onsite and offsite management units. Exhibit 3-8 summarizes the waste management information reported. Note that the quantities of wastes are weighted to reflect the sampled population, but are not additionally scaled to reflect the entire universe.

Exhibit 3-8 also includes EPA's assessment of whether the management method is interim or final. For example, a facility may report managing waste in containers prior to managing the waste in a landfill. In the capacity analysis, EPA has assumed that containers, tanks, and waste piles are always interim management methods to avoid double counting, and all other management methods are always final management methods. A more detailed review of the data, presented in Appendix B, shows that this assumption does not apply to approximately ten percent (or less) of the waste quantities identified in Exhibit 3-8. In other words, even if this simplified assumption was replaced by a detailed facility-by-facility accounting of waste management to isolate instances where this assumption is not valid, the result is not expected to change the overall results of the analysis by more than ten percent.

Exhibit 3-8. Management of Paint Industry Nonhazardous Waste and Characteristically Hazardous Wastes in 1998					
Management Method	**Final Management? [A]**	**Nonhazardous Waste (weighted quantity)**		**Characteristic Hazardous Waste (weighted quantity)**	
		Gallons	**Metric Tons**	**Gallons**	**Metric Tons**
Waste Type: liquid residual from caustic wash water (K180 wastewater)					
Containers	No	0	0	2,130	8.7
Onsite Storage Tanks	No	8,730	33	9,814	38
Onsite Treatment Tanks	No	7,286	28	0	0
POTW	Yes	8,546	32	0	0
WWTF	Yes	0	0	8,814	34
Incinerator	Yes	0	0	126,400	491
Other	Yes	8,730	33	112,200	434
Subtotal for all management methods identified as final for liquid residual from caustic wash water (wastewater)		**17,276**	**65**	**247,414**	**959**
Waste Type: sludges from caustic cleaning residual (K179 nonwastewater)					
Containers	No	1,329	5.6	21,000	99
Fuel Blending	Yes	0	0	1,106	4.7
WWTF	Yes	0	0	2,145	9.0
Incinerator	Yes	1,329	5.6	17,700	85
Other	Yes	0	0	58	0.3
Subtotal for all management methods identified as final for sludges from caustic cleaning residual (nonwastewater)		**1,329**	**5.6**	**21,009**	**99**
Waste Type: emission control dust (K179 nonwastewater)					
Containers	No	692,000	3,052	16,900	39
Onsite Treatment Tanks	No	94,000	1,066	0	0
Subtitle D Landfills (municipal and industrial)	Yes	587,300	1,947	18	0.03
Subtitle C Landfill	Yes	4,728	8.9	11,520	19
Incinerator	Yes	1,370	5.5	5,250	19
BIF	Yes	0	0	81	0.4
Other	Yes	4,709	11	0	0

Exhibit 3-8. Management of Paint Industry Nonhazardous Waste and Characteristically Hazardous Wastes in 1998					
Management Method	**Final Management? [A]**	**Nonhazardous Waste (weighted quantity)**		**Characteristic Hazardous Waste (weighted quantity)**	
		Gallons	**Metric Tons**	**Gallons**	**Metric Tons**
Subtotal for all management methods identified as final for emission control dust (nonwastewater)		**598,107**	**1,972**	**16,869**	**38**
Waste Type: emission control sludge (K179 nonwastewater)					
Subtotal for all management methods identified as final for emission control sludge (nonwastewater)		**0**	**0**	**0**	**0**
Waste Type: off-specification residual (K179 nonwastewater [B])					
Containers	No	457,900	2,023	499,900	2,027
Onsite Storage Tanks	No	12,500	53	441,600	1,532
Subtitle D Landfills (municipal and industrial)	Yes	199,200	942	4,048	22
Subtitle C Landfill	Yes	16,700	80	0	0
Fuel Blending	Yes	82,400	352	442,600	1,742
WWTF	Yes	12,300	48	0	0
Incinerator	Yes	18,400	72	108,700	452
Cement Kiln	Yes	13,000	56	34,300	142
BIF	Yes	844	3.4	534	2.6
Other	Yes	31,100	133	354,400	1,208
Subtotal for all management methods identified as final for off-specification residual (nonwastewater)		**373,944**	**1,686**	**944,582**	**3,569**
Waste Type: liquid residual from solvent cleaning (K180 nonwastewater)					
Containers	No	984	3.7	1,635,000	5,919
Onsite Storage Tanks	No	0	0	1,349,000	4,788
Subtitle D Landfills (municipal and industrial)	Yes	0	0	394	1.3
Fuel Blending	Yes	984	3.7	649,900	2,328
Incinerator	Yes	0	0	116,200	438
Cement Kiln	Yes	0	0	107,300	384

Exhibit 3-8. Management of Paint Industry Nonhazardous Waste and Characteristically Hazardous Wastes in 1998					
Management Method	**Final Management? [A]**	**Nonhazardous Waste (weighted quantity)**		**Characteristic Hazardous Waste (weighted quantity)**	
		Gallons	**Metric Tons**	**Gallons**	**Metric Tons**
BIF	Yes	0	0	2,671	9.9
LWAK	Yes	0	0	24,000	73
Other	Yes	0	0	1,381,000	4,924
Subtotal for all management methods identified as final for liquid residual from solvent cleaning (nonwastewater)		**984**	**3.7**	**2,281,465**	**8,158**
Waste Type: sludges from solvent cleaning waste (K179 nonwastewater)					
Onsite Storage Tanks	No	0	0	416,300	1,519
Containers	No	582	2.2	193,900	813
Waste Piles	No	7,969	33	0	0
Subtitle D Landfills (municipal and industrial)	Yes	8,682	35	2,067	11
Fuel Blending	Yes	0	0	523,200	1,989
Incinerator	Yes	0	0	46,300	186
Cement Kiln	Yes	0	0	18,600	78
Other	Yes	0	0	920	3.0
Subtotal for all management methods identified as final for sludges from solvent cleaning waste (nonwastewater)		**8,682**	**35**	**591,087**	**2,267**
Waste Type: liquid residual from wash water (K180 wastewater)					
Containers	No	386,300	1,517	55,400	217
Onsite Storage Tanks	No	3,825,000	14,500	43,300	166
Offsite Storage Tanks	No	197	0.8	0	0
Onsite Treatment Tanks	No	2,020,000	7,487	0	0
Subtitle D Landfills (municipal and industrial)	Yes	656	2.9	0	0
Fuel Blending	Yes	93,000	455	35,400	142
POTW	Yes	7,249,000	27,600	0	0
WWTF	Yes	1,640,000	6,407	15,000	57

Exhibit 3-8. Management of Paint Industry Nonhazardous Waste and Characteristically Hazardous Wastes in 1998					
Management Method	**Final Management? [A]**	**Nonhazardous Waste (weighted quantity)**		**Characteristic Hazardous Waste (weighted quantity)**	
		Gallons	**Metric Tons**	**Gallons**	**Metric Tons**
NPDES	Yes	20,200	76	0	0
Incinerator	Yes	14,100	56	29,100	111
Cement Kiln	Yes	13,000	52	0	0
Other	Yes	343,800	1,309	19,100	72
Subtotal for all management methods identified as final for liquid residual from wash water (wastewater)		**9,373,756**	**35,958**	**98,600**	**382**
Waste Type: sludges from washwater residual (K179 nonwastewater)					
Containers	No	200,300	1,154	1,577	9.0
Onsite Storage Tanks	No	324,100	1,814	0	0
Subtitle D Landfills (municipal and industrial)	Yes	451,800	2,597	0	0
Subtitle C Landfill	Yes	66,700	352	0	0
Fuel Blending	Yes	893	3.9	1,577	9.0
Incinerator	Yes	9,043	51	0	0
Other	Yes	102	0.6	0	0
Subtotal for all management methods identified as final for sludges from washwater residual (nonwastewater)		**528,538**	**3,005**	**1,577**	**9.0**
Waste Type: sludges from wastewater treatment (K179 nonwastewater)					
Containers	No	139,000	992	0	0
Onsite Treatment Tanks	No	74,300	487	0	0
Subtitle D Landfills (municipal and industrial)	Yes	204,200	1,440	0	0
Fuel Blending	Yes	4,640	21	0	0
WWTF	Yes	1,250	4.8	0	0
Incinerator	Yes	5,282	24	0	0
Subtotal for all management methods identified as final for sludges from wastewater treatment (nonwastewater)		**215,372**	**1,490**	**0**	**0**

Exhibit 3-8. Management of Paint Industry Nonhazardous Waste and Characteristically Hazardous Wastes in 1998					
Management Method	**Final Management? [A]**	**Nonhazardous Waste (weighted quantity)**		**Characteristic Hazardous Waste (weighted quantity)**	
		Gallons	**Metric Tons**	**Gallons**	**Metric Tons**
GRAND TOTAL		**11,117,988**	**44,220**	**4,202,603**	**15,481**

Reference: Spreadsheet derived from RCRA 3007 Survey 'CD' September 22, 2000. File entitled: 'MgtUnitvsWasteStream9_22.wk4'
The survey did not collect management information for listed hazardous wastes.
A. Based on engineering judgement; the survey did not identify management methods in this manner.
B. Since the questionnaire did not require generators to further identify the physical characteristics of off-specification product, EPA could not immediately assess whether the waste would be wastewater or nonwastewater. However, as shown, almost all of the waste is managed as a solvent (e.g., combustion) or a solid (e.g., landfill), so in this analysis EPA assumes that the off-specification residual will be classified as a nonwastewater.

3.3.2. Waste Management Evaluation

The waste management methods for K179 and K180 wastes include storage, burning (either incinerated or burned for energy recovery), disposal in landfills, treated at wastewater treatment facilities or discharged, or other/unknown. Depending on the type of current waste management, newly-identified waste may or may not require further commercial treatment in order to meet the proposed LDR treatment standards. The data from Exhibit 3-8 are further summarized in Exhibit 3-9 according to four general management steps:

- Burning includes the following management methods: fuel blending, boiler and industrial furnace (BIF) management, cement kiln management, lightweight aggregate kiln management, and incinerator management. It is unclear, for two reasons, whether management using these methods is likely to be adequate if LDRs for these paint production wastes are finalized. First, quantities of waste that are currently burned in non-hazardous waste units will be required to be sent to Subtitle C units. Second, in the case of incinerator management, the residue from incineration may require additional treatment to meet proposed treatment standards for antimony (e.g., stabilization).

  Appendix B assesses the extent to which nonhazardous waste management units are used to manage paint production wastes. Appendix B also presents information regarding the presence of antimony in paint production wastes.

- Other: The category "other" may include recycling and other management methods. Depending on the specific management method, wastes managed in this manner may or may not require alternative treatment to comply with LDRs. Responses from facilities using this management method are presented in Appendix B, which provide some additional detail (but no conclusions or generalizations) regarding how facilities described this management practice.

- Wastewater Treatment, POTW, NPDES. Facilities may currently be treating waste in an on- or offsite wastewater treatment facility or sending wastewaters to

a POTW or discharging through a NPDES permit. These wastes are assumed to not require additional treatment either because they would be exempt, or because they would not be land disposed.

- Land Disposal. Waste that is currently sent to Subtitle D industrial waste landfills, municipal solid waste landfills, and Subtitle C landfills will now be required to meet the new treatment standards for the newly-identified wastes.

To address the uncertainty regarding whether wastes managed by burning and 'other' management are expected to require alternative treatment capacity, the capacity analysis was conducted in two ways to create a low end and high end estimate of required alternative treatment capacity. Exhibits 3-9 and 3-10 summarize the results of this evaluation:

- Lower bound estimate: Assumes that present management of wastewater treatment, burning, and 'other' would be sufficient to meet proposed LDRs but landfilling would not. This results in a lower bound estimate.

- Upper bound estimate: Assumes that present management of wastewater treatment would be sufficient to meet proposed LDRs, but burning, 'other,' and landfilling would not. This results in an upper bound estimate.

Based on the results of the RCRA §3007 survey and the site visits, EPA did not identify any paint manufacturing facilities that manage these proposed wastes in onsite surface impoundments. From the available information, EPA found that at least one wastewater treatment plant accepted proposed paint manufacturing waste liquids (K180) from the paint production industry, and the facility managed these wastes in a lined surface impoundment. Assuming such an impoundment satisfies requirements of §3005(j)(11) (in essence, meets minimum technological requirements and is dredged annually), such wastes would not require treatment. If any wastes are managed in an impoundment not satisfying requirements of 3005(j)(11) (e.g., an unlined surface impoundment) of a wastewater treatment system, the wastes would be subject to land disposal prohibitions. However, EPA anticipates that very few facilities, if any, would manage the newly identified paint manufacturing wastes in such impoundments.

Exhibit 3-9. Waste Management Summary for K179 and K180

Waste Management Method	Meets LDR?	Annual Management Quantity Weighted Metric Tons			
		K180 Wastewater	K179 Non-wastewater	K180 Non-wastewater	Total
Characteristic Hazardous Wastes					
Burning	Maybe	744	4,710	3,233	8,687
Other	Maybe	506	1,211	4,924	6,641

Exhibit 3-9. Waste Management Summary for K179 and K180					
Waste Management Method	**Meets LDR?**	**Annual Management Quantity Weighted Metric Tons**			
		K180 Wastewater	**K179 Non-wastewater**	**K180 Non-wastewater**	**Total**
Wastewater treatment, POTW, NPDES	Yes	91	9	0	100
Landfill	No	0	52	1	53
Subtotal		*1,341*	*5,982*	*8,158*	*15,481*
Nonhazardous Wastes					
Burning	Maybe	563	594	4	1,161
Other	Maybe	1,342	145	0	1,487
Wastewater treatment, POTW, NPDES	Yes	34,115	53	0	34,168
Landfill	No	3	7,402	0	7,405
Subtotal		*36,023*	*8,194*	*4*	*44,221*
Total		**37,364**	**14,176**	**8,162**	**59,702**

Exhibit 3-10. K179 and K180 Capacity Summary				
Waste Management	**Quantities Managed, Metric Tons**			
	Nonhazardous Wastes		**Hazardous Wastes**	
	Weighted	**Universe**	**Weighted**	**Universe**
Total Quantity Managed	44,221	76,000	15,481	27,000
Excluded from Hazardous Waste Regulation [1]	34,168	59,000	100	200
May Require Further Commercial Treatment [2]	2,648	4,500	15,328	26,000
Requires Alternative Commercial Treatment [3]	7,405	12,700	53	100
Lower bound estimate for nonhazardous wastes: Universe quantity corresponding to 'requires alternative commercial treatment' = 12,700 MT or approximately **13,000 MT**				
Upper bound estimate for nonhazardous wastes: Universe quantity corresponding to lower bound estimate plus quantity corresponding to 'may require further commercial treatment' = 12,700 MT + 4,500 MT = **17,000 MT**				

Universe quantity equals weighted quantity times 1.7173.

[1] Waste meets the wastewater treatment exclusion under 40 CFR 261.4(a)(1).

[2] Waste is currently burned or otherwise managed (e.g., recycled). Residues may require additional treatment for metals, or current management may not be a Subtitle C unit.

[3] Waste is currently disposed in landfills.

3.4 CONTAMINATED SOIL AND DEBRIS

In addition to the production wastes generated from paint manufacturers on a routine basis, EPA also considered the quantity of contaminated soil and debris present at these facilities. EPA believes that the majority of contaminated soil and debris can and will be managed onsite and therefore would not require substantial offsite commercial treatment capacity. Therefore, EPA is proposing to not grant 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, it is possible to treat and/or manage hazardous waste without triggering LDR treatment standards. For LDR standards to be triggered, contaminated soil must be removed from the land (i.e., generated) and managed in a manner constituting land disposal. If the contaminated soil is not removed from the land via excavation (e.g., *in situ* treatment), then the LDR standards will not be applied to these wastes. In addition, if hazardous soil is excavated, LDR standards will only apply if the subsequent management is considered "land disposal" for the purposes of the LDR program. If a contaminated soil is managed within an area of contamination (AOC), even if it is "removed from the land" within such an area, the soil would not be considered generated, and the LDR treatment requirements do not apply. (For more information, see the most recent EPA guidance, a March 13, 1996 EPA memo titled, "Use of the Area of Contamination Concept During RCRA Cleanups." (Available from the RCRA Hotline, or http://www.epa.gov/rcraonline or http://www.epa.gov/epaoswer/hazwaste/ldr/guidance.html.)

Contaminated soil can also be managed onsite through the use of a corrective action management unit (CAMU) and temporary unit (TU). This allows an area of land at a facility to be designated a CAMU and receive remediation wastes without triggering LDR standards or minimum technological requirements (MTRs). This rule was finalized on February 16, 1993 (58 *FR* 8659) and is codified in 40 CFR Part 264 Subpart S. On August 22, 2000 (65 FR 51080), EPA proposed amendments to the CAMU standards. If finalized, the proposed amendments would modify the types of waste that may be managed in CAMUs, the design standards that apply to CAMUs, the treatment requirements for wastes placed in CAMUs, information submission requirements for CAMU applications, responses to releases from CAMUs, and public participation requirements for CAMU decisions.[19] However, the CAMU would still be exempt from LDR and MTR standards.

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 contaminate soils onsite. These innovative treatment technologies being used include soil vapor extraction, thermal desorption, ex-situ

[19]On May 14, 1993, a petition for review was filed with the U.S. Court of Appeals for the District of Columbia Circuit. Environmental Defense Fund v. EPA, No. 93–1316 (D.C. Cir.). The proposed amendments are part of an EPA settlement with petitioners on the CAMU litigation. The current Part 264/265, Subpart S regulations are still in effect until the rule is finalized.

bioremediation, in-situ bioremediation, soil washing, solvent extraction, dechlorination as well as other innovative treatment technologies.[20]

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* 28602, 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 proposed paint production 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.

Third, the LDRs also provide flexibility in selecting treatment methods for debris contaminated with the proposed paint production 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 (August 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 wastes 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.

Fourth, the LDR program allows facilities to petition EPA to modify LDR requirements. If necessary, a facility can apply for a case-by-case extension or a treatability variance to manage or treat these soil and debris wastes.

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. Uncertainty over regulatory requirements, in turn, has contributed to a decrease in the demand for commercial treatment for contaminated media.

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[20] 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.

3.5 MIXED RADIOACTIVE WASTES CONTAMINATED WITH K179 and K180

EPA identified no quantities of K179 and K180 destined for treatment as mixed radioactive wastes based on information from the RCRA 3007 surveys and site visits. EPA is proposing to not grant a national capacity variance for mixed radioactive wastes or for soil and debris contaminated with mixed radioactive wastes.

3.6 UNDERGROUND INJECTED WASTES

EPA identified no quantity of K179 and K180 that is presently managed by underground injection from the RCRA 3007 surveys and site visits. EPA is proposing to not grant a national capacity variance for underground injected wastes.

4. REQUIRED CAPACITY FOR WASTES IMPACTED BY CHANGES IN UTS AND F039 LIST

EPA is proposing to add styrene to UTS and to also define it as a underlying hazardous constituent. Wastes subject to UTS (i.e., characteristically hazardous wastes) must be either analyzed for these constituents, or generator knowledge must be used, to ensure that the concentrations are below the proposed treatment standards prior to land disposal. EPA is also proposing to add acrylamide and styrene to the F039 LDR list. These changes are summarized in Exhibit 4-1.

Exhibit 4-1. Constituents Proposed for Addition to UTS and/or to F039 List

Constituent	Proposed Wastewater Treatment Standard	Proposed Nonwastewater Treatment Standard	Will Constituent Be Added to UTS (40 CFR 268.48) ?	Will Constituent Be Added to F039 List (40 CFR 268.40)?
Acrylamide	19 mg/L	23 mg/kg	No (already on UTS)	Yes
Styrene	0.028 mg/L	28 mg/kg	Yes	Yes

This section of the report evaluates the additional commercial treatment capacity that may be required as a result of these changes. The results of this capacity analysis are summarized in Exhibit 4-2.

Exhibit 4-2. Summary of Alternative Treatment Capacity Required for Proposed Changes to UTS and F039

	Wastewater Forms	Nonwastewater Forms
Quantity of Waste Managed in a Manner Unlikely to Treat Organics; Alternative Commercial Capacity Required	F039: 95,000 metric tons	F039: 7,200 metric tons
	UTS: 20,327,000 metric tons	UTS: 253,000 metric tons

4.1 OCCURRENCE OF SUBJECT CONSTITUENTS IN LANDFILL LEACHATE AND INDUSTRIAL WASTES

Existing EPA data were used to qualitatively identify the frequency that the constituents identified in Exhibit 4-1 are present in hazardous wastes. The available data are very limited. As a result, EPA can at most only obtain general indications concerning the existence of these constituents in subject wastes. This section presents the limited findings concerning the presence of these constituents in wastes, conclusions drawn from these findings, and how the results are used in conjunction with waste quantity estimates presented in Sections 4.2 and 4.3.

Three data sources were used in identifying the presence of styrene and acrylamide in wastes:

- A draft database, LEACH2000, developed by the Office of Solid Waste on leachate composition from hazardous and nonhazardous landfills. This data set was used to characterize leachate that may be classified as F039. (This database is not available on the Internet or present in an EPA docket.)

- National Hazardous Waste Constituent Survey data.[21] This data set was used to characterize hazardous wastes. The data were used to assess impacts from proposed changes to UTS.

- 1998 Toxics Release Inventory (TRI) data. The data were used to assess impacts from proposed changes to UTS.[22]

4.1.1 Office of Solid Waste Data

The Office of Solid Waste has compiled a draft database characterizing leachate from various landfills, including hazardous waste landfills, construction and demolition landfills, industrial waste landfills, and co-disposal landfills. These monitoring data are compiled from states and from commercial landfill operators. The database also integrates the results of the Office of Water's January 2000 final rule regarding wastewater generated by landfill operators.[23]

Results from this draft database are presented in Exhibit 4-3 for the two constituents proposed for addition to the F039 LDR list. The database includes data regarding the leachate composition from the following three types of landfills:

- Commercial and captive hazardous waste landfills. These landfills include commercial landfills, which are expected to accept a wide variety of wastes, and captive landfills, which are expected to accept a more limited array of hazardous wastes from only a single site or a single corporation. Incoming wastes are subject to LDRs, but untreated wastes may be present in some old landfills or landfill cells. Whether commercial or captive, the landfill leachate that is generated and collected is expected to carry the F039 waste code.

- Codisposal landfills which include historical disposal of municipal waste, hazardous waste, and industrial waste. The industrial codisposal landfills information in the database consists of a set of 21 sites included in the data set obtained from Chemical Waste Management (CWM). These landfills are older than other landfill types represented in the database, with typical opening dates in

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[21] These data were evaluated in support of EPA's proposed November 1999 HWIR. The data are located on the Internet at http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/economic.htm

[22] TRI data are available through the Internet at EPA's Envirofacts (www.epa.gov/enviro).

[23] Data from the landfill rule are at US EPA, Development Document for Final Effluent Limitations Guidelines and Standards for the Landfills Point Source Category, EPA-821-R-99-019, January 2000. Available at: www.epa.gov/ostwater/guide/landfills/index.html.

the 1950's and 1960 and as early as 1927. Although detailed operating histories are not available for these landfills, they all have received a wide variety of wastes throughout their lives, including industrial non-hazardous waste, hazardous waste, and residential and commercial waste (i.e., municipal waste). It is believed that most of these landfills began operation receiving industrial waste (hazardous, non-hazardous, or both) and at some point began accepting MSW commercially. Most of these landfills currently are closed. It is unknown how those that are currently open are regulated (e.g., it is unknown if they are permitted under Federal Subtitle C hazardous waste regulations or under state Subtitle D non-hazardous waste regulations). Due to the past practices of hazardous waste disposal, even of wastes that were listed only after disposal in the landfill had ceased, the landfill leachate that is generated and collected is expected to carry the F039 waste code.

- Industrial waste landfills such as pulp wastes, ash, and construction and demolition wastes. Some of these landfills are unlikely to generate F039 leachate because wastes presently listed as hazardous were never disposed in the landfill. However such an assessment relies on site-specific knowledge which is not available.

The data compiled here are intended to approximate the composition of leachate which may be characterized as F039. This is because every landfill generates leachate with a different composition, with leachate composition varying over time. Therefore, while the Office of Solid Waste database provides a large number of data points, no database will be sufficiently representative for characterizing F039.

Data for acrylamide and styrene from this database are summarized in Exhibit 4-3. Conclusions based on these results are as follows:

- Only eleven data points are available for acrylamide. Because they are all below the detection limit, this result indicates that acrylamide may not typically require additional treatment to meet LDRs. However the low number of data points limits the applicability of the results.

- A much greater number of data points are available for styrene (187). All but one measurement is below the proposed treatment standard. Therefore, based on these data styrene is likely to be present in only a small fraction of landfill leachate above the treatment standard.

- Not all of the leachate samples in this database are not necessarily classified as F039.

Exhibit 4-3. Frequency of Constituents in F039						
Constituent	**Landfill Type**	**# of Observations**	**# of Non-Detects**	**# < Standard**	**# ≥Standard**	**Proposed Wastewater Standard (mg/L)**
Acrylamide	Hazardous Waste	5	5	NA	NA	19
	Codisposal	6	6	NA	NA	
	Industrial D Waste	0	0	NA	NA	
Styrene	Hazardous Waste	66	61	5	0	0.028
	Codisposal	15	15	NA	NA	
	Industrial D Waste	106	96	9	1	

Source: EPA Office of Solid Waste LEACH2000 Landfill Leachate Database, 2000. (Draft). Here "NA" means "not applicable" because all observations were categorized as being not detected (ND). The leachate is compared to the proposed wastewater treatment standard (which assumes that the leachate would be classified as a 'wastewater').

4.1.2 National Hazardous Waste Constituent Survey

To characterize hazardous wastes that may be subject to the new UTS for styrene, EPA used data from its 1996 National Hazardous Waste Constituent Survey. Data were investigated for styrene, the constituent proposed for addition to UTS. The purpose was to identify constituent concentrations in various hazardous wastes and extrapolate results to those wastes subject to UTS. The data are intended to be used in obtaining a general idea of the concentrations potentially present in industrial hazardous wastes that could be subject to UTS, rather than characterizing different types of wastes (e.g., listed wastes versus characteristic).

The NHWCS includes data for 1760 waste streams from 221 different facilities. The results are summarized in Exhibit 4-4 for styrene. The following conclusions can be drawn from the data:

- For nonwastewater forms of the waste, waste concentrations exceeded the proposed treatment standard for styrene for 22 of the 24 observations.

- For wastewaters, there were only three observations. There was one exceedance, however another observation produced a non-detect, and the third observation was unknown or not-detected. Therefore, no conclusions can be made regarding the presence of styrene in wastewater forms of wastes.

The following limitations exist with the data:

- The data are not necessarily representative of wastes subject to UTS.

- It was not possible to distinguish between constituents that were 'not detected' and 'not reported.'

- Waste concentrations are based on both estimated and measured values; Exhibit 4-4 does not distinguish between the two.

- The distinction was not made between listed versus characteristic wastes because of the low number of data points (24 nonwastewater and only 3 wastewater).

Exhibit 4-4. Styrene Data in Listed and Characteristic Hazardous Wastes

Form of Waste	Total # Obs.	Limit	# Exceeded Limit	# Below Limit	# Unknown / Not Detected [1]
Nonwastewater	24	28 mg/kg	22	2	0
Wastewater	3	0.028 mg/L	1	1	1

1. Indicates a 0 in the database. Unclear if this means not detected or no data.
Source: National Hazardous Waste Constituent Survey Database, 1996 survey.

4.1.3 TRI Data

EPA is using 1998 TRI data to qualitatively identify the industries most likely to generate characteristically hazardous wastes (subject to UTS) that contain styrene. Because TRI data are not organized in this manner, EPA makes a number of assumptions in its application of the data. A total of 1,637 facilities reported releasing 56.6 million pounds of styrene to all media in 1998. The data are summarized in Exhibit 4-5 according to industry (2-digit SIC code). EPA found that certain industries are much more likely to report multimedia releases of styrene than other industries. Specifically, the highest reporting is in SIC 30 (plastics), followed by SIC 37 (transportation equipment), and SIC 28 (chemical production). These three SIC codes comprise 89 percent of releases and 73 percent of reporting facilities.

In using these data, EPA assumes that these industries would be more likely to generate characteristically hazardous wastes with styrene above the proposed UTS than other industries. EPA assumes that the releases are indicative of the presence of styrene in these industries, and that styrene could potentially be present in these hazardous wastes.

The following limitations exist with this approach:

- Data in the TRI do not allow for the comparison of waste concentrations with the proposed UTS. Therefore it is not possible to identify if the three industries noted above actually generate wastes with styrene greater than UTS.

- Due to reporting exemptions, certain facilities may use and release styrene but are not required to report to the TRI. These exclusions result from a small facility

size (less than ten full-time employees), a relatively low rate of chemical manufacture or usage (10,000 pounds used or 25,000 pounds manufactured), and industrial activity outside of certain SIC codes (in 1998, reporting was required for the manufacturing sector for SIC codes 20 to 39, electric utilities, mining, and others).

Exhibit 4-5. TRI Onsite and Offsite Releases of Styrene (in pounds), By Industry, U.S., 1998								
SIC Code and Industry	Number of Facilities Reported	Total Air Emissions	Surface Water Discharges	Under-ground Injection Releases	Releases to Land (Onsite)	Total Onsite Releases	Total Offsite Releases	Total On- & Offsite Releases
30 Plastics	591	26,917,831	260	0	170,118	27,088,209	1,018,135	28,106,344
37 Transportation Equip.	267	17,165,009	505	0	27,889	17,193,403	261,124	17,454,527
28 Chemicals	343	4,117,860	11,192	345,945	8,738	4,483,735	217,149	4,700,884
Multiple Codes 20-39	75	1,259,970	505	0	57,995	1,318,470	311,811	1,630,281
39 Miscellaneous	38	1,261,987	0	0	0	1,261,987	1,075	1,263,062
36 Electrical Equip.	39	570,699	750	0	55,514	626,963	86,241	713,204
32 Stone/Clay/Glass	51	650,136	0	0	0	650,136	40,728	690,864
34 Fabricated Metals	19	542,059	0	0	0	542,059	7,284	549,343
No Reported Codes	7	436,664	0	0	1,980	438,644	14,681	453,325
35 Machinery	25	238,652	5	0	150	238,807	20,180	258,987
4953/7389 RCRA/Solvent Recovery	22	8,374	5	161,738	14,398	184,515	29,061	213,576
33 Primary Metals	25	163,201	5	0	0	163,206	295	163,501
25 Furniture	11	103,969	0	0	0	103,969	0	103,969
24 Lumber	8	93,794	0	0	0	93,794	0	93,794
29 Petroleum	23	32,197	55	0	352	32,604	21,443	54,047
38 Measure/Photo.	5	53,419	160	0	0	53,579	250	53,829
22 Textiles	2	42,485	0	0	0	42,485	0	42,485
26 Paper	2	41,906	0	0	0	41,906	0	41,906
5169 Chemical Wholesalers	72	7,141	0	0	531	7,672	2,384	10,056
20 Food	1	7,473	0	0	0	7,473	0	7,473
5171 Petroleum Bulk Terminals	8	3,774	5	0	0	3,779	0	3,779
49 Electric Utilities	2	2,900	0	0	0	2,900	0	2,900
12 Coal Mining	1	.	.	.	.	.	.	.
Total	1,637	53,726,585	13,447	507,683	337,665	54,585,380	2,031,841	56,617,221

4.1.4 Conclusions Regarding Constituent Data

F039

Two constituents are proposed to be added to the F039 LDR list: acrylamide and styrene. The data source identified in Section 4.1.1 (the Office of Solid Waste landfill leachate data) were used to identify the concentration of these two constituents in landfill leachate. As presented in Exhibit 4-3, available acrylamide data are limited to 11 observations, and all observed constituent concentrations were below the detection limit. For styrene, only one of 187 leachate data points exceeds the proposed treatment standard for F039 wastewaters. For this analysis we assume that all landfill leachate samples are in a wastewater form to allow comparison against the wastewater standard.

For acrylamide, the available observations admittedly are so few that there could be significant uncertainty in the typical concentrations of acrylamide in landfill leachates. We can only make an assumption that if the 11 records are representative of acrylamide-containing F039 wastewaters, then such wastes will not frequently require additional treatment. For styrene, the larger number of data points provide stronger evidence (more so than the acrylamide data) that such exceedences will not occur often.

These data suggest that only rarely will F039 contain the organic constituents at levels higher than the proposed treatment standards. These wastes may not require additional organic treatment to meet the proposed land disposal restrictions for F039. The available data described above certainly do not demonstrate a clear *likelihood* that acrylamide or styrene will exceed proposed wastewater standards in landfill leachates. In the calculations presented in Section 4.2, EPA makes the conservative assumption that either acrylamide or styrene will exceed the proposed F039 treatment standard in 5 percent of the cases.

Styrene UTS

One constituent, styrene, is proposed to be added to the UTS. The data source identified in Section 4.1.2 (the NHWCS data) was used to estimate waste concentrations, while the data source identified in Section 4.1.3 (the TRI data) was used to identify the industries most likely to generate wastes containing this constituent.

Data from the NHWCS suggest that most wastes (from a variety of industries) contain styrene at levels in excess of the proposed nonwastewater standard. Closer examination of the NHWCS data show that 11 of the 27 data points are from SIC codes 28 and 30. Therefore, EPA anticipates that the potentially greatest impacts to be in these two industries if the wastes they generated contain the constituents above UTS levels.

Data from the 1998 TRI indicate that three industries were found to release the greatest quantities of styrene: SIC 30 (plastics), SIC 37 (transportation equipment), and SIC 28 (chemical production). Therefore, EPA assumes that characteristically hazardous wastes generated in these industries are most likely to contain styrene above the proposed treatment standard.

In conclusion, for assessing impacts from proposed changes to UTS, EPA will assume that all hazardous wastes generated from SIC 30 (plastics), SIC 37 (transportation equipment), and SIC 28 (chemical production) contain styrene above proposed UTS, and will assume that hazardous wastes generated from other industries do not. This information will be used in conjunction with the BRS data for these specific industries developed in Section 4.3.

4.2 QUANTITIES OF WASTES POTENTIALLY IMPACTED BY PROPOSED CHANGES TO FO39 TREATMENT STANDARD

A screening analysis of the 1997 BRS data was conducted to evaluate the potential impacts of adding acrylamide and styrene to the F039 treatment standards. This analysis included the following steps: (1) identification of the quantity of F039 managed onsite and offsite; and (2) assessment of the management methods to determine if the management method is either likely to treat these organic constituents to levels below UTS, or is a management practice not likely to be impacted by the LDRs. Because the BRS does not report specific constituents, constituent concentrations, or detail all management techniques, it is not possible to positively identify these impacts.

The end result of this analysis identifies the quantity of F039 that is generated, but which is managed in such a manner as to leave untreated acrylamide and styrene (if present in the waste at all, and if managed using land disposal). For these reasons the waste characterization data (previously summarized in Section 4.1.4) are factored into the results to better estimate the resulting quantity and potential impacts.

4.2.1 Efficiency of Management Practices in Treating Organics

The management of F039 was identified using 1997 BRS. Exhibit 4-6 summarizes the quantity of waste that would not be treated sufficiently to destroy organics, and distributes this quantity between wastewater and nonwastewater forms. Exhibit 4-7 summarizes the offsite management practices and associated quantities.

In each exhibit, engineering judgement was conducted to assess if the particular management practice is likely to be effective in treating acrylamide and styrene to levels below the proposed treatment standards, or which are unlikely to involve land disposal. For either case, the quantities associated with the particular management method were not considered further. For other management methods (i.e., technologies determined unlikely to be effective in treating organics, and/or potentially involving land disposal), the quantities were further parsed into wastewater and nonwastewater forms.

Please note that only the management description was considered, and no detailed analyses of specific facilities or streams were conducted (except for underground injection practices, described below). As a result of this analysis, the following management types were assumed to be minimally impacted by the proposed addition of these organics and were not considered further in the analysis for the reasons given:

- Discharge to surface waters (NPDES); discharge to sewer/POTW [no land disposal involved; exempt from LDRs]
- Air/steam stripping [technology is effective in treating volatile organics]
- Biological treatment; precipitation and biological treatment [biological treatment is effective in treating a wide range of organics]
- Incineration: sludges; solids; liquids; unknown [technology is BDAT for a wide range of organics]
- Fuel blending; energy recovery; energy recovery (liquids); other recovery (unknown) [like incineration, technologies are effective for a wide range of organics]
- Aqueous organic treatment; unknown aqueous organic treatment [technology is likely to be effective in treating organics]
- Carbon adsorption; precipitation and carbon adsorption [carbon adsorption is effective in treating a wide range of organics]
- Oxidation; oxidation and precipitation [oxidation is effective in treating a wide range of organics]
- Evaporation; thin film evaporation [generates zero or minimal treatment residues containing organics]

The following management types were identified as potentially unable to treat the identified organics to the proposed F039 LDR levels:

- Deepwell/underground injection (evaluated further site-by-site)
- Precipitation
- Other organic/inorganic treatment
- Neutralization
- Landfill
- Other - known (disposal)
- Other - unknown (treatment)
- Other - known (treatment)
- Transfer facility storage
- Stabilization/fixation with cementitious/pozzolanic materials
- Phase separation
- Surface impoundment
- Settling/clarification
- Land treatment/application/farming
- Other stabilization
- Cyanide destruction

Exhibit 4-6. Onsite Management of F039 Waste Streams in 1997 Using BRS

Onsite Management Type	Total (tons)	Not Treat Organics (tons)	WW (tons)	Non WW (tons)
Discharge to surface water (NPDES)	52,219,076			
Deepwell/underground injection *	4,829,125	4,829,125	796,000	0
Air/steam stripping	4,060,819			
Biological treatment	1,499,272			

Exhibit 4-6. Onsite Management of F039 Waste Streams in 1997 Using BRS				
Onsite Management Type	**Total (tons)**	**Not Treat Organics (tons)**	**WW (tons)**	**Non WW (tons)**
Discharge to sewer/POTW	1,206,868			
Precipitation	510,045	510,045	510,045	0
Other organic/inorganic treatment	488,121	488,121	488,121	0
Aqueous organic treatment	470,996			
Carbon adsorption	166,977			
Precipitation and carbon adsorption	157,626			
Neutralization	152,462	152,462	152,462	0
Other - known (disposal)	82,494	82,494	82,494	0
Precipitation and biological treatment	81,441			
Landfill	44,464	44,464	108	44,356
Other - unknown (treatment)	38,708	38,708	38,708	0
Incineration - sludges	35,861			
Other - known (treatment)	25,533	25,533	6,099	19,434
Incineration - solids	17,296			
Oxidation and precipitation	15,181			
Transfer facility storage	9,861	9,861	9,498	363
Stabilization/fixation with cementitious/pozzolanic materials	3,383	3,383	8	3,376
Phase separation	3,284	3,284	3,284	0
Surface impoundment	1,747	1,747	1,747	0
Settling/clarification	1,243	1,243	1,243	0
Incineration - liquids	1,089			
Other Recovery	785			
Evaporation	164			
Energy Recovery - solids	70			
Land treatment/application/farming	52	52	0	52
Fuel blending	0.35			
Grand Total	66,124,045	6,190,523	2,089,817	67,581

All quantities are in short tons. Includes all F039 wastes (i.e., wastes with only F039 as a waste code, and wastes with multiple codes one of which is F039).

* Underground injection quantities presented in this table distinguish between facilities with approved no-migration petitions: of the 4.6 million tons managed in this manner, 796,000 is managed at facilities without approved no-migration petitions.

Exhibit 4-7. Offsite Management of Waste Streams Containing F039 in 1997 Using BRS					
Offsite System	**Management Type**	**Quantity (tons)**	**Not Treat Organics (tons)**	**WW (tons)**	**Non WW (tons)**
M111	Stabilization/fixation with cementitious/pozzolanic materials	56,563	56,563	22	56,541
M077	Precipitation	38,371	38,371	38,307	64
M134	Deepwell/underground injection	32,910	32,910	32,910	0
M132	Landfill	30,081	30,081	0	30,081
M081	Biological treatment	27,008			
M136	Discharge to surface water (NPDES)	19,581			
M085	Aqueous organic treatment	19,252			
M075	Oxidation	5,966			
M041	Incineration - liquids	5,575			
M141	Transfer facility storage	3,580	3,580	2,335	1,245

Exhibit 4-7. Offsite Management of Waste Streams Containing F039 in 1997 Using BRS					
Offsite System	Management Type	Quantity (tons)	Not Treat Organics (tons)	WW (tons)	Non WW (tons)
M125	Other - known (treatment)	2,578	2,578	0	2,578
M051	Energy Recovery - liquids	2,450			
M043	Incineration - solids	1,381			
M094	Other organic/inorganic treatment	1,021	1,021	1,021	0
M129	Other - unknown (treatment)	632	632	0	632
M032	Other Recovery	590			
M061	Fuel blending	282			
M022	Thin film evaporation	232			
M112	Other stabilization	198	198	0	198
M042	Incineration - sludges	195			
M053	Energy Recovery - solids	178			
M049	Incineration - unknown	159			
M137	Other - known (disposal)	100	100	0	100
M039	Other Recovery (unknown)	23			
M073	Cyanide destruction	1	1	1	0
TOTAL		248,907	166,035	74,596	91,439

All quantities are in short tons. Includes all F039 wastes (i.e., wastes with only F039 as a waste code, and wastes with multiple codes one of which is F039). Data source: 1997 BRS, Table USOR1Y97.

Underground Injection

Additional analysis was conducted for wastes managed in onsite underground injection systems. Twelve facilities were identified that manage F039 using onsite underground injection. As identified in Exhibit 4-6, a total of 4.8 million tons (4.4 million metric tons) of F039 was managed in this manner in 1997. Seven of the twelve facilities were found to have approved no-migration petitions (based on EPA, "Background Document for Analysis of the Land Disposal Restrictions Phase IV: Underground Injection Data and Issues, April 1998). These seven facilities were found to manage a total of 4.0 million tons (3.7 million metric tons) in 1997. EPA anticipates that these facilities would not be impacted by the changes because they could modify their no-migration petition to include these additional constituents. However, even if this was not possible, there is still sufficient commercial capacity to cover the additional waste quantity.

The remaining five facilities were assumed to not have approved no-migration petitions, managing a total of 796,000 tons (724,000 metric tons) per year. EPA assumed that these facilities would require alternative treatment if the concentrations of the additional organic constituents exceeded the revised F039 treatment standards.

The supporting results for the onsite analysis is presented in Exhibit 4-8. No additional evaluation was conducted for wastes sent to offsite underground injection wells. To be conservative, the entire quantity sent offsite was assumed to require alternative management to meet LDRs.

Exhibit 4-8. Onsite Underground Injection of F039			
EPA ID	**Site/Company Name**	**City**	**Waste Quantity, Short Tons**
AKD048679682	Tesoro Alaska Petroleum Co Kenai Refinery	Kenai	44,515
ARD043195429	Great Lakes Chemical Corporation	El Dorado	750,900
LAD000618256	Cecos International Inc.	Westlake	5,595
MSD008186587	Morton International, Inc	Moss Point	489,252**
OHD020273819	Waste Management of Ohio Inc	Vickery	6,501**
TX0000611251	T H Agriculture & Nutrition Co Inc	Llano	1,041
TXD000751172	Green Lake Facility	Bloomington	1,094,574**
TXD000761254	Chemical Waste Management	Corpus Christi	4
TXD000838896	Chemical Waste Management, Inc	Port Arthur	7,799**
TXD001700806	Chocolate Bayou Plant	Alvin	2,425,214**
TXD008123317	Du Pont De Nemours & Co., E.I.	Victoria	3,725**
TXR000001016	DSCCI	Corpus Christi	6
TOTAL			4,829,125

Source: 1997 BRS
** Indicates facility has an approved no-migration petition based on EPA, "Background Document for Analysis of the Land Disposal Restrictions Phase IV: Underground Injection Data and Issues, April 1998). These quantities were assumed to not require alternative commercial treatment capacity.

4.2.2 Management Summary

The waste streams for these management systems were screened and categorized as wastewaters or nonwastewaters based on the reported form code in the BRS. In this analysis, wastes were considered 'wastewaters' if they had a form code beginning with B1 or B2 (i.e., in the B1xx and B2xx series), and were considered nonwastewaters if any other form code was used.

In some cases, the reported form code was incomplete, missing, or did not match the list of BRS form codes. In such instances, the waste stream was assumed to be a wastewater in most instances. However, for certain management systems (i.e., landfill, stabilization), the wastes were generally assumed to be nonwastewaters, and any form code that was incomplete, missing, or did not match the list of BRS form codes was assumed to be a nonwastewater.

A total of 67,600 tons (61,500 metric tons) per year of nonwastewaters managed in onsite systems, and 91,400 tons (83,100 metric tons) per year of nonwastewaters managed in offsite systems, are managed where treatment may be inadequate for organics (assuming they are present). This is shown in Exhibit 4-6 (onsite) and Exhibit 4-7 (offsite). A total of 2,090,000 tons (1,900,000 metric tons) per year of wastewaters as shown in Exhibit 4-6 are managed in onsite systems where treatment may be inadequate for acrylamide and styrene (assuming they are present); the quantity of wastewaters managed offsite are negligible in comparison as shown in Exhibit 4-7. The onsite wastewater quantities exclude wastes managed by facilities with approved no-migration petitions.

4.2.3 Conclusions for F039 Quantities Requiring Alternative Commercial Treatment

The quantities identified in Section 4.2.2 do not account for the fact that only a minority of F039 wastes are likely to have levels of the two organics greater than the proposed numerical treatment standards, or are management methods likely to involve land disposal. Based on the data presented in Section 4.1.4, EPA anticipates that it would be conservative to estimate that only five percent of this quantity would be impacted by this proposed rule, due to the relatively low concentrations of acrylamide and styrene expected to be present in F039 wastes.

EPA's estimate of required alternative treatment capacity for the proposed changes to F039 is summarized in Exhibit 4-9. Impacts may even be less because it is not known how many of these management practices involve land disposal.

Exhibit 4-9. Summary of Alternative Treatment Capacity Required for Proposed Changes to F039

	Wastewater Forms of F039	**Nonwastewater Forms of F039**
Quantity of Waste Managed in a Manner Unlikely to Treat Organics	1,900,000 metric tons (onsite; offsite quantity is negligible in comparison)	61,500 metric tons (onsite) 83,100 metric tons (offsite) 144,600 metric tons (total)
Percent of Waste Likely to Contain Acrylamide or Styrene Above Proposed Standard	5 percent	5 percent
Resulting Estimate of Commercial Capacity Required	95,000 metric tons	7,200 metric tons

4.3 QUANTITIES OF WASTES POTENTIALLY IMPACTED BY PROPOSED CHANGES TO UTS

A screening analysis of the 1997 BRS data was conducted to evaluate the potential impacts of adding styrene to UTS. All characteristically hazardous wastes are subject to UTS. However, it would be unreasonable to assume that this entire quantity would require alternative commercial treatment, for the following reasons:

- Not all characteristic wastes are likely to contain styrene. EPA anticipates that only D001 (ignitable), D002 (corrosive), or D003 (reactive) wastes may contain styrene. Other non-pesticide organic wastes (D018, D019, and D021 to D043) are already expected to be treated for organics (including styrene). Metal wastes (i.e., D004 to D011) and pesticide wastes (i.e., D012 to D017, and D020) are assumed to be unlikely to contain styrene.

- Some of the wastes contain other organic constituents which must be treated to below UTS. Such treatment is likely to concurrently treat styrene to below proposed UTS. EPA factors this into its analysis by assuming that all

characteristic wastes that are TC for an organic (i.e., D018, D019, and D021 to D043) already would be adequately treated for styrene.

- Of these remaining wastes, some are already managed using techniques such as incineration. Such treatment is likely to concurrently treat styrene to below proposed UTS. EPA factors this into its analysis by making an engineering judgement as to whether a given management method would be likely to treat organics.

- Not all of the management practices involve land disposal, and therefore would not necessarily be subject to LDRs. This analysis, however, does not account for non-land disposal practices and is therefore conservative in this regard.

- Finally, not all hazardous wastes from all industries are likely to contain styrene. EPA factors this into its analysis by limiting the industries considered to SIC 30 (plastics), SIC 37 (transportation equipment), and SIC 28 (chemical production). These three industries were identified by TRI data as releasing the bulk of styrene to the environment, thus we assumed that styrene is principally used in these three industries.

For the amount of characteristic wastes that would be subject only to the new treatment standards for this constituent, EPA evaluated the universe of wastes that might be impacted by revisions to UTS based on limited information. The upper bound estimates may be very overstated since only a portion of each estimated waste volume may contain the proposed additional constituent at a concentration above the proposed UTS level. The estimates assume that the constituent is present at levels above the proposed treatment standard in all of these characteristically hazardous wastes and would therefore require alternative treatment, when it is likely that this may be true in only a small subset of the cases.

Additionally, we are somewhat restricted by the availability of data from conducting further analysis or different kinds of analyses. For example, we may know of the unlikelihood that all amounts of a waste exhibit concentrations of styrene exceeding the UTS level, or in some instances the unlikelihood that all of the wastes even contain styrene, because facilities may combine a variety of wastes and send their wastes off to one waste management unit. However, there may not be a feasible method for conducting such an analysis.

EPA's analysis is presented in Exhibits 4-10 through 4-12. Exhibits 4-10 and 4-11 presents the quantities of wastes generated in SIC codes 28, 30, and 37 in conjunction with the other criteria listed here (i.e., the quantity generated and an assessment of whether styrene is likely to be treated in the management method); Exhibit 4-10 represents wastes currently managed onsite and Exhibit 4-11 represents wasters currently managed offsite. A summary of the analysis is presented in Exhibit 4-12.

EPA does not anticipate that waste volumes subject to treatment for characteristic wastes would significantly increase because waste generators already are required to comply with the treatment requirements for other already regulated organic or metal constituents that may be

present in the wastes. The volumes of wastes for which additional treatment is needed solely due to the addition of these constituents to the F039 and UTS lists are therefore expected to be small.

Exhibit 4-10. Quantities of Characteristic Wastes Potentially Requiring Alternative Commercial Capacity for Styrene Treatment (Onsite)

Code	Onsite Management Type	Quantity (tons)	Treats Styrene?	WW (tons)	NWW (tons)
M136	Discharge to surface water (NPDES)	21,675,406	Yes		
M121	Neutralization	13,315,516	No	13,315,516	0
M135	Discharge to sewer/POTW	9,143,249	Yes		
M134	Deepwell/underground injection	3,720,318	No	3,720,318	0
M081	Biological treatment	1,260,731	Yes		
M041	Incineration - liquids	1,099,250	Yes		
M137	Other - known (disposal)	1,042,794	No	1,042,794	0
M133	Surface impoundment	1,010,550	No	820,367	190,183
M077	Precipitation	997,727	No	997,727	0
M083	Air/steam stripping	782,038	Yes		
M141	Transfer facility storage	735,871	No	735,871	0
M094	Other organic/inorganic treatment	355,669	No	355,669	0
M051	Energy Recovery - liquids	350,997	Yes		
M123	Settling/clarification	322,934	No	300,154	22,780
M131	Land treatment/application/farming	221,051	No	221,051	0
M125	Other - known (treatment)	216,274	No	206,341	9,933
M071	Chrome reduction and precipitation	190,784	No	190,784	0
M091	Precipitation and biological treatment	183,228	Yes		
M032	Other Recovery	129,950	Yes		
M078	Other aqueous inorganic	100,692	No	100,692	0
M021	Fractionation/distillation	93,617	Yes		
M132	Landfill	73,027	No	69,827	3,200
M085	Aqueous organic treatment	63,302	Yes		
M073	Cyanide destruction	48,099	No	48,099	0
M111	Stabilization/fixation with cementitious/pozzolanic materials	19,259	No	0	19,259
M049	Incineration - unknown	18,605	Yes		
M074	Oxidation and precipitation	13,640	Yes		
M031	Acid Regeneration	11,085	No	10,471	614
M079	Aqueous inorganic - unknown	8,255	No	8,255	0
M099	Aqueous organic and inorganic - unknown	7,473	No	7,473	0
M124	Phase separation	4,207	No	4,207	0
M022	Thin Film Evaporation	2,641	Yes		
M061	Fuel blending	2,396	Yes		
M043	Incineration - solids	2,172	Yes		
M042	Incineration - sludges	2,033	Yes		
M024	Solvent Recovery	1,904	Yes		
M072	Cyanide destruction and precipitation	1,473	No	1,473	0
M076	Wet air oxidation	1,089	Yes		
M023	Solvent Extraction	611	Yes		
M129	Other - unknown (treatment)	492	No	483	9

Exhibit 4-10. Quantities of Characteristic Wastes Potentially Requiring Alternative Commercial Capacity for Styrene Treatment (Onsite)					
Code	Onsite Management Type	Quantity (tons)	Treats Styrene?	WW (tons)	NWW (tons)
M101	Sludge dewatering	229	No	229	
M093	Wet air oxidation	207	Yes		
M075	Oxidation	174	Yes		
M112	Other stabilization	124	No	5	119
M039	Other Recovery (unknown)	42	Yes		
M103	Absorption/adsorption	38	Yes		
M089	Aqueous organic treatment - unknown	14	Yes		
M029	Solvent Recovery (unknown)	11	Yes		
M122	Evaporation	1	Yes		
M011	HTMR	0	No	0	0
TOTAL		57,231,249	Yes: 34,827,000 No: 22,403,000	22,157,806	246,097

Exhibit 4-11. Quantities of Characteristic Wastes Potentially Requiring Alternative Commercial Capacity for Styrene Treatment (Offsite)					
Code	Offsite Management Type	Quantity (tons)	Treats Styrene?	WW (tons)	NWW (tons)
M061	Fuel blending	211,446	Yes		
M134	Deepwell/underground injection	102,541	No	100,266	2,275
M051	Energy Recovery - liquids	95,866	Yes		
M081	Biological treatment	90,586	Yes		
M041	Incineration - liquids	77,544	Yes		
M021	Fractionation/distillation	49,090	Yes		
M141	Transfer facility storage	37,458	No	29,448	8,010
M077	Precipitation	24,108	No	20,148	3,960
M022	Thin Film Evaporation	20,330	Yes		
M121	Neutralization	15,170	No	14,336	834
M125	Other - known (treatment)	11,010	No	9,721	1,289
M111	Stabilization/fixation with cementitious/pozzolanic materials	8,921	No	2,531	6,390
M043	Incineration - solids	8,248	Yes		
M091	Precipitation and biological treatment	8,135	Yes		
M094	Other organic/inorganic treatment	7,118	No	7,118	0
M085	Aqueous organic treatment	6,003	Yes		
M132	Landfill	5,955	No	1,320	4,635
M071	Chrome reduction and precipitation	4,967	No	4,967	0
M042	Incineration - sludges	3,207	Yes		
M049	Incineration - unknown	2,929	Yes		
M137	Other - known (disposal)	2,674	No	1,690	984
M029	Solvent Recovery (unknown)	2,485	Yes		
M014	Metals Recovery for Reuse	2,328	No	738	1,590
M052	Energy Recovery - sludges	2,098	Yes		
M135	Discharge to sewer/POTW	2,042	Yes		
M011	HTMR	1,977	No	695	1,282
M124	Phase separation	1,934	No	1,934	0
M032	Other Recovery	1,777	Yes		
M079	Aqueous inorganic - unknown	1,587	No	1,587	0
M031	Acid Regeneration	1,395	No	1,395	0
M023	Solvent Extraction	1,214	Yes		

Exhibit 4-11. Quantities of Characteristic Wastes Potentially Requiring Alternative Commercial Capacity for Styrene Treatment (Offsite)					
Code	Offsite Management Type	Quantity (tons)	Treats Styrene?	WW (tons)	NWW (tons)
M019	Metals Recovery (unknown)	1,167	No	1,127	40
M083	Air/steam stripping	1,051	Yes		
M112	Other stabilization	972	No	812	160
M129	Other - unknown (treatment)	855	No	835	20
M044	Incineration - gases	805	Yes		
M053	Energy Recovery - solids	623	Yes		
M101	Sludge dewatering	580	No	0	580
M119	Stabilization - unknown	571	No	456	115
M099	Aqueous organic and inorganic - unknown	466	No	466	0
M072	Cyanide destruction and precipitation	438	No	438	0
M089	Aqueous organic treatment - unknown	279	Yes		
M084	Wet air oxidation	263	Yes		
M039	Other Recovery (unknown)	234	Yes		
M074	Oxidation and precipitation	228	Yes		
M078	Other aqueous inorganic	224	No	224	0
M092	Precipitation and carbon adsorption	164	Yes		
M075	Oxidation	158	Yes		
M013	Secondary Smelting	150	No	104	46
M109	Sludge treatment - unknown	37	No	1	36
M082	Carbon adsorption	37	Yes		
M059	Energy Recovery - unknown	37	Yes		
M136	Discharge to surface water (NPDES)	36	Yes		
M133	Surface impoundment	28	No	28	0
M024	Solvent Recovery	4	Yes		
M012	Retorting	2	No	1	1
M103	Absorption/adsorption	1	Yes		
M102	Addition of lime	0	No	0	0
M093	Wet air oxidation	0	Yes		
M073	Cyanide destruction	0	No		
TOTAL		821,554	No: 235,000 Yes: 587,000	202,386	32,247

Exhibit 4-12. Summary of Alternative Treatment Capacity Required for Proposed Changes to UTS		
	Wastewater Forms	Nonwastewater Forms
Quantity of Waste Managed in a Manner Unlikely to Treat Organics; Alternative Commercial Capacity Required	22,158,000 (onsite) 202,000 tons (offsite) 22,360,000 tons (total) [20,327,000 metric tons)	246,000 tons (onsite) 32,000 tons (offsite) 278,000 tons (total) [253,000 metric tons]

5.0 CAPACITY ANALYSIS RESULTS

5.1 PAINT PRODUCTION WASTES (K179 and K180)

This section presents the results of capacity analysis for alternative commercial treatment of the proposed paint production wastes (K179 and K180). A brief summary of these results was presented in Section 1 of this document (see Exhibit 1-3). The capacity analysis is based on assessment of available treatment capacity (Section 2) and the required treatment capacity for treatment of K179 and K180 (Section 3) as well as wastes impacted by proposed changes to UTS and F039 (Section 4). This section compares estimates of required treatment capacity to that commercially available for these wastes proposed to be listed.

EPA is proposing to list two wastes from paint production: K179 and K180. EPA is proposing numerical treatment standards, equivalent to universal treatment standards, for each of these wastes, with the exception of formaldehyde. EPA has determined that it is technically feasible to apply these existing numerical standards to the hazardous constituents of K179 and K180 (except for formaldehyde), because the waste compositions are similar to other wastes for which applicable treatment technologies have been demonstrated. For formaldehyde, EPA is proposing technology based standards. When formaldehyde is present in K180 at levels triggering the listing, the waste must be treated by the required technologies and then comply with any applicable numerical standards. Wastes that do not trigger the listing based on formaldehyde are not subject to the formaldehyde technology requirement, but are subject to all other numerical standards. The technology standards proposed for K180 wastewasters are wet air oxidation (WETOX) or chemical or electrolytic oxidation (CHOXD) followed by carbon adsorption (CARBN); or combustion (CMBST). For nonwastewaters forms of K180, the technology standard proposed is combustion (CMBST).

After examining waste generation quantities (for the whole paint industry universe, approximately one thousand facilities) and their management practices, EPA estimated that less than 17,000 metric tons per year of wastewater and nonwastewater forms of K179 and K180 may require alternative treatment to meet the LDR standards. Some of the wastes requiring treatment are in liquid form but meet the nonwastewater definition under the LDR.

The quantity of commercially available combustion capacity for sludge, solid, and liquids is well over one million tons per year based on 1997 Biennial Report data. The quantity of commercially available stabilization capacity is at least eight million tons per year based on 1995 Biennial Report data. EPA has determined that the commercially available combustion and stabilization capacity is much greater then the estimated quantities of waste requiring treatment and therefore sufficient to treat the proposed K179 and K180. Therefore, EPA is not proposing to grant a capacity variance for K179 and K180 hazardous wastes.

Based on the results of the RCRA § 3007 survey and the site visits, EPA did not identify any paint manufacturing facilities that manage these wastes in onsite surface impoundments. From the available information, EPA found that at least one wastewater treatment plant accepted proposed paint liquid wastes (K180) from the paint industry, and the facility managed these wastes in a lined surface impoundment. If any wastes managed in a non-Subtitle C land-based

unit (e.g., an unlined surface impoundment) of a wastewater treatment system, the wastes may be subject to land disposal prohibitions. However, EPA anticipates that very few facilities, if any, would manage the newly identified paint manufacturing wastes in such impoundments.

Further, soil and debris contaminated with these newly identified wastes may be subject to the LDRs (LDR Treatment Standards for Soil in LDR Phase IV Final Rule, 63 FR 28602, May 26, 1998; 40 CFR 268.45 Treatment Standards for Hazardous Debris), but EPA believes that the contaminated soil and debris would not require substantial commercial treatment capacity if any. Therefore, EPA is not proposing to grant a national capacity variance for hazardous soil and debris contaminated with these wastes covered under this proposal. Based on the 2000 RCRA § 3007 Survey (which collected 1998 data), there are no data showing the newly proposed wastes are managed by underground injection wells. Also, based on the 2000 RCRA § 3007 Survey, there are no data showing mixed radioactive wastes associated with the proposed listings. We are proposing to not grant a national capacity variance for underground injected wastes, mixed radioactive wastes (i.e., radioactive wastes mixed with K179 and K180), or soil and debris contaminated with these mixed radioactive wastes, if such wastes are generated.

5.2 OTHER WASTES SUBJECT TO REVISED UTS AND F039 STANDARDS

EPA also evaluated whether sufficient capacity would be available to treat F039 and wastes subject to UTS as a result of the proposed addition of acrylamide and styrene to the list of regulated constituents in F039 and the addition of styrene to the UTS table. Such a change would affect wastes outside of the paint production industry. EPA estimated an upper bound of 7,000 metric tons per year of nonwastewaters mixed with other waste codes, the F039 leachate from which would be potentially impacted by the revision to the F039 treatment standards. EPA also estimated that approximately 250,000 metric tons per year of characteristic nonwastewaters potentially might be affected by the proposed changes. For wastewaters, EPA estimates an upper bound of 95,000 metric tons per year for F039 leachate and an upper bound of 20 million metric tons per year of wastes for UTS wastes.

Based on data submittals in the 1990's and the 1997 Biennial Report, EPA has estimated that approximately 37 million tons (34 million metric tons) per year of commercial wastewater treatment capacity are available, and well over one million tons per year of liquid, sludge, and solid commercial combustion capacity are available. Also, as discussed earlier in this section, there exist several million tons of available stabilization capacity. These are well above the quantities of F039 or characteristic wastes potentially requiring treatment for the proposed additional constituents even under the conservative screening assumptions described in Section 4. Therefore, EPA is proposing a decision not to delay the effective date for adding these constituents to the lists of constituents for F039 and UTS.

5.3 CONCLUSION

In summary, EPA is not proposing to grant a national capacity variance for nonwastewater or wastewater forms of K179 and K180 being surface-disposed. EPA also is not proposing to grant a national capacity variance for soil and debris contaminated with K179 and K180 wastes, wastes managed by underground injection wells, mixed radioactive wastes

contaminated with K179 and K180 or soil and debris contaminated with radioactive mixed. Treatment capacity also will be sufficient to include the addition of styrene and acrylamide to the list of constituents in F039 treatment standards and UTS. Therefore, if finalized, the LDR standards become effective when the K179 and K180 listings become effective. As discussed earlier in this document, the LDR treatment standards become effective essentially at the same time a listing does (usually six months after publication of the final rule in the Federal Register), unless EPA grants a national capacity variance (see RCRA Section 3004(h)(2)). RCRA allows generators to apply for an extension to the LDR effective date 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)).

APPENDIX A. ANALYSIS OF AVAILABLE COMMERCIAL CAPACITY FOR COMBUSTION

This appendix presents a summary of the estimated maximum practical, utilized, and available capacities for combustion of hazardous wastes. Section 1 discusses their methodology for identifying, collecting, and analyzing data pertaining to available capacity for combustion. Section 2 presents maximum practical, utilized, and available capacities. Section 3 briefly discusses caveats of the analysis.

1. METHODOLOGY FOR ESTIMATING MAXIMUM PRACTICAL, UTILIZED, AND AVAILABLE CAPACITIES

EPA used the 1997 Biennial Reporting System (BRS) (September 1999), 1995 BRS and the Resource Conservation and Recovery Information System (RCRIS) database in Envirofacts (November 1999).

The maximum practical capacity, as defined for this analysis, is the amount of hazardous waste that could be handled by a facility, given constraints of a calendar year, work shifts, and permits. The utilized capacity is the amount of hazardous waste that was actually managed in the year (i.e., the quantity managed according to the 1997 BRS). The available capacity is the difference between the maximum practical and the utilized capacities.

In analyzing the maximum practical, utilized, and available commercial capacity for combustion, EPA included only those incineration and energy recovery (i.e., boiler and industrial furnaces, or BIFs) facilities included in a list other EPA office compiled (Permit and State Program Division, Office of Solid Waste). This list identifies hazardous waste combustion facilities that are commercial and operational as of May 27, 1999.

1.1 Maximum Practical Commercial Capacity Analysis

<u>Step 1: Estimating the maximum operational commercial RCRA capacity from capacity data from the PS Form of the 1995 BRS</u>

Capacity data for incineration and energy recovery, for each facility for which data were available, were extracted from the Onsite Waste Treatment, Disposal, or Recycling Process System (PS) Form of the 1995 BRS. Data elements contained in the PS Form and used in the analysis include maximum RCRA operational capacity and percent capacity commercially available. The *1995 Hazardous Waste Report Instructions and Forms* (EPA Form 8700-13A/B (5-80) (8-95)) defines maximum RCRA operational capacity as the greatest RCRA quantity that could have entered the process system, assuming all of the following:

- No change in equipment;
- An unlimited supply of waste of the same typical mix managed in 1995;
- Willingness to add additional shifts;
- Necessary routine downtime;
- Effects of other process systems sharing the same units for competing for capacity;

- Limits in current permit will not be exceeded; and
- Regulatory limitations.

The maximum operational commercial RCRA capacity was estimated by multiplying the maximum RCRA operational capacity times the percent capacity commercially available. EPA was only able to estimate the maximum operational commercial RCRA capacity for about 50 percent of the combustion facilities included in their analysis.[24]

Step 2: Extracting process design capacity data from the RCRIS database

Maximum RCRA operational capacity data obtained from the 1995 BRS were supplemented with process design capacity data obtained from the RCRIS database in Envirofacts (http://www.epa.gov/ enviro/index_java.html). The *RCRIS Data Element Dictionary*[25] defines process design capacity as the amount of waste capacity handled in the unit or the capacity for which the unit is designed. This value does not factor in constraints of calendar year, work shifts, commercially available percentage, and the permitted amount of waste that can be treated in the unit. Thus, the process design capacity value, as obtained from RCRIS, cannot be used directly as the maximum practical commercial capacity estimate. Nevertheless, as described in Step 3, this value could be used to a limited extent.

Process design capacity data in RCRIS is reported in several units. In order to convert to tons per year, the following assumptions were made:

- 1 year = 7,008 operating hours[26];
- 1 gallon = 0.004 tons; and
- 1 BTU per hour = 0.876 pounds of waste/hour or 4.4E-04 tons of waste/year[27].

Process design capacity was not available for three of the combustion facilities included in the analysis (i.e., one incineration facility and two energy recovery facilities).

Step 3: Combining the data and estimate the maximum practical commercial capacity

EPA assumed that maximum operational commercial capacity was equivalent to maximum practical commercial capacity. To estimate the maximum practical commercial capacity for the remaining combustion facilities, they first estimated the average process

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[24] The analysis included a total of 48 facilities (22 incineration and 26 BIF facilities). Of these, only 23 facilities (12 incineration and 11 BIF facilities) reported maximum RCRA operational capacity to the BRS in 1995.

[25] U.S. Environmental Protection Agency. 1998. Resource Conservation and Recovery Information System (RCRIS) Data Element Dictionary (v.7.1.0). Office of Solid Waste. Washington, D.C. August 1998.

[26] Assuming facilities operate 80 percent of a calendar year (i.e., 365 days/year × 24 hours/day × 0.80).

[27] U.S. Environmental Protection Agency. *Commercial Combustion Capacity for Hazardous Waste Sludges and Solids*. Prepared by ICF Incorporated. August 1990.

operational rate (i.e., the sum of the maximum operational commercial RCRA capacities ÷ the sum of the process design capacities) for facilities for which they had reliable maximum operational commercial RCRA capacity and process design capacity data.[28] For incineration, the estimated average process operational rate is 71 percent. For energy recovery, the estimated average process operational rate is 73 percent. The average process operational rate was then multiplied by the facility-specific process design capacity to obtain the maximum practical commercial capacity for each incineration and energy recovery facility that lacked maximum operational commercial capacity data. They raised the maximum practical commercial capacity estimate to the utilized capacity estimate if the maximum practical commercial capacity estimate for a facility was less than its estimated utilized capacity.

Step 4: Estimate the maximum practical commercial capacity, by waste form

The maximum practical commercial capacity, at a facility level, was broken into three categories: (1) compressed gases, (2) liquids and pumpable sludges, and (3) solids and non-pumpable sludges. To categorize the data into these three waste forms, the average industry proportions of waste forms (based on liquid, solid, and gas utilized capacities; see next section) were calculated and multiplied by the facility maximum practical commercial capacity.

1.2 Utilized Capacity

EPA extracted hazardous waste stream data for combustion facilities that reported to the 1997 BRS using the BRS system type codes for incineration (i.e., M041 through M049) and energy recovery (i.e., M051 through M059). For combustion facilities that managed hazardous waste generated onsite (e.g., primary waste generation by the facility or residuals from pre-treatment), data were collected from their Waste Generation and Management (GM) Forms. For combustion facilities that received hazardous waste from offsite for management, data were collected from their Waste Received from OffSite (WR) Forms. For each waste stream, the following data elements were extracted from the 1997 BRS:

- EPA ID of the facility managing the waste stream;
- System type code of management process used;
- Quantity of hazardous waste managed using system type code;
- EPA hazardous waste codes representing the hazardous waste; and
- Waste form code.

The utilized capacity, at a facility level, was categorized as (1) compressed gases, (2) liquids and pumpable sludges, or (3) solids and non-pumpable sludges, as follows:

- Gases (system code M044 for incineration) were assigned to Category 1;

[28] That is, for which these capacities were reasonably similar to those obtain for the Report, *Available Commercial Capacity for Selected Hazardous Waste Management Technologies* (September 30, 1998; Task 7, WA 306, EPA Contract No. 68-W4-0030), hereafter referred to as the Available capacity Report.

- Liquids (system code M041 for incineration and system code M051 for energy recovery) were assigned to Category 2;

- Solids (system code M043 for incineration and system code M053 for energy recovery) were assigned to Category 3;

- Sludges (system code M042 for incineration and system code M052 for energy recovery) were categorized into pumpable and non-pumpable sludges based on the relative quantities of liquid and solid managed at the facility, and assigned to Category 2 or 3, respectively[29]; and

- In cases where the system type did not indicate waste form (system type code M049 for incineration and system type code M059 for energy recovery), the waste was assigned to Category 2 or 3 based on the relative quantities of liquid and solid managed at the facility. (Note that the methodology used in categorizing these wastes is the same methodology that was used in categorizing sludges.)

The utilized capacity was calculated, by waste form, by adding all hazardous waste stream quantities managed at the facility.

1.3 Available Capacity

The available commercial capacity for combustion of hazardous waste was calculated, by waste form, by subtracting the utilized capacity from the maximum practical commercial capacity on a per facility basis. The results of this analysis are presented in Section 2.

2. RESULTS

There were 48 commercial combustion facilities in the nation with a combined maximum practical capacity of 2.8 million tons per year. EPA determined that less than 1.3 million tons per year of the capacity was being utilized, leaving a total available capacity of almost 1.6 million tons per year.

Exhibit 1 gives a breakdown of the combustion capacity by type of system (i.e., incineration or energy recovery) and waste form. The total available capacity for the combustion of liquids and pumpable sludges is approximately 0.9 million tons per year. Of this capacity, approximately 0.3 million tons per year comes from incineration and 0.6 million tons per year comes from energy recovery. The total capacity for the combustion of solids and non-pumpable sludges is approximately 0.7 million tons per year. Approximately 0.6 million tons per year (or 99.6 percent of the total capacity for the combustion of solids) comes from incineration.

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[29] For example, for a facility that reported managing 1 ton of hazardous waste with a system code for liquids, 2 tons of hazardous waste with a system code for solids, and 3 tons of hazardous waste with a system code for sludges, the following assumptions were made: (1) 1 ton of the 3 tons of hazardous waste managed with the system code for sludges was assigned to Category 2 and (2) 2 tons of the 3 tons of hazardous waste managed with the system code for sludges were assigned to Category 3.

Exhibit 1
Maximum Practical, Utilized, and Available Capacities (000s tons/year) for Combustion, by Waste Form, at a National Level

Waste Form	Incineration			Energy Recovery			Total Available Capacity
	Maximum Practical Capacity	Utilized Capacity	Available Capacity	Maximum Practical Capacity	Utilized Capacity	Available Capacity	
Compressed Gases	1	1	0	N/A	N/A	N/A	0
Liquids and Pumpable Sludges	513	237	275	1,359	722	637	913
Solids and Non-Pumpable Sludges	897	269	628	55	30	25	653
Total	1,411	507	903	1,414	752	662	1,566

Exhibits 2 and 3 present summaries by waste forms for maximum practical, utilized, and available capacities for incineration and energy recovery, respectively.

Exhibit 2
Maximum Practical, Utilized, and Available Capacities (tons/year), by Waste Form, for Incineration

Waste Form	Maximum Practical Capacity	Utilized Capacity	Available Capacity
Liquids	512,743	237,420	275,324
Solids	897,151	268,829	628,322
Gases	1,145	828	317

Notes: Maximum operational commercial RCRA capacity (PS Form of the 1995 BRS) and process design capacity (RCRIS) were used in estimating the average process operational rate.
Certain facilities did not report to the BRS in 1997.
Maximum operational commercial RCRA capacity and process design capacity were not available in some instances. Maximum practical commercial capacity for liquids is equal to the utilized capacity (1997 BRS).

Exhibit 3
Maximum Practical, Utilized, and Available Capacities (tons/year)
for Energy Recovery, by Waste Form

Waste Form	Maximum Practical Capacity	Utilized Capacity	Available Capacity
Liquids	1,359,261	721,997	637,264
Solids	54,790	30,148	24,642

Notes: Maximum operational commercial RCRA capacity (PS Form of the 1995 BRS) and process design capacity (RCRIS) were used in estimating the average process operational rate.
Certain facilities included in the analysis did not report to the BRS in 1997.

Exhibits 4 and 5 present facility-specific data by waste forms for maximum practical, utilized, and available capacities for incineration and energy recovery, respectively.

3. CAVEATS

Several caveats should be noted regarding the data used in this analysis:

- Capacity information used in this analysis is primarily based on information provided by the industry in the PS, WR, and GM forms of the BRS database and the RCRIS database. Because some of the information provided in these databases are voluntary (e.g., PS Forms) or dated (RCRIS, 1995 and 1997 BRS), these data may not accurately reflect the current maximum and available treatment capacity.

- The average process operational rate used to calculate the maximum and available capacity for combustion may not provide an accurate statistical representation of the national average.

- Because nonhazardous wastes are not required to be reported in the BRS, the utilized capacity data only refer to the hazardous waste capacity. Therefore, the available capacity could be an overestimate. In addition, wastes excluded from the definition of solid waste and permitting requirements are not reported in the BRS. These factors could significantly influence the capacity estimates.

Exhibit 4
Maximum Practical, Utilized, and Available Capacities (tons/year), by Waste Form, for Incineration

EPA ID	Facility Name	Liquids			Solids			Gases		
		Maximum Practical Capacity	Utilized Capacity	Available Capacity	Maximum Practical Capacity	Utilized Capacity	Available Capacity	Maximum Practical Capacity	Utilized Capacity	Available Capacity
ALD031499833 *	Allied-Signal Inc.	0	0	0	1,604	1,517	88	0	0	0
ARD006354161	Reynolds Metals Co.	0	0	0	239,955	46,278	193,676	0	0	0
ARD069748192	ENSCO Inc.	118,757	17,609	101,148	165,689	24,568	141,121	0	0	0
ILD098642424 *	TWI Transportation Inc.	30,594	17,754	12,841	21,284	12,351	8,933	322	187	135
KSD981506025	Safety Kleen Argonite Inc.	3,246	1,458	1,788	16,094	7,231	8,863	0	0	0
KYD006373922	Elf Atochem N. America Inc.	12,498	2,597	9,901	0	0	0	0	0	0
KYD088438817 *	LWD, Inc.	43,806	15,328	28,478	56,194	19,663	36,531	0	0	0
LAD008161234 ‡	Rhodia Inc.	2,095	2,095	0	0	0	0	0	0	0
LAD010395127	Safety Kleen Baton Rouge Inc.	7,125	8	7,117	75,547	89	75,458	0	0	0
MOD985798164 *	ICI Explosives Environmental Co.	0	0	0	7,500	1,060	6,440	0	0	0
MSD985972074 †	Hughes Environmental Systems (FTMI)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NED981723513	Clean Harbors Environmental Services	30,058	30,058	0	15,369	15,369	0	0	0	0
NJD053288239 †	Safety- Bridgeport Inc.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NYD000632372	Safety-Kleen (BDT) Inc.	0	0	0	339	91	248	36	10	26
OHD048415665	Ross Incineration Services, Inc.	45,754	22,357	23,397	20,234	9,887	10,347	0	0	0
OHD980613541 *	Waste Technologies Industries (WTI)	36,113	36,113	0	23,898	23,898	0	0	0	0
SCD981467616	Safety-Kleen Roebuck Inc.	31,542	31,542	0	0	0	0	0	0	0
TXD000838896	Chemical Waste Management	19,577	19,577	0	52,311	52,311	0	0	0	0
TXD008099079	Rhone-Poulenc Basic Chemical Co.	63,909	8,029	55,880	141	18	123	0	0	0
TXD055141378	Safety-Kleen Inc. Deer Park	28,047	27,916	131	33,828	33,669	158	613	610	3
UTD982595795	Safety-Kleen (Clive), Inc.	37,622	4,688	32,934	167,165	20,829	146,336	174	22	153
WID990829475	WRR Environmental Services Inc.	2,000	291	1,709	0	0	0	0	0	0
	Total	512,743	237,420	275,324	897,151	268,829	628,322	1,145	828	317

* Maximum operational commercial RCRA capacity (PS Form of the 1995 BRS) and process design capacity (RCRIS) were used in estimating the average process operational rate.
† Did not report to the BRS in 1997.
‡ Maximum operational commercial RCRA capacity and process design capacity were not available. Maximum practical commercial capacity for liquids is equal to the utilized capacity (1997 BRS).
N/A= Not available

Exhibit 5
Maximum Practical, Utilized, and Available Capacities (tons/year) for Energy Recovery, by Waste Form

EPA ID	Facility Name	Liquids			Solids		
		Maximum Practical Capacity	Utilized Capacity	Available Capacity	Maximum Practical Capacity	Utilized Capacity	Available Capacity
ARD981512270 *	Ash Grove Cement	64,629	52,556	12,073	67	55	13
IND001859032	Rhodia Inc.	61,768	13,261	48,507	0	0	0
IND005081542	Essroc Cement Corp.	203,809	87,691	116,118	27	11	15
IND006419212	Lone Star Industries Inc.	64,328	57,271	7,057	14	13	2
KSD007148034 *	Lafarge Corp.	81,400	1	81,399	0	0	0
KSD031203318	Ash Grove Cement	75,437	22,370	53,067	28,643	8,494	20,149
KSD980739999	Heartland Cement Co.	58,452	21,211	37,241	4,357	1,581	2,776
KYD059568220 †	Kentucky Solite	N/A	N/A	N/A	N/A	N/A	N/A
MID005379607	Alpena Plant Lafarge Corp.	65,227	35,801	29,426	0	0	0
MOD029729688 *	Holnam Inc.	138,486	79,171	59,315	0	0	0
MOD054018288	Continental Cement Co.	60,676	55,954	4,722	21,681	19,994	1,687
MOD981127319	Lone Star Industries	53,121	39,870	13,251	0	0	0
MSD077655876	Holnam,Inc.	84,159	34,327	49,833	0	0	0
NCD003152642	Carolina SoliteCorp.	5,350	5,350	0	0	0	0
NYD080469935	Norlite Corporation	24,707	24,015	693	0	0	0
OHD005048947 †	Lafarge	N/A	N/A	N/A	N/A	N/A	N/A
OHD986983237 †	Environmental Purification Industries	N/A	N/A	N/A	N/A	N/A	N/A
PAD002389559 *	Keystone Cement Co.	70,153	54,614	15,539	0	0	0
PAD083965897	Medusa Cement Co.	36,931	36,931	0	0	0	0
SCD003351699 †	Giant Cement	N/A	N/A	N/A	N/A	N/A	N/A
SCD003368891 †	Holnam,Inc.	N/A	N/A	N/A	N/A	N/A	N/A
TND982109142 †	Diversified Science	N/A	N/A	N/A	N/A	N/A	N/A
TXD007349327	TXI Midlothian	58,971	58,971	0	0	0	0
TXD008097487	Olin	41,822	4,920	36,902	0	0	0
VAD042755082	Solite	53,083	19,027	34,056	0	0	0
VAD046970521	Virgina Solite Co.	56,750	18,685	38,066	0	0	0
	Total	1,359,261	721,997	637,264	54,790	30,148	24,642

* Maximum operational commercial RCRA capacity (PS Form of the 1995 BRS) and process design capacity (RCRIS) were used in estimating the average process operational rate.

† Did not report to the BRS in 1997.

N/A= Not available

APPENDIX B. ANALYSIS OF ASSUMPTIONS USED IN ESTIMATING ALTERNATIVE TREATMENT CAPACITY FOR PAINT PRODUCTION WASTES

Assumptions Regarding 'Double Counting' of Containers and Tanks

Section 3 of this document identifies the quantities of paint production wastes associated with various management methods. The survey did not explicitly identify whether individual management methods are 'intermediate' or 'final.' For example a facility may have reported generating 100 gallons of waste, and reported the management of 100 gallons managed in a container and 100 gallons managed in a landfill. Because simply adding all the management methods would have resulted in double-counting of managed waste quantities, certain assumptions were used in this capacity analysis to avoid such a result:

- Tanks, containers, and waste piles were assumed to represent intermediate management methods. Therefore quantities associated with these management methods were not considered further in the analysis.

- All other methods (such as incineration, wastewater treatment) were assumed to represent final management methods. Quantities associated with these management methods were considered further in the analysis.

EPA tested these assumptions by investigating each facility's waste management train for each waste. In most cases, the above assumptions held true. For example, a facility would report generating 100 gallons of a certain waste, managing 100 gallons of the waste in containers and 100 gallons of the same waste in a landfill. In such an instance, the quantity managed in containers was not included in the capacity analysis because it would obviously be double counted otherwise.

Exhibit B-1 identifies each instance where the above assumptions do not hold. As shown in this exhibit, some facilities reported quantities managed in containers but did not further describe how it was further managed. This may be due to missing information or because a final management method was not selected by the facility. In considering all wastes, there is a discrepancy of only 9 percent (i.e., 5,300 weighted MT out of 60,000 weighted MT from Exhibit 3-3).

It should be emphasized that EPA did not adjust the results of its capacity analysis to account for the individual instances in Exhibit B-1. Such revisions would have been complex, and only slightly greater precision would have resulted. Instead, this analysis shows that the use of the above simplifying assumptions are appropriate.

Assumptions Regarding Hazardous Waste Combustion

In the survey distributed to paint manufacturers, certain waste management methods were explicitly described as hazardous waste management and others were explicitly described as

nonhazardous waste management. However, the following management methods were unspecified:

- Sent to incinerator
- Fuel blender
- Sent to cement kiln
- Sent to boiler and industrial furnace

If a facility (that utilizes these management methods in managing paint production wastes) is a permitted hazardous waste treatment storage and disposal facilities, then the waste can continue to be managed at this facility following promulgation of the listing (if finalized). If, however, the facility is not permitted to receive hazardous waste, then alternative commercial treatment capacity is required for that waste.

EPA was able to indirectly determine whether these offsite facilities (e.g., incinerators, fuel blenders, cement kilns, or BIFs) were likely to accept hazardous wastes. First, EPA assumed that any facility accepting paint production wastes that were already hazardous (e.g., listed or characteristic) was a permitted hazardous waste treatment storage and disposal facility. Next, the list of incinerators, fuel blenders, cement kilns, or BIFs that were sent nonhazardous paint production wastes were initially cross-referenced with the list of such facilities that were sent hazardous paint production wastes. Nonhazardous wastes sent to the same facilities that also receive hazardous wastes were not assumed to require alternative treatment capacity. Facilities that receive nonhazardous paint production wastes, but do not also receive hazardous paint production wastes, may or may not have a hazardous waste permit (there is insufficient information).

The results of this analysis are presented in Exhibit B-2. Exhibit B-2 shows that only 178 metric tons (weighted) of nonhazardous wastes are managed at facilities that do not also receive hazardous paint production wastes. This is only 15 percent of the 1,161 metric tons (weighted) of all nonhazardous wastes managed using any type of combustion method. Therefore, the majority of nonhazardous wastes are already managed at facilities that have hazardous waste capability. The remaining 15 percent may or may not be managed at facilities with hazardous waste treatment capability (other resources were not investigated).

In the capacity analysis summary presented in Exhibits 3-4 and 3-5, EPA used two different assumptions for this quantity of nonhazardous waste managed using combustion; for a conservative estimate, EPA included the total amount of nonhazardous waste (1,161 metric tons) in the estimate of required treatment capacity. For the opposite end of the range, EPA assumed that this quantity is already managed at hazardous waste treatment facilities. The above analysis suggests that most of the quantity, in fact, is likely already managed at hazardous waste treatment facilities and would not require alternative treatment.

Analysis of Management Practices Identified as 'Other'

In the paint production industry survey, facilities were able to identify management method as 'other'. This was defined in the survey as follows: "This category applies to any waste

management unit that is not described above. It includes, but is not limited to, management units that are applied to reuse, recycle or reclaim residuals. In Table 4d.9 [of the survey], you must provide a detailed description of this unit, including information on the unit's function and its configuration (e.g., surface area, height, lined or unlined, height)."

Additional information was obtained from the survey for all management practices identified as 'other.' This information is presented in Exhibit B-3. No generalizations can be made regarding the management practices, such as whether they are likely to represent practices that could continue following promulgation of land disposal restrictions.

In the capacity analysis summary presented in Exhibits 3-4 and 3-5, EPA again used two different assumptions for this quantity of nonhazardous waste managed as 'other;' for a conservative estimate, EPA included the total amount of nonhazardous waste (1,487 weighted metric tons) in the estimate of required treatment capacity. For the opposite end of the range, EPA assumed that this quantity is already managed at hazardous waste treatment facilities.

Presence of Antimony in Paint Production Wastes

In the survey, facilities were instructed to indicate whether certain hazardous constituents were present in the wastes. This information was reviewed to identify the extent to which antimony was present in these wastes. This analysis is intended to estimate the frequency that antimony would subsequently require treatment.

Exhibit B-4 summarizes the waste types and management methods currently used in treating these antimony-containing wastes. Management methods include fuel blending, incineration, landfill, and wastewater discharge. Treatment standards are being proposed for antimony in K179 and K180. The method of treatment used for antimony will be different than the method used to treat organics, however treatment is only expected to be necessary when antimony is present in the waste. Depending on antimony levels in the waste, additional treatment may be required following incineration to meet the proposed treatment standard. Exhibit B-4 shows the total quantity of characteristically hazardous waste identified as containing antimony is 530 MT (weighted). This compares to a total generation quantity of 15,000 MT (weighted) of characteristically hazardous waste, or about 4 percent of the total. The total quantity of nonhazardous waste identified as containing antimony is 15,000 MT (weighted), which compares to a total generation quantity of 44,000 MT (weighted) of nonhazardous waste, or about 34 percent of the total. This suggests that antimony may indeed require treatment in a significant portion of the newly-proposed paint production wastes.

Exhibit B-1. Cases Where Containers or Tanks are not Intermediate Management Steps, or Unexpected Methods are Used for Intermediate Management				
Facility	**Waste Quantity (and density)**	**Weighting Factor**	**Weighted Waste Quantity, MT**	**Comments**
Waste Type: Hazardous Off-Specification Residual (K179)				
CTM224	180 gallons (9.31 lb/gal)	1.2143	1.02	Container is identified as final management method.
MAD031	1,116 gallons (9.68 lb/gal)	4.0476	21.86	Management methods of incineration and fuel blending are identified but no quantities are provided after the container step.
MIN055	110 gallons (8.74 lb/gal)	4.0476	1.95	Container is identified as final management method.
Subtotal			**24.83**	Represents 0.7% of total quantity managed
Waste: Nonhazardous Off-specification Residual (K179)				
FLT010	2,020 gallons (9.5 lb/gal)	4.0476	38.84	Container is identified as final management method.
ILB048	4,050 gallons (9.5 lb/gal)	4.0476	77.87	Disposal management methods do not add up to the quantity in containers; 4,050 gallons represents the remainder.
ILN223	1,555 gallons (8.6 lb/gal)	1.2143	8.12	Container is identified as final management method.
OHG214	4,950 gallons (9.5 lb/gal)	1.2143	28.55	Container is identified as final management method.
WAA300	2,475 gallons (8.56 lb/gal)	2.1667	22.95	Container is identified as final management method.
Subtotal			**176.33**	Represents 10.4% of total quantity managed
Waste: hazardous sludges from solvent cleaning waste (K179)				
GAP046	2,885 gallons (7.8 lb/gal)	4.0476	45.54	Container is identified as final management method.
MAK051	4 gallons (8 lb/gal)	4.0476	0.06	Container is identified as final management method.
Subtotal			**45.60**	Represents 2.0% of total quantity managed
Nonhazardous emission control dust (K179)				
ILM156	40 gallons (4 lb/gal)	3.629	0.29	Container is identified as final management method.

Exhibit B-1. Cases Where Containers or Tanks are not Intermediate Management Steps, or Unexpected Methods are Used for Intermediate Management				
Facility	**Waste Quantity (and density)**	**Weighting Factor**	**Weighted Waste Quantity, MT**	**Comments**
Subtotal			**0.29**	Represents 0.01% of total quantity managed
Waste: hazardous liquid residual from solvent cleaning (K180)				
CAN172	28 gallons (7.5 lb/gal)	3.629	0.38	Disposal management methods do not add up to the quantity in containers; 28 gallons represents the remainder.
FLA104	330 gallons (7.25 lb/gal)	1.1951	1.43	330 gallons are reported as sent to incinerator and 330 gallons are reported as sent to landfill (apparently 660 gallons total), but only 330 gallons are reported as generated
ILM156	6,180 gallons (8 lb/gal)	3.629	89.71	Container is identified as final management method.
ILV129	1,050 gallons (8 lb/gal)	1.0	4.2	Disposal management methods do not add up to the quantity in containers; 1050 gallons represents the remainder.
MAD031	864 gallons (7.5 lb/gal)	4.0476	13.11	Management methods of incineration and fuel blending are identified but no quantities are provided after the container step.
PAC310	200 gallons (7.3 lb/gal)	2.1667	1.58	Container is identified as final management method.
WAA300	2,396 gallons (7.34 lb/gal)	2.1667	19.05	Container is identified as final management method.
Subtotal			**129.46**	Represents 1.6% of total quantity managed
Nonhazardous liquid residual from washwater (K180)				
CAN112	17,000 gallons (8.5 lb/gal)	1.0417	75.3	Wastewater treatment identified as intermediate management (prior to POTW discharge)
CAV121	8,000 gallons (8.5 lb/gal)	1.0417	35.4	'Other' identified as intermediate management (prior to POTW discharge)
GAT237	6,900 gallons (8 lb/gal)	1.05	29.0	Disposal management methods do not add up to the quantity in tanks; 6900 gallons represents the remainder.
IAJ017	5,000 gallons (8.33 lb/gal)	4.0476	84.3	POTW identified as intermediate management (prior to surface water discharge)

Exhibit B-1. Cases Where Containers or Tanks are not Intermediate Management Steps, or Unexpected Methods are Used for Intermediate Management				
Facility	**Waste Quantity (and density)**	**Weighting Factor**	**Weighted Waste Quantity, MT**	**Comments**
NCA016	278,011 gallons (8.34 lb/gal)	4.0476	4,692.4	Wastewater treatment identified as intermediate management (prior to POTW discharge)
Subtotal			**4,916**	Represents 14% of total quantity managed
GRAND TOTAL			**5,293**	Represents 8.9% of total quantity managed

This table lists waste types where discrepancies were observed. All other waste types had no discrepancies or no quantities were reported in the survey, as follows:
Nonhazardous sludges from wastewater treatment: no discrepancies
Nonhazardous sludges from solvent cleaning residuals: no discrepancies
Nonhazardous sludges from caustic cleaning residuals: no discrepancies
Hazardous sludges from caustic cleaning residuals: no discrepancies
Hazardous emission control dust: no discrepancies
Hazardous sludges from washwater residual: no discrepancies
Nonhazardous sludges from washwater residual: no discrepancies
Nonhazardous liquid residual from solvent cleaning: no discrepancies
Hazardous liquid residual from caustic washwater: no discrepancies
Nonhazardous liquid residual from caustic washwater: no discrepancies
Hazardous liquid residual from washwater: no discrepancies
Hazardous emission control sludge: zero quantities reported in survey
Nonhazardous emission control sludge: zero quantities reported in survey
Hazardous sludges from wastewater treatment: zero quantities reported in survey

Exhibit B-2. Combustion Facilities That Accept Nonhazardous Paint Production Wastes, and Do Not Also Accept Hazardous Paint Production Wastes [A]				
Generating Facility	**Management Method**	**Facility Receiving Waste**	**Survey Quantity, Density, Weighting Factor**	**Weighted Waste Quantity, MT**
Waste Type: Nonhazardous Off-specification residual (K179)				
MNC095	Sent to Incinerator	Ashland Chemical, Shakopee, MN	200 gal, 9 lb/gal, WF=1.1951	1.08
NJW233	Sent to Incinerator	Ogden Martin, Havervill, MA	3,583 gal, 8.3 lb/gal, WF=1.05	15.61
ORA301	Sent to Incinerator	Ogden Martin, Brooks, OR	1,160 gal, 8.5 lb/gal, WF=8.8571	43.67
MOT133	Sent to Boiler and Industrial Furnace	Safety Disposal Systems, Hampton, SC	844 gal, 9 lb/gal, WF=1	3.80
MOT133	Sent to Incinerator	Waste Technologies Industries, East Liverpool, OH	605 gal, 9 lb/gal, WF=1	2.72
Waste Type: Nonhazardous emission control dust (K179)				
MAS236	Sent to Incinerator	BFI, Boston, MA	1,250 gal., 8.5 lb/gal, WF=1.05	5.58
MND232	Sent to Incinerator	Honnepin County Energy Resource, Minneapolis, MN	5 gal, 10 lb/gal, WF=1.05	0.03
FLT070	Sent to Incinerator	Waste Management of Bay County, Panama City, FL	817 lb, WF=1.1951	0.49
Waste Type: Nonhazardous sludges from Caustic Cleaning Residual (K179)				
ORA301	Sent to Incinerator	Ogden Martin, Brooks, OR	150 gal, 9.29 lb/gal, WF=8.8571	32.79
Waste Type: Nonhazardous sludges from Washwater Residual (K179)				
ORA301	Sent to Incinerator	Ogden Martin, Brooks, OR	600 gal, 12.34 lb/gal, WF=8.8571	32.79
FLT070	Sent to Incinerator	Waste Management of Bay County, Panama City, FL	3,120 gal, 12.34 lb/gal, WF=1.1951	23.01
Waste Type: Nonhazardous sludges from Wastewater Treatment (K179)				
FLD082	Sent to Incinerator	Pinellas County Resource Recovery Facility, St. Petersburg, FL	4,420 gal, 10 lb/gal, WF=1.1951	26.41
Waste Type: Nonhazardous Liquid Residual from Washwater (K180)				
FLT070	Sent to Incinerator	Waste Management of Bay County, Panama City, FL	3,120 gal, 8.78 lb/gal, WF=1.1951	16.37

Exhibit B-2. Combustion Facilities That Accept Nonhazardous Paint Production Wastes, and Do Not Also Accept Hazardous Paint Production Wastes [A]				
Generating Facility	**Management Method**	**Facility Receiving Waste**	**Survey Quantity, Density, Weighting Factor**	**Weighted Waste Quantity, MT**
GRAND TOTAL				**177.73**

[A] Facility may not be permitted to receive hazardous waste or may not have the capacity available to receive hazardous waste.

Exhibit B-3. Analysis of Management Methods Identified as 'Other'		
FacilityID	**Location**	**Additional Information**
ILB249	Offsite	According to a faxed letter received from Benjamin Moore: After the waste is stabilized and treated, it is shipped to Wayne Disposal, Inc. 49350 N I-94 Service Drive, Belleville, MI 48111. Benjamin Moore does not know why the waste is landfilled in a Subt [sic]
ILC103	Offsite	The premixer dust was connected to the exhaust system which was releasing in the air. This system is now in the process of change.
ILS116	Offsite	84,997 gallons of bottoms went to fuel blending after processing 22,771 gallons of water were decanted and fuel blended HSL & HOR are combined, stored, reclaimed and disposed (fuel blended) managed as one residual after mixing (before or during storage)
ILV037	Offsite	The waste stream is sent to Heritage Environmental Services by transport tanker truck. They advise that it is handled per code D85. It is treated through an aqueous treatment facility and the filter cake that is generated is disposed in their own landfill
INE219	Onsite	Full drums are taken to and unloaded into the vacuum distillation unit. The distillate is collected in a 55 gallon drum or pumped to the tank farm for storage. If more waste wash solvent is generated than the still can handle, it is sent to the 90 day storage area.
INS138	Offsite	Solvents are distilled offsite.
MAS236	Offsite	The facility does not have further information regarding the landfill disposal step. Therefore, no information about the landfill step is added to table 4c.
MAS236	Offsite	The facility does not have further information regarding the landfill disposal step. Therefore, no information about the landfill step is added to table 4c.
MDB113	Onsite	Nonhazardous liquid residue from wash water is stored in tanks, treated with biocides, and reused in future paint production. No liquid wash residue is disposed of on- or offsite.
MDB113	Onsite	Nonhazardous off-specification residue is stored and reworked into future paint batches. Off-specification residue is 100% recycled, there is no on- or offsite disposal of this material.
MDB113	Onsite	Residue from dust collectors is collected and stored in 5 gallons pails. The residual material is ground into a low grade paint for re-sale. This material is 100% recycled, there is no on- or offsite disposal
MOM001	Onsite	The liquid from the distillation process is stored in 55 gallon drums and recycled back into the process.
NYS123	Offsite	Contains precious metal: Sent to metal reclaimer off site for metal value recovery.
OHP101	Onsite	Liquid Recovery Inc 7404 Grade Lane Louisville, KY 40219
OHP101	Offsite	The residual is sent to the facility and distilled. The solvent is recycled to the facility after distillation.
Various	Onsite	An additional 18 facilities did not report additional information for onsite 'other' management
Various	Offsite	An additional 19 facilities did not report additional information for offsite 'other' management

Exhibit B-4. Management Methods for Antimony-Containing Wastes from Paint Production		
FacilityID	**Weighted Mgmt. Qty, MT**	**Management Method**
hazardous off-specification residual		
ARN235	10.31	Fuel Blender
ILV129	2.25	Fuel Blender
ILV129	4.00	Sent to Incinerator
PAP337	102.42	Sent to Incinerator
WVC312	11.64	Fuel Blender
hazardous sludges from wash water residual (K179)		
ARN235	1.29	Fuel Blender
hazardous liquid residual from caustic wash water (K180)		
ILV129	44.92	Sent to Incinerator
hazardous liquid residual from solvent cleaning (K180)		
ILV129	295.00	Fuel Blender
hazardous sludges from caustic cleaning residual (K179)		
ILV129	1.35	Sent to Incinerator
hazardous sludges from solvent cleaning waste (K179)		
ILV129	17.25	Fuel Blender
PAC310	0.20	Subtitle D Industrial Landfill
PAP337	---	---
hazardous liquid residual from solvent cleaning (K180)		
NYS123	19.07	Fuel Blender
PAC310	1.44	Hazardous Containers
ILS230	---	---
IND067	---	---
hazardous emission control dust (K179)		
PAP337	18.90	Subtitle C Industrial Landfill
SUBTOTAL for hazardous wastes: 530 MT		
nonhazardous sludges from wash water residual (K179)		
NCA016	358.25	Municipal Landfill
SCT342	9.85	Subtitle D Industrial Landfill
WVC312	0.76	Subtitle D Industrial Landfill
nonhazardous emission control dust (K179)		
ARN235	0.64	Municipal Landfill
SCT342	59.09	Subtitle D Industrial Landfill
nonhazardous liquid residual from wash water (K180)		
ARN235	145.78	Sent to a Publicly-owned Treatment Work (POTW)
NCA016	4,265.82	Sent to a Publicly-owned Treatment Work (POTW)
NYS088	541.05	Sent to a Publicly-owned Treatment Work (POTW)
SCT342	8,214.75	Sent to a Publicly-owned Treatment Work (POTW)
nonhazardous off-specification residual (K179)		
NCA016	489.76	Municipal Landfill
NCA016	12.14	Subtitle D Industrial Landfill
SCT342	29.55	Subtitle D Industrial Landfill
WVC312	26.57	Fuel Blender
nonhazardous sludges from wastewater treatment (K179)		
NCA016	740.71	Municipal Landfill

Exhibit B-4. Management Methods for Antimony-Containing Wastes from Paint Production		
FacilityID	**Weighted Mgmt. Qty, MT**	**Management Method**
SUBTOTAL for nonhazardous wastes: 14,915 MT		

APPENDIX C. UPDATED ANALYSIS OF COMMERCIAL WASTEWATER TREATMENT CAPACITY FOR HAZARDOUS WASTES

This appendix presents a method of estimating commercially available wastewater treatment capacity for hazardous wastes. For several years, EPA has used an approach which relied on data from the 1991 Office of Water survey of Centralized Waste Treatment (CWT) facilities and 1991 Biennial Reporting System (BRS) data. However, the underlying data are dated and, therefore, may not be reflective of current market conditions. Using these Office of Water and 1991 BRS data (presented in EPA's *Background Document for Land Disposal Restrictions for Wood Preserving Wastes (final rule): Capacity Analysis and Response to Capacity-Related Comments*, April 1997) resulted in an estimate of commercially available wastewater treatment capacity of approximately 37 million tons (34 million metric tons or 8.9 billion gallons) per year.

The purpose of this appendix is to present a revised approach using more recent data which relies primarily on the 1995 and 1997 Biennial Reporting System (BRS). (The approach also uses some data from the 1991 Office of Water survey.) This revised approach results in an slightly higher estimate of commercially available wastewater treatment capacity of approximately 47 million tons (42 million metric tons or 11.2 billion gallons) per year. The results of both analyses are summarized in Exhibit C-1.

Exhibit C-1. Comparison of Approaches Used to Estimate Available Commercial Wastewater Treatment Capacity for Hazardous Wastes at a National Level, tons

Approach	Number of Facilities	Operational Capacity	Utilized Capacity	Available Capacity
Current [A]	83	78,400,000	32,000,000	46,600,000
Former [B]	35	135,000,000	103,000,000	37,000,000

Unless site-specific data were available, this appendix uses a conversion factor of 240 gallons per ton (equal to the density of water).
A. As described in this appendix, relying primarily on 1995 and 1997 BRS data.
B. As described in EPA's *Background Document for Land Disposal Restrictions for Wood Preserving Wastes (final rule): Capacity Analysis and Response to Capacity-Related Comments*, April 1997), this approach used results from the 1991 Office of Water CWT Survey and the 1991 BRS. A total of 87 facilities responded to the CWT survey. Available capacity was scaled to account for underreporting and therefore does not exactly equal the difference between operational and utilized capacity.

C.1. Introduction

Land disposal restrictions for hazardous wastes require that wastes meet numerical or technology-specific treatment standards prior to land disposal. Aqueous hazardous wastes generated by facilities and subsequently land disposed must meet appropriate standards depending on whether the waste is classified as a wastewaters or as a nonwastewater. Facilities that generate such wastes and that do not have appropriate onsite treatment facilities must therefore manage the wastes at an offsite facility, shipping the waste by drum, tanker truck,

pipeline, etc. Commercial wastewater treatment facilities commonly accept wastes that are aqueous or pumpable, regardless of whether the waste is classified as a 'wastewater' or nonwastewater in 40 CFR 268.2 (wastewaters have less than 1 percent solids and less than 1 percent total organic carbon).

Not all aqueous hazardous wastes must meet LDR treatment standards. Many such wastes are not land disposed (e.g., because they are managed solely in tanks prior to discharge). However, other facilities may manage nonhazardous wastes in Subtitle D surface impoundments or underground injection wells. If such wastes became hazardous they would require alternative management such as management at a commercial facility. Other facilities may manage their hazardous wastes in underground injection units. If the generated wastes were subject to any changes in LDRs the waste may require alternative management, such as management at a commercial facility. Note that LDR treatment standards are not required if the wastewater is managed in a lined surface impoundment that meets the requirements of §3005(j)(11) (i.e., meets minimum technological requirements and is dredged annually).

This appendix describes our methodology for estimating the available commercial treatment capacity for wastewater treatment of hazardous wastes. Such treatment would be appropriate, for example, in managing aqueous wastes generated by individual facilities. While this appendix typically refers to these materials as 'wastewaters,' such wastes are not required to meet the 40 CFR 268.2 definition of a wastewater (with less than 1 percent solids and less than 1 percent total organic carbon) to be managed in this manner.

Wastewater treatment technologies used by commercial wastewater treatment facilities include biological treatment, chemical precipitation, filtration, and many other technologies. For the estimate developed in this appendix, we have considered treatment methods that would be likely to result in substantial waste treatment, to below 40 CFR Part 268 treatment standards. These treatment facilities can be commercial treatment storage disposal (TSD) facilities that receive wastes exclusively from offsite, as well as TSD facilities that treat a combination of both wastewater generated onsite and wastewater received from offsite. While commercial facilities may have multiple technologies for treating a wider variety of wastes, not every commercial facility has the capability to accept and treat every type of waste (or have the necessary permits to accept such a wide variety of wastes). Additionally, generators typically restrict shipments to a commercial facility located relatively close, particularly if larger quantities of wastes must be transported. Nevertheless, the result of this analysis is a single estimate of available commercial treatment capacity for all treatment methods; the limitations of this estimate are discussed in Section C.6.

The following steps are used in conducting this analysis:

- Identify the population of commercial facilities (Section C.2)
- Estimate the quantity of wastes presently treated (i.e., waste throughput) (Section C.3)
- Estimate the total or maximum operational treatment capacity (Section C.4)
- Estimate the available treatment capacity (Section C.5)

- Discuss uncertainties and limitations (Section C.6).

C.2. Population of Commercial Facilities

To estimate the current population of commercial wastewater treatment facilities, we used the following information sources: the WR form of the 1997 BRS, the results of the 2000 paint production wastes survey, the PS form of the 1995 BRS, and the 1991 Office of Water survey.

Data and information from the 1997 BRS as a starting point (1997 is the most recent year of BRS data). Specifically, a search of the BRS was conducted to identify facilities who reported accepting hazardous wastes from offsite and managing them using one of three general treatment technologies: aqueous inorganic treatment, aqueous organic treatment, and aqueous organic and inorganic treatment.[30] A total of 87 facilities were initially identified in this manner. As shown below, a number of adjustments were made that resulted in a final list of 83 facilities for the capacity assessment.

Not all facilities reporting the receipt of wastes in 1997, however, are commercial. ("Commercial" is defined as accepting wastes from any facility. See Section 1.2.2 of this background document for definitions used in this analysis.) For example, some facilities may only receive wastes generated from a single site within its corporate structure. At the same time, additional commercial facilities are known to exist but, for whatever reason, did not report receiving hazardous wastes from offsite in 1997. To correct these deficiencies, a number of adjustments were made to this list:

- Facilities were ADDED to the list if they were identified as wastewater treatment facilities that receive paint production wastes and had a RCRA permit.[31] A total of 13 such facilities were identified in this manner.

- Facilities were REMOVED from the list if they were not commercial (i.e., facilities with status codes 1 or 2 were removed). Facilities identified their commercial status in the 1995 BRS.[32] Facilities used one of four commercial status codes:

    - 1: System only manages wastes generated from onsite operations.

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[30] These management methods correspond to system codes M071 through M099 from the 1997 BRS waste received (WR) form.

[31] EPA distributed a RCRA §3007 Questionnaire to paint manufacturing facilities in Spring 2000, collecting data for the year 1998. Among other information, facilities were required to report the destination of in-scope wastes shipped offsite. Facilities that reported sending wastes to 'offsite wastewater treatment facilities' are included in this total. We assumed that such facilities are commercial. For each facility, RCRA permit information was identified using the RCRA Information System in Envirofacts (http://www.epa.gov/enviro/html/rcris/rcris_query_java.html).

[32] Data from the 1995 BRS PS (process system) form were used. Similar data were not available for later years.

- 2: System is available only to other facilities within the same corporate structure.
- 3: System is available to a limited group of facilities.
- 4: System is commercially available to any facility.

Facilities that reported a commercial status code of 1 or 2 were removed from the list (they are not included on any of the lists in this appendix). Facilities that reported a commercial status code of 3 or 4 (or did not report any status code) were retained on the list.[33]

- Facilities were RETAINED on the list if they were included in the Office of Water's 1991 survey of the centralized waste treatment (CWT) industry. This survey identified centralized waste treatment facilities that accepted wastes from offsite, but not exclusively by pipe (note that this is a distinction made by the Office of Water survey). Facilities on this list were assumed to be commercial.

Using the procedures described in this Section, a total of 83 facilities in the U.S. were identified as commercial hazardous wastewater treatment facilities. These facilities are identified in Exhibit C-2.

C.3. Estimation of Waste Throughput

Using the list of facilities identified from this analysis in Section C.2 (i.e., 83 facilities), we subsequently estimated the quantities of hazardous wastes that are managed in each facility's wastewater treatment system. The principal data source for this information was the 1997 BRS. These data were supplemented with information from the 1995 BRS and the 1991 CWT Survey. These specific data sources are discussed in detail below.

Use of 1997 BRS Data

The 1997 BRS identifies, for each facility, the total quantities of hazardous waste generated and managed onsite (this information is from the GM form), as well as the total quantities of hazardous waste accepted from offsite facilities (this information is from the WR form). Both of these quantities contribute to a facility's total waste throughput.

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[33] Occasionally, a facility reporting multiple systems would identify different codes for each system. For example, it may have one management system used exclusively for its own generated wastes and a second management system available for commercial use. In most cases, the system capacity associated with one code was much greater than any of the others. This code was used to represent the entire facility's wastewater treatment operation. For a facility whose wastewater treatment commercial availability was unknown, its other waste treatment operations were investigated even if they were unrelated to wastewater treatment. For example, if a facility did not report whether its wastewater treatment system is commercially available, but reported a commercial availability code for its onsite incinerator, then it was assumed that this same code would apply to its wastewater treatment operations.

Each of the 83 facilities was assessed in this manner. However, not all wastes accepted from offsite will be managed using wastewater treatment. For example, a facility may have multiple treatment operations, only a portion of which may be appropriate for treating aqueous wastes. The WR form of the 1997 BRS indicates the treatment used for each waste shipment. To estimate the quantity of wastes received from offsite and managed in each facility's wastewater treatment system, we summed the total quantities of wastes managed in each of the following system codes using the WR form results of the 1997 BRS:

- System codes M071 to M079, aqueous inorganic treatment
- System codes M081 to M089, aqueous organic treatment
- System codes M091 to M099, aqueous organic and inorganic treatment.

Similarly, not all wastes generated onsite are managed in a facility's wastewater treatment system. To identify the quantity of wastes generated onsite and managed in each facility's wastewater treatment system, we used a slightly different list of system codes. An expanded set of codes were used to account for the possibility that a facility only reported an intermediate management step, or only reported an initial management step. To estimate the quantity of wastes generated onsite and managed in each facility's wastewater treatment system, we summed the total quantities of wastes managed in each of the following system codes using the GM form results of the 1997 BRS:

- System codes M071 to M079, aqueous inorganic treatment
- System codes M081 to M089, aqueous organic treatment
- System codes M091 to M099, aqueous organic and inorganic treatment
- System code M121, neutralization only
- System code M122, evaporation only
- System code M123, settling or clarification only
- System code M124, phase separation (e.g., emulsion breaking or filtration) only
- System code M134, deepwell/underground injection
- System codes M135, discharge to a sewer/POTW
- System code M136, discharge to a surface water under National Pollutant Discharge Elimination System (NPDES) permit.

The latter codes M121 to M136 do not represent the same degree of treatment as the other treatment codes. However, it is assumed that facilities reporting such management would, in addition, manage their generated wastewaters in their onsite treatment system prior to discharge.

The 1997 total throughput includes the sum of the wastes generated onsite and wastes received from offsite.

Use of 1995 BRS Data and 1991 CWT Survey Data

For 13 of the facilities (i.e., those identified from the paint survey), waste throughput data were not available from the 1997 BRS. For these facilities, data from the PS form of the 1995 BRS were investigated. The PS form identifies the total throughout in a facility's treatment

system. To identify the quantity of wastes managed in each facility's wastewater treatment system, we summed the total quantities of wastes (the influent quantity from the PS form) managed using system codes M071 through M099, M121 to M124, and M134 to M136 (i.e., the same system codes used when considering treatment system loading from wastes generated onsite). A total of two additional facilities reported waste throughput in this manner.

Finally, data from the 1991 CWT survey were investigated for the remaining facilities for which the above approaches using 1997 or 1995 BRS data were unsuccessful.[34] However, none of these facilities provided responses to the 1991 CWT Survey. As a result, waste throughput data could not be estimated for these remaining facilities.

C.4. Estimation of Total Operational Treatment Capacity

Total (or maximum) operational capacity is the greatest rate of wastewaters that can be treated in the system, limited only by permit requirements and equipment considerations. This quantity was estimated for each facility using one of three approaches:

- Use of 1995 BRS data
- Use of 1991 CWT survey data
- Extrapolation.

Details of each approach are presented below.

Use of 1995 BRS Data

Data from the PS form of the 1995 BRS were attempted to be obtained for each of the 83 facilities identified in Section C.2 (1995 is the latest year that total or maximum operational capacity was collected). Initially, the analysis was limited to each facility's wastewater treatment operations (i.e., management using the system codes M071 through M099). For each facility, the operational capacity associated with each relevant system was identified and summed, providing a single operational capacity for each facility.

For facilities that did not report operational capacity for system codes M071 to M099 in their 1995 PS forms, we reviewed their PS forms to identify if capacity information for other treatment methods were reported. This was conducted for facilities reporting capacity information for 'neutralization' (M121) and 'emulsion breaking' (M124). When appropriate, we assumed that the system would likely treat wastewaters or be part of a larger wastewater treatment system.

Of the 83 commercial hazardous wastewater treatment facilities identified in Section C.2, 1995 PS form data were available for 32 facilities. Note that we only used maximum operational

[34] These data are available in EPA's 1997 Background Document for Land Disposal Restrictions Wood Preserving Wastes (final rule), Capacity Analysis and Response to Capacity-Related Comments, pages 2-6 to 2-10.

capacity from the 1995 PS form. Waste influent data was obtained from each facility using the approach described in Section C.3.

Use of 1991 CWT Data

For facilities not providing maximum operational capacity information in the 1995 PS form, data from the 1991 CWT survey were used instead. The relevant survey results are presented in EPA's 1997 Background Document for Land Disposal Restrictions Wood Preserving Wastes (final rule), Capacity Analysis and Response to Capacity-Related Comments. Data for nine facilities were provided from this source.

Extrapolation of Results for Remaining Facilities

For facilities not providing capacity information in their BRS PS form, or in the 1991 CWT Survey, their operating capacity was estimated. No other data sources were identified that would have this information. Estimation of their operation capacity was conducted in the following manner.

Facilities identified in Exhibit C-2 that provided data on both their waste throughput and their operating capacity were used as the basis for estimating operating capacity of the remaining facilities. Data were available for both total waste throughput and maximum operating capacity using the approaches described in Sections C.3 and C.4, respectively. Each facility's utilization rate was calculated by dividing the waste throughput by the operating capacity. For all facilities with such data, an overall median utilization rate was calculated. The median utilization rate was calculated to be 17 percent.

The median utilization rate was used for all facilities that supplied waste throughput data but did not supply operational capacity data. The operating capacity was calculated for each facility by dividing the waste throughput by the utilization rate. Operating capacity was estimated for 32 facilities using this approach.

Operational capacity could not be calculated for ten facilities. This is because the waste throughout for these ten facilities could not be determined using the data sources in Section C.3. As a result, these ten facilities are essentially omitted from the calculations due to lack of data.

C.5. Calculation of Estimated Available Commercial Treatment Capacity

The nationwide estimated available commercial treatment capacity was calculated by integrating the above information on waste throughput (Section C.3) and maximum operational capacity (Section C.4). The information was used in the following manner:

- The population of facilities was selected as shown in Section C.2. This process identified facilities accepting wastes from offsite but eliminated facilities that were not identified as 'commercial.' A total of 83 facilities, identified in Exhibit C-2, were identified.

- For each facility identified in Section C.2, waste throughput was calculated using the methods described in Section C.3 and operational capacity was calculated using the methods described in Section C.4. For each facility, the waste throughput was subtracted from the operational capacity to identify each facility's available treatment capacity. For facilities who reported that their operational capacity was less than their throughput, their available capacity was assumed to be zero. Therefore, each facility's available capacity was equal to or greater than zero.

- The individual facilities' available commercial treatment capacity were summed to generate a nationwide estimate.

The results of the analysis are presented in Exhibit C-2. Based on these results, EPA estimates that the commercially available hazardous waste treatment capacity is 47 million short tons per year (equal to 42 million metric tons per year or 11.2 billion gallons per year).

Note that the above calculation approach is slightly different than simply adding each facilities' operational capacity and subtracting from the sum of wastes treated. This is because some facilities inadvertently reported that their operating capacity was less than the total quantity of wastes treated. For such a facility, we assumed the available commercial treatment capacity was zero rather than a negative number.

C.6. Uncertainty and Limitations

This appendix presents an estimate of the nationwide commercial wastewater treatment capacity for hazardous wastes. Wastewater treatment, however, is a compilation of many different types of processes. For example, some facilities may specialize in the treatment of inorganic wastes (e.g., chemical precipitation) while others treat organic wastes (e.g., biological treatment). Such differences were not accounted for in this analysis due to data limitations. One of the source materials, the results of the 1991 CWT survey as reported in EPA's 1997 Background Document for Land Disposal Restrictions Wood Preserving Wastes (final rule), Capacity Analysis and Response to Capacity-Related Comments, did not distinguish between treatment type. The other principal source of data, the BRS, does distinguish between treatment type. However, these distinctions were not used because much higher scrutiny of the data would have been necessary to account for complex facility processes.

Another difficulty with presenting a national estimate for wastewater treatment capacity is that generators prefer not to ship wastewaters long distances to a commercial facility, particularly if larger quantities of wastes must be transported. Therefore generators may not be able to effectively utilize wastewater treatment capacity if the treatment facility is located far from their generating facility. This limitation of the analysis can be overcome if the national estimate for capacity is compared to national estimates of waste generation. Assuming that generators of a particular waste are distributed throughout the U.S., then comparison to a national estimate of available treatment capacity is appropriate because the treatment facilities are also distributed throughout the U.S.

There are several limitations to the numerical estimate of available treatment capacity presented in this appendix:

- No single source was available to identify commercial hazardous waste wastewater treatment facilities. Instead, the identification of these facilities was conducted using the 1997 BRS and data from the 1998 Paint Industry survey as described in Section C.2. These data are several years old, and additionally may not have captured every facility with wastewater treatment capability. Therefore, use of this population may underestimate available treatment capacity.

- Much of the maximum operational capacity data (presented in Section C.4) used in this analysis is based on the PS form from the 1995 BRS, which facilities voluntarily provided. Therefore, these data may not accurately reflect the actual capacity for all facilities. These data were supplemented with data from the 1991 CWT survey. Both data sources are dated and may not reflect the current operating practices of the facilities.

- Exhibit C-2 identifies that a total of 30 million short tons of wastes are received from offsite (using the methodology described in Section C.3). This waste quantity may be received in drums, tanker truck, or by pipe. While portions of this quantity may not be subject to land disposal restrictions (e.g., from piped sources), nevertheless it impacts the available commercial capacity of treatment facilities.

- Operating capacity was estimated for facilities that did not otherwise provide this information. A utilization rate of 17 percent was calculated as a median value from all facilities supplying sufficient data. The use of this estimate may not provide an accurate representation for a national estimate.

- Because nonhazardous wastes are not required to be reported in the BRS, the utilized capacity data only refer to the hazardous waste capacity. Therefore, the available capacity could be an overestimate if non-hazardous waste is being managed. In addition, wastes excluded from the definition of solid waste and permitting requirements are not reported in the BRS. Therefore, use of these data likely overestimates available treatment capacity.

- The BRS does not contain information on the commercial status for some of the facilities included in our analysis. When no information was available, we assumed the facility was a commercial facility. Thus, we may be overestimating the number of commercial facilities and therefore overestimating available treatment capacity.

Exhibit C-2. Commercial Capacity Availability Analysis

EPA ID	Facility Name	City	State	Is Facility Identified in 1991 CWT Survey?	Quantity, Short Tons: Total Received from Offsite	Generated Onsite	Sum of Max. Op. Capacity	Available Commercial Capacity, Tons	Source of Capacity Data
ALD070513767	M & M CHEMICAL & EQUIPMENT COMPANY, INC.	REECE CITY	AL	No	1	0	7	6	Estimated
ARD981057870	RINECO	BENTON	AR	No	2	0	11	9	Estimated
CAD983672155	McKittrick Waste Treatment Site	McKittrick	CA	No				0	No estimate
CAT080013352	Demenno/Kerdoon	Compton	CA	No	156,572		336,000	179,428	1995 PS
CTD000604488	CECOS TREATMENT CORP.	BRISTOL	CT	Yes	4,328	0	260,208	255,880	1995 PS
CTD002593887	BRIDGEPORT UNITED RECYCLING INC	BRIDGEPORT	CT	No	1,298	0	94,900	93,602	1995 PS
CTD021816889	UNITED OIL RECOVERY, INC.	MERIDEN	CT	Yes	12,214	0	1,064,000	1,051,786	1995 PS
DED984073692	International Petroleum Company	Wilimington	DE	No				0	No estimate
FLD981928484	Industrial Water Services	Jacksonville	FL	No				0	No estimate
GAD033582461	ALTERNATE ENERGY RESOURCES, INC.	AUGUSTA	GA	Yes	2,775	362	32,500	29,362	1995 PS
IAD005289806	JOHN DEERE-COMPONENT WORKS	WATERLOO	IA	Yes	355	280	163,341	162,706	1991 CWT Survey
IAT200010601	ISU-CHEMICAL WASTE HANDLING FACILITY	AMES	IA	No	0	0	0	0	Estimated
ILD000672121	Clean Harbors Services, Inc.	Chicago	IL	Yes	70,500		150,000	79,500	1991 CWT Survey
ILD000666206	ENVIRITE CORP. (IL)	HARVEY	IL	Yes	38,531	0	86,600	48,069	1995 PS
ILD005087630	UNITED REFINING & SMELTING CO	FRANKLIN PARK	IL	No	111	0	332	221	1995 PS
ILD010284248	CID LANDFILL	CALUMET CITY	IL	No	19,072	0	176,000	156,928	1995 PS
ILD062480850	PHIBRO TECH INC	JOLIET	IL	No	17,150	0	103,457	86,307	Estimated
ILD085349264	HERITAGE ENVIRONMENTAL SERVICES	LEMONT	IL	No	6	0	650	644	1995 PS
ILD980613913	SAFETY-KLEEN ENVIRONSYSTEMS CO	DOLTON	IL	No	25	0	151	126	Estimated
IND000646943	POLLUTION CONTROL INDUSTRIES INC	EAST CHICAGO	IN	No	34	0	207	173	Estimated
IND093219012	HERITAGE ENVIRONMENTAL SERVICES, INC.	INDIANAPOLIS	IN	Yes	70,076	0	201,200	131,124	1995 PS
KSD985003037	Reddi Services	Kansas City	KS	No				0	No estimate
KYD985072008	WESTLAKE MONOMERS & WESTLAKE CA & 0 CORP	CALVERT CITY	KY	No	10,416	545,078	3,350,932	2,795,438	Estimated
MAD000650051	WINDFIELD ALLOY INC	LAWRENCE	MA	No	5	0	54	49	1995 PS
MAD046613279	ATTLEBORO REFINING CO -- HANDY & HARMAN	ATTLEBORO	MA	No	1,419	0	665	0	1995 PS
MDD980551600	METALS & RESIDUES PROCESSING CO, INC	COCKEYSVILLE	MD	No	1	0	5	4	Estimated
MED019051069	ENVIRONMENTAL COMPLIANCE CORP	SOUTH PORTLAND	ME	No	2,838	18,103	1,131	0	1995 PS
MID005503263	MODERN HARD CHROME SERVICE CO	WARREN	MI	No	229	0	1,379	1,150	Estimated
MID074259565	DYNECOL, INC.	DETROIT	MI	Yes	39,226	30,122	418,330	348,982	1991 CWT Survey
MID088754668	EDWARDS OIL CO.	DETROIT	MI	Yes	1,076	0	3,152,520	3,151,444	1995 PS
MID092947928	DRUG AND LABORATORY DISPOSAL INC	PLAINWELL	MI	No	7	0	41	34	Estimated
MID098011992	CYANOKEM, INC.	DETROIT	MI	No	3,591	0	21,663	18,072	Estimated
MID980991566	USL CITY ENVIRONMENTAL INC	DETROIT	MI	No	42,148	0	330,000	287,852	1995 PS
MND980996805	ENVIRO CHEM INC	ROGERS	MN	No	49	0	65	16	1995 PS
MND981098478	METRO RECOVERY SYSTEMS	ROSEVILLE	MN	Yes	17,855	0	57,191	39,336	1991 CWT Survey
MOD981123391	HAZ MAT RESPONSE DISPOSAL INC	KANSAS CITY	MO	No	27	0	163	136	Estimated
MOD981505555	HERITAGE ENVIRONMENTAL SVCS LLC	KANSAS CITY	MO	No	235	1,607	11,111	9,269	Estimated
NCD061263315	Ashland Chemical	Charlotte	NC	No				0	No estimate
NCD986215002	All Waste	Charlotte	NC	No				0	No estimate
NJD002385730	E.I. Dupont DeNemours Co.,Inc.	Deepwater	NJ	Yes	29,323,815		55,000,000	25,676,185	1995 PS

Exhibit C-2. Commercial Capacity Availability Analysis

EPA ID	Facility Name	City	State	Is Facility Identified in 1991 CWT Survey?	Quantity, Short Tons: Total Received from Offsite	Generated Onsite	Sum of Max. Op. Capacity	Available Commercial Capacity, Tons	Source of Capacity Data
NVD980895338	21ST CENTURY EMI DBA TRANSPORTER	FERNLEY	NV	No	2,528	0	11,414	8,886	1995 PS
NYD045604964	DUPONT ROCHESTER	ROCHESTER	NY	No	2,177	2,420	2,168	0	1995 PS
NYD049836679	CHEMICAL WASTE MANAGEMENT OF NEW YORK	MODEL CITY	NY	Yes	4,533	127,983	329,259	196,743	1995 PS
NYD080336241	CECOS INTERNATIONAL	NIAGARA FALLS	NY	Yes	21,989	3,871	311,000	285,140	1995 PS
OHD066060669	Chemtron	Avon	OH	No				0	No estimate
OHD987027604	Northeast Chemical	Cleveland	OH	No				0	No estimate
OHD004178612	RESEARCH OIL CO.	CLEVELAND	OH	Yes	31,890	0	200,000	168,110	1995 PS
OHD004274031	CLARK PROCESSING, INC. (PERMA-FIX OF DAYTON)	DAYTON	OH	Yes	1,360	0	641	0	1995 PS
OHD081290611	SAFETY KLEEN (WT)INC	HILLIARD	OH	No	14,500	0	87,472	72,971	Estimated
OKD000402396	PERMA-FIX TREATMENT SVCS INC	TULSA	OK	No	4,642	0	28,002	23,360	Estimated
OKD007233836	CONOCO, INC. PONCA CITY	PONCA CITY	OK	Yes	684	0	2,721,600	2,720,916	1991 CWT Survey
OKD982293334	ENVIRONMENTAL MGMT	GUTHRIE	OK	No	0	0	0	0	Estimated
ORD009020231	TEKTRONIX, INC.	BEAVERTON	OR	Yes	44	23,416	1,596,143	1,572,683	1995 PS
PAD004835146	MILL SERVICE, INC. YUKON PLT.	YUKON	PA	Yes	13,054	58,018	475,823	404,751	1995 PS
PAD010154045	ENVIRITE CORP. (PA)	YORK	PA	Yes	24,682	0	62,500	37,818	1995 PS
PAD085690592	WASTE CONVERSION, INC.	HATFIELD	PA	Yes	2,029	460	144,400	141,911	1995 PS
RID095978995	GEIB REFINING CORP	WARWICK	RI	No	24	0	140	116	1995 PS
RID980906986	ETICAM	WARWICK	RI	Yes	202	0	37,903	37,701	1995 PS
SCD982128746	Western Carolina Regional Sewer Authority	Greenville	SC	No				0	No estimate
SCD070371885	PHIBRO-TECH INC	SUMTER	SC	No	24	0	144	121	Estimated
SCD981467616	SAFETY KLEEN ROEBUCK INC	ROEBUCK	SC	No	65	0	391	326	Estimated
TND982141392	Safety Kleen	Chattanooga	TN	No				0	No estimate
TND981922826	SAFETY-KLEEN OF NASHVILLE INC	NASHVILLE	TN	No	14,428	3	87,052	72,621	Estimated
TXD000461533	UNION CARBIDE CORP	TEXAS CITY	TX	No	14	701,415	4,231,257	3,529,829	Estimated
TXD055135388	TREATMENT ONE, DIV. OF SET ENVIRONMENTAL, INC.	HOUSTON	TX	Yes	191	0	7,560	7,369	1991 CWT Survey
TXD073912974	INTERCONTINENTAL TERMINALS CO.	DEER PARK	TX	Yes	4,414	89,787	37,800	0	1991 CWT Survey
TXD077603371	SAFETY-KLEEN SYSTEMS INC	DENTON	TX	No	75	0	454	378	Estimated
TXD097673149	EMPAK, INC. DEER PARK	DEER PARK	TX	Yes	13,409	0	1,196,034	1,182,625	1991 CWT Survey
TXD102599339	ALLWASTE RECOVERY SYSTEMS INC	DALLAS	TX	No	4,400	312	28,423	23,711	Estimated
TXD980626154	DETREX CORP	ARLINGTON	TX	No	103	0	619	516	Estimated
TXD980748461	A subsidiary of Stolt-Nielson S.A.	Houston	TX	No	1,392	5,295	40,338	33,651	Estimated
WAD000812909	CHEMICAL PROCESSORS, INC. (BURLINGTON ENVIRONMENTAL INC GEORGE)	SEATTLE	WA	Yes	382	0	1,235	853	1995 PS
WAD009250366	DUNKIN & BUSH INC TOSCO	FERNDALE	WA	No	1,240	0	7,481	6,241	Estimated
WAD009262171	BOEING RENTON	RENTON	WA	No	252	10,783	66,571	55,535	Estimated
WAD009276197	TEXACO REFINING & MARKETING	ANACORTES	WA	No	180	0	1,087	907	Estimated
WAD020257945	CHEMICAL PROCESSORS, INC. (BURLINGTON ENVIRONMENTAL INC TACOMA)	TACOMA	WA	Yes	149	0	24,700	24,551	1995 PS
WAD041337130	BOEING CO. - AUBURN	AUBURN	WA	Yes	947	310,816	1,405,914	1,094,152	1991 CWT Survey
WAD041585464	BOEING EVERETT	EVERETT	WA	No	899	37,641	232,490	193,949	Estimated

Exhibit C-2. Commercial Capacity Availability Analysis

EPA ID	Facility Name	City	State	Is Facility Identified in 1991 CWT Survey?	Quantity, Short Tons: Total Received from Offsite	Quantity, Short Tons: Generated Onsite	Quantity, Short Tons: Sum of Max. Op. Capacity	Available Commercial Capacity, Tons	Source of Capacity Data
WAD991281767	CHEMICAL PROCESSORS, INC. (BURLINGTON ENVIRONMENTAL INC KENT)	KENT	WA	Yes	5,977	0	10,400	4,423	1995 PS
WI0000934174	AURA II INC	MILWAUKEE	WI	No	28	29	347	289	Estimated
WID000808824	HYDRITE CHEMICAL CO	COTTAGE GROVE	WI	No	127	0	769	641	Estimated
WID990829475	WRR ENVIRONMENTAL SERVICES CO INC	EAU CLAIRE	WI	No	2,105	0	12,701	10,595	Estimated
WVD981107600	REGENERATION TECHNOLOGIES INC	MORGANTOWN	WV	No	115	1,934	12,358	10,309	Estimated
TOTAL					30,011,246	1,969,736	78,429,402	46,528,535	

APPENDIX D. RESULTS OF 1997 BRS FOR ALL FACILITIES IN SIC CODE 2851 (PAINT AND COATINGS MANUFACTURE)

EPA queried the 1997 BRS database to determine the universe of paint production facilities that already generate hazardous wastes. EPA was able to identify facilities in the paints and coatings industry by selecting those facilities with an SIC code of 2851. According to this 1997 BRS query, there are 602 thousand short tons (547 thousand metric tons) of wastes generated by approximately 440 facilities in the industry. This appendix provides summaries of the quantities of waste generated by the industry, organized first by facility name and location, and also by hazardous waste code.

Exhibit D-1 presents a listing of all of the facilities under SIC code 2851. The name of the facility is provided as well as city and state locations, and the amount of waste in short ton units. There were approximately 445 facility records associated with SIC code 2851. Many of these were facilities in variety of different cities, but owned or operated by the same company. The facilities were spread throughout 36 different states. This query indicated the largest quantities of paint waste were generated by facilities in Ohio, Pennsylvania, and Michigan. These states also had a relatively higher number of facilities than other states. The facility generating the highest quantity of waste, 51,422 short tons, was located in Pennsylvania.

Exhibit D-2 presents the amount of waste by hazardous waste code. There were 98 (plus one unidentified, possibly due to a data entry error) different hazardous waste codes within the universe of facilities with SIC code 2851. Of these waste codes, D001 wastes were of the greatest quantity at 122,000 short tons, followed by F003 at 96,800 short tons. Together, these two waste codes make up approximately 36 % of the total wastes associated with SIC code 2851. Overall, the vast majority of hazardous wastes generated are identified as characteristically hazardous or as listed spent solvents, F001 to F005.

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS

Site/Company Name	City	State	Total Generated, Short Tons
ACCENT STRIPE INC	Orchard Park	NY	41.71
ACCURATE COATINGS & DISPERSION	South Holland	IL	223.75
ACCURATE DISPERSIONS	South Holland	IL	502.44
ACE HARDWARE	Matteson	IL	49.96
ADHERON COATINGS CORP	Oak Forest	IL	26.99
ADVANCED POLYMER TECHNOLOGY	Harmony	PA	20.73
AEXCEL CORPORATION	Mentor	OH	1,145.52
AKRON PAINT AND VARNISH	Akron	OH	1,216.00
AKZO COATINGS INC	Zion	IL	2,796.52
AKZO NOBEL COATINGS INC	Birmingham	AL	1,548.16
AKZO NOBEL COATINGS INC	Columbus	OH	4,545.74
AKZO NOBEL COATINGS INC	High Point	NC	1,361.17

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS			
Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
AKZO NOBEL COATINGS INC	Roanoke	VA	838.69
AKZO NOBEL COATINGS INC	Springfield	OH	124.40
AKZO NOBEL COATINGS INC.	Orange	CA	3,680.79
AKZO NOBEL COATINGS INC.	Pontiac	MI	1,990.62
AKZO NOBEL COATINGS, INC.	Clinton	MS	3,560.40
AKZO NOBEL RESINS	Louisville	KY	124.51
AKZP NOBEL COATINGS, INC.	Norcross	GA	65.34
AMERICAN COATINGS, INC.-TOMBALL PLANT	Tomball	TX	205.60
AMERICAN COLORS INC. DISPERSIONS PLANT	Sandusky	OH	419.56
AMERICAN COLORS, INC.	Murfreesboro	TN	129.29
AMERICAN SAFETY TECH INC	Roseland	NJ	97.06
AMERITEX	Irving	TX	75.48
AMERON - PROTECTIVE COATINGS SYSTEMS	Little Rock	AR	3,474.45
AMERON INTERNATIONAL	Brea	CA	72.33
AMSTERDAM COLOR WORKS, INC.	Bronx	NY	14.96
ASHLAND CHEMICAL,CO.	Clearfield	UT	62.68
ATOMIZED MATERIALS CO INC	Mcdonald	PA	124.82
B & B PAINT CORPORATION	Flint	MI	15.68
B A S F CORP	Fenton	MO	382.51
BAF INDUSTRIES	Santa Ana	CA	20.14
BARRETT VARNISH CO	Cicero	IL	15.59
BASF CORPORATION	Grand Rapids	MI	1,254.58
BASF CORPORATION	Greenville	OH	20,485.29
BASF CORPORATION	Southfield	MI	1,849.95
BASF CORPORATION	Whitehouse	OH	352.68
BASF CORPORATION, BOURKE AVE. PLANT	Detroit	MI	11,128.20
BASF CORPORATION, MILFORD AVE	Detroit	MI	959.39
BASF PARK 50 LABORATORY	Milford	OH	50.31
BEAVER PAINT CO	Girard	PA	175.74
BEAZER EAST INC	Newark	NJ	14.97
BENJAMIN MOORE & CO	Melrose Park	IL	83.60
BENJAMIN MOORE & CO	Newark	NJ	173.54
BENJAMIN MOORE & CO	Pell City	AL	104.10
BERKLEY PRODUCTS CO	Akron	PA	334.46
BF GOODRICH -ALGAN PRODUCTS BUSINESS	Chagrin Falls	OH	1.53
BLATZ PAINT CO.INC.	Louisville	KY	155.53
BLUE RIDGE TALC CO., INC	Henry,	VA	4.20
BONDO/MAR-HYDE CORPORATION	Cincinnati	OH	1,145.84

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Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
BONDOLMAR- HYDE CORPORATION	Atlanta	GA	162.57
BRINER PAINT MFG. CO., INC.	Corpus Christi	TX	59.84
BROWNWOOD	Brownwood	TX	13,727.00
BYK CHEMIE USA	Wallingford	CT	264.49
C & B PRODUCTS	Warren	AR	9.91
C A REEVE PAINT CO INC	Syracuse	NY	24.00
C P INC	Connersville	IN	64.35
C.E. BRADLEY LABORATORIES, INC.	Brattleboro	VT	2,673.25
CALDWELL CHEMICAL COATINGS CORPORATION	Fayetteville	TN	297.05
CALIFORNIA PRODUCTS CORPORATION	Cambridge	MA	3.30
CAMGER CHEMICAL SYSTEMS	Norfolk	MA	569.43
CARBOLINE	Lake Charles	LA	2,427.39
CARBOLINE CO	St Louis	MO	67.36
CARBOLINE COMPANY	Xenia	OH	2,583.48
CARDINAL INDUSTRIAL FINISHES	Denver	CO	16.00
CARDINAL INDUSTRIAL FINISHES	San Jose	CA	43.65
CARDINAL INDUSTRIAL FINISHES	South El Monte	CA	217.13
CAROLINA SOLVENTS, INC.	Hickory	NC	831.33
CATALYST SYSTEMS	Gnadenhutten	OH	55.44
CENTERLINE INDUSTRIES INC	Ennis	TX	167.52
CENTERLINE INDUSTRIES INC	St Louis	MO	779.28
CERAM TRAZ CORP DBA CERAMIC IND COAT	Osseo	MN	73.80
CHEMCOAT INC	Montoursville	PA	409.55
CHEMCRAFT INTERNATIONAL	Winston Salem	NC	742.32
CHEMICAL COATINGS INC	Hudson	NC	196.67
CHICAGO, CITY OF	Chicago	IL	17.10
CHUGOKU PAINT COMPANY	Belle Chasse	LA	404.00
CINTECH INDUSTRIAL COATINGS INC	Cincinnati	OH	348.12
CLEVITE ELASTOMERS	Angola	IN	0.60
COATINGS & CHEMICALS CORP	Chicago	IL	1,055.01
COATINGS RESOURCE CORP.	Huntington Beach	CA	1,321.44
COLOR COMMUNICATIONS INC	Buffalo	NY	6.24
COLOR COMMUNICATIONS INC	Chicago	IL	437.58
COLOR COMMUNICATIONS INC	Poughkeepsie	NY	11.58
CONTINENTAL COATINGS COMPANY, INC.	Fontana	CA	1,239.31
CONTINENTAL PRODUCTS COMPANY	Euclid	OH	168.48
COOK COMPOSITES AND POLYMERS CO	North Kansas City	MO	3,094.78
COOK COMPOSITES AND POLYMERS CO	Sandusky	OH	32.49

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS			
Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
COOK COMPOSITES AND POLYMERS CO.	Orlando	FL	110.55
CORONADO PAINT COMPANY	Edgewater	FL	476.79
COURTAULDS COATINGS INC	Louisville	KY	1,425.66
COURTAULDS COATINGS INC	Union	NJ	1,261.26
COURTAULDS COATINGS, FKA-PORTER PAINT CO	Louisville	KY	859.73
COURTAULDS COATINGS, INC.	Houston	TX	2,795.27
CRAWFORD LABS INC	Chicago	IL	1,338.87
CREANOVA	Lockland	OH	337.74
CREANOVA INC.	Pleasanton	CA	421.58
CROWE INDUSTRIAL COATINGS	Lawrenceville	GA	227.13
CUSTOM-PAK PRODUCTS INC	Germantown	WI	20.12
D & L INDUSTRIAL FINISHES INC	Liberty	IN	369.77
DAP INC	Tipp City	OH	1,378.44
DAVIES IMPERIAL COATINGS INC	Hammond	IN	61.74
DAVIS FROST INC	Lynchburg	VA	108.61
DAVIS PAINT CO	North Kansas City	MO	267.30
DECORATIVE INDUSTRIES, INC.	Sloatsburg	NY	59.65
DEFT, INC.	Irvine	CA	456.80
DEHART PAINT & VARNISH CO INC	Louisville	KY	13.28
DELTA INDUSTRIAL COATINGS, INC.	Arlington	TN	193.41
DELTA LABORATORIES, INC.	Ocala	FL	5.48
DENNIS CHEMICAL CO	St Louis	MO	27.47
DEXTER CORP THE	Waukegan	IL	2,267.63
DEXTER PACKAGING PRODUCTS	Birmingham	AL	2,336.04
DEXTER POLYMER SYSTEMS	Seabrook	NH	102.32
DON V DAVIS CO	St Louis	MO	40.69
DOZIER & GAY PAINT CO.	Green Cove Springs	FL	439.28
DSM DESOTECH INC	Elgin	IL	182.18
DU PONT E I DE NEMOURS & CO INC	Fort Madison	IA	15,763.06
DUNCAN ENTERPRISES	Fresno	CA	2.30
DUNN-EDWARDS CORPORATION	Los Angeles	CA	219.94
DUPONT AUTOMOTIVE REFINISH PRODUCTS	Dallas	TX	31.66
DUPONT DENEMOURS	Marietta	GA	79.97
DUPONT REFINISH SERV CTR	Minneapolis	MN	120.66
DUPONT REFINISH SERVICE CENTER	Kansas City	MO	64.83
DUPONT WESTERN DISTRIBUTION CENTER	Reno	NV	425.10
DUPONT/KANSAI	South San Francisco	CA	65.20
DURON INC	Beltsville	MD	179.23

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS			
Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
DUTCHESS COUNTY DEPT OF PUBLIC WORKS	Stanfordville	NY	6.61
E. I. DU PONT DE NEMOURS & CO	Avon	OH	126.16
E. I. DUPONT DE NEMOURS	Front Royal	VA	40,592.13
E. I. DUPONT DENEMOURS & CO. INC	Jacksonville	FL	70.19
E.I. DUPONT DE NEMOURS & CO	Groveport	OH	76.92
E.I. DUPONT DE NEMOURS & COMPANY	Troy	MI	512.82
E.I. DUPONT DENEMOURS CO.	Wilmington	MA	71.76
E.I. DUPONT, MOUNT CLEMENS	Mount Clemens	MI	47,661.85
EAGLE BRIDGES COMPANY, INC.	Byron	GA	147.42
EARL SCHEIB AUTO PAINT FINISH	Springfield	MO	9.20
EGYPTIAN LACQUER MFG CO INC	Lafayette	IN	816.36
EI DUPONT CO	Garfield Heights	OH	62.70
EI DUPONT DE NEMOURS	Morton Grove	IL	232.90
EI DUPONT EXTON	Exton	PA	327.90
EI DUPONT MARSHALL LAB	Philadelphia	PA	1,902.50
ELDORADO CHEMICAL COMPANY,INC.	San Antonio	TX	337.28
ELEMENTIS DPC INC	Jersey City	NJ	620.46
ELITE COATINGS COMPANY	Gordon	GA	69.03
ELPACO COATINGS CORP	Elkhart	IN	695.55
ENGINEERED POLYMER SOLUTINS	Williamsport	MD	82.18
ENVIRONMENTAL COATINGS INC.	Caledonia	MI	175.50
ESSEX GROUP INC CHEM PROCESSING	Ft Wayne	IN	439.63
ESSEX WASTE MANAGEMENT SVCS	Kingsville	MO	579.04
ETNA PRODUCTS INC	Chagrin Falls	OH	13.27
FEDERAL INTERNATIONAL CHEMICAL	Chicago	IL	171.42
FEDERATED PAINT MFG	Chicago	IL	800.42
FERRO CORP	Edison	NJ	46.28
FINISHES UNLIMITED INC	Sugar Grove	IL	252.28
FINNAREN & HALEY INC	Conshohocken	PA	355.33
FLOOD COMPANY THE	Hudson	OH	5.62
FLORIDA PLATING/ ROYAL STORE FIXTURES	Miami	FL	11.30
FOCUS RECYCLING SYSTEMS, INC.	Staten Island	NY	8.68
FORMULABS INC	Piqua	OH	480.68
FOSROC INC	Plainview	NY	38.50
FOUR SEASONS PAINT MFG CO	Lincoln	NE	81.93
FRAZEE INDUSTRIES	San Diego	CA	370.20
FUTURA COATINGS INC	Hazelwood	MO	371.44
G J NIKOLAS & CO INC	Bellwood	IL	167.32

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS			
Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
GAGE IN STORE MARKETING LLC	New Hope	MN	
GEMINI COATINGS, INC.	El Reno	OK	702.94
GIBRALTAR CHEMICAL WORKS INC	South Holland	IL	99.30
GLIDDEN CO	Reading	PA	6,524.24
GLIDDEN COMPANY	Huron	OH	733.63
GLYPTAL INC.	Chelsea	MA	2,749.71
GRAHAM PAINT & VARNISH CO INC	Chicago	IL	4.40
HARRISON PAINT CORP	Canton	OH	79.06
HARTIN PAINT & FILLER CORP	Carlstadt	NJ	125.83
HEMPEL COATINGS INC.; FORMER RELIANCE UN	Houston	TX	2,112.44
HENTZEN COATING INC	Milwaukee	WI	510.20
HODGSON PROCESS CHEMICALS, INC.	Oak Creek	WI	14.44
HULS AMERICA INC	Elizabeth	NJ	17,393.58
HUNTING INDUSTRIAL COATINGS	Cincinnati	OH	38.30
HY-KLAS PAINTS, INC.	Louisville	KY	12.69
ICI DEVOE COATINGS	Louisville	KY	6.15
ICI PAINTS	Carrollton	TX	354.51
ICI PAINTS	Houston	TX	837.33
ICI PAINTS	Tampa	FL	7.83
ICI-SINCLAIR PAINT	Commerce	CA	582.30
ICON METALCRAFT INC	Wood Dale	IL	5.20
INDURALL COATINGS FACTORY	Birmingham	AL	148.54
INDUSTRIAL SUMMIT TECHNOLOGY CORP	Parlin	NJ	120.92
IOWA PAINT MFG CO INC	Des Moines	IA	919.17
IVC INDUSTRIAL COATINGS	Indianapolis	IN	323.70
JAMES B DAY CO	Carpentersville	IL	153.97
JAMESTOWN PAINT CO	Jamestown	PA	541.30
JASPER CHEMICAL COATINGS	Jasper	IN	50.33
JELLICO COMPANY INC.	Louisville	KY	47.79
JOHN C DOLPH COMPANY	Monmouth Junction	NJ	1,487.94
JOHN DEERE HORICON WORKS	Horicon	WI	0.67
JOHN L. ARMITAGE & COMPANY	Gallatin	TN	351.00
JONES-BLAIR CO SOUTHEAST REGION	Chattanooga	TN	330.34
K J QUINN & CO INC	Seabrook	NH	371.54
KALCOR COATINGS COMPANY	Willoughby	OH	560.81
KANSAS CORRECTIONAL INDUSTRIES	Lansing	KS	28.80
KANSAS PAINT & COLOR CO	Wichita	KS	251.45
KEELER & LONG INC.	Watertown	CT	178.90

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Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
KELLEY TECHNICAL COATINGS, INC.	Louisville	KY	52.10
KELLY MOORE PAINT COMPANY, INC.	Hurst	TX	95.05
KEMPEN PAINT CO	East Carondelet	IL	108.41
KENTUCKY PAINT MFG.	Lexington	KY	18.36
KISH, S.P. INDUSTRIES, INC.	Charlotte	MI	73.13
KLINGER PAINT CO INC	Cedar Rapids	IA	228.38
KOP-COAT, INC.	Vernon	CA	90.57
L H B INDUSTRIES	Berkeley	MO	135.47
LAWRENCE MCFADDEN CO	Philadelphia	PA	268.68
LAWTER INTERNATIONAL INC	Pleasant Prairie	WI	63.23
LIILY INDUSTRIES, INC.	Bowling Green	KY	352.28
LILLY IND (USA) INC	Elkhart	IN	80.52
LILLY IND INC	Indianapolis	IN	3,265.92
LILLY INDS INC MOLINE PLANT	Moline	IL	2,610.87
LILLY INDUSTRIAL COATINGS INC	Dothan	AL	995.17
LILLY INDUSTRIES	Tulsa	OK	277.19
LILLY INDUSTRIES (USA) INC	Davie	FL	17.00
LILLY INDUSTRIES (USA), INC. ENGLISH RD	High Point	NC	3,314.89
LILLY INDUSTRIES (USA), INC. BREVARD RD	High Point	NC	2,120.67
LILLY INDUSTRIES INC	Little Rock	AR	1,875.45
LILLY INDUSTRIES, INC.	Gardena	CA	54.46
LILLY INDUSTRIES, INC.	Jamestown	NY	468.86
LILLY INDUSTRIES, INC.	Montebello	CA	500.88
LILLY INDUSTRIES, INC.	Rocky Hill	CT	1,143.70
LILLY INDUSTRIES, INC.	South Gate	CA	990.42
LILLY INDUSTRIES;PERFECTION PAINT DIV	Indianapolis	IN	134.63
LINEAR DYNAMICS, INC.	Ballground	GA	3.11
LPS LABORATORIES, INC.	Tucker	GA	33.27
M A B PAINTS INC	Terre Haute	IN	790.31
MA BRUDER & SONS INC	Orlando	FL	25.52
MA BRUDER & SONS INC	Philadelphia	PA	118.93
MAGNI INDUSTRIES, INC.	Detroit	MI	469.74
MAHONING PAINT CORPORATION	Youngstown	OH	133.78
MAN-GILL CHEMICAL CO PAINT DIVISION	Bedford	OH	412.90
MANSFIELD PAINT COMPANY	Mansfield	OH	368.29
MARCUS PAINT CO	Nashville	TN	235.65
MARCUS PAINT COMPANY	Louisville	KY	219.14
MARWIN PAINTS INC	Minneapolis	MN	218.16

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS			
Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
MASTER BUILDERS INC.	Houston	TX	78.64
MASTERCHEM INDUSTRIES INC	Imperial	MO	21.13
MATTHEWS PAINT CO	Kenosha	WI	94.44
MAUTZ PAINT CO	Madison	WI	462.44
MERIAL LIMITED - ATHENS, GA 30601	Athens	GA	0.14
MID STATES PAINT & CHEMICAL CO	St Louis	MO	59.46
MID-AMERICA PROTECTIVE COATING	Elk Grove Village	IL	25.55
MIDWEST LACQUER MFG CO	Schiller Park	IL	139.12
MILLER STEPHENSON CHEMICAL CO	Danbury	CT	11.28
MOBILE PAINT MFG CO INC DEL	Theodore	AL	179.68
MOHAWK FINISHING PRODUCTS INC	Burr Ridge	IL	468.92
MOHAWK FINISHING PRODUCTS, INC.	Amsterdam	NY	441.90
MONARCH PAINT COMPANY	Houston	TX	92.95
MORTON INTERNATIONAL	Decatur	AL	1,932.35
MORTON INTERNATIONAL INC	Batavia	IL	1,905.16
MORTON INTERNATIONAL INC	Orrville	OH	2,626.73
MORTON INTERNATIONAL, INC.	Chicopee	MA	356.06
MOZEL INC	St Louis	MO	564.18
MULTICOLOR SPECIALTIES INC.	Waupun	WI	32.29
MULTICOLOR SPECIALTIES MANUFAC	Cicero	IL	56.27
NATIONAL COATINGS INC	Galesburg	IL	431.60
NEGLEY PAINT DIVISION	Schertz	TX	50.68
NEW MORTON	Chicago Heights	IL	558.39
NEW MORTON	Lansing	IL	7,363.78
NIEDT	St Louis	MO	9.97
NJZ COLORS INC	Brooklyn	NY	109.80
NORTH AMBERICA TECHNOLOGIES	Ocean	NJ	33.98
NORTHERN COATINGS AND CHEMICAL CO.	Menominee	MI	129.02
NPA AUTOMOTIVE FINISHES AND FILMS	Cleveland	OH	303.20
P D GEORGE CO	St Louis	MO	6,222.65
PACIFIC POLYMERS, INC.	Garden Grove	CA	87.34
PAF	Dover	DE	8.39
PAINTS & SOLVENTS, DIV COURTER CO INC	Elkhart	IN	18.61
PALMER MFG & TANK INC	Garden City	KS	75.78
PAN CHEMICAL	Carlstadt	NJ	123.72
PAN CHEMICAL	Hawthorne	NJ	268.55
PATRIOT PAINT CO INC	Portland	IN	115.00
PEARL PAINTS NORTH AMERICA INC	Harvey	IL	31.14

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Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
PEERLESS CHEMICAL COATINGS INC	Cullman	AL	310.20
PENN COLOR INC	Doylestown	PA	1,897.58
PERRY & DERRICK CO	Norwood	OH	198.02
PIEDMONT PAINTS & PRIMERS, INC.	Toccoa	GA	497.10
PIERCE & STEVENS CORP	Kimberton	PA	211.51
PIONEER PAINT PRODUCTS LLC	Melrose Park	IL	221.09
PLANT #2 STRATHMORE PRODUCTS INC.	Liverpool	NY	313.20
PLANT 3	Houston	TX	188.34
PLASTI KOTE CO INC	Medina	OH	2,519.49
PLASTICOLORS, INC	Ashtabula	OH	972.69
POLYCOAT PRODUCTS	Santa Fe Springs	CA	17.40
POLYMER COIL COATERS	Fairfield	AL	8,201.55
POLYMER PLASTICS CORP	Hauppauge	NY	44.12
PORCELEN LIMITED LLC	Hamden	CT	20,763.91
POTTER PAINT CO OF IN INC	Cambridge City	IN	475.47
POTTER PAINT CO. OF TEXAS, INC.	Brownsville	TX	127.96
PPG ARCHITECTURAL FINISHES	East Point	GA	4,378.41
PPG ARCHITECTURAL FINISHES	Louisville	KY	25.00
PPG IND INC COATINGS & RESINS	Springdale	PA	51,422.29
PPG IND INC COATINGS & RESINS R&D	Springdale	PA	707.80
PPG IND INC RESEARCH CENTER	Allison Park	PA	704.90
PPG INDUSTRIES	Batavia	IL	29.10
PPG INDUSTRIES	Cleveland	OH	15,286.66
PPG INDUSTRIES	Strongsville	OH	19.14
PPG INDUSTRIES INC	Belvidere	IL	35.83
PPG INDUSTRIES INC	Blatimore	MD	19.69
PPG INDUSTRIES INC	Normal	IL	55.44
PPG INDUSTRIES INC	Oak Creek	WI	3,173.25
PPG INDUSTRIES INC	Warren	OH	115.05
PPG INDUSTRIES INC	Wentzville	MO	23.28
PPG INDUSTRIES INC.	Delaware	OH	14,783.06
PPG INDUSTRIES INC.	Torrance	CA	2,038.50
PPG INDUSTRIES INCORPORATED	Flat Rock	MI	16.77
PPG INDUSTRIES INCORPORATED	Flint	MI	379.78
PPG INDUSTRIES INCORPORATED	Sterling Heights	MI	43.09
PRATT & LAMBERT INC	Buffalo	NY	249.20
PREMIER COATINGS INC	Elk Grove Village	IL	108.89
PREMIUM COATINGS INC	Conover	NC	73.13

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS			
Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
PRO-LINE PAINT/SHERWIN-WILLIAMS CO	San Diego	CA	236.77
PROGRESS PAINT MFG CO	Louisville	KY	35.19
R & A SPECIALTY CHEMICAL COMPANY, INC	Brooklyn	NY	50.00
R.P. BELLEROSE ENT INC	Saco	ME	1.02
RANBAR ELECTRICAL MATERIALS	Manor	PA	1,249.01
RANBAR TECHNOLOGY INC	Glenshaw	PA	207.96
RED SPOT PAINT & VARNISH	Evansville	IN	4,379.10
RED SPOT WESTLAND, INC.	Westland	MI	1,409.86
REICHHOLD, INC.	Durham	NC	58.70
RICH RAINT MFG	S Hutchinson	KS	199.83
RILEY PAINT CO	Burlington	IA	172.74
RIVER VALLEY COATINGS INC	Aurora	IL	20.59
ROBINSON CHEMICAL COATINGS, INC.	Meridian	MS	64.27
ROHM TECH INC.	Malden	MA	73.24
RUST - 0LEUM CORP	Pleasant Prairie	WI	1,357.47
SAMUEL CABOT INC	Newburyport	MA	53.93
SANDSTROM PROD CO	Port Byron	IL	57.15
SAVANNAH PAINT MFG, CO.	Savannah	GA	604.21
SCHENECTADY INTERNATIONAL INC	Schenectady	NY	1,583.26
SCHOLLE CORPORATION	College Park	GA	417.68
SCHULTE PAINT MFG CO INC	St Louis City	MO	36.54
SEIBERT OXIDERMO INCORPORATED	Romulus	MI	693.84
SEIBERT-OXIDERMO, INC.	Romulus	MI	11.27
SENTRY PAINT TTECH INC	Darby	PA	355.06
SERVICE PAINT AND COATINGS INC	Hermitage	TN	20.56
SEYMOUR OF SYCAMORE INC	Sycamore	IL	5,902.74
SHEBOYGAN PAINT CO.	Cedartown	GA	39.61
SHEBOYGAN PAINT CO.	Sheboygan	WI	426.78
SHERWIN WILLIAMS	Garden City	NY	6.88
SHERWIN WILLIAMS	Morrow	GA	8,119.27
SHERWIN WILLIAMS	Newark	NJ	10.27
SHERWIN WILLIAMS CO	Chicago	IL	9,031.92
SHERWIN WILLIAMS CO	Richmond	KY	16,439.84
SHERWIN WILLIAMS CO	Troy	MI	28.49
SHERWIN WILLIAMS CO MINWAX	Flora	IL	64.16
SHERWIN WILLIAMS DIVERSIFIED BRANDS	Indianapolis	IN	306.51
SHERWIN-WILLIAMS	Andover	KS	6,035.44
SHERWIN-WILLIAMS AUTOMOTIVE DIST	Richmond	KY	2,368.88

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS			
Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
SHERWIN-WILLIAMS CLEVELAND TECH CENTER	Cleveland	OH	58.57
SHERWIN-WILLIAMS CO COLUMBUS PLANT	Columbus	OH	9,827.09
SHERWIN-WILLIAMS DIVERSIFIED BRANDS	Greensboro	NC	3,979.95
SHERWIN-WILLIAMS DIVERSIFIED BRANDS	Holland	MI	2,475.41
SHERWIN-WILLIAMS OLIVE BRANCH FACILITY	Olive Branch	MS	575.98
SIERRA CORPORATION	Minnetonka	MN	359.64
SIGMA COATINGS USA BV	Harvey	LA	6,091.02
SIMPSON COATINGS GROUP INC.	South San Francisco	CA	36.92
SINNETT-ELPACO COATINGS CORP	Pagedale	MO	215.97
SPECIALTY COATINGS CO	Elk Grove Village	IL	441.46
SPRAY ME INC	South Berwick	ME	1.76
SPRAYLAT CORP	Chicago	IL	542.58
SPRAYLAT CORPORATION	Mt Vernon	NY	280.05
STAHL USA	Peabody	MA	624.40
STANDARD PAINT COMPANY	Detroit	MI	598.29
STERLING LACQUER MFG CO	St Louis	MO	63.19
STEWART BROS PAINT COMPANY	Alliance	OH	87.88
SULLIVAN COUNTY DIV OF PUBLIC WORKS	Barryville	NY	18.59
SURFACE COATINGS, INC.	Wilmington	MA	794.41
SURFACE PROTECTION INDUSTRIES, INC.	Los Angeles	CA	246.15
TAMMS IND	Kirkland	IL	19.10
TANK MANAGEMENT, INC.	Livonia	MI	622.19
TECHNICAL COATING CO	Melrose Park	IL	403.61
TECHNICAL COATINGS CO.	Santa Clara	CA	20.14
TECHNICAL COATINGS COMPANY	Pell City	AL	46.50
TECHNICAL COATINGS LAB	Avon	CT	121.03
TENAX FINISHING PRODUCTS CO	Newark	NJ	60.03
TENNESSEE TECHNICAL COATINGS CORP	Lewisburg	TN	121.04
TESTOR CORP	Rockford	IL	302.95
TEXTRON AUTOMOTIVE CO	Morristown	IN	54.29
THE DEXTER CORPORATION DEXTER PACKAGING	Hayward	CA	57.32
THE OBRIEN CORP.	Brunswick	GA	31.58
THE SHERWIN-WILLIAMS	Emeryville	CA	300.35
THE SHERWIN-WILLIAMS CO	Greensboro	NC	3,532.04
THE VALSPAR CORPORATION	Azusa	CA	100.66
THORO SYSTEMS	Centerville	IN	9.25
TI-KROMATIC PAINTS	St Paul	MN	47.00
TIOGA COATINGS	Rockford	IL	202.20

Exhibit D-1. Alphabetical Listing of Paint And Coatings Manufacturers Included in the 1997 BRS			
Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
TITAN COATINGS INC	Bessemer	AL	344.96
TNEMEC CO INC	North Kansas City	MO	770.79
TOPEKA HOUSING AUTHORITY PINE RIDGE	Topeka	KS	0.25
TRANSTAR AUTOBODY TECHNOLOGIES	Brighton	MI	12.74
TRICOR INDUSTRIES PRISON	Only	TN	174.05
TRINITY COATINGS CO.	Fort Worth	TX	87.92
TROY CHEMICAL CORP INC	Newark	NJ	73.18
TRU-TEST MFG CO	Cary	IL	156.69
TRU-TEST MFG-DIV OF COTTER CO	Chicago	IL	97.53
U S PAINT CORP	St Louis	MO	4,143.12
U S POLYMERS INC	St Louis	MO	11.34
UNITED COATINGS INC	Indianapolis	IN	1,172.82
UNITED PAINT AND CHEMICAL CORP.	Southfield	MI	44.90
UNIVERSAL CHEMICALS & COATINGS	Elgin	IL	310.44
UNIVERSAL CHEMICALS & COATINGS	Elk Grove Village	IL	402.41
US CHEMICAL AND PLASTICS	Canton	OH	1.49
VALSPAR	Beaumont	TX	726.33
VALSPAR COATINGS	Carol Stream	IL	60.25
VALSPAR COATINGS	Kankakee	IL	4,325.29
VALSPAR COATINGS	Rockford	IL	1,763.64
VALSPAR COATINGS (HIGH POINT FACILITY)	High Point	NC	1,687.47
VALSPAR COATINGS PITTSBURGH	Pittsburgh	PA	992.34
VALSPAR COATINGS ROCHESTER	Rochester	PA	15,485.39
VALSPAR COATINGS, A DIVISION OF EPS	Grand Prairie	TX	317.50
VALSPAR COATINGS, A DIVISON OF EPA	Garland	TX	5,270.89
VALSPAR CORP	Ft Wayne	IN	1,483.73
VALSPAR CORPORATION	Louisville	KY	124.86
VALSPAR CORPORATION THE	Minneapolis	MN	153.52
VALSPAR REFINSH, INC.	Picayune	MS	139.20
VANEX COLOR INC	Mt Vernon	IL	13.48
VISTA PAINT	Fullerton	CA	25.25
VJ DOLAN & COMPANY INC	Chicago	IL	94.44
W.M. BARR & COMPANY, INC	Memphis	TN	1,337.81
WABASH PRODUCTS	Terre Haute	IN	37.12
WARLICK PAINT COMPANY INC	Statesville	NC	206.32
WARREN PAINT & COLOR CO.	Nashville	TN	91.29
WATSON RHENANIA COATINGS CO	Harwick	PA	138.63
WATSON STANDARD CO HARWICK	Harwick	PA	154.52

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Site/Company Name	**City**	**State**	**Total Generated, Short Tons**
WATSON STANDARD CO NEVILLE ISLAND	Neville Island	PA	51.19
WATTYL PAINT CORPORATION	Atlanta	GA	157.96
WC RICHARDS CO OF CAROLINA	Aberdeen	NC	179.56
WC RICHARDS COMPANY	Blue Island	IL	404.94
WESTFIELD COATINGS CORP.	Westfield	MA	686.59
WHITFORD CORP	Frazer	PA	726.00
WILKO PAINT INC	Wichita	KS	398.00
WILLIAM ZINSSER & CO., INC	Newark	NJ	17.82
WILLIAMS-HAYWARD PROT COATINGS	Bedford Park	IL	8.55
WILLIAMS-HAYWARD PROT COATINGS	Summit	IL	30.89
WILSON IMPERIAL CO	Newark	NJ	2.96
XIM PRODUCTS INC	Westlake	OH	68.20
YENKIN-MAJESTIC PAINT CORP	Columbus	OH	9,118.19
TOTAL			**602,227.53**

Exhibit D-2. Summary of Wastes by Hazardous Waste Codes Reported in the 1997 BRS	
EPA Hazardous Waste Code	**Sum of Short Tons**
D001	122,198.95
F003	96,823.93
D035	92,526.69
F005	85,974.51
D008	52,404.58
D007	47,269.77
D005	32,663.07
D002	26,171.82
D006	17,866.74
D018	9,936.12
D009	4,416.97
D026	2,712.22
F001	2,346.66
D004	1,530.00
F002	1,497.49
D019	937.91
D010	849.72
D003	836.77
D023	687.79
F004	380.00
U239	344.00
D039	337.07
D028	276.48
U188	135.04
F035	115.53
U220	114.69
U159	82.53
U031	80.64
U002	78.96
U122	67.19
D025	42.16
D024	42.14
[missing]	38.72
D038	38.56
U080	37.58
D027	27.97
D011	24.67
U223	20.81
D040	20.61

Exhibit D-2. Summary of Wastes by Hazardous Waste Codes Reported in the 1997 BRS	
EPA Hazardous Waste Code	**Sum of Short Tons**
D036	19.34
U052	16.38
U190	16.15
U196	13.40
D037	12.33
D043	11.93
U057	10.69
D022	10.57
U012	10.56
D029	10.05
U170	10.00
U107	9.93
U162	8.03
U154	7.06
U226	6.48
D033	6.33
D041	6.33
D030	6.33
D032	6.33
D042	6.33
D034	6.33
U165	6.01
D021	5.09
U161	4.92
LABP	4.35
U008	3.33
U044	2.37
U092	2.36
U202	2.36
U153	2.36
U123	2.36
U119	2.36
U103	2.36
F006	2.36
U034	2.36
U003	2.36
U112	2.36
P030	1.92
D016	1.39

Exhibit D-2. Summary of Wastes by Hazardous Waste Codes Reported in the 1997 BRS	
EPA Hazardous Waste Code	**Sum of Short Tons**
U160	1.23
U201	1.18
U009	1.01
U055	0.66
P105	0.41
U021	0.33
U117	0.30
U041	0.28
U007	0.28
U102	0.25
U043	0.25
U037	0.16
U404	0.15
P106	0.08
P120	0.08
P003	0.01
P023	0.01
P092	0.01
U151	0.00
U081	0.00
F027	0.00
TOTAL	**602,227.53**