United States Environmental Protection Agency

Solid Waste and Emergency Response (5305W)

EPA530-R-97-037a
NTIS: PB97-177 422
June 1992

EPA

Background Document for Capacity Analysis for Newly Listed Wastes and Hazardous Debris to Support 40 CFR 268 Land Disposal Restrictions (Final Rule)

Volume 1: Capacity Analysis Methodology and Results

Appendix A - Organic Waste Phone Logs

Appendix B - Hazardous Debris Issues and Concerns

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United States Environmental Protection Agency
Office of Solid Waste
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June 1992

BACKGROUND DOCUMENT FOR CAPACITY ANALYSIS FOR NEWLY LISTED WASTES AND HAZARDOUS DEBRIS TO SUPPORT 40 CFR 268 LAND DISPOSAL RESTRICTIONS (FINAL RULE)

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Chapter 1
Introduction

CHAPTER 1

INTRODUCTION

This document presents the capacity analysis EPA conducted to support the final rule on the Land Disposal Restrictions (LDRs) of Newly Listed Wastes and Hazardous Debris. EPA conducts the capacity analysis 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 and recovery prior to land disposal as a result of the LDRs and estimates alternative commercial treatment and recovery capacity available to manage wastes restricted from land disposal. In this final rule, EPA is prohibiting the land disposal of certain wastes listed between November 1984 and June 1990. These wastes are summarized in Exhibit 1-1.

1.1 LEGAL BACKGROUND

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

Under the Land Disposal Restrictions Program, EPA must identify levels or methods of treatment that substantially reduce the toxicity of a waste or the likelihood of migration of hazardous constituents from the waste. Whenever possible, EPA prefers to define treatment in terms of performance (i.e., levels of treatment, expressed as a concentration of hazardous constituents in residuals from treatment) rather than in terms of specific treatment methods. EPA's standards are generally based on the performance of the best demonstrated available technology (BDAT), as documented by treatment data collected at well-designed and well-operated systems using that technology, or are based on data derived from the treatment of similar wastes that are as difficult or more difficult to treat.

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[1] The LDRs are effective when promulgated unless the Administrator grants a national capacity variance from the otherwise applicable date and establishes a different date (not to exceed two years beyond the statutory deadline) based on :... the earliest date on which adequate alternative treatment, recovery, or disposal capacity which protects human health and the environment will be available (RCRA Section 3004(h)(2)).

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

EXHIBIT 1-1

NEWLY LISTED WASTES FOR WHICH STANDARDS ARE BEING FINALIZED

Waste Code	Description
Petroleum Refining Wastes	
F037	Petroleum refinery primary oil/water/solids separation sludge - Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling towers segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in Section 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing.
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge - Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes including, but are not limited to, all sludges and floats generated in induced air flotation (IAF) units, tanks, and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated in aggressive biological treatment units as defined in Section 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.

EXHIBIT 1-1

NEWLY LISTED WASTES FOR WHICH STANDARDS ARE BEING FINALIZED

Waste Code	Description
Other Organic Wastes	
UDMH Wastes:	
K107	Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines.
K108	Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.
K109	Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.
K110	Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) carboxylic acid intermediates.
2-Ethoxyethanol:	
U359	2-Ethoxyethanol
Dinitrotoluene and Toluenediamine Wastes:	
K111	Product washwaters from the production of dinitrotoluene via nitration of toluene.
K112	Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.
U328	Ortho-toluidine
U353	Para-toluidine

EXHIBIT 1-1

NEWLY LISTED WASTES FOR WHICH STANDARDS ARE BEING FINALIZED

Waste Code	Description
Ethylene Dibromide (EDB) Wastes:	
K117	Wastewater production from the reactor vent gas scrubber in the production of ethylene dibromide via-bromination of ethene.
K118	Spent adsorbent solids from the purification of ethylene dibromide via bromination of ethene.
K136	Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.
Methyl Bromide Wastes:	
K131	Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide.
K132	Spent adsorbent and wastewater separator solids from the production of methyl bromide.
Ethylenebisdithiocarbamic (EBDC) Wastes:	
K123	Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.
K124	Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts.
K125	Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.
K126	Baghouse dust and floor sweepings in milling and packaging operations from the production of ethylenebisdithiocarbamic acid and its salts.

The land disposal restrictions are effective immediately upon promulgation unless the Agency grants a national capacity variance from the statutory date because of a lack of available treatment/recovery capacity. For every waste, EPA considers, on a national basis, both the capacity of commercially available treatment or recovery technologies and the quantity of restricted wastes currently sent to land disposal for which on-site treatment or recovery capacity is not available. If EPA determines that adequate alternative treatment or recovery capacity is available for a particular waste, the land disposal restriction goes into effect immediately. If not, EPA establishes an alternative effective date based on the earliest date on which adequate treatment or recovery capacity will be available, or two-years, whichever is less.

RCRA allows EPA to grant national variances if there is insufficient capacity available among the nation's hazardous waste treatment facilities to manage the quantity of wastes requiring treatment as a result of the LDRs (RCRA Section 3004(h)(2)). Once the variance expires, the wastes must meet the LDR treatment standards prior to being placed on the land.

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

HSWA's schedule divided hazardous wastes into four broad categories: Solvent and Dioxin wastes; California list wastes[3], and scheduled wastes. The second category, whose final rule was issued on July 8, 1987, covers wastes originally listed by the State of California and adopted intact within HSWA. The "scheduled" wastes refer to the Agency's statutory timetable that restricted one-third of these wastes by August 8, 1988, two-thirds by June 8, 1989, and the remaining third by May 8, 1990. For hazardous wastes that are newly identified or listed after November 8, 1984, EPA is required to promulgate land disposal prohibitions within six months of the date of identification or listing (RCRA Section 3004(g)(4)). However, the statute does not provide an automatic prohibition of land disposal of such wastes if EPA fails to meet this deadline. Exhibit 1-2 summarizes the previous LDR rulemakings and their respective promulgation dates.

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

EXHIBIT 1-2

SUMMARY OF PREVIOUS LAND DISPOSAL RESTRICTIONS RULEMAKINGS

Rulemaking	Federal Register Notice	Promulgation Date
Solvents and Dioxins (surface disposed)	51 FR 40572	November 7, 1986
Solvents and Dioxins (deepwell-injected)	53 FR 28188	July 26, 1988
California List (surface disposed)	52 FR 25760	July 8, 1987
California List (deepwell injected)	53 FR 30908	July 26, 1988
First Third Rule	53 FR 31138	August 8, 1988
First Third Rule (deepwell 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

1.2 CAPACITY ANALYSIS METHODOLOGY

In evaluating the need for national capacity variances, EPA estimates the quantities of waste requiring alternative treatment as a result of the land disposal restrictions and the capacity available at commercial treatment/delivery facilities to manage the restricted wastes. This section provides an overview of EPA's methodology in estimating required and available capacity. By comparing the required capacity with the available commercial capacity, EPA can identify capacity shortfalls and make determinations concerning national capacity variances.

1.2.1 Determination of Required Commercial Treatment Capacity.

Required commercial treatment capacity represents the quantity of wastes currently being land disposed that can not be treated on site and, consequently, will require <u>commercial</u> treatment to meet a treatment standard prior to being land disposed. Required commercial capacity also includes the residuals generated by treatment of these wastes (i.e., the quantity of generated residuals that will require treatment prior to land disposal).

EPA identifies the waste streams potentially affected by the land disposal restrictions by type of land disposal unit, including surface impoundment; waste pile; land treatment unit; landfill; and underground injection well. Salt dome formations, salt bed formations, and underground mines and caves are additional methods of land disposal that are affected by the land disposal restrictions rulemakings. Since insufficient information is available to document the quantity of wastes disposed of by these three methods, they are not addressed in the analysis of quantities and required alternative capacity.

To determine the type of alternative capacity required by the affected wastes, EPA conducts a "treatability analysis" of each waste stream. Based on the waste's physical and chemical form data and information on prior management practices, EPA assigns the quantity of affected waste to the appropriate best demonstrated available technology (BDAT). Waste groups (i.e., waste streams described by more than one waste code) present special treatability concerns because they often contain constituents (e.g., organics and metals) requiring different types of treatment. To treat these wastes, EPA develops a treatment train that can treat all waste types in the group (e.g., incineration followed by stabilization of the incinerator ash). In these cases, EPA has estimated the amount of residuals that would be generated by treatment of the original quantity of waste and has included these residuals in the quantities requiring alternative treatment capacity.

EPA excludes from the estimate of required capacity the quantity of wastes that are treated on site. EPA collects information to identify the availability and use of on-site treatment at facilities. EPA identifies the quantities of waste requiring alternative treatment on a facility level basis; if the appropriate treatment/recovery technology is not available on-site, or if adequate available capacity is not present to manage the waste, then the appropriate quantity of waste requiring alternative treatment is aggregated into a national demand for commercial capacity.

Generation and management information concerning the wastes was collected by EPA during 1990 and early 1991 under the authority of section 3007 in RCRA. This capacity analysis incorporates data from that section 3007 information request, from the National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (the TSDR Survey); and from the National Survey of Hazardous Waste Generators (the Generator Survey). In addition, the Agency has contacted other facilities in order to obtain further information concerning waste generation, management practices, and residuals. The Agency also received voluntary capacity data from several facilities in response to the ANPRM (56 Federal Register 24444, May 30, 1991) and in response to the proposed rule (57 Federal Register 957 January 9, 1992).

1.2.2 Determination of Available Commercial Treatment.

The determination of available capacity for this capacity analysis used data from commercial facilities. Consequently, all estimates of capacity presented in this document represent commercially available (not private) capacity.[4] To determine whether to grant a national capacity variance for newly identified wastes regulated in today's rule, EPA analyzed available commercial capacity for alternative treatment or recovery technologies capable of meeting the final LDR treatment standards. This capacity analysis generally included estimating the maximum or design capacity (maximum) for appropriate waste management systems and the amount of waste currently going to these systems (utilized capacity). Available capacity was estimated as the difference between maximum and utilized capacity. For today's final rule, EPA analyzed commercial capacity for hazardous waste combustion (including incineration and reuse as fuel), biological treatment, chemical precipitation, and stabilization. In its analysis of incineration capacity, EPA requested voluntary waste quantity and capacity information from major commercial incineration firms. To assess reuse as fuel capacity, EPA analyzed the results of a survey conducted by the Cement Kiln Recycling Coalition (CKRC) in cooperation with EPA. The CKRC is a trade association representing cement kilns that burn wastes as fuel. For the remaining technologies, EPA based its capacity analysis on data compiled and analyzed as part of the Third Third rule. (See Chapter 2 for a detailed discussion of the data sources used for the analysis).

1.3 SUMMARY OF CAPACITY ANALYSIS CONDUCTED FOR FINAL RULE

EPA is promulgating treatment standards for certain wastes listed between November 1984 and June 1990 and debris contaminated with these newly listed wastes. To estimate the need for national capacity variances, EPA estimated the quantities of waste requiring alternative treatment as a result of the land disposal restrictions and the capacity available at commercial treatment facilities to manage the restricted wastes. Exhibit 1-3 indicates the total quantities of surface disposed (deepwell injected quantities are not included) wastes that will require alternative commercial treatment capacity as a result of the final rule.

Exhibit 1-4 summarizes commercially available capacity for each alternative treatment or recovery technology that will be required for newly listed petroleum refining and other organic wastes. This exhibit also summarizes the required capacity for each

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

EXHIBIT I-3

Quantities Requiring Commercial Treatment As a Result of the LDRs

Waste Code	Surface Disposed Quantities Requiring Alternative Capacity (tons/year)	Adequate Alternative Capacity Available (yes/no)
F037/8 - S.I.(1992-93)	173,000	No
F037/8 - S.I.(1993-94)	99,000	No
F037/8 - Routine	69,000	No
K107	0	Yes
K108	0	Yes
K109	0	Yes
K110	0	Yes
K111	<3,500	Yes
K112	0	Yes
K117	0	Yes
K118	<100	Yes
K123	0	Yes
K124	0	Yes
K125	<100	Yes
K126	0	Yes
K131	0	Yes
K132	0	Yes
K136	0	Yes
U328	<100	Yes
U353	<100	Yes
U359	<500	Yes
Mixed Rad. Waste	N/A[5]	No
Hazardous Debris	33,000	No

[5] Specific quantities are not available.

EXHIBIT 1-4

COMPARISON OF REQUIRED AND COMMERCIALLY AVAILABLE CAPACITY FOR SURFACE-DISPOSED NEWLY LISTED PETROLEUM REFINING AND OTHER ORGANIC WASTES

Technology	Available Capacity[6] (thousand tons/ year)	Required Capacity (thousand tons/ year)
Biological Treatment	188	<1
Chemical Precipitation	813	<1
Combustion of Liquids	526	<1
Combustion of Sludges and Solids (Cement Kilns)	121	102 (1992-1993)
		76 (1993-1994)
Combustion of Sludges and Solids (Commercial Incinerators)	116	144 (1992-1993)
		96 (1993-1994)
Stabilization	1,204	77

technology. Analysis of data indicates that sufficient commercial capacity is currently available for wastewater treatment, stabilization, and combustion of liquids. A comparison of the required and available capacity indicates that available capacity exists to treat all surface disposed wastes, excluding F037/8 petroleum refining wastes, hazardous debris, and mixed radioactive wastes.

Exhibit 1-5 lists the waste groups for which the EPA is granting a national capacity variance. EPA is granting a two-year national capacity variance for F037 and F038 wastes currently managed in surface impoundments; mixed radioactive wastes; and hazardous debris. The Agency is granting a one-year capacity variance for routinely-generated F037/8 wastes to allow time for additional bulk solids incineration capacity and capacity of other treatment and recycling technologies (e.g., solvent extraction and thermal desorption) to come on line and for cement kilns to comply with the interim status requirements of the BIF rule. Routinely generated F037/8 wastes are wastes

[6] Estimates of available combustion capacity for sludges and solids include processes not generally able to manage all F037/8 wastes. In addition, the cement kiln capacity estimate may not be available at the effective date of the final rule because some cement kilns may not meet the August deadline for compliance with the BIF rule.

EXHIBIT 1-5

SUMMARY OF NATIONAL CAPACITY VARIANCES FOR SURFACE-DISPOSED WASTES

Waste	Final Effective Date of Land Disposal Prohibition
F037 Removed From Surface Impoundments	June 1994
F038 Removed From Surface Impoundments	June 1994
F037 Managed in Surface Impoundments	June 1994
F038 Managed in Surface Impoundments	June 1994
Routinely Generated F037	June 1993
Routinely Generated F038	June 1993
Mixed Radioactive Wastes	June 1994
Hazardous Debris	June 1994

generated from tanks, including equalization tanks and oil/water/solids separators (such as CPI separators and IAF units) that are not API separators or DAF units.

Petroleum refining wastes from surface impoundments that have not yet closed or retrofitted will require alternative treatment to meet the LDR treatment standards. EPA has evaluated these wastes separately from routinely generated F037/8 wastes.

Because incineration capacity for bulk solids is inadequate for treating the quantity of F037/8 wastes that will be removed from surface impoundments and require treatment by incineration, EPA is granting a two-year national capacity variance for F037/8 wastes from surface impoundments.

In the analysis of mixed radioactive wastes, EPA determined that there is currently a treatment capacity shortfall for all mixed radioactive wastes that are surface-disposed. Consequently, EPA is granting a two-year national capacity variance for all surface-disposed mixed radioactive wastes. EPA has no information on the deepwell-disposal of mixed radioactive wastes and, therefore, EPA is not granting a national capacity variance for these wastes.

EPA is promulgating three separate treatment options for hazardous debris: extraction, destruction, and immobilization. In the analysis of hazardous debris, EPA determined that there will not be sufficient capacity in June 1992 to treat debris contaminated with newly listed and identified wastes. This lack of capacity is due primarily to the increased demand for destruction and immobilization capacity to treat debris contaminated with Third Third wastes for which the national capacity variance expired in May 1992. In addition, EPA has received information indicating that there is currently insufficient permitted capacity for extraction technologies. Consequently, EPA is granting a two-year national capacity variance for all surface-disposed debris contaminated with newly listed and identified wastes covered under this final rule.

For the analysis of underground injected wastes, EPA identified no quantities of K107, K108, K109, K110, K123, K124, K125, K126, K136, U328, U353, and U359 that are currently being disposed via underground injection wells. Therefore, these wastes are prohibited from injection upon the effective date of the rule. Current data indicates that F037, F038, K117, K118, K111, K112, K131, and K132 are being underground injected by UIC Class 1 hazardous waste injection wells. Because adequate capacity exists to manage deep well-injected F037, F038, K112, and K112 wastes, EPA is not granting a variance for these wastes. Comments received on the proposed rule indicate that 300 million gallons of K117, K118, K131, and K132 wastewaters are currently being deep well-injected. Because insufficient capacity exists to treat this quantity, the Agency is granting a two-year national capacity variance for deep well-injected K117, K118, K131, and K132 wastewaters.

1.4 ORGANIZATION OF BACKGROUND DOCUMENT SUPPORTING CAPACITY ANALYSIS

EPA has prepared this background document to present the capacity analysis conducted for the final LDRs for newly listed wastes, mixed radioactive wastes, and hazardous debris. The document is organized into seven chapters and appendices, as are described below:

- **Chapter 1: Introduction**
- **Chapter 2: Commercial Treatment Capacity.** Describes the methodology and data used to determine available commercial capacity for biolcgical treatment, chemical precipitation, combustion of liquids and solids, and stabilization.
- **Chapter 3: Capacity Analysis for F037 and F038 Petroleum Refining Wastes.** Discusses methodology and data used to conduct the capacity analysis for petroleum refining wastes (F037/8).

- **Chapter 4: Capacity Analysis for Other Newly Listed Wastes.** Describes the capacity analysis for organic U wastes (U328, U353, and U359), wastes from the production of unsymmetrical dimethylhydrazine (K107, K108, K109, and K110), wastes from the production of dinitrotoluene and toluenediamine (K111 and K112), wastes from the production of ethylene dibromide (K117, K118, and K136), and wastes from the production of methyl bromide (K131 and K132).

- **Chapter 5: Capacity Analysis for Mixed Radioactive Wastes.** Provides the methodology used for the capacity analysis of radioactive wastes mixed with newly listed wastes for which LDRs are being promulgated in the final rule.

- **Chapter 6: Capacity Analysis for Debris Contaminated With Newly Listed Wastes.** Discusses the methodology and data used to conduct the capacity analysis for debris contaminated with newly listed for which LDRs are being promulgated in final rule.

- **Chapter 7: K061, K062, and F006 Wastes.** Provides a description of the revisions to treatment standards for K061, K062, and F006 in the final rule.

- **Appendices A - F:** Appendix A provides phone logs of contacts with facilities for the capacity analysis of other newly listed wastes; Appendix B addresses some issues and concerns related to the analysis of hazardous debris; Appendix C contains background data on the determination of available incineration and cement kiln capacity; Appendices D through F contain information on petroleum refineries used for estimating required F037/8 capacity.

Chapter 2 Commercial Treatment Capacity

CHAPTER 2
COMMERCIAL TREATMENT CAPACITY

Chapter 2 presents EPA's estimates of available commercial treatment capacity for newly listed and newly identified wastes. Section 2.1 summarizes the results of EPA's analysis of commercial combustion capacity at incinerators and cement kilns. Section 2.2 discusses EPA's estimate of available commercial incineration capacity for sludges and solids, the methodology used to arrive at its estimate, capacity at individual incineration facilities, planned expansions to commercial incineration capacity. Revisions resulting from public comments received in response to the proposed rule are discussed in individual facility sections. These comments are summarized and discussed in detail in *Response to Comments Background Document for the Newly Listed Wastes and Hazardous Debris Proposed Rule.* Section 2.3 discusses EPA's estimate of available cement kiln capacity for sludges and solids, the methodology used to estimate available cement kiln capacity, each facility included in the estimate, and planned expansions of commercial cement kiln capacity. Section 2.4 discusses capacity for commercial treatment other than combustion, including stabilization, biological treatment, and chemical precipitation.

2.1 COMMERCIAL COMBUSTION CAPACITY SUMMARY

This section summarizes the results of EPA's analysis of commercial combustion capacity at incinerators and cement kilns, as EPA expects the majority of treatment capacity for newly listed wastes to come from cement kilns and incinerators. Exhibit 2-1 summarizes EPA estimates of commercial hazardous waste capacity by waste form and facility. Exhibit 2-2 lists the incineration facilities included in the commercial combustion capacity estimate, along with the waste forms each facility can burn. Each of these facilities is discussed in greater detail in section 2.1.2. Exhibit 2-3 lists the cement kilns included in this capacity update, and the types of wastes accepted at each facility. Each of these facilities is discussed in greater detail in section 2.2.3. Exhibit 2-4 is a map showing the location of cement kilns and incinerators considered in EPA's estimate of commercial sludge and solid hazardous waste burning capacity in May 1992. Specifically, the map shows all cement kiln and incinerator facilities with available capacity that were included in the capacity estimates. Two incinerator facilities on the map, LWD, Calvert City, Kentucky, and Chemical Waste Management, Chicago, Illinois, were not included in the capacity estimates due to permit disputes with state regulatory authorities which make their future operating status uncertain.

Exhibit 2-1

May 1992 Commercial Hazardous Waste Combustion Capacity Summary

Waste Form	Incinerators			Cement Kilns			Total Available (1000 tpy)
	Maximum (1000 tpy)	Available (1000 tpy)	Percent Utilized	Maximum (1000 tpy)	Available (1000 tpy)	Percent Utilized	
Pumpable Sludges	117	51	59 %	28	12	57 %	63
Nonpumpable sludges	3	1	66	5	2	60	3
Containerized solids	178	41	77	129	83	36	124
Dry solids	NA	NA	NA	37	24	35	24
Bulk Solids	73	23	68	NA	NA	NA	23
Total Sludges and Solids	371	116	69	198	121	39	237
Liquids	351	172	51	914	354	61	526[1]
Total	722	288	60	1,112	475	57	763

NA: Not Applicable. This type of capacity generally does not apply to this type of facility.

Totals may not add correctly due to rounding.

[1] Facilities burning only liquid hazardous waste are generally not included in this number. In its capacity analysis, EPA targeted facilities burning sludges and solids because these have historically been more limited.

Exhibit 2-2

Incinerators Included in May 1992 Capacity Estimate

Facility Name and Location	Types of Wastes Burned
Aptus, Coffeyville, KS	liquids, containerized solids, bulk solids
Aptus, Tooele, UT	liquids, containerized solids, bulk solids
Chemical Waste Management Port Arthur, TX	pumpable sludges, nonpumpable sludges, containerized solids, bulk solids
Chemical Waste Management Sauget, IL	liquids, pumpable sludges, nonpumpable sludges, containerized solids, bulk solids
ENSCO, El Dorado, AR	liquids, sludges and solids
Rhone-Poulenc Basic Chemicals Baton Rouge, LA	liquids, pumpable sludges
Rhone-Poulenc Basic Chemicals Houston, TX	liquids, pumpable sludges
Rollins Environmental Services Baton Rouge, LA	liquids, pumpable sludges, containerized solids
Rollins Environmental Services Bridgeport, NJ	liquids, pumpable sludges, containerized solids
Rollins Environmental Services Deer Park, TX	liquids, pumpable sludges, containerized solids, bulk solids
Ross Incineration Services, Grafton, OH	liquids, nonpumpable sludges, containerized solids, bulk solids
ThermalKEM, Rock Hill, SC	liquids, pumpable sludges, nonpumpable sludges, containerized solids, bulk solids

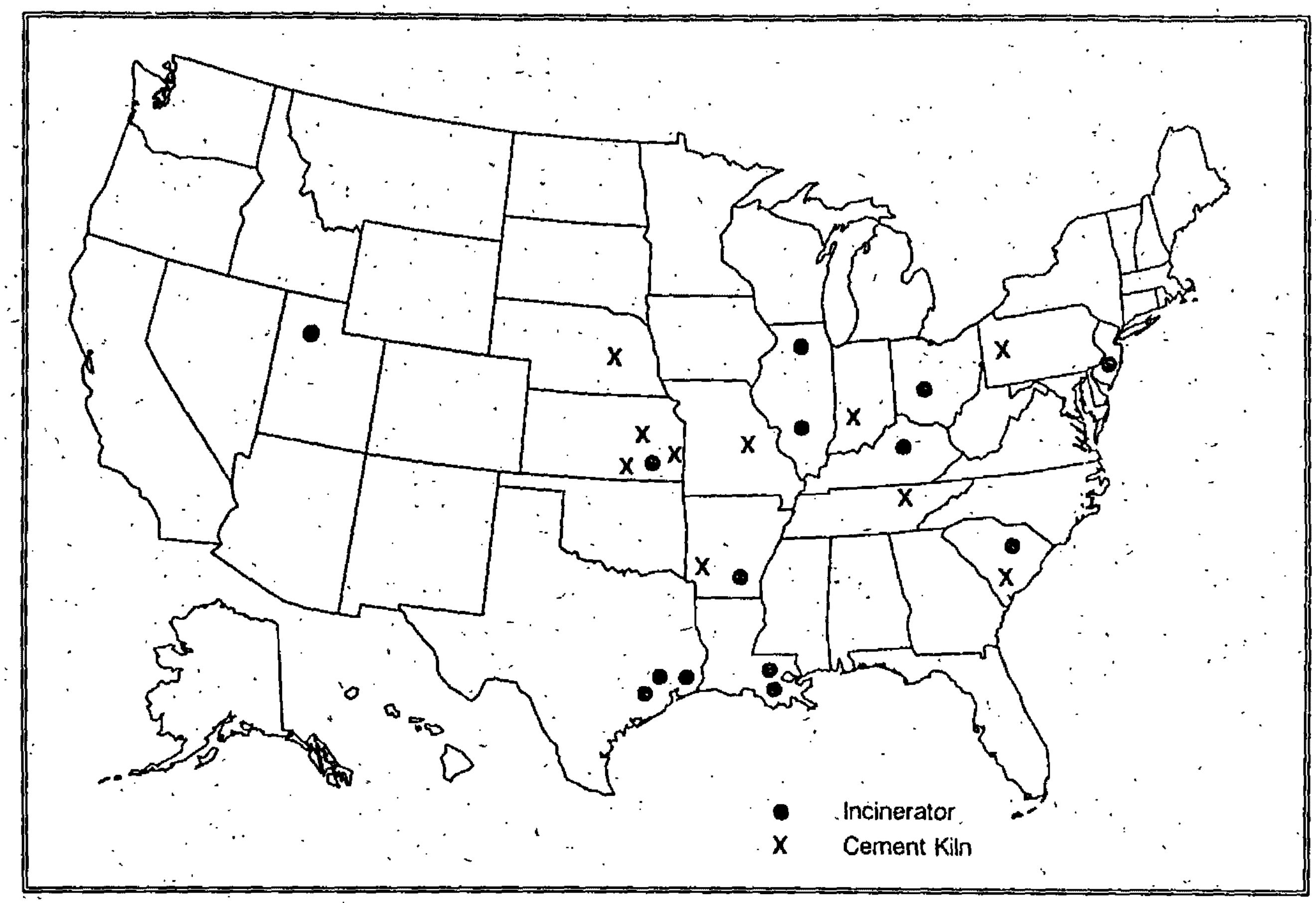
Exhibit 2-3

Cement Kilns Included in May 1992 Capacity Estimate

Facility Name and Location	Types of Wastes Burned
Ash Grove Cement, Chanute, KS	liquids, containerized solids
Ash Grove Cement, Foreman, AR	liquids, containerized solids
Ash Grove Cement, Louisville, NE	liquids, containerized solids
ESSROC Cement Group, Logansport, IN	liquids, containerized solids
Giant Cement, Harleyville, SC	liquids, dry solids
Heartland Cement, Independence, KS	dry solids
Keystone Cement, Bath, PA	liquids
Lafarge, Alpena, MI	liquids
Lafarge, Demopolis, AL	liquids
Lafarge, Fredonia, KS	liquids, dry solids
Lafarge, Paulding, OH	liquids
Lone Star Industries, Green Castle, IN	liquids, containerized solids
Medusa Cement, Wampum, PA	liquids, pumpable sludges, nonpumpable sludges
National Cement, Lebec, CA	liquids
River Cement, Festus, MO	liquids, pumpable sludges, nonpumpable sludges
San Juan Cement, San Juan, PR	liquids
Southdown, Fairborn, OH	liquids
Southdown, Knoxville, TN	liquids, containerized solids

Exhibit 2-4

Locations of Incinerators and Cement Kilns Included in May 1992 Commercial Sludge and Solid Combustion Capacity Estimate



2.2 COMMERCIAL INCINERATION CAPACITY

This section focuses on the combustion capacity of the nation's commercial hazardous waste incinerator facilities. Sections 2.2.1 discusses how EPA collected and analyzed information. Section 2.2.2 discusses capacity at individual facilities. Section 2.2.3 discusses sludge and solid incineration capacity additions planned for 1992 to 1994. Phone logs documenting calls to incineration facilities are in Appendix C.

2.2.1 General Approach and Assumptions

To support its capacity analysis for newly listed and newly identified wastes, EPA contacted currently operating hazardous waste incineration companies prior to the proposed rule to update the Agency's available capacity estimates for RCRA hazardous sludges and solids. For this analysis, EPA categorized hazardous waste into the following forms: liquids, pumpable sludges, nonpumpable sludges, containerized solids, and bulk solids. Since the proposed rule, EPA has incorporated information contained in public comments on the proposed rule, and collected additional data to resolve specific issues raised in public comments.

Analysis for the Proposed Rule

Commercial hazardous waste incineration firms that can incinerate sludges and solids were contacted prior to the proposed rule and asked if they would be willing to participate in a voluntary capacity update. The companies that responded to the capacity update were Aptus, Chemical Waste Management, Ross Incineration Services, ThermalKEM, Rhone-Poulenc, and Rollins. In August 1991, these companies were sent a capacity guideline form indicating the types of information EPA could use in its capacity analysis. To arrive at accurate facility estimates, EPA requested both facility-specific and unit-specific information including permit status, number of incinerator units currently operating and expected to operate by 1994, acceptable physical form of receiving wastes, acceptable RCRA waste codes, maximum bromine limits (high bromine concentrations are characteristic of K117 and K118 waste), and future changes to the facility that may increase or decrease capacity. Unit specific questions included: type of unit, thermal rating, annual average operating hours, feed mechanisms, waste burned in first half of 1991, permitted waste feed capacity for each form of waste, and practical waste feed capacity for each form of waste. Capacity guideline forms submitted by hazardous waste incinerator facilities are in Appendix C. Responses from facilities requesting that their capacity information be maintained as Confidential Business Information are also in the docket, in a separate document entitled *Background Data Set for Commercial Hazardous Waste Incinerator Capacity Analysis -- Confidential Business Information*.

To estimate maximum and available capacities, EPA used unit-specific capacity information including average operating hours per year, RCRA hazardous waste volume burned in the first half of 1991, permitted maximum waste feed capacity, and practical waste feed capacity. EPA categorized wastes into the following forms: liquids, pumpable sludges, nonpumpable sludges, containerized solids, and bulk solids.

Data submitted by each facility varied in detail. All facilities reported waste volumes burned during the first half of 1991, and indicated that these volumes were typical for the year. Therefore, EPA estimated annual utilization by multiplying the volume of waste burned in the first half of 1991 by two.

EPA estimated practical yearly maximum capacities for each waste form using several methods, depending on the information provided by each facility. Several facilities submitted both practical and permitted waste feed capacities. If the permitted and practical capacities differed, EPA used the lower of the two reported capacities. Some facilities reported capacity estimates in pounds per hour. EPA converted hourly estimates to yearly estimates by multiplying them by average operating hours per year. If the facility did not report average operating hours per year, EPA assumed a typical operating year of 7,200 hours. Some facilities reported total capacities, but did not distinguish between specific waste forms. EPA distributed total capacity estimates into specific waste forms based on volumes of each waste form burned in 1991.

EPA adjusted reported maximum practical capacities using reduction factors for two different scenarios. Reported capacities for new facilities were reduced by 50 percent to account for the likelihood that new capacity will experience start-up delays. It is EPA's experience that such start-up delays are common for new incinerators (e.g. Chemical Waste Management's Port Arthur facility.) Capacity estimates at existing facilities were reduced by 10 percent to account for the likelihood that not all facilities will achieve their reported maximum capacity. To determine adjusted available capacity, EPA subtracted utilized capacity from adjusted maximum practical capacity. The following hypothetical example indicates how EPA used reported information to arrive at adjusted available capacity estimates.

Facility Information:

Operating Status:	existing facility
Operating hours per year:	unreported
Maximum practical capacity:	25,000 lbs/hour
Waste volume burned during first half of 1991:	6,500 tons liquids, 3,500 tons containerized solids, 10,000 tons bulk solids

1. Convert maximum practical waste feed capacity to tons/year.

25,000 lbs/hour x (1 ton/2,000 lbs) x (7,200 hours/year) = 90,000 tons/year

2. Calculate practical waste feed capacities for each specific waste form.

(a) Annualize utilized capacity by multiplying the waste volume burned in the first half of 1991 by two.

Liquids:	(6,500 tons x 2)=	13,000 tons
Pumpable sludges:		0 tons
Nonpumpable sludges:		0 tons
Containerized solids:	(3,500 tons x 2)=	7,000 tons
Bulk Solids:	(10,000 tons x 2)=	20,000 tons
Total:		40,000 tons

(b) Calculate waste ratios based on current burning practices by dividing utilized capacity for each waste form by total utilized capacity.

Liquids:	(13,000 tons/40,000 tons)=	32.5%
Containerized solids:	(7,000 tons/40,000 tons)=	17.5%
Bulk solids:	(20,000 tons/40,000 tons)=	50.0%

(c) Distribute reported total practical capacity among specific waste forms by multiplying waste ratios for each type of waste by total waste capacity.

Liquids:	32.5% x 90,000 tons/year =	29,250 tons/year
Containerized solids:	17.5% x 90,000 tons/year =	15,750 tons/year
Bulk solids:	50.0% x 90,000 tons/year =	45,000 tons/year

3. Adjust reported practical capacities by 10% reduction factor for existing facilities.

Liquids:	29,250 tons/year x 90% =	26,325 tons/year
Containerized solids:	15,750 tons/year x 90% =	14,175 tons/year
Bulk solids:	45,000 tons/year x 90% =	40,500 tons/year

4. Calculate available capacity by subtracting utilized capacity from maximum capacity.

Liquids:	29,250 - 13,000 tons/year =	16,250 tons/year
Containerized solids:	15,750 - 7,000 tons/year =	8,750 tons/year
Bulk solids:	45,000 - 20,000 tons/year =	25,000 tons/year

5. Calculate adjusted available capacities by subtracting annual utilized capacity from adjusted practical capacities.

Liquids:	26,325 - 13,000 tons/year =	13,325 tons/year
Containerized solids:	14,175 - 7,000 tons/year =	7,175 tons/year
Bulk solids:	40,500 - 20,000 tons/year =	20,500 tons/year

Revisions to the Analysis since the Proposed Rule

EPA received several public comments on the proposed rule regarding commercial incineration capacity[2]. As a result of information and issues contained in public comments, EPA revised its capacity estimates for the following incinerators: Rollins, Deer Park, Texas; Chemical Waste Management, Port Arthur, Texas; and Aptus, Tooele, Utah. Specific changes to these estimates are discussed in Section 2.2.2 below, and background documentation for these changes is provided in Appendix C.

After the public comment period ended, EPA received additional capacity information from the Hazardous Waste Treatment Council. Even though it was received well after the comment period closed, EPA reviewed the information to determine whether it could potentially affect EPA's variance decision. Based on review of the information, EPA determined that it could not use the information as received because it was not company- or facility-specific, it was not presented at a level of detail that would have allowed it to be compared to other information on which EPA's capacity analysis was based (e.g., whether capacity was from pumpable sludge, bulk solids, or container systems), and it was unclear how HWTC defined available.

EPA contacted HWTC to clarify the information (telephone logs documenting these calls are also in Appendix C). In response, HWTC provided confidential company-specific information. HWTC also noted that it was not clear whether reported excess capacity was already committed by current contracts to other wastes, or what specific waste feed systems (e.g., bulk solids versus drums) were accounted for in the estimates. Because of these limitations and the fact the company-specific data were not facility-specific, EPA was unable to reconcile the new information with that already used in the analysis. Although time constraints precluded EPA from clarifying details of this new information, EPA does not believe that it would have changed EPA's variance decision because EPA has already received more detailed capacity information from each of the firms included in the HWTC data. The only new facility noted in any communication with EPA is a lightweight aggregate kiln which, although it is permitted as a hazardous waste incinerator, is subject to product-quality based minimum waste heating value constraint of about 5,000 BTU/lb. EPA believes that, like cement kilns, this facility

[2] For a detailed discussion of public comments pertaining to commercial incineration capacity, refer to Chapter 2 of *Response to Comments Background Document for Phase One Land Disposal Restrictions Proposed Rule.*

cannot reduce the required bulk solids incineration capacity for incineration of low-BTU wastes.

2.2.2 Individual Incineration Facility Capacity Analysis

Exhibit 2-5 presents utilized, maximum, and available capacity for each unit at each commercial incineration facility. As indicated by Exhibit 2-5, EPA estimates that roughly 116,000 tons per year of commercial sludge/solid incineration capacity was available as of May 1992 (51,000 tons pumpable sludges, 1,000 tons nonpumpable sludges, 41,000 tons containerized solids, and 23,000 tons bulk solids). This section summarizes the specific method and results for each commercial hazardous waste incinerator included in the capacity analysis. This section includes capacity information received by EPA between the proposed and final rules.

Aptus, Coffeyville, Kansas

Aptus, a Westinghouse company, has a TSCA and RCRA permit. The incinerator unit is a slagging rotary kiln with a maximum permitted heat release of 61.9 MBTU/hour.

This facility can process several physical forms of waste. Liquids are directly injected into the rotary kiln. Containerized solids are ram-fed into the rotary kiln. Recycle feed anddrop feed systems are used to feed bulk solids into the incinerator unit. Prior to July 1991, this facility burned only PCB contaminated wastes. It is currently working to expand its RCRA waste receipts and the firm intends to distribute its capacity between TSCA and RCRA wastes based on market conditions.

Capacity information provided by the facility included the total hourly maximum permitted capacity and the maximum hourly permitted capacity for solids. Based on discussions with facility managers, EPA estimated the maximum practical capacity to be 80 percent of the maximum permitted capacity. EPA estimated that 50 percent of maximum practical capacity could be devoted to burning RCRA waste by May 1992, and considered this capacity as new capacity. Consequently, 20 percent of the reported permitted solids capacity was considered available for RCRA wastes (80 percent of the permitted limit is practical x 50 percent of practical capacity for RCRA wastes x 50 percent adjustment for new capacity).

This facility is permitted to accept F037, F038, K117, and K118. The facility reported that there is no bromine limit, but its permit does limit total halogen feed to 1,900 lbs/hour. This facility does not accept K048-52. This was a management decision rather than a technical restriction, and the facility is currently investigating whether it will accept F037 and F038. EPA did not revise its estimate of the facility's available capacity because it is able to take F037 and F038. If it does not burn F037 and F038, it can accept other bulk solids and would therefore be able to accept wastes that are currently

EXHIBIT 2-5

SUMMARY OF COMMERCIAL SLUDGE/SOLID INCINERATION CAPACITY THROUGH 1992

FACILITY NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 ESTIMATED MAXIMUM CAPACITY (TONS/YR)	MAY 1992 ESTIMATED AVAILABLE CAPACITY (TONS/YR)
APTUS	RK	LIQ	0	7,221	7,221
COFFEYVILLE, KS		PUMP. SL.	0	0	0
KSD981506025		NPU. SL.	0	0	0
		CONT. SOL.	0	2,500	2,500
		BULK SOL.	0	2,500	2,500
	FACILITY	TOTAL	0	12,221	12,221
APTUS (WESTINGHOUSE)	RR	LIQ			
TOOELE, UT		PUMP. SL.			
		NPU. SL.		* SEE NOTE	BELOW *
		CONT. SOL.			
		BULK SOL.			
	FACILITY TOTAL		0	0	0
CHEMICAL WASTE MANAGEMENT	FH	LIQ	CBI	CBI	CBI
SAUGET, IL		PUMP. SL.	CBI	CBI	CBI
ILD098642424		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	UNIT TOTAL		CBI	CBI	CBI
	FH	LIQ	CBI	CBI	CBI
		PUMP. SL.	CBI	CBI	CBI
		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	UNIT TOTAL		CBI	CBI	CBI
	FH	LIQ	CBI	CBI	CBI
		PUMP. SL.	CBI	CBI	CBI
		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	UNIT TOTAL		CBI	CBI	CBI

X

EXHIBIT 2-5 (CONTINUED)

SUMMARY OF COMMERCIAL SLUDGE/SOLID INCINERATION CAPACITY THROUGH 1992

FACILITY NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 ESTIMATED MAXIMUM CAPACITY (TONS/YR)	MAY 1992 ESTIMATED AVAILABLE CAPACITY (TONS/YR)
CHEMICAL WASTE MANAGEMENT	MRK	LIQ	CBI	CBI	CBI
SAUGET, IL		PUMP. SL.	CBI	CBI	CBI
ILD098642424		NPU. SL.	CBI	CBI	CBI
(CONTINUED)		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	UNIT TOTAL		CBI	CBI	CBI
	FACILITY TOTAL		CBI	CBI	CBI
CHEMICAL WASTE MANAGEMENT	RK	LIQ	CBI	CBI	CBI
PORT ARTHUR, TX		PUMP. SL.	CBI	CBI	CBI
TXD00838896		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	FACILITY TOTAL		CBI	CBI	CBI
ENSCO	RK	LIQ			
ELDORADO, AR		PUMP. SL.			
ARD069748192		NPU. SL.			
		CONT. SOL.	32,076	35,640	3,564
		BULK SOL.			
	UNIT TOTAL		32,076	35,640	3,564
	RK	LIQ			
		PUMP. SL.			
		NPU. SL.			
		CONT. SOL.			
		BULK SOL.			
	UNIT TOTAL		0	0	0
	MRK	LIQ			
		PUMP. SL.			
		NPU. SL.			
		CONT. SOL.	11,664	12,960	1,296
		BULK SOL.			
	UNIT TOTAL		11,664	12,960	1,296
	FACILITY TOTAL		43,740	48,600	4,860

EXHIBIT 2-5 (CONTINUED)

SUMMARY OF COMMERCIAL SLUDGE/SOLID INCINERATION CAPACITY THROUGH 1992

FACILITY NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 ESTIMATED MAXIMUM CAPACITY (TONS/YR)	MAY 1992 ESTIMATED AVAILABLE CAPACITY (TONS/YR)
RHONE-POULENC	SR	LIQ	CBI	CBI	CBI
BATON ROUGE, LA		PUMP. SL.	CBI	CBI	CBI
LAD008161234		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	UNIT TOTAL		CBI	CBI	CBI
	SR	LIQ	CBI	CBI	CBI
		PUMP. SL.	CBI	CBI	CBI
		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	UNIT TOTAL		CBI	CBI	CBI
	FACILITY	TOTAL	CBI	CBI	CBI
RHONE-POULENC	SR	LIQ	CBI	CBI	CBI
HOUSTON, TX		PUMP. SL.	CBI	CBI	CBI
TXD008099079		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	FACILITY	TOTAL	CBI	CBI	CBI
ROLLINS ENVIRONMENTAL	RK	LIQ	26,281	43,797	17,516
BATON ROUGE, LA		PUMP. SL.	1,592	2,606	1,014
LAD010395127		NPU. SL.	0	0	0
		CONT. SOL.	10,445	17,162	6,717
		BULK SOL.	0	0	0
	FACILITY	TOTAL	38,318	63,564	25,246
ROLLINS ENVIRONMENTAL	RK	LIQ	26,457	30,699	4,242
BRIDGEPORT, NJ		PUMP. SL.	2,532	4,052	1,520
NJD053288239		NPU. SL.	0	0	0
		CONT. SOL.	9,016	14,367	5,351
		BULK SOL.	0	0	0
	FACILITY TOTAL		38,005	49,118	11,113

EXHIBIT 2-5 (CONTINUED)

SUMMARY OF COMMERCIAL SLUDGE/SOLID INCINERATION CAPACITY THROUGH 1992

FACILITY NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 ESTIMATED MAXIMUM CAPACITY (TONS/YR)	MAY 1992 ESTIMATED AVAILABLE CAPACITY (TONS/YR)
ROLLINS ENVIRONMENTAL	RK	LIQ	25,500	39,098	13,598
DEER PARK, TX	CP	PUMP. SL.	8,500	13,033	4,533
TXD055141378		NPU. SL.	0	0	0
		CONT. SOL.	17,000	26,066	9,066
		BULK SOL.	0	0	0
	UNIT TOTAL		51,000	78,197	27,197
	RK/RR	LIQ	23,800	37,427	13,627
	CP	PUMP. SL.	11,050	17,377	6,327
		NPU. SL.	0	0	0
		CONT. SOL.	16,575	26,066	9,491
		BULK SOL.	18,615	35,103	16,488
	UNIT TOTAL		70,040	115,973	45,933
	FACILITY	TOTAL	121,040	194,170	73,130
ROSS INCINERATION SERVICES	CBI	LIQ	CBI	CBI	CBI
GRAFTON, OH		PUMP. SL.	CBI	CBI	CBI
OHD048415665		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	FACILITY	TOTAL	CBI	CBI	CBI
THERMALKEM	FH	LIQ	CBI	CBI	CBI
ROCK HILL, SC		PUMP. SL.	CBI	CBI	CBI
SCD044442333		NPU. SL.	CBI	CBI	CBI
		CONT. SOL.	CBI	CBI	CBI
		BULK SOL.	CBI	CBI	CBI
	FACILITY	TOTAL	CBI	CBI	CBI

EXHIBIT 2-5 (CONTINUED)

SUMMARY OF COMMERCIAL SLUDGE/SOLID INCINERATION CAPACITY THROUGH 1992

FACILITY NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 ESTIMATED MAXIMUM CAPACITY (TONS/YR)	MAY 1992 ESTIMATED AVAILABLE CAPACITY (TONS/YR)
AGGREGATE CBI		LIQ.	77,196	192,900	115,704
		PUMP. SL.	42,634	80,286	37,652
		NPU SL.	2,200	3,120	920
		CONT. SOL.	40,016	43,084	3,068
		BULK SOL.	30,978	35,424	4,446
	TOTAL CBI		193,024	354,813	161,789
TOTAL LIQUID			179,234	351,142	171,908
TOTAL PUMPABLE SLUDGES			66,308	117,353	51,045
TOTAL NONPUMPABLE SLUDGES			2,200	3,120	920
TOTAL CONTAINERIZED SOLIDS			136,792	177,844	41,052
TOTAL BULK SOLIDS			49,593	73,027	23,434
TOTAL (TONS/YEAR)			434,127	722,486	288,359

NOTES:

Some totals may be inexact due to rounding errors.

UNIT TYPES:

- CP = Concrete Pump
- FB = Fluidized Bed
- FH = Fixed Hearth Kiln
- IR = Infrared Unit
- LI = Liquid Injection
- MRK = Mobile Rotary Kiln
- RK = Rotary Kiln (often include liquid injection ports)
- RR = Rotary Reactor
- SR = Sulfur Recovery Furnace

* NOTE * EPA assumed no available capacity for this facility because it has yet to receive approval of its trial burn results, and its permit modification for F037 and F038.

going to facilities that take F037 and F038, thereby freeing capacity at these facilities. This facility reported no plans to change capacity within the next three years.

Aptus, Tooele, Utah

This new facility received a RCRA Part B permit in March 1990 that allowed the construction of the incinerator and waste storage buildings. The final permit will be issued pending successful trial burns conducted in May 1992 (at the time of the proposed rule, trial burns were scheduled for January 1992). Aptus also has applied for a TSCA permit to burn PCB contaminated waste. The incinerator system at this facility is a slagging rotary kiln with an afterburner. This system has a total heat release of 120 MBTU/hour.

This facility will be equipped with several mechanisms for feeding waste into the slagging rotary kiln. Liquids will be injected directly from a storage tank into the kiln and/or afterburner chamber. Pumpable sludges, having a viscosity lower than 10,000 centipoise, will be fed via a cement pump. Bulk solids and nonpumpable sludges will be placed into holding tanks. From these tanks, the waste will be moved by a clamshell to an apron feeder where the waste will be fed directly into the kiln feed chute. Containerized solids that do not require shredding (e.g., soils) will be fed directly into the kiln via an elevator feed system. Containerized solids and bulk solids that require shredding will be processed through a shredder prior to being placed into storage tanks. During its shakedown period, the facility is accepting petroleum refining wastes for bulk solids incineration. They rejected one load in a tanker intended for pumpable sludge incineration because it was too viscous for the pumpable sludge feed system. The facility indicated petroleum refining wastes in drums could also be fed through its containerized solids feed system.

Capacity information provided by the facility included hourly maximum permitted and hourly maximum practical capacities. The facility reported that its entire capacity could be dedicated to RCRA wastes if warranted by demand. Because this facility did not have final approval of permitted operating parameters, and required a permit modification for F037 and F038 at the time of the final rule, EPA did not include its capacity in its May 1992 capacity estimate of available capacity for F037 and F038.

Aptus, Utah, expects to add F037 and F038 to its permit in August 1992. The facility is currently permitted to burn K117 and K118 wastes. The maximum permitted bromine feed rate at this facility is 4,100 lbs/hour. This facility reported plans to add storage capacity in coming years if warranted by demand, but it does not currently plan to add incineration capacity.

Chemical Waste Management (Trade Waste Incineration), Sauget, Illinois

This RCRA-permitted facility operates four incinerator units. Three of the units are of the fixed hearth design. Two of these units have maximum permitted heat releases of 16 MBTU/hour and one has a maximum permitted heat release of 14 MBTU/hour. The fourth unit, a rotary kiln, has a maximum permitted heat release of 50 MBTU/hour.

This facility can accept all physical forms of wastes. Liquids are blended in tanks and transferred to atomizers for direct injection into the incinerator unit(s). Pumpable sludges are injected into the incinerator unit(s) via a sludge lance. Nonpumpable sludges and containerized solids are repackaged into burnable containers and ram-fed into the incinerator units. Bulk solids are unloaded into pits and transported via clamshell into the rotary kiln unit.

For each unit, this facility provided waste volumes burned during the first half of 1991, total hourly maximum permitted and practical waste capacities, and hourly maximum permitted and practical waste capacities for each physical form of waste. EPA applied the standard 10 percent reduction factor to the maximum capacity of this facility. Chemical Waste Management requested that capacity data submitted for this facility be classified as Confidential Business Information. Capacities for each accepted waste form are included in the aggregate CBI capacity estimates.

This facility can accept F037, F038, K117, and K118. Bromine in the feed is kept below 0.5 percent due to operational constraints.

Chemical Waste Management reported that it may build a material processing facility that would increase its containerized solid processing capacity, but it would not increase overall incineration capacity.

Chemical Waste Management, (SCA) Chicago, Illinois

This RCRA Interim Status and TSCA-permitted facility is not currently operating due to operational and permit problems. EPA did not include this facility's capacity in its national commercial incinerator capacity estimate due to the facility's current operating status, and uncertainty regarding future operation at the facility. The incinerator unit at this facility is a rotary kiln with a maximum heat release of 120 MBTU/hour.

The feed mechanism for this unit consists of a drum conveyor and ram-feed for containerized solids. In general, bulk solids and pumpable sludges are not accepted at this facility. Nonpumpable sludges are generally accepted only as containerized solids.

The facility submitted waste volumes burned in the first half of 1991, hourly maximum waste capacities for liquids and containerized solids (limited due to Interim Status conditions), and estimated hourly maximum practical waste capacities for liquids and containerized solids. Chemical Waste Management requested that capacity data for this facility be classified as Confidential Business Information.

Due to Interim Status restrictions, F037, F038, K117, and K118 waste will not be accepted at the facility when it becomes operational. In addition, operational constraints will limit amount of bromine to be burned to 10,000 lbs/year.

Chemical Waste Management reported that this facility's expansion plans will depend on the outcome of final permitting decisions.

Chemical Waste Management, Port Arthur, Texas

This RCRA-permitted facility operates a rotary kiln system that has an overall maximum permitted heat release of 150 MBTU/hour. The facility has applied for a TSCA permit in order to burn PCB contaminated wastes.

This facility can accept most physical forms of wastes. There are several feed mechanisms for feeding waste into the rotary kiln. Positive displacement pumps are used to feed pumpable sludges. Nonpumpable sludges are mixed with drying agent, shredded, and charged to the kiln by a chute. Containerized solids are fed into the unit via a ram-feed system. Bulk solids are fed in the same manner as nonpumpable sludges, however solids may bypass shredding and drying.

For the proposed rule, the facility provided waste volumes burned in the first half of 1991, hourly maximum permitted and practical waste feed capacities, and average operating hours. Because Chemical Waste Management considered start-up problems at this facility in its practical capacity estimate, EPA applied the standard 10 percent reduction factor to the maximum capacity for this facility. Public comments on the proposed rule indicated that waste specific characteristics of F037 and F038 (e.g. high heating value, "tackiness") make these wastes more difficult to handle than other bulk solids wastes, and therefore reduce the available capacity for these wastes. To assess these issues, EPA visited this facility between the proposed and final rules, and revised its estimates based on information reported by the facility. A trip report is included in Appendix C. This revision reflects the fact that previous capacity estimates were based on wastes with lower heating values than that of F037 and F038. Chemical Waste Management requested that capacity data for this facility be classified as Confidential Business Information. Capacities for different physical types of waste are included in the aggregate CBI capacity estimates.

This facility can accept F037, F038, K117, and K118 waste, but it limits the amount of bromine it accepts to 1,607 lbs/year.

Chemical Waste Management indicated this facility plans to add storage capacity, a magnetic separator, and a processing building which will increase operating efficiency and maximum practical throughput capacity over the next year.

ENSCO, EL Dorado, Arkansas

This facility did not participate in the voluntary capacity update. For this analysis, EPA applied the standard 10 percent reduction factor to maximum sludge and solid capacity estimates from the Third-Third rule[3]. Lacking current utilization data, EPA conservatively estimated that 90 percent of this facility's maximum sludge and solid capacity is utilized, and that this capacity is for containerized wastes.

L.W.D. Inc., Calvert City , Kentucky

This Interim Status facility was denied a Part B permit by the state regulatory agency. L.W.D. Inc. appealed the decision and will continue to operate under Interim Status while the appeal is processed in court. EPA did not include the facility in the commercial hazardous waste incinerator capacity update due to the uncertainty of its future operating status.

Rhone-Poulenc Basic Chemicals Company (formerly Stauffer Chemical Company), Baton Rouge, Louisiana

This RCRA-permitted facility operates two sulfuric acid regeneration furnaces rated at 180 MBTU/hour each. This facility can accept liquids and pumpable sludges. The pumpable sludges must either be slurried or have a sufficiently low viscosity to be injected into the furnace. This facility currently receives K048-52 from 3 major refineries, and is in the process of approving waste profiles for several additional refineries. Some DAF float (K048) is also carrying the F037 and F038 codes. The Baton Rouge plant received 14,000 tons of petroleum refining wastes in 1991, which it incinerated as pumpable sludge.

Rhone-Poulenc submitted average operating hours, waste volumes burned in the first half of 1991, and hourly maximum permitted and practical waste feed capacities. EPA reduced reported available pumpable sludge capacity by 60 percent to account for this facility's relatively low solids content and viscosity limits relative to the types of sludges and solids included in today's final rule. EPA applied the standard 10 percent reduction factor to the maximum capacity of this facility, Rhone-Poulenc requested that

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[3]EPA, Background Document for Third-Third Wastes to Support 40 CFR 268, Land Disposal Restrictions, Final Rule, Third-Third Waste Volumes, Characteristics and Required Available Treatment Capacities, Appendix K, May 1990

capacity data for this facility be classified as Confidential Business Information. Capacities for each accepted waste form are included in the aggregate CBI capacity estimates.

This facility can accept F037, F038, K117, and K118. No bromine limits are imposed on wastes accepted by this facility.

Rhone Poulenc's Baton Rouge facility is limited by its storage capacity, and for petroleum refining wastes by the fact that it only accepts pumpable wastes in tanker trucks. Under current constraints, the Baton Rouge facility could accept about one third more petroleum refining wastes than it is currently receiving. The facility plans to complete a 157,000-gallon tank in October 1992. This tank will increase the facility's practical throughput capacity.

Rhone-Poulenc Basic Chemicals Company (formerly Stauffer Chemical Company), Houston, Texas

This RCRA-permitted facility operates one sulfuric acid regeneration furnace rated at 180 MBTU/hour. This facility can accept liquids and pumpable sludges. The pumpable sludges must either be slurried or have a sufficiently low viscosity to be injected directly into the furnace.

Rhone-Poulenc submitted average operating hours, waste volumes burned in the first half of 1991, and hourly maximum permitted and practical waste feed capacities. EPA reduced reported available pumpable sludge capacity by 60 percent to account for this facility's relatively low solids content and viscosity limits relative to the types of sludges and solids included in today's final rule. EPA applied the standard 10 percent reduction factor to the maximum capacity of this facility. Rhone-Poulenc requested that capacity data for this facility be classified as Confidential Business Information. Capacities for each accepted waste form are included in the aggregate CBI capacity estimates.

This facility can accept F037, F038, K117, and K118. No bromine limits are imposed on wastes accepted by this facility.

This facility plans to expand its storage capacity by constructing additional blending tanks, but reported no plans to increase its burning capacity.

Rollins Environmental Services, Baton Rouge, Louisiana

This incinerator facility operates under Interim Status. The facility has submitted a RCRA Part B application which is pending approval from the Louisiana Department of Environmental Quality. This facility's integrated system consists of a rotary kiln, Loddby (liquid) burner, and an afterburner. The total heat release from the train is limited to

95.6 MBTU/hour. Interim Status operating requirements limit the facility's maximum feed rate to 21,732 lbs/hour and 70,627 tons/year.

Several mechanisms are used to feed waste into the incinerator system. Liquids are atomized under air pressure and injected into the Loddby liquid burner and afterburner chamber. A positive displacement pump feeds pumpable sludges into the rotary kiln. Nonpumpable sludges are usually accepted only in containers and are fed into the unit via a conveyor belt. This facility generally does not accept bulk solids.

Capacity information provided by the facility included the waste volumes burned during the first half of 1991, average operating hours per year, and the hourly total maximum waste feed capacity (limited due to Interim Status conditions). The facility indicated that the hourly total practical waste feed capacity equals hourly total maximum waste feed capacity. EPA determined hourly practical maximum capacities for each waste form by distributing the total limit according to the ratio burned in the first half of 1991. EPA applied the standard 10 percent reduction factor to the maximum capacity of this facility. The facility indicated that final permit conditions may affect its future capacity, but is uncertain whether permit conditions will increase or decrease capacity.

This facility can accept F037, F038, K117, and K118; and has a bromine acceptance limit of 34 lbs/hour.

Rollins Environmental Services, Bridgeport, New Jersey

This RCRA-permitted facility includes a rotary kiln, Loddby (liquid) burner, and an afterburner. The total heat release from the system is 115 MBTU/hour. The facility has a maximum permitted waste feed rate of 15,575 lbs/hour.

Several mechanisms are used to feed waste into the incinerator system. Liquids are atomized under air pressure and injected into the Loddby liquid burner and afterburner chamber. A positive displacement pump feeds pumpable sludges into the rotary kiln. Nonpumpable sludges are generally accepted only in containers and are fed into the unit via a conveyor belt. This facility generally does not accept bulk solids.

This facility submitted hourly maximum practical waste capacities for each waste form. Because the facility did not submit average number of operating hours per year, EPA assumed that the facility operates 7,200 hours/year. EPA applied the standard 10 percent reduction factor to the maximum capacity of this facility.

This facility accepts F037 and F038 wastes. Presently, this facility cannot accept K117, K118, or other brominated wastes.

This facility plans to increase sludge/solid capacity by adding a rotary reactor unit and associated feed systems in 1993. Additional storage areas will also be constructed to accommodate extra capacity.

Rollins Environmental Services, Deer Park, Texas

This RCRA-permitted facility has two independent incinerator systems or trains. The first train includes a rotary kiln (80 MBTU/hour) and an afterburner (100 MBTU/hour). The second train includes a rotary kiln (80 MBTU/hour), a fluidized bed rotary reactor (33 MBTU/hour) and an afterburner (100 MBTU/hour). Train #1 has a permitted waste feed capacity of 23,400 lbs/hour (13,400 lbs/hour for rotary kiln and 8,000 lbs/hour for the afterburner). Train #2 has a permitted waste feed capacity of 32,000 lbs/hour (8,000 lbs/hour for rotary kiln, 12,000 lbs/hour for rotary reactor, and 8,000 lbs/hour for the afterburner).

Each train has several feed mechanisms. Both trains utilize concrete pumps to feed pumpable sludges and an elevator feed for containers: Train #2 also has a clamshell/shredder that feeds bulk solids into the fluidized bed rotary reactor.

For each train, the facility provided the following capacity information: waste volumes burned during the first half of 1991, the hourly maximum permitted and waste feed capacities for liquids and solids, and average operating hours per year. Because the facility reported a combined sludge and solid category, EPA distributed waste volume and capacities evenly among the specific sludge and solid categories. EPA applied the standard 10 percent reduction factor to the maximum capacity of this facility. This facility can accept F037, F038, K117, and K118. No bromine limits are imposed on wastes accepted at this facility.

Between the proposed and final rule, EPA contacted the facility to clarify issues raised in public comments and confirm its capacity estimates. Contacts at this facility noted that previously reported nonpumpable sludge capacity should have been reported as containerized solids and bulk solids capacity. EPA revised its estimates based on this correction. The facility routinely accepts K048-52 petroleum refining wastes, which it describes as "crumbly" rather than "tacky", and did not notice an increase in the quantities of K-wastes during the second half of 1991. Petroleum refining K-wastes are not amenable to the pumpable sludge system, and are fed through the bulk solids feed system. The facility requires that bulk solids wastes have a heating value of less than 5,000 BTU/lb, and reported that petroleum refining K-wastes received by the facility generally have heating values between 3,000 and 4,000 BTU/lb. The facility would reject wastes with very high metals concentrations (i.e., thousands of parts per million of lead, arsenic or chromium.) EPA revised its estimates of this facility's available capacity based on the heating value of petroleum refining wastes, the facility's maximum practical throughput capacity and current utilization.

This facility is building a gas injection system so that it can accept pressurized cylinders. It is also permitted to construct another fluidized bed rotary reactor to increase sludge/solid capacity, but it will not be constructed before July 1994.

Ross Incineration Services, Grafton, Ohio

This facility has obtained a RCRA Part B permit from the U.S. EPA, but is awaiting approval for a Part B permit from the Ohio EPA. Ross Incineration Services has requested information submitted in the voluntary data collection form be classified as Confidential Business Information. This information included maximum permitted and practical capacities, type of unit, technical specifications, and feed mechanisms. EPA applied the standard 10 percent reduction factor to the maximum capacity of this facility. Capacities for different physical types of waste are included in the Aggregate CBI capacity estimates.

This facility can accept K-listed and F-listed petroleum refining wastes. The facility does not accept K117 and K118 waste. The facility currently accepts K-wastes in bulk solids form, and reported that the quantities decreased during the second half of 1991, due to competition from cement kilns.

This facility replaced its rotary kiln in December 1991. Between the proposed and final rule, EPA contacted the facility to update its capacity estimate. Because detailed capacity estimates were not available at the time of the update, EPA did not revise its estimates of available capacity at this facility. Information submitted in the voluntary data collection form concerning future capacity was requested to be classified as Confidential Business Information.

ThermalKEM, Rock Hill, South Carolina

This RCRA-permitted facility uses a fixed hearth incinerator with a total heat release limit of 42 MBTU/hour. This facility can accept liquids, pumpable sludges, nonpumpable sludges, bulk solids, and containerized solids. ThermalKEM requested that feed mechanism information submitted in the voluntary data collection form be classified as Confidential Business Information.

Capacity data provided by the facility include waste volumes burned during first half of the year, hourly maximum permitted and practical capacities, and average operating hours per year. EPA applied the standard 10 percent reduction factor to the maximum capacity of this facility. ThermalKEM requested that capacity data for this facility be classified as Confidential Business Information. Capacities for each physical type of waste are included in the Aggregate CBI capacity estimates.

ThermalKEM can accept F037, F038, K117, and K118 waste. The permit requires that wastes fed into the fixed hearth not exceed 5 percent in total bromine content.

The facility plans to increase sludge/solid capacity by adding an additional unit, a waste fired boiler, and additional storage areas.

2.2.3 Sludge and Solid Incineration Capacity Beyond 1992

The incineration capacity update focussed only on commercial incinerators that are currently operating or are expected to begin operating by May 1992. Several of these companies, however, reported plans to add sludge and/or solids capacity over the next two years:

- ThermalKEM, Rock Hill, South Carolina reported that a second incinerator unit and a waste-fired utility waste boiler will be on-line by July 1994. The facility is constructing a new solids handling feed system, and a bulk solids storage system to facilitate handling increased amounts of solids.

- American NuKEM, the parent company of ThermalKEM, has recently acquired a RCRA-permitted lightweight aggregate kiln from Norlite Corporation. Information regarding available capacity for this unit was not available at the present time.

- Rollins, Bridgeport, New Jersey reported that a rotary reactor unit currently under construction will be on line in 1993. This unit will increase the facility's capacity to burn sludges and solids.

In addition to facilities where incinerators currently exist, several planned commercial incinerators appear to be sufficiently advanced in the permitting and siting process to potentially come on line by 1993. EPA contacted state regulatory agencies for information regarding these facilities:

- USPCI, Tooele, Utah has its RCRA Part B permit and at the time of the proposed rule was scheduled to begin trial burns in May 1992. The facility has also applied for a TSCA permit to burn PCB contaminated waste. Pending successful trial burns, the facility is expected to come on line in late 1993. The total permitted capacity is 130,000 tons per year.

- At the time of the proposed rule, Waste-Tech, Kimball, Nebraska expected to receive a draft Part B Permit in March 1992 to begin constructing a fluidized bed incineration facility. Trial burns are scheduled for late 1992. Pending successful trial burns, the facility is expected to come on line in late 1993. The maximum permitted total capacity for this facility will be 43,000 tons per year.

- Waste-Tech, East Liverpool, Ohio has its RCRA Part B permit, and at the time of the proposed rule was scheduled to begin trial burns in May 1992. Pending successful trial burns, the facility is expected to be on line in February 1993.

2.3 COMMERCIAL CEMENT KILN HAZARDOUS WASTE CAPACITY

This chapter covers EPA's assessment of the combustion capacity available in cement kilns in the U.S. Sections 2.3.1 and 2.3.2 explain how the information was collected from individual firms and analyzed. Section 2.3.3 contains a summary of the information reported by each facility, regarding its current and future waste fuel burning practices. Section 2.3.4 discusses facilities expected to begin burning hazardous waste between May 1992 and May 1994. Section 2.3.5 discusses facilities not included in this capacity analysis. Finally, Section 2.3.6 discusses EPA's assessment of the packaging capacity available for putting hazardous wastes into containers suitable for containerized solids feed systems.

2.3.1 General Approach and Assumptions

The Cement Kiln Recycling Coalition (CKRC) is a trade association representing firms involved in the use of wastes as fuel or feedstocks in cement production. CKRC notified EPA of its interest in providing capacity information to support EPA's capacity analysis for newly listed wastes. EPA informed CKRC of the types of data it needed to conduct the capacity analysis, and CKRC surveyed its members. The survey asked a variety of questions pertaining to the types of wastes accepted, the amount of waste currently burned, maximum practical waste burning capacity, and the regulatory status of surveyed facilities. CKRC divided the universe of hazardous wastes as fed to cement kilns into six categories: liquids, pumpable sludges, nonpumpable sludges, containerized solids, dry solids, and bulk solids. Firms were also asked about their hazardous waste storage capacity, their fuel processing capabilities, the fuels blenders from whom they receive their hazardous waste fuels, and the physical and chemical specifications their fuel must meet. Responses to the CKRC survey were provided directly to the EPA for inclusion in the capacity analysis for newly listed wastes. These completed survey forms are available in a separate document in Appendix C. Survey forms from facilities requesting that part of their information be classified as CBI are in a separate document in the docket, entitled *Background Data Set For Commercial Hazardous Waste Cement Kiln Capacity Analysis -- Confidential Business Information.*

In the subsequent data analysis, EPA asked several firms to clarify their responses to gain a more complete understanding of whether they will be able to provide capacity for newly listed wastes. Phone logs documenting these calls can be found in Appendix C. EPA also asked various firms whether they expect to burn wastes with heating values below 5,000 BTU/lb, once they certify compliance with interim status requirements of the Boiler and Industrial Furnace (BIF) Rule (56 FR 7134, February 21, 1991). BIF requirements, however, will supersede sham recycling policy guidelines once a facility certifies compliance with BIF Interim Status requirements. Currently, the EPA Sham Recycling Policy Guidelines specify that wastes should have a minimum of 5,000 BTU/lb to be considered legitimate fuel substitutes, and several states impose higher heating value limits. Cement companies indicate that while some changes may be made, the overall limit will not decrease much, because of the high temperatures that must be maintained to produce cement clinker. Ash Grove Cement, a major burner of solid hazardous wastes, indicated that it will decrease its solid fuel heat content limit to 4,000 BTU/lb, specifically to accommodate petroleum refinery wastes.

2.3.2 Individual Facility Analysis Methodology

The CKRC survey asked facilities for their maximum practical hazardous waste burning capacity, and the volumes burned in 1991 to August 21. EPA annualized this number by dividing it by 0.64, the fraction of a full year represented by the period January 1 through August 21. Some facilities submitted hazardous waste utilization data through other dates in July and August, and the annualization factor was adjusted accordingly. This method assumes that hazardous waste burning practices for January through August are representative of the remainder of the year. In its capacity analysis, EPA estimates available capacity on an annualized basis by subtracting waste volumes burned (utilized capacity) from the maximum practical capacity. By using annualized volume and capacity data, EPA attempts to account for seasonal fluctuations and scheduled downtimes. Though the CKRC survey asked cement firms to estimate the amount of solids typically entrained in their liquid hazardous waste feed, these estimates were not included in the final estimates of available solid capacity because of the technical limitations on the types of solids amenable to this type of blending.

Exhibit 2-6 reports utilized, maximum and available capacity. EPA adjusted the maximum capacity estimates reported by facilities, to be conservative in its estimate of the national available capacity. To account for the likelihood that not all facilities will be able to operate at maximum capacity, maximum capacities reported by facilities that have well established hazardous waste burning practices (referred to as "existing" capacity) were reduced by 10 percent. Maximum capacities of firms just beginning to burn hazardous waste (referred to as "new" capacity) were decreased by 50 percent to account for potential start-up problems and delays. In no case was maximum capacity adjusted below utilized capacity. Several firms currently burning containerized solids indicated that they could increase their capacity by feeding two containers per feed cycle, instead of the usual one. EPA considered the increment representing the first container per feed cycle as existing capacity, and the incremental second part as new capacity, and adjusted both accordingly. To determine the amount of available capacity for newly listed wastes, EPA subtracted the annualized utilized capacity from the adjusted maximum capacity. Calculations were performed for each unit at a facility, and summed to obtain the total capacity available at the facility.

EXHIBIT 2-6

SUMMARY OF COMMERCIAL CEMENT KILN CAPACITY THROUGH MAY 1992

NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 MAXIMUM CAPACITY (TONS/YR)	MAY 1992 AVAILABLE CAPACITY (TONS/YR)
ASH GROVE	CK	LIQ.	21,531	33,750	12,219
CHANUTE, KS		CONT. SOL.	9,286	17,500	8,214
KSD031203318					
	CK	LIQ.	21,531	33,750	12,219
		CONT. SOL.	9,286	17,500	8,214
	FACILITY TOTAL		61,634	102,500	40,866
ASH GROVE	CK	LIQ.	16,206	31,104	14,898
FOREMAN, AR		CONT. SOL.	5,531	15,590	10,059
ARD981512270					
	CK	LIQ.	16,206	31,104	14,898
		CONT. SOL.	5,531	15,590	10,059
	CK	LIQ.	16,206	31,104	14,898
		CONT. SOL.	5,531	15,590	10,059
	FACILITY TOTAL		65,211	140,083	74,872
ASH GROVE	CK	LIQ.	3,598	31,500	27,902
LOUISVILLE,NE		CONT. SOL.	1,381	12,528	11,147
NED007260672					
	CK	LIQ.	3,598	31,500	27,902
		CONT. SOL.	1,381	12,528	11,147
	FACILITY TOTAL		9,958	88,056	78,098
ESSROC	CK	LIQ.	17,402	23,400	5,998
LOGANSPORT, IN					
	CK	LIQ.	17,402	23,400	5,998
	FACILITY TOTAL		34,804	46,800	11,996
GIANT CEMENT CO.	CK	LIQ.	14,400	23,400	9,000
(GIANT RESOURCE RECOVERY)		DRY SOL.	1,128	3,700	2,572
HARLEYVILLE, SC					
	CK	LIQ.	13,302	23,400	10,098
		DRY SOL.	898	3,700	2,802
	CK	LIQ.	11,578	23,400	11,822
		DRY SOL.	511	3,700	3,189
	CK	LIQ.	13,231	23,400	10,169
		DRY SOL.	483	3,700	3,217
	FACILITY TOTAL		55,531	108,400	52,869

EXHIBIT 2-5 (CONTINUED)

SUMMARY OF COMMERCIAL CEMENT KILN CAPACITY THROUGH MAY 1992

NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 MAXIMUM CAPACITY (TONS/YR)	MAY 1992 AVAILABLE CAPACITY (TONS/YR)
HEARTLAND CEMENT CO.	CK	DRY SOL.	938	3,750	2,813
(CEMTECH)					
INDEPENDENCE, KS	CK	DRY SOL.	938	3,750	2,813
KSD980739999					
	CK	DRY SOL.	938	3,750	2,813
	CK	DRY SOL.	938	3,750	2,813
	FACILITY TOTAL		3,750	15,000	11,250
KEYSTONE PORTLAND CEMENT	CK	LIQ.	1,992	18,000	16,008
BATH, PA					
PAD002389559	CK	LIQ.	37,872	54,000	16,128
	FACILITY TOTAL		39,864	72,000	32,136
LAFARGE CORP.	CK	LIQ.	25,870	30,600	4,730
(SYSTECH)					
ALPENA, MI	CK	LIQ.	25,870	30,600	4,730
MID981200835	FACILITY TOTAL		51,740	61,200	9,460
LAFARGE CORP. (SYSTECH) DEMOPOLIS, AL ALD981019045	CK	LIQ.	31,748	32,000	252
LAFARGE CORP.	CK	LIQ.	26,263	28,760	2,497
(SYSTECH)					
FORMERLY GENERAL PORTLAND	CK	LIQ.	40,404	46,116	5,712
FREDONIA, KS		DRY SOL.	6,067	6,917	850
KSD980633259	FACILITY TOTAL		72,734	81,793	9,059
LAFARGE CORP.	CK	LIQ.	27,532	30,150	2,618
(SYSTECH)					
FORMERLY GENERAL PORTLAND	CK	LIQ.	27,532	30,150	2,618
PAULDING, OH	FACILITY TOTAL		55,064	60,300	5,236
OHD005048947					
LONE STAR INDUSTRIES	CK	LIQ.	26,970	42,750	15,780
GREEN CASTLE, IN		CONT. SOL.	2,634	3,564	930
IND006419212	FACILITY TOTAL		29,604	46,314	16,710

EXHIBIT 2-6 (CONTINUED)

SUMMARY OF COMMERCIAL CEMENT KILN CAPACITY THROUGH MAY 1992

NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 MAXIMUM CAPACITY (TONS/YR)	MAY 1992 AVAILABLE CAPACITY (TONS/YR)
MEDUSA CEMENT CO.	CK	LIQ.	4,375	13,500	9,125
(CEMTECH)		PUMP. SL.	1,563	2,667	1,104
WAMPUM, PA		NPU. SL.	313	500	188
PAD083965897					
	CK	LIQ.	4,375	13,500	9,125
		PUMP. SL.	1,563	2,667	1,104
		NPU. SL.	313	500	188
	CK	LIQ.	4,375	13,500	9,125
		PUMP. SL.	1,563	2,667	1,104
		NPU. SL.	313	500	188
	FACILITY TOTAL		18,750	50,000	31,250
NATIONAL CEMENT CO. LEBEC, CA CAT080031628	CK	LIQ.	30,578	31,320	742
	FACILITY TOTAL		30,578	31,320	742
RIVER CEMENT	CK	LIQ.	15,625	27,900	12,275
(CEMTECH)		PUMP. SL.	5,469	9,900	4,431
FESTUS, MO		NPU. SL.	1,172	1,800	628
MOD050232560					
	CK	LIQ.	15,625	27,900	12,275
		PUMP. SL.	5,469	9,900	4,431
		NPU. SL.	1,172	1,800	628
	FACILITY TOTAL		44,531	79,200	34,669
SAN JUAN CEMENT	CK	LIQ.	18,750	19,000	250
(ESSROC)					
SAN JUAN, PR	CK	LIQ.	781	31,500	30,719
	FACILITY TOTAL		19,531	50,500	30,969
SOUTHWESTERN PORTLAND (SOUTHDOWN, INC.) FAIRBORN, OH OHD981195779	CK	LIQ.	4,478	17,500	13,022
SOUTHDOWN INC.	CK	LIQ.	2,958	10,800	7,842
KNOXVILLE, TN		CONT. SOL.	4,559	18,200	13,641
	FACILITY TOTAL		7,517	29,000	21,483

EXHIBIT 2-6 (CONTINUED)

SUMMARY OF COMMERCIAL CEMENT KILN CAPACITY THROUGH MAY 1992

NAME	UNIT TYPE	WASTE TYPE	1991 UTILIZED CAPACITY (TONS/YR)	MAY 1992 MAXIMUM CAPACITY (TONS/YR)	MAY 1992 AVAILABLE CAPACITY (TONS/YR)
TOTAL LIQUID			560,164	913,758	353,594
TOTAL PUMPABLE SLUDGES			15,625	27,800	12,175
TOTAL NON-PUMPABLE SLUDGES			3,281	5,100	1,819
TOTAL CONTAINERIZED SOLIDS			45,120	128,591	83,471
TOTAL DRY SOLIDS			12,837	36,717	23,880
TOTAL HAZARDOUS WASTE			637,028	1,111,966	474,939

NOTES: CK = CEMENT KILN. SOME TOTALS MAY BE INEXACT DUE TO ROUNDING ERRORS.

The following example of a one-kiln facility demonstrates how EPA used reported information to arrive at its available capacity estimates.

Facility information:

Liquid hazardous waste burned to August 21, 1991:	15,000 tons
Containerized solid waste burned to August 21, 1991:	8,000 tons
Maximum practical liquids burning capacity:	35,000 tons per year
Maximum practical containerized solids burning capacity:	24,000 tons per year

1. Annualize volume liquid hazardous waste fuel burned to August 21, 1991:

  15,000 tons of liquid hazardous waste fuel burned
÷ 0.64 year
  23,438 tons of liquid waste fuel utilized per year

2. Adjust maximum annual capacity:

  35,000 tons maximum liquids per year
x 0.9 existing capacity adjustment factor
  31,500 tons adjusted maximum capacity per year

3. Subtract to determine annual available capacity:

  31,500 tons adjusted maximum capacity per year
\- 23,438 tons of liquid waste fuel utilized per year
  8,062 tons of available liquid burning capacity

4. Annualize volume containerized solid waste fuel burned to August 21, 1991:

  8,000 tons of containerized solid hazardous waste fuel burned
÷ 0.64 year
  12,500 tons of containerized solid waste fuel utilized per year

5. Adjust maximum annual capacity:
   A. Existing capacity: one container per cycle:

  24,000 tons maximum solids capacity per year
÷ 2 the factor from first container per cycle
x 0.9 adjustment for existing capacity
  10,800 tons adjusted maximum capacity for one container per cycle

B. New capacity: the second container per cycle:

	24,000 tons maximum solids capacity per year
÷	2 the factor from second container per cycle
x	0.5 adjustment factor for new capacity
	6,000 tons adjusted maximum capacity for second container per cycle

C. Total adjusted maximum capacity for containerized solids:

	10,800 tons per year from one container per cycle
+	6,000 tons per year from second container per cycle
	16,800 tons per year total adjusted maximum capacity

6. Subtract to determine annual available capacity:

	16,800 tons adjusted maximum solids capacity per year
-	12,500 tons of containerized solid waste fuel utilized per year
	4,300 tons of containerized solids capacity available per year

Some firms reported the volume of waste burned in gallons. These numbers were converted to tons by assuming the waste has the same density as water. For example, if a firm reported burning 1,000,000 gallons as of August 21, 1991, annualized utilized capacity would be obtained as follows:

	1,000,000 gallons
÷	0.64 year
x	8.34 pounds/gallon
÷	2,000 pounds/ton
	6,516 tons/year

Revisions to the Analysis since the Proposed Rule

EPA received several public comments on the proposed rule regarding cement kiln combustion capacity[4]. As a result of the information and issues contained in public comments, EPA conducted calls to various cement kilns to confirm their operating status and capacity. Information collected from these activities is discussed in Section 2.3.2 below, and background documentation is provided in Appendix C. EPA did not revise any facility-specific capacity estimates since the proposed rule as a result of new information. However, EPA did collect additional information to assess capacity for packaging wastes for cement kilns. This assessment is discussed in Section 2.3.6 below.

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[4] For a detailed discussion of public comments pertaining to commercial combustion capacity, refer to Chapter 2 of *Response to Comments Background Document for Phase One Land Disposal Restrictions Proposed Rule.*

After the public comment period ended, EPA received additional information from Cadence Chemical Resources regarding cement kiln capacity. This information, which is documented in Appendix C, was not received in time for EPA to use it to revise its capacity analysis and meet the court-ordered deadline for promulgating this rule. However, EPA does not believe this information would have affected its variance decision because it dealt only with cement kilns, not incinerators. EPA's primary reason for granting a variance to routinely generated F037 and F038 is the lack of adequate bulk solids incineration capacity for F037 and F038 wastes that are not amenable to cement kilns.

2.3.3 Individual Facility Results

Exhibit 2-6 reports annualized capacity utilized by facilities, maximum practical hazardous waste burning capacity, and the total available capacity for hazardous waste combustion in cement kilns. EPA estimates that the facilities responding to the CKRC will have approximately 121,000 tons of sludge/solid capacity available by May 1992 (83,000 tons containerized solids, 24,000 tons of dry solids, and 14,000 tons of sludges). This section discusses the hazardous waste burning practices of individual facilities, including their available capacity for sludge and solid hazardous waste fuel combustion, feed mechanisms, permit status for newly listed wastes, and plans for changes to their current hazardous waste burning practices. Bromine limits for each facility are discussed in response to concerns that the bromine content of K117 and K118 would be prohibitively high for some commercial hazardous waste incinerators.

Ash Grove, Chanute, Kansas

The Ash Grove Chanute facility currently operates two cement kilns, both of which burn liquid and containerized solid hazardous wastes. The kilns burn hazardous waste fuel during 80 percent of their operating time. Based on reported maximum practical feed rates, and 1991 utilized capacity, EPA estimates the facility's available liquid waste capacity to be 24,438 tons per year and its available solids capacity to be 16,428 tons per year. The estimate for liquid capacity reflects the standard reduction for existing capacity discussed in the methodology section above. The estimate for containerized solids reflects the standard reduction for new and existing capacity, discussed above. All Ash Grove facilities report their liquids contain up to 30 percent entrained solids. The acceptable bromine content in hazardous waste fuel at Ash Grove Chanute is limited by a total permitted halogen limit of 5 percent for both liquids and containerized solids, but this is not broken down by element. This facility reported no plans to change its hazardous waste burning practices before June 1994. In response to the proposed rule, EPA received comments stating that EPA overestimated available capacity at Ash Grove facilities. In response to these comments, EPA contacted Ash Grove to update its capacity analysis. Ash Grove confirmed the available capacity and utilization estimates from the August CKRC survey, estimating that they have approximately 10,000 tons per year, per kiln available for containerized solids. Ash

Grove mentioned that it is possible during winter months, when kilns are rotated through their maintenance schedule, to be operating "at capacity" on a given day, but that over the course of the year, they have excess capacity. All three Ash Grove facilities receive petroleum refining wastes, and Ash Grove describes F037 and F038 as "ideal" kiln feed, with low metals and moderate heating values. As a result of these confirmations, EPA did not revise its previous estimates of available capacity at this facility.

Ash Grove, Foreman, Arkansas

There are three wet process rotary cement kilns currently burning hazardous waste at this facility. They all inject liquid hazardous waste fuel into the clinker discharge end of the kiln, and charge containerized solids to the calcining zone. EPA estimates that together the three kilns have 44,694 tons of liquid capacity available per year and 30,177 tons of containerized solid capacity available. This estimate is based on the reported maximum practical feed rates and 1991 utilized capacity estimates. The liquid available capacity estimate reflects the adjustments for existing capacity explained in the methodology section above, and the containerized solids available capacity estimate reflects the reductions for new and existing capacity, discussed above. All Ash Grove facilities report that as burned, their liquids contain approximately 30 percent solids. Acceptable bromine levels are limited at this facility by its total permitted halogen limits of 10 percent for liquids and 8 percent for solids. The facility is authorized to receive K117, K118, F037 and F038 wastes. In June 1992, this facility is planning a test burn to broaden fuel specifications and change its air permit in order to increase its maximum solids capacity from 46,770 tons per year for the three kilns, to 90,000 tons per year. In response to the proposed rule, EPA received comments stating that EPA overestimated available capacity at Ash Grove facilities. In response to these comments, EPA contacted Ash Grove to update its capacity analysis. Ash Grove confirmed the available capacity and utilization estimates from the August CKRC survey, estimating that they have approximately 10,000 tons per year, per kiln available for containerized solids. Ash Grove mentioned that it is possible during winter months, when kilns are rotated through their maintenance schedule, to be operating "at capacity" on a given day, but that over the course of the year, they have excess capacity. All three Ash Grove facilities receive petroleum refining wastes, and Ash Grove describes F037 and F038 as "ideal" kiln feed, with low metals and moderate heating values. As a result of these confirmations, EPA did not revise its previous estimates of available capacity at this facility.

Ash Grove, Louisville, Nebraska

The Ash Grove Louisville facility currently burns liquid and containerized solid waste fuel in two rotary preheater cement kilns. Liquid hazardous waste fuel is injected into the clinker discharge end of the kiln, and charge containerized solids to the calcining zone. Both kilns burn waste 290 days out of 365, slightly less than the total operating time of the kilns. Based on the reported maximum practical feed rates and 1991 utilized capacity, EPA estimates that the facility has 55,804 tons of liquid combustion capacity available per year, and 22,294 tons of containerized solids capacity available per year. The liquid available capacity estimate reflects the adjustments for existing capacity explained in the methodology section above, and the containerized solids available capacity estimate reflects the reductions for new and existing capacity, discussed above. Ash Grove reports that as burned, their liquids contain approximately 30 percent solids. Bromine is limited at this facility by a total permitted halogen limits of 6.66 percent for liquids and 7.3 percent for solids. It is authorized to burn K117, K118, F037 and F038 wastes. At the time of the proposed rule this facility was planning to conduct compliance testing in June 1992 to increase the range of hazardous waste fuels it can burn, and to increase the firing rate. The testing is planned at 1.5 to 2 times the currently permitted rate. In response to the proposed rule, EPA received comments stating that EPA overestimated available capacity at Ash Grove facilities. In response to these comments, EPA contacted Ash Grove to update its capacity analysis. Ash Grove confirmed the available capacity and utilization estimates from the August CKRC survey, estimating that they have approximately 10,000 tons per year, per kiln available for containerized solids. Ash Grove mentioned that it is possible during winter months, when kilns are rotated through their maintenance schedule, to be operating "at capacity" on a given day, but that over the course of the year, they have excess capacity. All three Ash Grove facilities receive petroleum refining wastes, and Ash Grove describes F037 and F038 as "ideal" kiln feed, with low metals and moderate heating values. As a result of these confirmations, EPA did not revise its previous estimates of available capacity at this facility.

ESSROC, Logansport, Indiana

This facility burns liquid hazardous waste fuel in two wet process cement kilns. Based on the reported maximum practical feed rates, and capacity utilized in 1991, EPA estimates that this facility has 11,996 tons per year capacity available for liquid hazardous waste. This estimate reflects the adjustments made for existing capacity, discussed in the methodology section above. After the close of the public comment period, EPA learned that this facility has begun to burn solids. This information, which is presented in Appendix C, was not received in time to revise this analysis, but will be incorporated into future capacity analyses. This facility did not report bromine limits or its ability to burn K117 and K118.

Giant Cement Company, Harleyville, South Carolina

This facility burns liquid and dry solid hazardous waste in four wet process cement kilns. Both types of wastes are fed into the clinker discharge end of the kiln. Based on the reported maximum practical feed rates and 1991 waste volumes, EPA estimates that together the kilns have 41,089 tons per year liquid combustion capacity available, and 11,780 tons per year available capacity for dry solids. The liquid available capacity estimate reflects the reduction made for existing capacity, and the dry solid capacity estimate reflects the new capacity adjustment, discussed in the methodology section above. Giant Cement is permitted to receive F037 and F038 petroleum refining wastes. They did not report plans to burn K117 and K118, but the bromine content of Giant's hazardous waste feed is limited by a total halogen permit limit of 8 percent for solid feed, and 4 percent for liquid feed. This facility did not report plans to change its hazardous waste burning practices before 1994. In response to the proposed rule, EPA received comments stating that EPA overestimated available capacity at this facility. In response to these comments, EPA contacted Giant. Giant Cement confirmed EPA's estimates of their available capacity, and confirmed that they do receive dewatered petroleum refining wastes. As a result of these confirmations, EPA did not revise its previous estimates of available capacity at this facility.

Heartland Cement Company, Independence, Kansas (Cemtech)

This facility burns dry solids in four dry process cement kilns. They each feed dry solid hazardous waste into the clinker discharge end of the kiln. Based on the reported maximum permitted feed rates and 1991 waste volumes, EPA estimates that together the four kilns have 11,252 tons per year available capacity for dry solids. The standard approach of reducing new capacity by 50 percent, discussed in the methodology section above, was used to arrive at these estimates. The facility is authorized to burn F037 and F038 wastes. K117 and K118 are acceptable in trace amounts. This facility does not intend to make changes to its hazardous waste burning practices before 1994, but has proposed to add liquid and pumpable sludge combustion capacity. In response to the proposed rule, EPA received comments stating that EPA overestimated available capacity at this facility. In response to these comments, EPA contacted Heartland Cement, confirmed that they are authorized to accept petroleum refining wastes, and found no reason to revise its capacity estimate. The facility was planning to include this trial burn with trial burns for BIF Compliance in the spring. As a result of these confirmations, EPA did not revise its previous estimates of available capacity at this facility.

Keystone Portland Cement Company, Bath, Pennsylvania

Keystone Cement Company burns liquid hazardous waste in two wet process rotary cement kilns. The hazardous waste fuel is injected into the clinker discharge end of the kiln. Based on reported maximum practical feed rates, and 1991 utilized capacity, EPA estimates that the facility has 32,136 tons per year available capacity. This estimate reflects the adjustment for existing capacity, discussed in the methodology section above. This facility did not report bromine limits or its ability to burn K117 and K118.

Lafarge Corp., Alpena, Michigan (Systech)

This facility operates five rotary cement kilns, but only two are currently burning hazardous waste. These kilns burn liquids only. Based on reported volumes utilized in 1991, and maximum permitted feed rates, EPA estimates that together the kilns have

9,460 tons of capacity available per year. This estimate reflects the 10 percent reduction for existing capacity discussed in the methodology section above. This facility has submitted an application to allow them to burn F037 and F038 under RCRA Interim Status. Lafarge intends to burn hazardous waste in the three kilns that are not currently burning hazardous waste, but must first satisfy numerous construction and regulatory requirements. Lafarge estimates they will be on line burning liquid waste in 1992 or 1993. The facility also plans to install a sludge handling system at some unspecified point in the future. This facility is not authorized to burn K117 and K118 wastes.

Lafarge Corp., Demopolis, Alabama (Systech)

The Demopolis, Alabama Lafarge facility operates one cement kiln, burning liquid hazardous waste fuel. Based on reported volumes utilized in 1991, and maximum permitted feed rates, EPA estimates it has 252 tons of capacity available per year. The facility's capacity is so highly utilized it was not adjusted at all. In 1992 or 1993, the facility intends to add a 150,000-gallon burn tank, to increase its capacity and blending capabilities. This facility is not authorized to burn K117 and K118 wastes.

Lafarge Corp., Fredonia, Kansas (Systech)

This facility operates two rotary cement kilns. One burns liquid and dry solid hazardous waste, the other only liquid. Based on reported maximum practical burning capacity, and 1991 capacity utilization, EPA estimates this facility has 8,209 tons per year liquid combustion capacity available, and 850 tons per year dry solids capacity available. The capacity of the kiln burning only liquid hazardous waste fuel was not adjusted, the dry solid and liquid available capacity of the other kiln was reduced by the standard 10 percent used for existing capacity. The facility is modifying its permit to accept newly listed F037 and F038 wastes. This facility is not authorized to burn K117 and K118 wastes.

Lafarge Corp., Paulding, Ohio (Systech)

This facility burns liquid hazardous waste fuel in two rotary cement kilns. Based on reported maximum practical burning capacity, and 1991 capacity utilization, EPA estimates this facility has 5,236 tons of available capacity per year. All available capacity was reduced by the standard 10 percent used for existing capacity. It is modifying its permit to be able to burn F037 and F038 wastes, estimating 2,000 tons per year of each. The facility plans to add dry solids capability in 1992 or 1993. This facility is not authorized to burn K117 and K118 wastes.

Lone Star Industries, Green Castle, Indiana

This facility burns liquid and containerized solid hazardous waste fuel in one long, wet process rotary cement kiln. The liquid waste fuel is injected into the clinker discharge end of the kiln, and solids are fed in with an air cannon. The kiln burns waste fuel during 80 percent of its operating time. Based on reported maximum practical burning capacity, and 1991 capacity utilization, EPA estimates that Lone Star has 15,780 tons per year liquid combustion capacity available, and 930 tons per year capacity available for containerized solids. All available capacity was reduced by the standard 10 percent used for existing capacity. This facility plans to add dry solids capacity in the third quarter of 1993. Bromine content of hazardous waste fuel burned is limited to 2.5 percent by product quality considerations, but the facility did not report whether they are authorized to burn K117 and K118 wastes.

Medusa Cement, Wampum, Pennsylvania (Cemtech)

This facility burns liquid and sludge hazardous waste in three long dry process cement kilns. Solids are ground and mixed into the liquid stream, before being injected into the kilns. Based on reported maximum practical burning capacity, and 1991 capacity utilization, EPA estimates that the facility has 27,375 tons per year liquid capacity available, 3,312 tons per year pumpable sludge capacity available, and 564 tons per year nonpumpable sludge capacity available. Its liquid capacity estimate was reduced 10 percent, as existing capacity, and its sludge capacity estimate was reduced 50 percent as new capacity. F037 and F038 wastes are included in its current permit, and K117 and K118 are acceptable in trace quantities. This facility did not report plans to change its hazardous waste burning practices before 1994. In response to the proposed rule, EPA received comments stating that EPA overestimated available capacity at this facility. In response to these comments, EPA contacted Medusa Cement, confirmed that they are authorized to accept petroleum refining wastes, and found no reason to revise its capacity estimate. As a result of these confirmations, EPA did not revise its previous estimates of available capacity at this facility.

National Cement Company, Lebec, California

This facility burns liquid hazardous waste in one long, dry process cement kiln. Waste fuel is injected into the clinker discharge end of the kiln. Based on reported maximum practical burning capacity, and 1991 capacity utilization, EPA estimates that the facility has 742 tons of capacity available per year. The liquid combustion capacity was reduced by the standard 10 percent used for existing capacity. This facility does not plan to burn F037 and F038. It is authorized to burn K117 and K118, and its total permitted bromine limit is 3.8 percent. This facility did not report plans to change its hazardous waste combustion practices before 1994.

River Cement, Festus, Missouri (Cemtech)

River Cement burns liquid and sludge hazardous waste fuel in two dry process cement kilns. The facility filters liquid hazardous waste and grinds sludges, before blending the two and pumping the hazardous waste fuel into the clinker discharge end of the kiln. Based on reported maximum practical feed rates and 1991 waste volumes, EPA estimates that the two kilns have 24,550 tons per year liquid hazardous waste capacity available, 8,862 tons per year pumpable sludge capacity available, and 1,256 tons per year nonpumpable sludge capacity available. The standard approach of reducing existing capacity estimates was used to adjust this facility's reported capacity estimates. This facility is authorized to burn newly listed F037 and F038 wastes. It is authorized to burn K117 and K118 in trace amounts. This facility is considering adding dry solids capacity and a sludge pump.

San Juan Cement, San Juan, Puerto Rico (ESSROC)

This facility burns liquid hazardous waste in one wet process kiln and one dry process with preheater. Hazardous waste feed is pumped into the clinker discharge end of the kiln. Based on the reported maximum practical feed rates and 1991 waste volumes, EPA estimates that the two kilns have 30,969 tons per year of available capacity. The estimate for one kiln was not adjusted due to the high utilization rate, and the available capacity for the other kiln reflects the standard 10 percent reduction for existing capacity, discussed in the methodology section above. This facility did not report bromine limits or its ability to burn K117 and K118.

Southdown, Inc., Fairborn, Ohio

Southdown's Fairborn, Ohio facility burns liquid hazardous wastes in one dry process cement kiln with preheater. The waste fuel is injected into the clinker discharge end of the kiln. Based on reported maximum practical feed rates and 1991 waste volumes, EPA estimates that the facility has 13,022 tons per year of liquid combustion capacity available. These estimates reflect the standard 10 percent reduction for existing capacity discussed in the methodology section above. At present it is only permitted to burn characteristic metal wastes, D001, and F001, F002, F003, and F005. It is modifying its RCRA permit to receive additional wastes, including F037 and F038. This facility did not report plans to burn K117 and K118 wastes.

Southdown, Inc., Knoxville, Tennessee (Southdown)

This facility burns liquid and containerized solid hazardous waste fuel in one four-stage cement kiln with preheater and precalciner. Based on reported maximum practical feed rates and 1991 waste volumes, EPA estimates that the facility has 13,641 tons per year solids capacity available, and 7,842 tons per year liquids capacity available. Liquid capacity was adjusted with the existing capacity adjustment factor of 10 percent. The estimate for containerized solid capacity reflects adjustments for both new and existing capacity, discussed in the methodology section above. This facility is not authorized to receive K117 and K118. The bromine content of waste fuels is limited by the total permitted halogen limit of 5 percent. This facility is currently not permitted to burn F037 and F038 wastes, but has submitted a permit modification to add these wastes.

State and regional EPA offices confirmed that approval is likely before May 1992. This facility reported plans to construct a liquid hazardous waste storage facility in 1992.

2.3.4 Sludge and Solid Cement Kiln Capacity Beyond May 1992

Several firms reported plans to add new sludge and solid capacity between May 1992 and May 1994. EPA did not include these planned capacity increases in its estimate for May 1992 available capacity. The following three facilities are currently burning hazardous waste, and planning to increase or expand their solids combustion capacity:

- Ash Grove, Foreman, Arkansas, currently burns liquids and containerized solids, and is planning to increase solids capacity at an unspecified future time;

- Lafarge, Paulding, Ohio, is currently burning liquids but planning to add dry solids capacity in 1992 or 1993; and

- Lone Star, Green Castle, Indiana currently burns liquids and containerized solids, and is planning to add dry solids capacity in 1993.

Ten facilities that are not expected to burn hazardous waste in May 1992 have plans to add sludge or solid hazardous waste capacity before 1994. Together these facilities have thirteen cement kilns. The activities of these facilities, as each prepares to burn hazardous waste fuel, are summarized below. EPA did not include the capacity from these facilities in its estimate for May 1992 available capacity.

Ash Grove West, Montana City, Montana

The Ash Grove West Montana City plant operates one wet process cement kiln. It does not currently burn hazardous waste, but this facility intends to begin in 1992, pending a public hearing. Because of the possibility of delays in coming on line, its capacity is not included in the projected May 1992 total. Ash Grove West plans to burn containerized solids only, with an annual capacity of 5,000 tons in 1992, increasing to 12,000 tons by 1994.

Ash Grove West, Leamington, Utah

The Ash Grove Leamington plant operates one dry process kiln with a 4-stage preheater and precalciner. It does not currently burn hazardous waste, but intends to begin in 1992, pending the lifting of the Utah moratorium on the use of cement kilns to burn hazardous waste. Because of the possibility of delays in coming on line, its capacity is not included in the projected May 1992 total. This facility plans to burn 2,500 tons of containerized solids in 1992, increasing to 12,000 tons per year by 1994.

Blue Circle Cement, Atlanta, Georgia (Cemtech)

Blue Circle Cement is operating two dry process cement kilns. They do not currently burn hazardous waste, but intend to begin in 1992. This schedule will depend on construction of a receiving storage facility in 1991 and early 1992, and receiving Interim Status in 1991. The facility has proposed to feed liquids and dry solids to the clinker discharge end of the kiln, and containerized solids to the calcining zone. F037 and F038 are among the waste codes on its permit application. The facility did not indicate plans to burn K117 and K118.

Blue Circle Cement, Tulsa, Oklahoma (Cemtech)

This facility is operating two dry process cement kilns, and is intending to begin burning hazardous waste in 1992. This facility plans to burn liquids, pumpable sludges, and dry solids. It is in the process of constructing a receiving and storage facility. The facility intended to qualify for Interim Status under the BIF rule during the third quarter of 1991. The facility intends to accept newly listed F037 and F038 wastes, but did not indicate plans to accept K117 and K118.

ESSROC, Speed, Indiana (Cadence)

This facility is planning to burn containerized solid hazardous waste fuel. The facility indicated that they are currently awaiting EPA permit processing, and could begin burning hazardous waste in 1993. The facility did not indicate whether they intend to burn F037 and F038 or K117 and K118, and did not indicate a bromine or halogen limit.

Kosmos Cement Company, Louisville, Kentucky (Southdown)

This Kosmos Cement facility operates one dry process cement kiln with preheater. It has completed all the necessary construction for liquids burning, and intends to begin burning hazardous wastes in January, 1992. It is still awaiting its RCRA Part B permit and its Jefferson County air permit. Equipment for feeding solid fuels to the kiln will be added after obtaining the necessary air permit for solids and tires burning. F037 and F038 are included on its permit application. EPA did not include this capacity in its estimate of May 1992 available capacity.

Kosmos Cement Company, Pittsburgh, Pennsylvania (Southdown)

This facility is operating one wet process rotary cement kiln. The facility is awaiting a permit from the Allegheny County Bureau of Air Pollution Control, which must be approved before they can begin installing the containerized solid injection port in the kiln. Then they will pursue RCRA Interim Status, and a RCRA Part B permit. F037 and F038 are included in the wastes on its permit application. EPA did not include this capacity in its estimate of May 1992 available capacity.

Medusa Cement, Clinchfield, Georgia (Cemtech)

This facility is operating one preheater cement kiln, but is not currently burning hazardous waste. It is planning to begin accepting hazardous waste in 1992. They have proposed to inject liquids and sludges into the clinker discharge end of the kiln. During the fourth quarter of 1991 and the first quarter of 1992, they will be constructing a receiving and storage facility and they will pursue Interim Status during the third quarter of 1991. F037 and F038 are included on its permit application. EPA did not include this capacity in its estimate of May 1992 available capacity since they are not yet operating.

Southdown, Inc., Brooksville, Florida

The Southdown Brooksville facility currently operates two dry process cement kilns with preheaters. It is not burning hazardous waste at this time, but is in the process of installing a baghouse exhaust filter on one kiln. Following the Florida Department of Environmental Regulation's (DER) approval of a testburn they will begin installing tire and container injection mechanisms into both kilns. It will then seek its RCRA Part B permit and adjust its nitrogen dioxide and sulfur dioxide emissions level for Prevention of Significant Deterioration (PSD). F037, F038, K117 and K118 are included in its permit application. EPA did not include this capacity in its estimate of May 1992 available capacity since they are not yet operating.

Southdown, Inc., Odessa, Texas

Two dry process rotary cement kilns, one with a preheater, are producing clinker at this facility. The facility is in the earliest stages of planning to burn hazardous waste and estimates it will begin burning in 1994. F037 and F038 are included in its permit application. EPA did not include this capacity in its estimate of May 1992 available capacity since they are not currently burning hazardous waste.

In summary, thirteen facilities reported plans to increase their hazardous waste burning capacity before May 1994. This increase in cement kiln capacity will add an estimated 98,500 tons to the national estimate of sludge and solid combustion capacity.

- Five facilities, with 8 units together, reported plans to add or increase containerized solids capacity. Assuming an average available capacity of 9,000 tons per year, based on utilization rates of facilities currently burning containerized solids hazardous waste fuel, this will add 72,000 tons of available cement kiln capacity per year by May 1994.

- Four facilities, operating seven units together, reported plans to add or increase dry solids capacity. Assuming an average available capacity of 2,500 tons per year, based on utilization rates of facilities currently burning dry solid hazardous waste fuel, this will add 17,500 tons of available cement kiln capacity per year by 1994.

- Two facilities, together operating three units, reported plans to add sludge burning capacity. Assuming an average available capacity of 3,000 tons per year, based on utilization rates of facilities currently burning hazardous waste fuel, this will add 9,000 tons of available cement kiln capacity per year by 1994.

2.3.5 Facilities not Included in this Capacity Analysis

According to a February 25, 1991 memorandum from CKRC to EPA, several Holnam and Continental Cement facilities have sludge and solid combustion capacity. It is uncertain whether Texas Industries has solids capacity. Due to the uncertainty regarding the form in which they will accept wastes, and their capacity, these facilities are not included in this capacity analysis.

Exhibit 2-7 summarizes facilities not included in this capacity update due to a lack of detailed information regarding capacity.

2.3.6 Packaging Capacity for the Cadence Solids Fuel Technology at Cement Kilns

Most of the solids combustion capacity at cement kilns comes from kilns equipped with a technology developed by Cadence Chemical Resources Incorporated and Ash Grove Cement Company. This technology allows intact containers, generally six-gallon pails or ten-gallon bags, to be fed to the cement kiln's calcining zone. To be fed to kilns via this technology, wastes must be packaged into appropriate containers. The availability of this packaging capacity is integral to the utilization of cement kiln capacity for burning containerized wastes. During the public comment period, EPA received several comments questioning the availability of packaging capacity. In response to these concerns, EPA contacted several fuels blenders and other waste processing firms to assess the availability of packaging capacity. Phone logs documenting these calls can be found in Appendix C. The remainder of this section summarizes EPA's findings regarding the availability of packaging capacity.

EPA identified waste fuel processing firms from the CKRC survey results. Using this approach, EPA hoped to target the largest providers of fuels processing and packaging capacity. As a result of these calls, EPA identified approximately 66,000 tons of packaging capacity in place at processing facilities (the current utilization rate of this capacity is unknown), and 60,000 tons of currently unutilized mobile packaging capacity which is not presently in place at a processing or waste generating facility (because it is in storage). EPA has identified the following sources of packaging capacity:

Exhibit 2-7
Facilities not Included in Capacity Analysis because Detailed Capacity Data Was Unavailable

Facility Name and Location	Types of Wastes Burned
Carolina Solite, Albemarle, NC	liquids
Continental Cement, Hannibal, MO	liquids, solids
Florida Solite, Green Cove Springs, FL	liquids
Gifford Hill, Midlothian, TX	liquids
Holnam, Clarksville, MO	liquids, solids
Holnam, Santee, SC	liquids
Kentucky Solite, Brooks, KY	liquids, solids
Independent Cement, Hagerstown, MD	uncertain
Lehigh Portland Cement, Cementon, NY	uncertain
Lehigh Portland Cement, Union Bridge, MD	uncertain
Missouri Portland Cement Independence, MO	uncertain
Monarch Cement, Humboldt, KS	uncertain
Norlite, Cohoes, NY	uncertain
Phoenix Cement, Scottsdale, AZ	uncertain
Solite, Arvonia, VA	liquids
Solite, Cascade, VA	liquids
St. Mary's Peerless, Detroit, MI	liquids
Texas Industries, Midlothian, TX	liquids, solids

- Cadence Chemical Resources currently operates an automated pailing device in Chanute, Kansas. It's maximum practical capacity is approximately 14,000 tons per year (2 tons per hour operating 80 percent of the time) about 8,000 tons of which is available based on 1991 utilization data.

- Cadence Chemical Resources also operates a bagging system at the Chanute, Kansas facility. It has a maximum practical capacity of roughly 30,000 tons per year (processing 3 bags per minute, at 50 pounds per bag for 75 percent of the time). The utilization rate of this capacity is unknown.

- Cadence also has 60,000 tons of maximum practical bagging capacity in the form of two idle mobile units that it expects to lease to petroleum refineries or fuels processors.

- OHM receives roll-off bins and transfers the wastes to 55-gallon drums and subsequently to six-gallon pails for cement kilns. OHM did not provide estimates of available capacity for the system that fills 6-gallon pails.

- PetroChem Processors currently processes about 7,000 tons of six-gallon pails per year from its automated packaging system (792 pails per day roughly 310 days per year) in Detroit, Michigan. The utilization rate of this capacity is unknown.

- GSX processes wastes from roll-off bins and 55-gallon drums into six-gallon pails at its facility in Crawley, Louisiana. About 5,000 tons per year of this facility's 15,000 ton per year maximum practical capacity is available.[5]

- Allworth Inc. in Mount Pleasant, Tennessee; Spring Grove Resource Recovery in Cincinnati, Ohio; Rhineco Chemical in Arkansas; and Chemical Processors Incorporated in Washington, also package wastes for the Cadence system, according to the CKRC survey, but available capacity estimates for these facilities were unavailable.

EPA has insufficient data to accurately estimate how much packaging capacity is currently available nationwide. However, based on the limited information noted above, the Agency estimates that at least 13,000 tons are available at existing fixed site facilities and another 60,000 is available through unutilized mobile units. EPA also is aware that some fixed-site fuel processors are not able to accept roll-off bins. EPA expects packaging capacity to expand considerably over the next six months to a year as additional packaging units are constructed and commissioned.

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[5] Based on 70 percent utilization, overall waste receipts of 6,000 drums per month and 40 roll-off bins per month, and roughly 40 percent of all wastes going through the packaging system ((6,000 drums/month x 55 gallons/drum / 240 gallons per ton + 40 bins/month x 20 tons/bin)) x 12 months/year x 40 percent to packaging = 10,000 tons currently packaged at 70 percent utilization therefore approximately 5,000 tons per year available).

2.4 OTHER TREATMENT SYSTEM CAPACITIES

This section discusses commercial treatment capacity other than combustion for the newly identified and listed wastes. Specifically, it presents EPA's capacity analysis for stabilization, biological treatment, and chemical precipitation. Section 2.4.1 discusses the general approach and assumptions EPA used for estimating available capacity for these technologies, and section 2.4.2 summarizes available capacity for newly listed and newly identified wastes.

2.4.1 General Approach and Assumptions

In analyzing alternative treatment capacity for stabilization, biological treatment, and chemical precipitation for newly identified and listed wastes, the Agency built on the capacity analyses conducted for the Third Third LDR rule. This analysis was based on data contained in the May 1990 TSDR Capacity Data Set. The TSDR Capacity Data Set contains results from the National Survey of Hazardous Waste Treatment, Storage, Disposal and Recycling Survey (the TSDR Survey). The TSDR Survey was administered in 1987 to 2,500 facilities and was designed to provide comprehensive information on current and planned hazardous waste management, and practices at RCRA-permitted and Interim Status treatment, storage, recycling, and disposal facilities. The TSDR Survey collected projections of capacity changes from 1986 through 1992. The TSDR Capacity Data Set includes the amount of hazardous and nonhazardous waste entering each treatment system in 1986, the maximum hazardous waste capacity, and the maximum total waste capacity.

In prior LDR rulemakings, EPA updated the TSDR Capacity Data Set for critical technologies based on confirmation of planned capacity changes, and other information received since the survey (e.g., comments on proposed rules). Updated information was obtained by contacting facilities and verifying critical projected capacities reported in the TSDR Survey. Based on the information provided by facility contacts, EPA determined whether planned facility capacity had come on line as projected. For a more detailed explanation of the TSDR Survey and of the Third Third Rule refer to U.S. EPA, *Background Document for Third Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions, May 1990.*

2.4.2 Summary of Available Capacity for Biological Treatment, Chemical Precipitation, and Stabilization

Exhibit 2-8 lists the maximum, utilized, and available capacities of commercial treatment systems appropriate for newly identified and listed wastes. The 1991 baseline available capacity is the updated maximum (updated as described above) net of the 1986 baseline utilized capacity. To estimate the capacity available for newly identified wastes, the required capacity for previous LDR rules was subtracted from the 1991 available baseline capacity. For individual facility data refer to U.S. EPA, *Commercial Treatment/Recovery Data Set, May 1990.*

Exhibit 2-8. DETERMINATION OF AVAILABLE COMMERCIAL CAPACITY FOR NEWLY IDENTIFIED AND LISTED WASTES			
Technology	1991 Baseline Available Capacity (1000 tons/year)	Required Capacity for Previous LDR Rules (1000 tons/year)	Capacity for Newly Listed and Identified Wastes (1000 tons/year)
Biological Treatment	196	8	188
Chemical Precipitation	1,413	600	813
Stabilization	3,125	1,921	1,204

Note: Totals may be inexact due to rounding.

Source: Background Document for Third Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions, May 1990

baseline capacity. For individual facility data refer to U.S. EPA, *Commercial Treatment/Recovery Data Set, May 1990.*

Chapter 3
Petroleum Refining Wastes

CHAPTER 3

CAPACITY ANALYSIS FOR F037 AND F038 PETROLEUM REFINING WASTES

3.1 INTRODUCTION

This chapter describes the capacity analysis for newly listed F037 and F038 petroleum refining wastes (hereafter referred to as F037/8). The overall purpose of this analysis is to estimate the demand for commercial treatment/ recovery capacity as a result of land disposal restrictions for F037/8. EPA compared this estimate of demand to the estimate of available commercial treatment and recovery capacity. This capacity analysis incorporates data on F037/8 generation and management collected after the proposed rule and was used to support variance determinations for F037/8 wastes. The remainder of this introduction provides background information on F037/8 and an overview of the capacity analysis for these wastes.

3.1.1 Background

The following sections provide background information on the regulatory history of the F037/8 wastes, the industry and wastewater treatment processes that generate the wastes, and the regulatory definitions of F037/8 wastes.

3.1.1.1 Regulatory History

As a part of an October 21, 1980 amendment to RCRA, Section 3001(b)(1) requires that EPA identify and list all wastes determined to be hazardous. As a result, two sludges from petroleum refining process operations (K050 and K052) and three petroleum refining wastewater treatment sludges (K048, K049, and K051), were listed as RCRA hazardous wastes in November 1980. In 1984, the Hazardous and Solid Waste Amendments (HSWA) amended RCRA by instituting explicit new hazardous waste management requirements, including land disposal restriction (LDR) schedules (Solvents and Dioxins, California List, First Third, Second Third, and Third Third)[1] for all listed hazardous wastes. K048-K052 were initially subject to LDRs as First Third Wastes, and were subsequently re-evaluated as part of the Third Third final rule. The K048-K052 LDR prohibition did not become effective until November 8, 1990, due to a six-month national capacity variance. The treatment standards for these wastes are based on incineration (including reuse as fuel) and solvent extraction.

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[1] The Federal Register notices containing the final land disposal restrictions schedules for these wastes are: Solvents and Dioxins - 51 Federal Register 40572, November 7, 1986 (Surface Disposed) and 53 Federal Register 28118, July 28, 1988 (Underground Injected); California List - 52 Federal Register 25760, July 8, 1987 (Surface Disposed) and 53 Federal Register 30908, August 16, 1988 (Underground Injected); First Third - 53 Federal Register 31138, August 17, 1988 (Surface Disposed) and 53 Federal Register 30908, August 16, 1988 (Underground Injected); Second Third - 54 Federal Register 26594, June 23, 1989 (All Land Disposed); Third Third - 55 Federal Register 22520, June 1, 1990 (All Land Disposed).

After the K048-K052 listing was proposed, EPA received a rulemaking petition that argued that primary wastewater treatment sludges generated by petroleum refineries (not just K048, K049, and K051) should be included in the listing because all such sludges would be similar in composition. In response to this petition, the Agency proposed in November 1980 that the K048-K052 listing be amended to include additional wastewater treatment sludges from refineries. Since that time, EPA collected additional data on these other sludges and evaluated alternate listing descriptions working toward a final listing rule.

F037/8 petroleum refining wastewater treatment sludges were listed as hazardous on November 2, 1990 (55 Federal Register 46354). The listing became effective in April 1991 and LDR standards for these wastes were proposed on January 9, 1992 (57 Federal Register 957). These sludges are chemically and physically similar to K048-K052; therefore, when the LDR becomes effective, the F037/8 wastes will likely compete for treatment/recovery technologies used to treat K048-K052.

A related rule to the F037/8 listing rule is the Toxicity Characteristic (TC) rule that was promulgated on March 29, 1990, and became effective on September 25, 1990 for large quantity generators and treatment, storage, and disposal facilities. The TC rule became effective for small quantity generators on March 29, 1991. Previous F037/8 studies, such as the background document for the listing of F037/8 wastes,[2] indicated that a large portion of F037/8 wastes exhibit the TC. As a result of the TC rule, some refineries may have reconfigured their wastewater treatment system so that sludges exhibiting the TC are not generated. For the capacity analysis, EPA considered the effect of the reconfiguration of wastewater treatment systems on the amount of F037/8 generated.

3.1.1.2 Industry and Wastewater Treatment Process Overview

At the beginning of 1991, there were 194 known operable petroleum refineries in the United States.[3] These refineries were spread across the country in 35 states, but 41 percent (80 refineries) were concentrated in just three states: Texas, Louisiana, and California. Virtually all refineries generate a variety of oily wastewaters, including process wastewaters, wastewaters associated with the storage and shipment of crude oil and products, wash waters, and cooling system wastewaters. These oily wastewaters are commingled, sometimes with oil-free stormwater runoff, and are either treated in an on-site wastewater treatment facility and discharged to surface waters or are pretreated on

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[2] Midwest Research Institute, Estimates of Waste Generation by the Petroleum Refining Industry, Draft Report, prepared for the Office of Solid Waste, EPA, October 29, 1987; and Midwest Research Institute, Summary of Data and Engineering Analysis for Petroleum Refining Wastewater Treatment Standards, Final Report, prepared for the Office of Solid Waste, EPA, April 8, 1988.

[3] Thrash, L.A., "Annual Refining Survey," Oil and Gas Journal, March 18, 1991.

site and discharged to an off-site wastewater treatment facility. Discharges to surface waters are controlled under the National Pollutant Discharge Elimination System (NPDES), while releases to publicly owned treatment works (POTWs) are subject to state and national pretreatment standards.

Although wastewater treatment systems vary from one refinery to another, these treatment systems follow a general pattern. Exhibit 3-1 presents a simplified block flow diagram of the common treatment steps, which are described below.

- Wastewater "influent" from refinery operations enters a series of oil/water/solids separation steps, collectively referred to as <u>primary treatment</u>. Process wastewaters may be commingled with stormwater runoff in a non-segregated system. The primary treatment system may be broken down into primary and secondary separation.

- <u>Primary separation</u> is generally characterized by gravitational separation, during which solids settle to the bottom and oil floats to the top and is skimmed off. The API separator is the most widely used gravity separator. Primary separation sludge can also be generated by corrugated plate interceptor (CPI) separators, settling ponds, stormwater ponds that receive oily wastewaters, and drainage and collection systems.

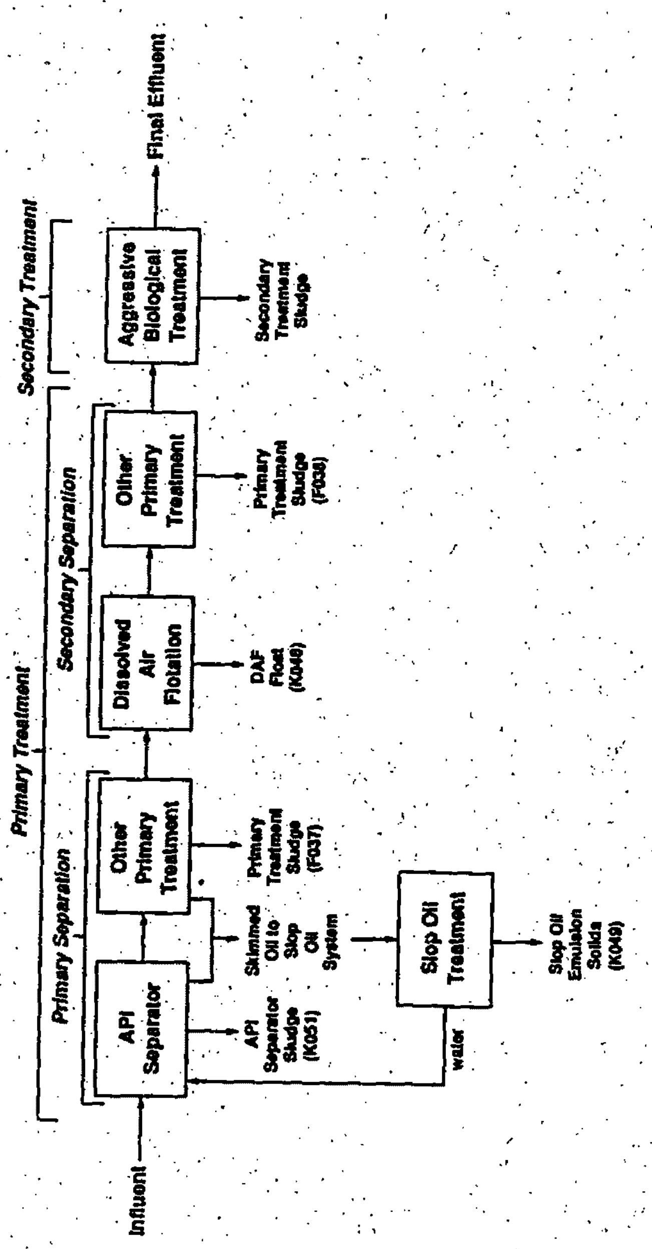
- <u>Secondary separation</u> is a primary treatment that is intended to remove suspended solids and emulsified oils that are not readily separated by gravity. Air floatation units, such as dissolved air floatation (DAF) and induced air flotation (IAF) units, generally are used for secondary separation. In addition, secondary separation may be performed by oxidation ponds and flow equalization tanks.

- Following secondary separation, wastewater enters <u>secondary or biological treatment</u>, and is then discharged after treatment.

3.1.1.3 Waste Stream Definitions

Based on the listing descriptions for K048, K049, and K051, these wastes encompass only certain sludges generated in specific units in the primary wastewater treatment process. In particular, K048 is DAF float, K049 is slop oil emulsion solids, and K051 is API separator sludge. The newly listed wastes, F037 and F038, effectively include all other <u>primary</u> and <u>secondary</u> oil/water/solids <u>separation</u> sludges that are not already generated as either K048 and K051. The listing descriptions for these F wastes are as follows:

EXHIBIT 3-1
SIMPLIFIED BLOCK FLOW DIAGRAM OF COMMON WASTEWATER TREATMENT STEPS



- F037: Petroleum refinery primary oil/water/solids separation sludge - Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling towers segregated for treatment from other process cooling waters, sludges generated in aggressive biological treatment units as defined in 40 CFR 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing.

- F038: Petroleum refinery secondary (emulsified) oil/water/solids separation sludge - Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in induced air floatation (IAF) units, tanks, and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling towers segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in 40 CFR 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.

3.1.2 Overview of Capacity Analysis

This capacity analysis consisted of three general tasks:

- Collect information on waste generation, chemical/physical characteristics, type and concentration of constituents, waste treatability, and current and potential management practices (treatment, storage, disposal, and recycling) of F037/8 petroleum refining hazardous wastes that will be restricted from land disposal. For example, EPA collected F waste information from voluntary data submissions by refineries and from visits to individual facilities and companies that own and operate refineries.

- Develop algorithms for quantifying the F037/8 generation rates at facilities for which EPA had limited data. EPA used previously reported K waste generation and other information to develop a "material-balance" estimate of F037/8 waste from each wastewater treatment unit, tank, and surface impoundment. If K waste generation and the facility's wastewater treatment configuration were not available, information on crude processing capacity and engineering judgement were used to estimate F037/8 generation rates.

- Quantify alternative commercial treatment or recycling demand (i.e., national demand for on-site and commercial capacity) that will be created by the shift of F037/8 petroleum refining wastes away from land disposal at the expected effective date of the LDR (June 1992); and for the two-year "variance window" following the final rule (until June 1994).

The remainder of this chapter consists of three sections. Section 3.2 describes the data sources used in the analysis. Section 3.3 provides details of the methodology used for the capacity analysis, discusses the factors affecting the analysis for F037/8 wastes, and provides estimates of the quantities requiring off-site treatment. Section 3.4 presents the results of the comparison of alternative and required capacity.

Appendices of the Background Document accompany this chapter. Appendix D contains the interview guide and information obtained from contacts with petroleum refineries. Appendices E and F present the calculations that EPA used for estimating F037/8 waste generation.

3.2 DATA SOURCES

For this capacity analysis, EPA identified a variety of potentially useful data sources, and then collected and examined them for use in estimating F037/8 waste generation. As a result of this data identification, collection, and evaluation effort, EPA used the following data sources:

- Petroleum refinery visits;
- Information submissions from refineries;
- Comments in response to "Advanced Notice of Proposed Rulemaking for Newly Identified and Listed Wastes" (ANPRM) (56 Federal Register 24444, May 30, 1991);
- F037/8 Regulatory Impact Analysis (F037/8 RIA) for Final Listing;
- National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR Survey);
- TSDR Capacity Data Set;

- National Survey of Hazardous Waste Generators (Generator Survey);
- Petroleum Refinery Data Base (PRDB);
- Reports on the F037/8 listing rule;
- No-migration petitions;
- Comments received in response to the proposed rule (57 Federal Register 957, January 9, 1992);
- Data from the American Petroleum Institute (API) Survey; and
- Data from the Toxicity Characteristic (TC) Questionnaire.

All but the last two sources were used for the capacity analysis conducted for the proposed rule. Comments received on the proposed rule and data from the TC questionnaire were available only for the final rule analysis. Exhibit 3-2 summarizes how this information was used in the capacity analysis.

EPA reviewed several additional data sources but did not use them for the analysis.

- Corrective Action Regulatory Impact Analysis Data Base;
- Biennial Report/State Reporting Requirements; and
- California Hazardous Waste Data Base.

Each data source, as well as the reason it was or was not used in the F037/8 capacity analysis, is briefly described in the remainder of this section. Section 3.3 then describes in more detail the data sources that were used, and how they were used.

3.2.1 Data Sources Used For F037/8 Capacity Analysis

Petroleum Refinery Visits. EPA visited four refineries to collect information on F037/8 generation and management. For these visits, EPA prepared an interview guide (see Appendix D) to obtain information on waste generation and management, wastewater system modifications planned for the upcoming F037/8 and TC LDRs, and chemical and physical characteristics that affect treatability. From these visits, EPA obtained reliable estimates of the quantities of F037/8 wastes that will require alternative commercial treatment as a result of the LDRs. Appendix D presents the interview guide that was used, as well as the information obtained during these visits.

EXHIBIT 3-2
SUMMARY OF DATA SOURCES USED IN F037/8 CAPACITY ANALYSIS

Data Sources	How Used in F037/8 Capacity Analysis
Petroleum refinery visits	Provided reliable estimates of quantities of F037/8 wastes for four refineries.
Recent information submissions	Provided reliable estimates of quantities of F037/8 wastes for 25 refineries.
Comments on the ANPRM	Provided information on F037/8 waste generation, management, and treatment.
F037/8 Regulatory Impact Analysis	Provided an industry overview and profile of affected facilities, an analysis of baseline waste management practices, and regulatory compliance scenarios.
TSDR Survey	Provided information on the generation and management of the related K048-K052 wastes, and on wastewater treatment system configurations.
TSDR Capacity Data Set	Provided information on required capacity for K048-K052 waste streams, and on available capacity of hazardous waste management technologies.
National Survey of Hazardous Waste Generators	Provided information on the generation and management of the related K048-K052 wastes, and on wastewater treatment system configurations.
Petroleum Refinery Data Base	Provided information on the characteristics, quantities, and management practices of primary wastewater sludges.
Reports on the F037/8 Listing Rule	Provided information on F037/8 waste generation rates, physical and chemical waste characteristics, and wastewater treatment block diagrams for 16 refineries.
No-migration Petitions	Provided information on wastewater treatment configuration, and petroleum refining waste generation and management.
Comments on the Proposed Rule	Provided information on F037/8 waste generation, management, and treatment.
Data from the API Survey	Provided estimates of waste generation and management at petroleum refineries in 1987 and 1988.
Data from the TC Questionnaire	Provided information on generation of wastes from the retrofitting or closure of surface impoundments, and from cleanout of tanks that will replace impoundments.

Recent Information Submissions. EPA reviewed information voluntarily submitted by 25 refineries for the proposed F037/8 waste LDR rule. EPA provided a recent information submission guideline (similar to the guide used for facility visits) to refineries that requested it so that they could provide information useful for the capacityanalysis. This information, which is presented in Appendix D, was evaluated in detail for the F037/8 capacity analysis.

Comments on the "Advanced Notice of Proposed Rulemaking for Newly Identified and Listed Wastes." Ten comments were received in response to the ANPRM.[4] These comments, which were submitted by refineries, trade organizations, and suppliers of hazardous waste treatment technologies, contain information on F037/8 waste generation, management, and treatment. Information from the comments was used in this report to note limitations to the methodology as well as provide data supporting the analysis. These comments are briefly summarized in the relevant sections of this report.

F037/8 Regulatory Impact Analysis. The F037/8 Regulatory Impact Analysis (RIA)[5] was prepared in 1990 for the F037/8 listing rule.[6] The RIA provides an industry overview and profile of affected facilities, an analysis of baseline waste management practices, regulatory compliance scenarios, economic costs and benefits of the listing, product price and international trade impacts, and a Regulatory Flexibility Analysis.

For the RIA, EPA conducted sampling visits at 16 petroleum refineries to determine the characteristics of sludges generated in primary and secondary wastewater treatment units, and to supplement the information gathered from other sources. During the visits, EPA collected information on wastewater treatment system configurations, effectiveness of oil/water/separation practices, and sludges samples generated from these units.[7]

EPA developed a data base for the RIA, referred to as the EPA/RIA data base, using data from the Petroleum Refining Data Base (PRDB) (see below), sampling visits, and wastewater treatment flow diagrams submitted with RCRA Section 3007

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[4] EPA, "Advance Notice of Proposed Rulemaking for Newly Identified and Listed Wastes," 56 Federal Register 24444, May 30, 1991.

[5] DPRA Inc. and ICF Incorporated, Regulatory Impact Analysis for the Listing of Primary and Secondary Oil/Water Solids Separation Sludges from the Treatment of Petroleum Refinery Wastewaters, prepared for the Office of Solid Waste, EPA, October 1990.

[6] EPA, "Hazardous Waste Management Systems: Identification and Listing of Hazardous Waste; Final Rule," 55 Federal Register 46354, November 2, 1990.

[7] Data from the sampling visits were presented in: EPA, "Notice of Data Availability," 53 Federal Register 12162, April 13, 1988.

questionnaires sent by EPA to petroleum refineries in 1984 (to gather information on 1983 operating characteristics). The data base listed facilities by groups based on wastewater treatment system configurations and impoundment categories. The data base contains data on approximately 190 facilities. EPA also incorporated sampling and characterization data from a series of reports[8] that were used in the development of the 1990 Toxicity Characteristic rule and the F037/8 listing rule. Some facility-specific information from the RIA was used in the F037/8 capacity analysis. Furthermore, some of the aggregate quantities (e.g., total F037/8 generation) were compared with the results of the capacity analysis.

National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR Survey). The National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR Survey) was mailed in the fall of 1987. The TSDR Survey requested information on waste quantities and waste management practices for the entire year of 1986, as well as on any projected changes in waste management capacity prior to 1992. The TSDR Survey included approximately 2,500 facilities that manage hazardous wastes on site. These facilities include all of the 2,400 RCRA-permitted or interim status treatment, disposal or recycling facilities, plus about 100 of the 700 facilities that only store wastes. All petroleum refineries that are classified as TSDRs were included in this survey.

EPA asked for several types of information in this survey, including:

- facility EPA identification, location, and regulatory and operating status;
- waste types, characteristics, quantities, and residuals;
- waste management practices (both for exempt and non-exempt systems);
- description of on-site processes, operations, and equipment; and
- capacity information (both current and future).

EPA could not use this survey to determine the exact quantities of F037/8 wastes requiring treatment, since these wastes were not identified or listed as hazardous until after 1986 and, therefore, were not included in the survey. However, this survey provided information on the generation and management of the related K048-K052 wastes, and on facility schematics. EPA used this information and a material-balance calculation approach to estimate F037/8 generation rates.

EPA identified petroleum refineries in the TSDR Survey by searching the TSDR Capacity Data Set (see below) for any facility in the TSDR Survey with a 29XX SIC code (i.e., petroleum refining and related industries). Eighty-nine refineries were identified.

[8] Midwest Research Institute. Estimates of Waste Generation by the Petroleum Refining Industry, Draft Report, prepared for the Office of Solid Waste, EPA, October 29, 1987; and Midwest Research Institute, Summary of Data and Engineering Analyses for Petroleum Refining Wastewater Treatment Standards, Final Report, April 8, 1988.

EPA reviewed the TSDR facility schematics to determine the configuration of the wastewater treatment questionnaires to extract appropriate information for the F037/8 capacity analysis.

TSDR Capacity Data Set. Some of the information from the TSDR Survey had been used to derive the TSDR Capacity Data Set. The TSDR Capacity Data Set was created based on selected responses from the TSDR Survey. This data set contains information on required capacity for waste streams managed in land disposal units, and on available capacity of hazardous waste management technologies. Some of the capacity data from the TSDR Survey have been updated through 1988.

The limitations of this data set are the same as the limitations of the TSDR Survey. EPA used the TSDR Capacity Data Set to identify the petroleum refineries who responded to the TSDR Survey.

National Survey of Hazardous Waste Generators (Generator Survey). The National Survey of Hazardous Waste Generators (Generator Survey) was mailed in the fall of 1987 and requested information on waste quantities and waste management practices for the entire year of 1986, as well as on any projected changes in treatment capacity prior to 1992. EPA included approximately 6,200 facilities in the Generator Survey. All treatment, storage, and disposal facilities (TSDFs) surveyed in the TSDR Survey were included in the Generator Survey. EPA also included the 1,000 largest U.S. hazardous waste generators and a statistical sample of large quantity hazardous waste generators for each state. About 5,600 facilities responded to the survey.

This survey was designed to obtain information on the quantities and characteristics of hazardous waste generated in the United States. In addition, the survey provided capacity information for facilities not included in the TSDR Survey (e.g., facilities that manage wastes in RCRA-exempt units). EPA asked for several types of information in this survey, including:

- facility EPA identification, location, and regulatory and operating status;
- waste identification, characterization, and quantities;
- waste generation, shipment, and management practices;
- description of on-site processes;
- capacity information; and
- waste minimization information.

EPA could not use this survey to determine the exact quantities of F037/8 wastes requiring treatment, since these wastes were not identified or listed as hazardous until after 1986 and, therefore, were not included in the survey. However, this survey provided information on the generation and management of the related K048-K052 wastes, and on facility schematics. EPA used this information and a material-balance calculation approach to estimate F037/8 waste generation.

Petroleum Refinery Data Base. The Petroleum Refinery Data Base (PRDB)[9] is a major data source on primary wastewater sludges from petroleum refineries and is based on a mail survey conducted by EPA during 1983, and includes revised 1985 information for some of the major facilities. The survey questionnaire asked for several types of information including:

- refinery capacity;
- crude oil types;
- product types and quantities;
- process descriptions;
- wastewater flow rates;
- process, slop oil systems, and wastewaters treatment flow diagrams; and
- generated residue characteristics, quantities, and management practices.

The data base contains information from 1983 for 182 of the 220 petroleum refineries listed as operating in 1984. However, only 166 refineries of the sample in the data base were still operating in the beginning of 1991, the others having been closed since 1983. During the same period the total number of operating refineries decreased from 220 to 194.

The refineries represented in the PRDB were distributed across the country in 35 states, but 43 percent (88 refineries) were concentrated in just three States -- Texas, Louisiana, and California.[10] The refineries that were not included in the PRDB are generally small topping and asphalt plants and account for less than five percent of the industry, based on daily crude throughput.

The PRDB classifies refinery wastewater treatment systems into several broad configurations. EPA used these classifications for the F037/8 capacity analysis to estimate the quantity of F037/8 generated at operating refineries.

Reports on the F037/8 Listing Rule. EPA developed two reports,[11] one in 1987 and the other in 1988, in support of the F037/8 listing and the Toxicity Characteristic rule. These reports summarize sampling and analysis data collected by EPA's Office of Solid Waste for 16 petroleum refining facilities. These reports contain several types of information including:

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[9] The PRDB contains confidential business information (CBI). Access to the PRDB was obtained through the RCRA CBI document.

[10] Thrash, L.A., "Annual Refining Survey," Oil and Gas Journal, March 18, 1991.

[11] Midwest Research Institute, Estimates of Waste Generation by the Petroleum Refining Industry, Draft Report, prepared for the Office of Solid Waste, EPA, October 29, 1987; and Midwest Research Institute, Summary of Data and Engineering Analyses for Petroleum Refining Wastewater Treatment Standards, Final Report, prepared for the Office of Solid Waste, EPA, April 8, 1988.

- generation rates;
- physical and chemical waste characteristics;
- waste management practices; and
- wastewater treatment block diagrams for all the facilities.

F037/8 wastes were not specifically identified in these reports because this analysis was done prior to the F037/8 listing; however, wastes fitting the F037/8 definition were reported. These two reports provide only partial information for the F037 and F038 capacity analysis because only 16 facilities were sampled.

For the capacity analysis, EPA used the wastewater treatment block diagrams to determine possible configuration modifications that refineries may undertake to comply with the F037/8 and TC LDRs.

No-migration Petitions. Over the past three years, approximately 30 petroleum refineries submitted no-migration petitions for land treatment units. These petitions attempt to demonstrate that wastes do not migrate from the unit for as long as the waste remains hazardous. If a no-migration petition is approved, the facility can continue to use the unit without meeting the LDR treatment standards. The data in the petition includes:

- generation rates;
- physical and chemical characteristics; and
- management practices of petroleum wastes that fit the description of F037/8 wastes.

Some facilities have included wastewater process schematics showing flows of waste streams. Since these schematics provide important waste generation and waste management information, EPA requested that all facilities submit wastewater process schematics to supplement the petition.

EPA reviewed the no-migration petitions to identify refineries that generate F037/8 wastes. For several facilities, these petitions provided information on wastewater treatment configurations, and petroleum refining waste generation and management.

Comments on the Proposed Rule. There were 20 submissions on the generation and management of F037 and F038 wastes in response to the proposed rule.[12] Most of the comments were from refineries and their trade associations. The major issues addressed by the commenters were the physical/chemical and waste generation characteristics of F037/8 wastes, quantities generated from surface impoundment cleanouts, the variance decisions in the proposed rule, and waste removal from surface

[12] 57 Federal Register 957, January 9, 1992.

impoundments and closure requirements. These comments are briefly summarized in the relevant sections of this report. The full texts of relevant comments are presented in the Response to Comments Document for the final rule.

American Petroleum Institute (API) Survey. In 1989 API conducted a survey of domestic refineries. The goal of the survey was to document the management of waste and secondary materials in 1987 and 1988. Out of a total U.S. population of 176 refineries in 1989, 115 responded to the survey. The results of the survey provided estimates of waste quantities generated and managed by refineries.

The results of the survey were not used as a source of data for the capacity analysis because data on individual refineries were not available. Results of the survey, however, were used as a means of confirming and validating the estimates of F037/8 waste quantities requiring off-site commercial treatment.

Data from the TC Questionnaire. In the spring of 1992 EPA conducted a survey of facilities that manage newly identified TC organic wastes (D018-D043) in land-based units or dispose of these wastes using underground injection wells. The questionnaire was sent to approximately 140 facilities, of which 59 are refineries. A total of 54 refineries responded to the TC questionnaire. They reported information on the refineries' wastewater treatment systems, the timing of when their surface impoundments would be retrofitted or closed (and be replaced by tanks), the quantity of F037/8 wastes that would be generated when these surface impoundments are retrofitted or closed, and the estimated quantity of F037/8 wastes that would be generated from cleanout of tanks that replace surface impoundments. EPA used this information, as well as follow-up telephone calls made to verify the data reported in the questionnaire, to update the quantity of F037/8 wastes from surface impoundments.

3.2.2 Data Sources Examined But Not Used For F037/8 Capacity Analysis

Corrective Action Regulatory Impact Analysis Data Base. EPA's Office of Solid Waste and Emergency Response developed a data base on a sample of 79 RCRA facilities in order to estimate costs and benefits of RCRA corrective action requirements. Nine petroleum refining facilities are included in this sample. The majority of information contained in the data base is from RCRA Facility Assessments (RFAs) conducted in the last five years (i.e., from 1985 to 1990) and from Part A RCRA permit applications, which may date back as far as ten years.

Since most of the corrective action data were collected prior to the F037/8 listing, the data base does not specifically identify F037/8 wastes. Furthermore, only a limited number of these facilities are petroleum refineries. Therefore, EPA did not use this data source for the F037/8 capacity analysis.

Biennial Report. EPA requires large quantity generator, treatment, storage, and disposal facilities to report to EPA on their hazardous waste activities every two years. Although these Biennial Reports do request data on the generation and management of hazardous wastes, the 1989 biennial Reports do not contain F037/8 wastes because these wastes were not considered hazardous when the surveys were conducted. Also, although the Biennial Reporting System is currently being revised and improved and F037/8 wastes will be included in the 1991 report, data was not available in time for incorporation into the capacity analysis for F037/8 wastes.

California Hazardous Waste Data Base. California enacted the Hazardous Waste Management Act in 1986 in accordance with the procedures for establishing treatment standards under Section 25179.6 of the State's Health and Safety Code. The California Department of Health Services is proposing treatment standards for non-RCRA organic-containing hazardous wastes generated from the petroleum refining industry in California. Petroleum wastes fitting the F037/8 waste definition have been identified by California prior to the F037/8 waste listing.

To assign treatment standards to the non-RCRA petroleum wastes, the Department of Health Services used manifest data from 1986 to develop a data base containing information on the generation, chemical/physical characteristics, and treatment of these wastes. These data were of limited use for the capacity analysis because these data did not specifically identify F037/8 wastes.

3.3 METHODOLOGY, ASSUMPTIONS, AND PRELIMINARY RESULTS

In conducting the capacity analysis for F037/8 petroleum refining wastes, EPA derived and quantified the amounts and characteristics of the wastes that will require commercial treatment/recovery as a result of the LDRs. These estimates were revised between the proposed and final rules as EPA evaluated additional data. This section presents only the estimates obtained for the final rule. The basic methodology did not change significantly between the two rulemakings and any changes in the underlying assumptions are noted in this section. The method that EPA developed for the F037/8 petroleum refining wastes capacity analysis is comprised of four steps:

(1) identify research needs and existing data;
(2) apply engineering judgment to existing data;
(3) collect and evaluate new data; and
(4) apply engineering judgment to fill data gaps.

Each of these steps is discussed below.

3.3.1 Step 1: Identify Research Needs and Existing Data

For this step, EPA identified key factors that needed to be addressed in order to conduct the capacity analysis, and then considered these factors while reviewing the available information sources on petroleum refining wastewater treatment sludges (see Section 3.2). The key factors included the quantities of newly regulated F037/8 sludges, management of K048-K052 wastes in response to existing LDRs for these wastes, potential management of F037/8 wastes in response to the LDRs for these wastes, and potential management of accumulated F037/8 wastes removed as a result of the retrofitting or closure of surface impoundments. These factors are discussed in more detail in the next sections.

As indicated in Section 3.2, the most relevant data were extracted from the following sources:

- Comments in response to "Advance Notice of Proposed Rulemaking for Newly Identified and Listed Wastes" (56 Federal Register 24444, May 30, 1991);
- F037/8 Regulatory Impact Analysis for Listing Rule (F037/8 RIA);
- National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR Survey);
- TSDR Capacity Data Set;
- National Survey of Hazardous Waste Generators (Generator Survey);
- Petroleum Refinery Data Base (PRDB);
- Reports on the F037/8 listing rule;
- No migration petitions;
- Comments received in response to the proposed rule (57 Federal Register 957, January 9, 1992);
- Data from the American Petroleum Institute (API) Survey; and
- Data received from the Toxicity Characteristic (TC) survey.

3.3.2 Step 2: Apply Engineering Judgement to Existing Data

EPA conducted an in-depth review of the most appropriate available data as identified in Step 1, and developed assumptions where possible to resolve issues and fill data gaps. This review focused on five areas:

(1) Evaluating previous estimates of total F037/8 waste quantities;

(2) Evaluating F037/8 management practices and available on-site treatment/recovery capacity;

(3) Evaluating the fate of accumulated sludge;

(4) Examining the extent to which F037/8 sludges can be dewatered; and

(5) Identifying existing data gaps.

These areas are discussed below. Additional detail, where relevant, is provided in Section 3.3.4 (Apply Engineering Judgment to Fill Data Gaps).

(1) Evaluating previous estimates of total F037/8 waste quantities. EPA evaluated previous estimates of the quantities of F037/8 wastes by reviewing available literature to identify what quantities are likely to be generated once these wastes become subject to the LDRs. For example, based primarily on the PRDB, EPA had derived for the F037/8 listing RIA a preliminary estimate of 450,000 tons/year of non-dewatered routine F037/8 waste generation. The PRDB, however, as well as a number of the other data sources examined in Step 1, were developed before 1988, and do not reflect current trends. For example, much of the data did not account for the impact on wastewater treatment system configurations due to the TC listing rule. In addition, not all data elements necessary for the capacity analysis are contained in these data bases. For example, explicit data on the generation rate of primary wastewater treatment sludges (i.e., F037/8 wastes) are not provided in the PRDB.

(2) Evaluating F037/8 management practices and available on-site treatment/recovery capacity. EPA evaluated how the newly regulated sludge is likely to be managed once it is subject to the LDRs. EPA reviewed the wastewater treatment system configuration at individual refineries and collected available data on how the industry responded to the LDRs for K048 and K051 to determine possible management scenarios for F037/8. Based on the information developed from this review, EPA applied engineering judgment and developed assumptions concerning how refineries might manage F037/8 to comply with the LDRs.

One basic assumption developed at this point was that once the F037/8 waste LDRs become effective, refineries will manage their F037/8 wastes in the same way as they are currently managing their K048-K052 wastes. That is, refineries, when possible, will recycle the F037/8 wastes through on-site cokers or will reduce the quantity of F wastes requiring treatment by dewatering, thermal drying, and/or other means, and then generally send the F wastes off site to commercial treatment/recovery facilities. The Agency expects that only nonwastewaters will be generated.

(3) Evaluating the fate of accumulated sludge. EPA analyzed existing data (e.g., data from the PRDB) on management practices prior to the effective date of the F waste listing. These data address regulatory constraints, potential liabilities, and technical issues that may affect refineries' decisions on management of newly regulated sludges that have accumulated in on-site surface impoundments that do not meet MTR requirements.

For the F037/8 Listing RIA, EPA estimated that the quantity of one-time generation of non-dewatered accumulated wastes (5.3 million tons) is much greater than the annual amount of routine F037/8 waste generation (450,000 tons). If these accumulated sludges are removed from impoundments before the expected effective date of the LDR (i.e., June 1992), they would not require treatment before being land disposed, and therefore they would not impact the available treatment/recovery capacity being examined by this analysis.

If accumulated sludges are removed from impoundments after the effective date of the LDR, they will increase the demand for treatment. EPA, however, has authority to grant only a two-year national capacity variance for F037/8 wastes. Therefore, if refineries remove accumulated sludges after June 1994 (i.e., two years past the expected time of the final LDR), the impact of those sludges on available treatment capacity would be out of the scope of this capacity analysis.[13]

A few of the commenters on the ANPRM and the proposed rule noted the difficulties involved in closing surface impoundments. In response to the ANPRM, ITEX Enterprises Inc. (Commenter CDP-00020)[14] noted that often the only viable option open to refineries was to make process changes in wastewater flow systems prior to the effective date of the LDRs such that the surface impoundments would no longer be receiving hazardous wastes (e.g., by closing). Those companies that did decide to close units often chose to treat this waste in situ, rather than remove it from the impoundment. ITEX felt that a number of companies were "locked in" to this option even though it may only be a sensible option where the waste is sufficiently shallow to respond to treatment, and the land area is not needed for future use. Sun Refining and Marketing

[13] For this capacity analysis, the Agency is concerned with the generation of F037/8 wastes during the two years following the effective date of the LDR; therefore, the Agency did not examine the F037/8 waste generation that would occur every three or more years (e.g., from the cleaning out of large or numerous tanks).

[14] ANPRM RCRA docket No. F-91-CDP-FFFFF.

(Commenter CDP-00030) noted that there is not capacity to handle either the sludge removed from the bottom of surface impoundments or the wastewaters that flow through them. Furthermore, this commenter stated that it will be impossible to build replacement units in less than four years. API's comments (Commenter CDP-00023) stated that replacing impoundments with tanks can take from six months for a small unit to more than four years for a large impoundment.

In response to the proposed rule, BP Oil (CD2P-00064) and Unocal (CD2P-00044) indicated that the full four years allowed under RCRA section 3005(j)(6) is needed to close (or retrofit) non-MTR surface impoundments and construct tanks to replace surface impoundments. According to these commenters, tank construction programs have been complex engineering projects; time is needed to design, permit, and construct wastewater tanks.

In the proposed rule's capacity analysis, EPA assumed that most surface impoundments would either be cleaned out or replaced by tanks prior to the effective date of the LDR. As a result, EPA assumed the quantities of wastes removed from large surface impoundments in the two years following the effective date to be negligible.

In response to the proposed rule, seven commenters, API (CD2P-00087), BP Oil (CD2P-00064), Conoco (CD2P-00092), Exxon (CD2P-00118), National Petroleum Refiners Association (CD2P-00022), Phillips (CD2P-00042), and Unocal (CD2P-00044), indicated that EPA underestimated the amount of F037/8 wastes that will be generated from surface impoundment cleanouts. For the final rule, EPA reassessed the proposed rule assumptions regarding the closure of surface impoundments. EPA evaluated additional data for the final rule from the TC questionnaire, contacts with refineries who responded to the questionnaire, and comments on the proposed rule. Based on these data, EPA identified refineries that will still operate with surface impoundments after June 1992 and the quantities generated from closure of these impoundments between 1992 and 1994.

In identifying surface impoundments that have closed, EPA assumed that refineries that did not take part in the TC questionnaire have already closed their surface impoundments that contain F037/8 wastes. EPA based this assumption on the fact that the TC questionnaire population is composed of facilities that have submitted notifications to EPA identifying surface impoundments that accept newly identified organic TC wastes. Because most of the F037/8 wastes also exhibit the TC (for benzene), the Agency believes that the TC questionnaire population included refineries that still manage F037/8 wastes in surface impoundments.

EPA believes that tanks replacing closed surface impoundments will require routine cleaning to remove accumulated F037/8 wastes. EPA used the information reported in the TC questionnaire as the basis for estimating the quantity of F037/8 wastes from tank cleanouts.

(4) Examining the extent to which F037/8 sludges can be dewatered. EPA examined dewatering data provided in no-migration petitions from refineries, and reviewed technical descriptions of the processes and efficiencies of primary dewatering technologies (i.e., centrifuges, belt presses, plate and frame filtering, and thermal drying). EPA combined this information on dewatering processes with information on the physical form of the sludge,[15] and EPA reports that examined dewatering of petroleum refining wastes,[16] in order to develop an understanding of quantity reductions from dewatering. This information indicates that dewatering of these wastes are widely practiced, and the type of treatment available to the refinery determines the dewatering equipment used and the extent to which the wastes are dewatered. For example, facilities that aggressively dewater their wastes (e.g., with a filter press) usually send the filter cake to treatment that can handle bulk solids. Facilities that dewater less or do not dewater at all, generally send wastes to treatment systems that require pumpable sludges.

(5) Identifying existing data gaps. As the above analyses were completed, EPA evaluated gaps in the data. In general, the data were often obtained prior to 1988 (before the K048-52 LDRs, and the F037/8 and TC listings). Also, not all of the specific data elements required for the analysis were available (e.g., on future management practices). In Step 3, EPA collected additional data to address the data gaps.

3.3.3 Step 3: Collect and Evaluate New Data

To evaluate the assumptions and address the data gaps identified in Step 2, EPA collected and evaluated additional data on F037/8 wastes. The data collection efforts focused on refineries that are the dominant F037/8 waste generators. Throughout this data collection effort, EPA coordinated with refineries and local and state regulatory agencies to assemble and review petroleum refining waste data. The bulk of the information was collected directly through data submissions by refineries, visits to individual facilities and/or companies that own and operate refineries, and phone calls to refineries responding to the TC questionnaire. Some information was verified through local and state agencies. This effort focused on the key petroleum refining states that account for the largest quantity of refining capacity (i.e., Texas, California, and Louisiana).

[15] U.S. EPA, Proposed Best Demonstrated Available Technology (BDAT) Background Document for Newly Listed Refinery Wastes F037 and F038, November 1991.

[16] U.S. EPA, Assessment of Hazardous Waste Practices in the Petroleum Refining Industry, NTIS Report PB-259097, 1976; and U.S. EPA, Assessment Data Base for Petroleum Refining Wastewater and Residuals, EPA/600/2-83-010, 1983.

3.3.4 Step 4: Apply Engineering Judgement to Fill Data Gaps

EPA evaluated each of the 194 refineries in operation as of January 1991. The types of engineering judgement EPA used to derive estimates of F037/8 waste generation depended on the availability of information for the refinery. This section describes in general the approach EPA used for refineries with different levels of information. This section also presents the preliminary results, as well as additional data gathering and analyses necessary for subsequent refinements. The following subsections are provided:

(1) Refinery categories.
(2) Refinery groups.
(3) Material-balance calculations.
(4) Non-dewatered F037/8 generation.
(5) Reductions as a result of dewatering.
(6) Reductions as a result of using on-site cokers.
(7) Reductions as a result of using other treatment.

3.3.4.1 Refinery Categories

EPA first placed the refineries into three categories based on the availability of information:

- Category 1: Refineries discussed in Step 3 that submitted information for the F037/8 waste capacity analysis. Category 1 contains 29 refineries and represents 28 percent of the total crude oil capacity. EPA determined the F037/8 waste generation for these 29 refineries by using the quantities provided by the refineries. This information is recent and therefore supersedes the information that refineries may have reported previously (in sources identified in Step 2).

  In cases where more recent information was submitted by these Category 1 refineries in response to the proposed rule or in the TC Questionnaire, EPA incorporated the new information into the analysis.

- Category 2: Refineries that provided detailed information in the TSDR Survey, Generator Survey, and PRDB. These sources of information provided the Agency with facility schematics or descriptions, estimates of K waste generation, and other information useful for "material-balance" calculations of facility-specific F waste quantities. Category 2 contains 136 refineries and represents more than 67 percent of the total crude processing capacity. For these refineries, EPA used the K waste generation data together with reported primary and secondary separation efficiencies,[17] typical waste compositions (i.e., oil/grease, suspended solids, and water content),[18] and solids settling characteristics, to develop a "material-balance" estimate of each wastewater treatment unit, tank, and surface impoundment. This approach provided EPA with an accurate engineering-based estimation of routine F waste generation. These facilities were labeled as either Category 2a and 2b. Category 2a represents refineries who responded to the TSDR and Generator Surveys, and Category 2b represents refineries for which EPA had information in the PRDB. Category 2a information is more recent than Category 2b information.

In cases where more recent information was submitted by these Category 2 refineries in response to the proposed rule or in the TC Questionnaire, EPA incorporated the new information into the analysis.

- Category 3: Remaining refineries with limited data. For these refineries, EPA only had data on crude processing capacity from the Oil & Gas Journal's 1991 refinery survey.[19] Category 3 contains 30 refineries and represents less than five percent of the total crude processing capacity. For these refineries, EPA estimated F037/8 waste generation based on waste generation rates associated with the most common type of wastewater treatment configuration.

Category 1 refineries are described in Appendix D. Appendices E and F describe the use of the data for refineries in Categories 2 and 3.

3.3.4.2 Refinery Groups

To facilitate the estimation of F037/8 waste generation for Categories 2 and 3, refineries were grouped according to their reported or assumed primary wastewater treatment configuration. This grouping, which is based on a grouping scheme used in the F037/8 Listing RIA,[20] allowed for a convenient representation of treatment schemes and petroleum waste generation potential. EPA assigned each refinery to Category 2 or

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[17] U.S. EPA, Environmental Assessment Data Base for Petroleum Refining Wastewater and Residuals, EPA 600/2-83-010, 1983.

[18] U.S. EPA, Assessment of Hazardous Waste Practices in the Petroleum Refining Industry, NTIS Report PB-259097, 1976.

[19] Thrash, L.A., "Annual Refining Survey," Oil & Gas Journal, March 18, 1991.

[20] DPRA Incorporated and ICF Incorporated, Regulatory Impact Analysis for the Listings of Primary and Secondary Oil/Water/Solids Separation Sludges From the Treatment of Petroleum Refinery Wastewaters, prepared for U.S. EPA, Office of Solid Waste, October 1990.

3 based on two factors: (1) the type and position of wastewater treatment units (e.g., CPI separators, IAF units) in the treatment train that routinely generate (ranging from continuous to annually) F037/8 wastes; and (2) the size and position of surface impoundments that accumulate F037/8 wastes.

The different waste treatment groups are illustrated in Exhibit 3-3 and are described below.[21]

- <u>Groups 1</u>: Facilities with one or more impoundments upstream of primary treatment (i.e., wastewater treatment upstream of biological treatment), and in between primary separation and secondary separation. The primary treatment section also receives stormwater runoff. (Primary separation includes gravity separation units such as API or CPI separators. Secondary separation includes air flotation units (AFUs), such as DAF or IAF units.)

- <u>Groups 2</u>: Facilities with one or more stormwater impoundments that discharge to primary treatment consisting of primary separation followed by secondary separation.

- <u>Group 3</u>: Facilities that do not have a well-defined process for secondary separation. The primary separation section discharges to surface impoundment(s) upstream of biological treatment.

- <u>Group 4</u>: Facilities with primary and secondary separation processes, but without any surface impoundments that would generate F wastes. Generation of sludges may occur, however, from treatment tanks, storage tanks, and sewers.

- <u>Group 5</u>: Facilities that have at least one surface impoundment downstream of primary and secondary separation.

- <u>Group 6</u>: Facilities that are similar to Group 1 facilities, but that carry out secondary separation in impoundments.

- <u>Group 7</u>: Facilities that are similar to Group 3 facilities, but that have stormwater impoundments that enter the treatment train in primary separation.

For Category 2 facilities, EPA used available facility schematics to determine the grouping that best represents the facility. These schematics, obtained from the TSDR and Generator Surveys and from the PRDB, may not reflect recent changes to refineries'

[21] See Section 3.1 for a general discussion of refinery treatment trains.

EXHIBIT 3-3
WASTEWATER PRIMARY TREATMENT GROUPINGS

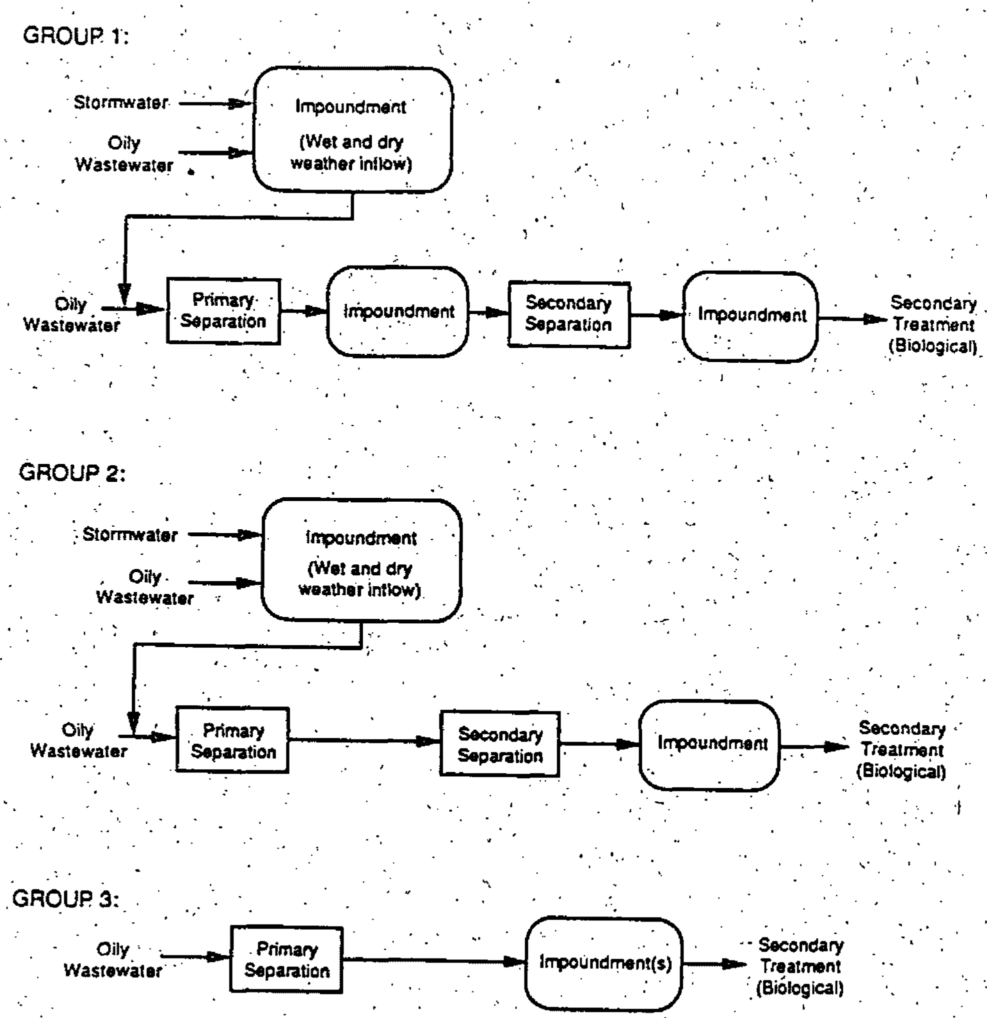
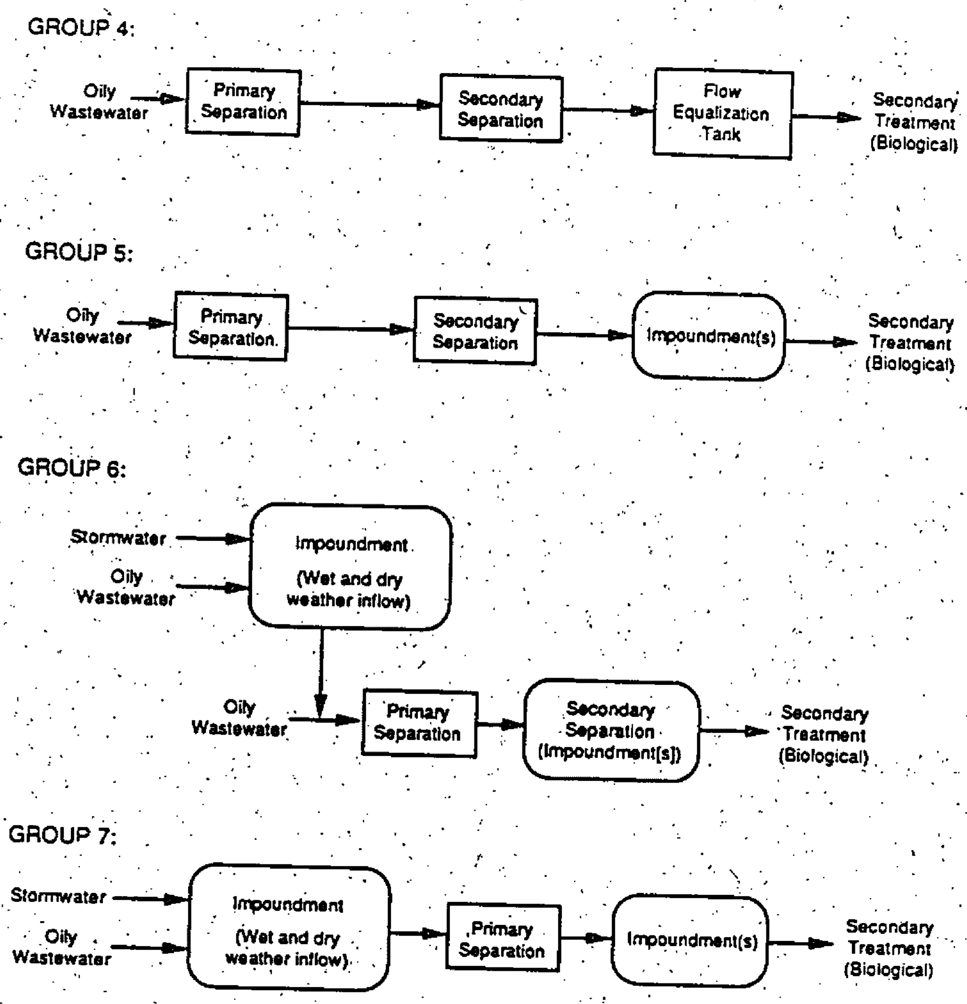


EXHIBIT 3-3 (continued)
WASTEWATER PRIMARY TREATMENT GROUPINGS



wastewater treatment system. In cases where more recent information on a refinery's wastewater treatment system is available (from the TC questionnaire), EPA used the new information in the analysis. EPA assigned all Category 3 refineries to Group 4, the most prevalent wastewater treatment configuration among Category 2 refineries.

3.3.4.3 Material-balance Calculation for Category 2 Refineries

EPA used material-balance calculations to estimate non-dewatered F037/8 wastes for Category 2 refineries. That is, information concerning a refinery's wastewater flow, treatment system, K waste generation, and other characteristics were used to determine a refinery-specific amount of F037/8 waste. These calculations are presented in detail in Appendix E. In general, the following information or assumptions about the facilities were incorporated into the calculations.

- Facilities within a group may differ in the type of primary and secondary separators they employ. CPI separators and IAF units generate F037/8 wastes, respectively; API separators and DAF units generate K051 and K048 wastes, respectively. Therefore, EPA considered whether a facility uses an API or CPI separator, a DAF unit, an IAF unit, or a combination of units.

- Location of impoundments determines the solids loading in the influent wastewater. Impoundments upstream of primary treatment receive wastewaters with higher concentrations of solids than impoundments that are between primary and secondary separation, or downstream of primary treatment, and therefore accumulate more F037/8 wastes.

- Segregated flow systems (i.e., wet weather flow only) were distinguished from non-segregated flow systems (i.e., dry and wet weather flow) because the wet weather component of segregated flow systems does not generate F037/8 wastes.

- Refineries that close surface impoundments prior to the effective date of the LDR and replace impoundments with tanks will generate F037/8 wastes when these tanks are cleaned out. Based on information submitted by refineries, EPA believes that these tanks will be cleaned out once during the two years following the LDR. Furthermore, based on estimated tank sludge generation reported in the TC Questionnaire, EPA estimates that the annualized quantity of routinely generated F037/8 tank sludges is, on the average, one-third the quantity of F037/8 wastes that were cleaned out from the surface impoundments that have closed.[22]

3.3.4.4 Non-dewatered F037/8 Waste Generation

For the final rule, EPA conducted separate capacity analyses for F037/8 wastes removed from surface impoundments and for all other F037/8 wastes (otherwise known as routinely generated wastes). In the proposed rule, wastes removed from small surface impoundments were included in the estimates of routine generation. For the final rule analysis, routinely generated F037/8 wastes are those wastes generated from tanks, including equalization tanks and oil/water/solids separators (such as CPI separators and IAF units) that are not API separators or DAF units. Surface impoundment wastes include wastes generated from both small and large surface impoundments.

<u>Routinely Generated Waste</u>

As described previously (and in greater detail in the appendices), the routine generation of F037/8 wastes was estimated according to a different procedure depending on the data category to which the refinery was assigned. These analyses of F037/8 waste generation show that, as of June 1992, non-dewatered routine F037/8 waste generation is estimated at 571,000 tons/year. Of this amount, California refineries generate approximately 173,000 tons/year (30 percent).[23] Category 1 facilities account for 301,000 tons/year (53 percent of the total), Category 2 facilities account for 265,000 tons/year (46 percent), and Category 3 facilities account for 5,000 tons/year (1 percent).

Exhibit 3-4 presents a summary of the contributions of Category 1, 2, and 3 refineries to the non-dewatered routine F037/8 waste generation, as well as to the total U.S. crude oil capacity. As seen in this exhibit, Category 1 refineries account for a relatively small proportion of the total number of refineries (i.e., 15 percent), yet they account for 28 percent of the total crude capacity and 53 percent of the non-dewatered routine F037/8 waste generation. The Agency believes that these differences may reflect a larger refinery size and a higher utilization of individual crude capacities for Category 1 refineries as compared to Category 2 and 3 refineries. The cost for treating and recovering these wastes provides incentives for refineries to reduce the amount of F wastes they generate. Therefore, EPA expects F waste generation to decrease following the effective date of the LDRs for F037/8. These reductions would be achieved by

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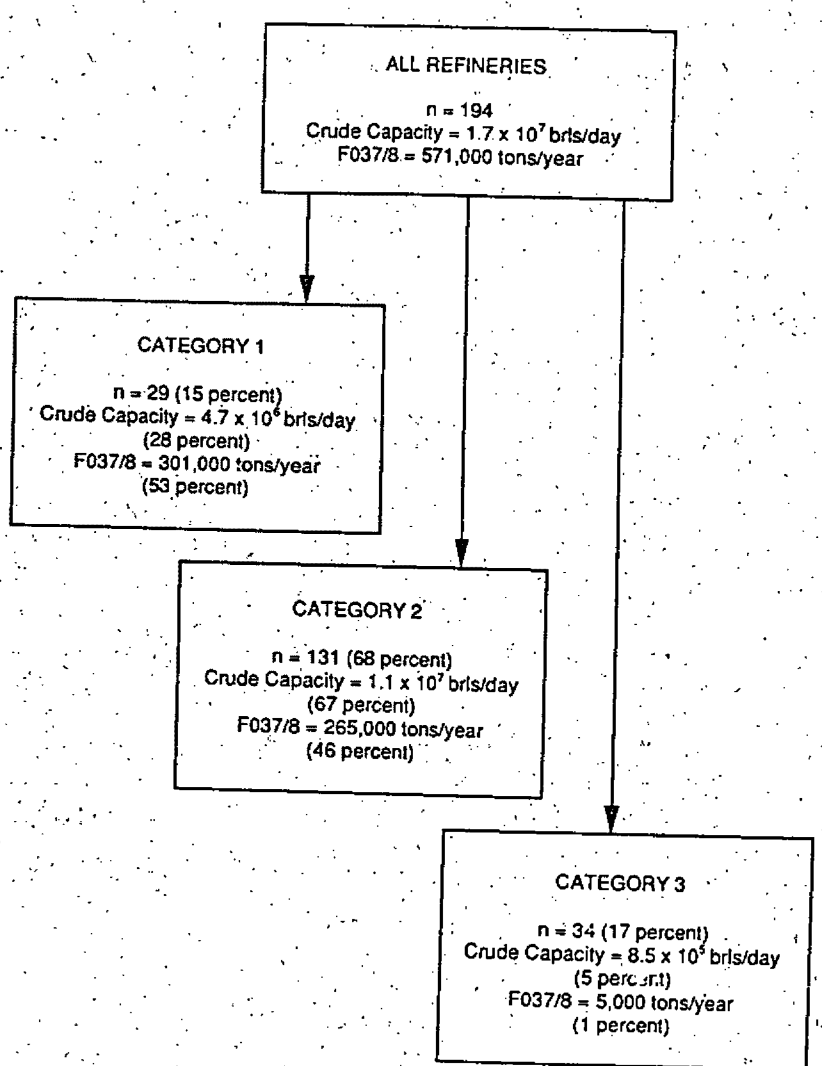
[22] For facilities with surface impoundments that will close due to management of newly identified wastes, the TC questionnaire requested that the facilities estimate the annualized quantity of tank sludges from tanks that will replace surface impoundments. EPA found that, on average, the annualized quantity of tank sludge is one-third the quantity of wastes that will be cleaned out from surface impoundments.

[23] The economic impact screening analysis differentiates between California and non-California wastes. Consequently, these quantities are presented here also.

EXHIBIT 3-4

CONTRIBUTIONS OF CATEGORY 1, 2, AND 3 REFINERIES TO TOTAL CRUDE CAPACITY AND NON-DEWATERED ROUTINE F037/8 WASTE GENERATION



segregating stormwater and process wastewater sewers so that solids from stormwater runoff does not contribute to F037/8 sludge generation, by improving refinery housekeeping so that less contaminants enter stormwater and process water, by dewatering or drying to reduce waste quantities.

Surface Impoundment Wastes

The quantity of accumulated F037/8 in surface impoundments was available for Category 1 facilities in (see Appendix D). For facilities in Categories 2 and 3, EPA used calculations shown in Appendices E and F to estimate the quantity of accumulated F037/8 wastes. Estimates of the quantity that would be removed after June 1992 was obtained from the TC questionnaire, contacts with refineries, and comments on the proposed rule. Refineries that did not take part in the TC questionnaire and did not submit information on surface impoundments in response to the proposed rule were assumed to have already closed their surface impoundments that contain F037/8 wastes. This assumption was based on the fact that the TC Questionnaire population is composed of facilities that have submitted notifications to EPA for land-based units accepting newly identified organic TC wastes. Impoundments managing F037/8 wastes are likely to be covered by the TC Questionnaire because most of the F037/8 wastes exhibit the TC for benzene. (Contacts with four refineries that did not respond to the survey confirmed that they no longer have surface impoundments in operation.)

EPA estimates that approximately 423,000 tons of non-dewatered F037/8 sludges will be removed from impoundments between June 1992 and June 1993, and 225,000 tons will be removed between June 1993 and June 1994. Of this amount, Category 1 facilities account for 224,000 tons between June 1992 and June 1993 and 118,000 tons between June 1993 and June 1994 (53 percent and 52 percent of the totals, respectively). Category 2 facilities account for 199,000 tons between June 1992 and June 1993 and 107,000 tons between June 1993 and June 1994 (47 percent and 48 percent of the totals, respectively).[24]

3.3.4.5 Reductions as a Result of Dewatering

After examining the information discussed in Section 3.3.2 on dewatering, as well as information from Category 1 refineries, EPA concluded that F037/8 wastes are generally dewatered prior to treatment and disposal. This information also showed that standard filter presses can reduce the quantity of oily wastes by an average of 50 percent (to a water content of 20 to 40 percent) -- with higher quantity reductions for sludges with higher water content -- while dewatering using a centrifuge or a belt press can

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[24] Since wastewater treatment configurations were not known for Category 3 facilities, they were assigned to Group 4 (the most prevalent wastewater treatment configuration). Since Group 4 facilities do not have impoundments that would generate F wastes, the 31 Category 3 facilities are assumed to contribute no accumulated F037/8 wastes.

achieve quantity reductions ranging from 30 to 40 percent (to a water content of 40 to 60 percent). Category 1 refineries that provided information on their dewatering practices indicated much higher quantity reductions. These reductions ranged from 50 to 98 percent, with an average of 80 percent. Six of the Category 1 refineries (or 21 percent) indicated that they have operated or are currently operating, planning to operate, or are investigating thermal dryers.

Routinely Generated Wastes

Based on the above mentioned information, EPA reduced the quantity of routinely generated F037/8 wastes by the amount reported (i.e., for Category 1 refineries that reported dewatered amounts), or by 50 percent for refineries that did not submit information on dewatering (i.e., Category 2 and 3 refineries, and several Category 1 refineries).[25] This dewatering reduces the 571,000 tons/year of routine F037/8 waste generation to approximately 185,000 tons/year. Of this amount, California refineries generate approximately 67,000 tons/year (36 percent).[26]

Surface Impoundment Wastes

For F037/8 wastes removed from surface impoundments, EPA used dewatering percentages reported by refineries. However, EPA applied a dewatering percentage of 50 percent for refineries for which refinery-specific dewatering percentages were not available for these wastes. This dewatering results in 200,000 tons of F037/8 removed from surface impoundments between 1992 and 1993 and 112,000 tons removed between 1993 and 1994.

3.3.4.6 Reductions as a Result of Using On-Site Cokers

EPA recognizes that recycling of petroleum refining wastes using cokers is attractive to refineries, and wastes recycled by this process to produce coke are exempt from hazardous waste regulations.[27] For example, of the 29 refineries in Category 1, seven indicated that they are or will be recycling petroleum refining wastes using on-site cokers. (Two of the 29 refineries have cokers but stated that they will not use them for recycling F wastes, and six refineries have cokers but did not indicate whether they will use the cokers to recycle F wastes.)

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[25] One exception to this assumption is a large Category 1 refinery that EPA assumes will dewater to an extent that is similar to several other large Category 1 refineries (i.e., 80 percent).

[26] The average water content of this dewatered waste would be approximately 30 percent. EPA recognizes that this is lower than the water contents discussed above for centrifuging and belt pressing (although not for filter pressing), but believes that -- based on greater incentives to dewater the waste -- this 30 percent value is close to the average water content being attained today.

[27] RCRA section 3004(q)(2)(A).

To obtain an estimate of the quantities of F037/8 that will not require commercial treatment due to the LDRs, EPA evaluated the use of on-site cokers to manage F037/8 wastes. EPA used reported estimates of coker use by Category 1 refineries, as well as an assumption developed for refineries that are known to have cokers[28] but that did not indicate whether they would use their cokers for F037/8 wastes. This latter assumption is that 90 percent of these refineries will use their cokers to recycle F037/8 wastes. This assumption was based on Category 1 refineries that indicated operational constraints that prevent them from using cokers,[29] as well as on the contrasting incentive that exists for increased coker use due to the coking exemption. EPA, therefore, estimated that 55 percent of the 185,000 tons/year of dewatered routine F037/8 waste generation will be managed using on-site cokers (thus reducing the potential quantity of F037/8 wastes requiring commercial treatment to 82,000 tons/year, where 13,000 tons/year is due to California refineries).

EPA assumed that those refineries recycling routinely generated F037/8 wastes through cokers will also use the cokers to recycle F037/8 wastes from surface impoundments, unless more recent information (e.g., from TC Questionnaires and comments in response to the proposed rule) indicates that the refinery will not use cokers to recycle these wastes.[30] A substantially smaller reduction of the F037/8 waste removed from surface impoundments will occur as a result of on-site coker use. The quantity F037/8 removed from impoundments potentially requiring commercial treatment will be reduced by roughly 3 percent due to coking, resulting in 193,000 tons requiring treatment between 1992 and 1993, and 109,000 tons requiring treatment between 1993 and 1994. The smaller reduction of F037/8 waste from surface impoundments resulted because several facilities that will generate large quantities of surface impoundment waste either do not have on-site cokers or do not plan to use cokers for these wastes.

3.3.4.7 Reductions as a Result of Other Treatment

On-site treatment such as incineration, thermal distillation, and solvent extraction can be used to treat F037/8 wastes to meet LDR treatment standards. Of the 194 refineries, five refineries have on-site sludge/solids incinerators. Of these refineries, two stated that they will not use their incinerators to treat F037/8 wastes, one stated that it will use its incinerator for F037/8 wastes, and the remaining two did not indicate what they will do. The two refineries that will not use their incinerators for F037/8 wastes

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[28] From information obtained directly from Category 1 refineries and from Oil and Gas Journal's "Annual Refining Survey" (March 18, 1991) for Category 2 and 3 refineries.

[29] For example, some refineries have cokers for which the technology for recycling petroleum refining wastes has not been developed. Other refineries may be producing anode-grade coke, which may not meet product specifications if petroleum refining wastes are recycled in the cokers.

[30] Several refineries have commented that they will not use their cokers to recycle F037/8 wastes from surface impoundments because they are lower in Btu value than routinely generated wastes.

stated operational constraints as their reasons (e.g., there would be excessive wear and tear on incinerator feed systems: the burning of petroleum wastes would exceed the incinerator emission limits).

Of the 29 Category 1 refineries, only one reported using a thermal distillation unit, and one other reported investigating the use of solvent extraction.

Many refineries are using or investigating thermal drying, a process that reduces F037/8 wastes by approximately 50 percent by removing water and volatile organic compounds and that results in a dried cake with a high ash content.

To obtain an estimate of the reduction to routinely generated F037/8 wastes requiring commercial treatment due to these other treatments, EPA used information on Category 1 refineries for June 1992, and developed an assumption for refineries that did not submit information on other treatment. That is, for the two Category 1 refineries that did not submit information on their incinerators, the Agency assumed that all of their F037/8 wastes would be treated using on-site incineration. For all six Category 1 refineries that indicated they may use thermal drying, EPA assumed a 50 percent reduction in their F037/8 wastes. For the Category 2 and 3 refineries, EPA assumed that approximately 20 percent will use thermal drying and thus reduce their waste requiring commercial treatment by 50 percent.

EPA, therefore, estimates that incineration, solvent extraction, thermal distillation, and thermal drying will reduce routinely generated dewatered F037/8 wastes requiring commercial treatment by an additional 13,000 tons per year. This reduction results in a total quantity requiring off-site commercial capacity of approximately 69,000 tons/year.

To estimate quantities of waste from surface impoundments treated in other on-site processes, the Agency used information submitted by refineries for the proposed rule analysis, comments in response to the proposed rule, and information from the TC Questionnaire on other on-site technologies. In cases where information was not available, EPA assumed that 20 percent of these refineries would use other on-site treatment methods to reduce surface impoundment wastes requiring commercial treatment by 50 percent. The Agency estimates that 20,000 tons of the dewatered F037/8 removed from impoundments between 1992 and 1993 will be sent to other treatment after coking (10 percent), and 10,000 tons will be sent to other treatment between 1993 and 1994 (9 percent). The resulting quantities requiring off-site commercial treatment are 173,000 tons between 1992 and 1993, and 99,000 tons between 1993 and 1994.

3.4 SUMMARY OF REQUIRED CAPACITY AND COMPARISON TO AVAILABLE CAPACITY

This section presents a summary of the results of the F037/8 capacity analysis. These results are presented on an aggregate basis (i.e., results of individual facility analyses are combined). Appendices D through F present refinery-specific calculations and values.

This section describes F037/8 waste generation and management as it occurs at the time of the expected effective date of the LDR (June 1992). This section also summarizes the results of the analysis of available capacity presented in Chapter 2, and compares these results to the estimate of required capacity.

Routinely generated wastes and wastes removed from surface impoundments are presented separately. Only dewatered F037/8 (as defined previously) is addressed in this section. Also, F037/8 waste generated in California is presented separately, for purposes of the economic analysis for the proposed rule.[31]

3.4.1 F037/8 Waste Generation and Management Expected on the Effective Date of the LDR (June 1992)

EPA estimates that approximately 185,000 tons/year of dewatered F037/8 wastes are currently generated routinely (see Exhibit 3-5). Of this amount, 116,000 tons/year (62 percent of the total) is expected to be managed in on-site systems. The majority of the management is coker use, with limited reductions to waste requiring off-site commercial treatment as a result of thermal drying, thermal distillation, solvent extraction, and incineration.

Subtracting 116,000 tons/year from the overall generation amount of 185,000 tons/year results in approximately 69,000 tons/year of routinely generated dewatered F037/38 waste requiring alternative commercial treatment/recovery capacity. Wastes that are removed from surface impoundments are addressed in the next section.

3.4.2. F037/8 Waste Generation During Two Years Following the LDR (June 1992 to June 1994)

EPA expects that during the two years that follow the expected effective date of the LDR for F037/8 waste (i.e., June 1994), the total annual quantity of routinely generated F037/8 waste will decrease as the cost of treating and recovering these wastes increases, while the quantity being treated on site will increase (see section 3.3.4.4). The

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[31] ICF Incorporated, Cost and Economic Impact Analysis of Land Disposal Restrictions for Phase I Newly Listed and Identified Waste Proposed Rule, prepared for the Office of Solid Waste, EPA, November 1991.

EXHIBIT 3-5

DEWATERED ROUTINE F037/8 WASTE GENERATION (TONS/YEAR) AND MANAGEMENT PRACTICES FOLLOWING EFFECTIVE DATE OF LDR (JUNE 1992)

Type	California	Non-California	Total
Generation	67,000	118,000	185,000
Reductions from On-site Coker Use	54,000	49,000	103,000
Reductions from Other On-site Treatment	3,000	10,000	13,000
Quantity Requiring Alternative Treatment	10,000	59,000	69,000

result of this is expected to be a decrease in the quantity of routinely generated F037/8 waste requiring commercial treatment or recovery capacity. Because EPA does not have data indicating the extent to which these changes would occur, however, the quantity of required capacity for routinely generated waste that was estimated for June 1992 (i.e., 69,000 tons per year) is being assumed, for the purpose of this analysis, for the two years following that date (i.e., until June 1994).

Quantities of dewatered F037/8 waste removed from surface impoundments are estimated to equal 200,000 tons between 1992 and 1993, and 112,000 tons between 1993 and 1994 (see Exhibit 3-6). EPA estimates that approximately 27,000 tons will be treated on site by cokers and other forms of treatment between 1992 and 1993 and 13,000 tons between 1993 and 1994. The resulting quantities requiring off site treatment are 173,000 tons between 1992 and 1993 and 99,000 tons between 1993 and 1994.

Combining the quantities of wastes from routine generation with wastes removed from surface impoundments results in a total of 242,000 tons of F037/8 wastes requiring alternative treatment between 1992 and 1993, and 168,000 tons between 1993 and 1994.

3.4.3 Available Commercial Capacity and Comparison to Required Capacity

The quantities of F037/8 wastes requiring off-site treatment are assumed to be treated either by incinerators or cement kilns. EPA believes that F037/8 wastes are not amenable to all types of incineration and cement kiln capacity. EPA believes that some

EXHIBIT 3-6

F037/8 WASTES REMOVED FROM SURFACE IMPOUNDMENTS, MANAGEMENT PRACTICES, AND TOTAL F037/8 QUANTITIES

Type	1992-1993	1993-1994
Generation	200,000	112,000
Reductions from On-site Coker Use	7,000	3,000
Reductions from Other On-site Treatment	20,000	10,000
Quantity Requiring Commercial Treatment	173,000	99,000
Routinely Generated	69,000	69,000
Total Quantity Including Routinely Generated	242,000	168,000

dewatered F037/8 wastes are tacky or not pumpable. Because of these characteristics, EPA believes that dewatered F037/8 wastes are not amenable to pumpable sludge feed systems at incinerators and sludge or dry solids feed systems at cement kilns.

EPA believes that some F037/8 wastes as generated are suitable for cement kilns. The Agency notes that F037/8 sludges removed from surface impoundments downstream of oil/water/solids separation units may contain prohibitively low amounts of organic contaminants. Even after using aggressive dewatering (e.g., filtration, drying), the BTU content of some of these surface impoundment sludges may not rise to acceptable levels for cement kilns.

The Sham Recycling Policy Guideline limit for waste fuels of 5,000 BTU/lb will be superseded as cement kilns certify compliance with the Boiler and Industrial Furnaces (BIF) Rule interim status requirements by August 1992. Once a kiln certifies compliance, its minimum waste fuel heating value will depend on product quality considerations. EPA recognizes that operational limits are likely to prohibit cement kilns from accepting wastes with heating values below about 4,000 BTU/lb. The BIF Rule also will allow broader use of fuels processing to enhance the heating value of wastes destined for cement kilns.. On the other hand, product quality constraints of cement kilns (i.e., wastes must have sufficiently high BTU to achieve adequate conditions in the kiln to produce a quality product) and technical and regulatory limitations of fuels blending for solids limit the use of low-BTU waste at cement kilns. In addition, EPA believes that some fuels blenders have the 5,000 BTU/lb limit written into their permit and would, at a minimum, require a permit modification to accept low-BTU wastes. Thus EPA does not expect blending to significantly increase the amount of low-BTU wastes used as fuels by cement kilns. EPA believes that containerized solids capacity at cement kilns will be used to burn high-BTU F037/8 wastes.

EPA believes that low-BTU F037/8 wastes sent off-site will likely require incineration and that these wastes are generally collected in bulk (e.g., in roll-off bins). EPA believes that systems for packaging petroleum refining wastes into drums for incinerators are not widely available. Therefore, EPA believes that containerized solids systems at incinerators will not receive a large portion of the nation's F037/8 wastes. Although packaging capacity could be added at generators, incinerators or intermediate processors, EPA believes that obtaining storage and operating permits, as well as construction and startup of packaging units will take six months to one year. EPA believes that most low-BTU F037/8 sent off-site will require bulk solids incineration and nonpumpable sludge capacity. EPA notes, however, that this rule does not preclude the use of other feed systems.

Since routinely generated F037/8 wastes are generated in wastewater treatment units (e.g., CPI separators, IAF units) similar to those that generate K048 and K051 wastes (from DAF units and API separators, respectively), the proportion of low-BTU to high-BTU F037/8 waste should be similar to the proportion of low-BTU to high-BTU K048 and K051 wastes. Cadence Chemical Resources Inc. provided information to EPA for the K048-K052 LDR rulemaking that indicated the heating value of K wastes. According to this information which is presented in Appendix C, approximately 30 percent of the K wastes as dewatered will meet levels acceptable to cement kilns and approximately another 30 percent will meet levels acceptable to cement kilns with the use of modified dewatering techniques such as changing to organics-based filter aids or eliminating inorganic filter aids (EPA also has collected information indicating that the use of sludge dryers can also increase the BTU content of petroleum waste). The remaining 40 percent of the K wastes will not have a heating value acceptable to cement kilns even after dewatering. Applying these proportions to routinely generated F037/8 wastes, EPA estimates that of the 69,000 tons/yr requiring alternative treatment, 28,000 tons/yr (40 percent) will be low-BTU content wastes that will be treated by bulk solids incineration, and 41,000 tons per year (60 percent) will be high-BTU content wastes that will be managed using containerized solids capacity at cement kilns.

EPA believes that there is insufficient bulk solids incineration capacity available for the 28,000 tons of low-BTU waste would need to be managed in the form of bulk solids at incinerators. Therefore, EPA is granting a one-year national capacity variance to all routinely generated F037/8 wastes to allow time for cement kilns to comply with the requirements of the BIF rule and for additional capacity for bulk solids incineration and other treatment and recycling technologies to come on line to meet the demand for low-BTU routinely generated wastes.

Some refineries submitted data on BTU values of F037/8 wastes from surface impoundments in their comments on the proposed rule. EPA used these data to estimate the proportion of low-BTU to high-BTU F037/8 wastes from surface impoundments. Of the 173,000 tons of dewatered F037/8 wastes that will be generated from surface impoundments between June 1992 and June 1993, EPA estimates that 112,000 tons will be low-BTU wastes and will require bulk solids incineration, and 61,000 tons will be high-BTU wastes and will be managed using containerized solids capacity at cement kilns. Of the 99,000 tons of dewatered F037/8 wastes that will be generated between June 1993 and June 1994, approximately 64,000 tons will be low-BTU wastes, and 35,000 tons will be high-BTU wastes.

EPA has identified 23,000 tons per year of bulk solids incineration capacity, 1,000 tons per year of nonpumpable sludge incineration capacity, and 83,000 tons per year of containerized solids capacity at cement kilns. EPA is granting a two-year national capacity variance to these surface impoundment wastes. This variance allows refineries time to find suitable storage, handling, treatment, and disposal capacity and also allows time for other types of commercial capacity to increase to meet the demand from these surface impoundment wastes.

Because low-BTU F037/8 wastes are not amenable to cement kilns, and incinerators generally have less capacity for high-BTU wastes than for low-BTU wastes (i.e., when they are constrained by heat release limits), EPA considered the possibility of limiting the capacity variance to low-BTU wastes. However, EPA abandoned this idea for several reasons. First, the precise point at which F037/8 wastes are not suitable to cement kiln processing is difficult to demarcate, varying to some extent on individual kiln preferences and shifting state regulation. Thus, there is no readily available means of accurately subcategorizing among amenable and non-amenable routinely generated wastes. More importantly, EPA believes that the heating value of F037/8 can vary considerably over time at the same refinery. A regulatory regime whereby the status of sludge could vary on a daily basis (or a tank-by-tank basis) would create a regulatory nightmare. There would be day-to-day uncertainty for waste generators regarding the regulatory status of the day's waste, increased testing to confirm compliance, vastly increased record keeping and construction of two sets of waste processing units (with their use depending upon BTU levels) whose use could not be reliably predicted. In addition to this miasma of uncertainty for generators, enforcement would be extremely difficult, with such issues as status of blending, drying, filtering and other processing operations in doubt (e.g., whether or not they add or remove BTU values), and documentation uncertain and difficult.

For the reasons discussed above, EPA concluded that it would be unduly burdensome and not a sound exercise of discretion, for the regulated community to comply with or for regulators to enforce different standards for high-BTU and low-BTU F037/8 wastes. Finally, by granting a variance to low-BTU wastes and not to high-BTU wastes, EPA would unfairly reward refineries who could process their wastes to enhance their BTU value but have not acted to do so. In addition, as discussed in the preamble and this document, it is not clear that there exists adequate capacity for high-BTU routinely generated F037/8 in any case. EPA believes there is uncertainty in the available containerized solids capacity because some cement kilns may not meet the August deadline for complying with interim status requirements of the BIF Rule (i.e., problems in complying with the hydrocarbon emission requirements, see Chapter 2).

Treatment of F037/8 wastes using incineration, solvent extraction, and thermal distillation will result in the generation of treatment residuals[32] (e.g., ash from incineration) that may require stabilization to meet the metal standards. The solids content of F037/8 wastes ranges from 40 to 70 percent (with an average of 55 percent). Assuming these solids result in the generation of residuals, EPA estimates that 77,000 tons of residuals will be generated from the treatment of routinely generated and surface impoundment wastes between June 1992 and June 1993, and 51,000 tons of residuals will be generated between June 1993 and June 1994. EPA also estimates that 1,204,000 tons per year of stabilization capacity is available (see Chapter 2). Therefore, the Agency believes that sufficient stabilization capacity is available to manage the F037/8 residuals.

Also in this final rule, EPA is resolving the conflict in RCRA concerning the deadline by which surface impoundments receiving wastes that are newly listed must comply with the minimum technology requirements specified in sections 3004(o). As mentioned in Section 3.3, many of the F037/8 wastes managed in surface impoundments are managed in unretrofitted units (i.e., impoundments not meeting the MTRs). EPA is promulgating that in the case of wastes subject to a national capacity variance, impoundments managing such wastes (and no other wastes subject to an earlier prohibition) have four years from the date of the identification or listing (i.e., the date the identification or listing is promulgated, not the effective date of the rule, see section 3005(j)(6)) to retrofit or close.

[32] F037/8 wastes used at cement kilns and on-site cokers to produce a product (i.e., cement from cement kilns and petroleum coke from cokers) do not result in the generation of residuals that would be subject to the LDRs.

Chapter 4
Other Newly Listed Wastes

CHAPTER 4

CAPACITY ANALYSIS FOR OTHER NEWLY LISTED WASTES

This chapter presents EPA's analysis of required alternative treatment or recovery capacity for other newly listed wastes that are currently being land-disposed. Other newly listed wastes include specific source wastes (K wastes; 40 CFR 261.32) as well as commercial chemical products (U wastes; 40 CFR 261.33). Specifically, this chapter addresses organic U wastes (2-ethoxyethanol (U359), o-toluidene (U328), and p-toluidene (U353)), UDMH production wastes, toluene diisocyanate wastes, EDB wastes, EBDC wastes, and methyl bromide wastes. The six waste groups received final listings between 1984 and 1990. Nearly all of these wastes result from organic chemicals production, and most contain either halogenated organic compounds or aromatic hazardous constituents. The purpose of the capacity analysis is to estimate the quantity of these wastes requiring alternative treatment or recovery (ATR) capacity as a result of today's final rule.

The remainder of this chapter is divided into two sections. Section 4.1 discusses the data sources and general methodology used to estimate the required capacity for other newly listed wastes. Section 4.2 presents the results of the capacity analysis and discusses current generation and management of other newly listed wastes by waste group, waste code, facility, treatability group (i.e., wastewater or nonwastewater) and individual waste stream.

4.1 DATA SOURCES AND METHODOLOGY

EPA used several data sources for conducting the capacity analysis for other newly listed wastes. Generation and management information concerning these wastes was collected by EPA during 1990 and early 1991 under the authority of section 3007 of RCRA (data collected by this effort can be found in Docket # F-91-CD2P-5F, and are hereafter referred to as the 3007 Data). Waste generation and management information for these wastes was requested of companies identified in relevant chemical industries. These companies were identified through commercial trade literature as potential generators based on the manufacture of the products that result in these wastes. EPA requested information from 25 facilities identified as potential generators of these wastes. The Agency contacted several of these facilities to clarify the information they submitted. Phone logs of these follow-up calls are presented in Appendix A: Organic Wastes Generation Phone Logs. Additional information used in this capacity analysis was obtained from comments submitted in response to the ANPRM for newly listed and newly identified wastes (56 Federal Register 24444, May 30, 1991) and submitted in response to the proposed rule for newly listed and newly identified wastes (57 Federal Register 958, January 9, 1992).

To assess required alternative capacity for these wastes, EPA analyzed the current generation and management of these wastes to determine how each individual waste stream will be affected by the final rule. EPA first considered whether a waste steam is currently land-disposed. If a waste is not currently land-disposed, or is currently land-disposed in a unit that has received a no-migration variance, it was considered not to be affected by the final rule. If a generated waste is currently land-disposed, EPA considered the current management of the waste to determine whether current treatment or recovery processing would meet the LDR treatment being promulgated today. If a land-disposed waste stream was managed using the BDAT or an equivalent, the waste stream was considered not to be affected by today's final rule. Any land-disposed waste streams that are not currently managed using a BDAT or equivalent were considered to require alternative treatment or recovery capacity as a result of today's final rule. These waste quantities were assigned to the BDAT technology to assess whether a national capacity variance was warranted. EPA compared the total or aggregate required capacity for a particular treatment or recovery capacity to the aggregate available commercial capacity to determine whether adequate capacity exists for each waste code.

4.2 CAPACITY ANALYSIS RESULTS

Exhibit 4-1 summarizes the results of EPA's analysis of the quantities of other newly listed wastes requiring alternative treatment or recovery capacity as a result of today's final rule. Exhibit 4-1 identifies:

- The generating facility and a waste stream identifier for each identified other newly listed waste stream;
- The waste quantity currently generated;
- The waste quantity being land-disposed (surface-disposed, deepwell-disposed with a no-migration variance, or deepwell disposed without a no-migration variance);
- The waste quantity currently treated (or recovered);
- The method by which the waste is currently treated or recovered and the type of discharge from treatment as applicable; and
- The quantity of each waste stream identified as requiring alternative treatment or recovery capacity as a result of today's final rule.

The remainder of this section discusses EPA's capacity analysis for each waste stream presented in Exhibit 4-1.

EXHIBIT 4-1
REQUIRED CAPACITY SUMMARY FOR OTHER NEWLY LISTED WASTES[1] (TONS PER YEAR)

GENERATING FACILITY	WASTE STREAM	TOTAL VOLUME GENERATED	VOLUME SURFACE DISPOSED	DEEP-WELL DISPOSED		VOLUME TREATED	TREATMENT TECHNOLOGY AND DISCHARGE	REQUIRED CAPACITY FOR ATR
				WITH NM VARIANCE[2]	WITHOUT NM VARIANCE			
UNSYMMETRICAL DIMETHYLHYDRAZINE (UDMH) PRODUCTION WASTES (K107, K108, K109, K110)								
NONE								0
2-ETHOXYETHANOL (U359)								
Oxy Petrochem. Pasadena, TX	U359 (NWW)	<1				<1	off-site incineration	0
Texas Eastman Longview, TX	U359 (NWW)	128				128	on-site incineration	0
	U359 (WW)	variable				none in 1989	on-site biotreatment	0
Union Carbide Seadrift, TX	U359 (NWW)	<1				<1	off-site incineration	0
	U359 (WW)	500	500					500
DINITROTOLUENE AND TOLUENEDIAMINE PRODUCTION WASTES (K111-K112, U328, AND U353)								
Air Products and Chemical Pasadena, TX	K111 (WW)	195,833				195,833	chemical oxidation; POTW	0
	K111 (NWW)	3,500	3,500					3,500

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EXHIBIT 4-1 (continued)

REQUIRED CAPACITY SUMMARY FOR OTHER NEWLY LISTED WASTES[1] (TONS PER YEAR)

GENERATING FACILITY	WASTE STREAM	TOTAL VOLUME GENERATED	VOLUME SURFACE DISPOSED	DEEP-WELL DISPOSED		VOLUME TREATED	TREATMENT TECHNOLOGY AND DISCHARGE	REQUIRED CAPACITY FOR ATR
				WITH NM VARIANCE[2]	WITHOUT NM VARIANCE			
	K112 (WW)	87,500				87,500	POTW	0
BASF Geismar, LA	K112 (WW)	60,833				60,833	on-site carbon treatment	0
Bayer (Mobay) Baytown, TX	K111 (WW)	54,750				54,750	on-site extraction, biotreatment, carbon treatment, dewatering; OCPSF Guidelines	0
	K112 (WW)	35,040				35,040	on-site biotreatment, carbon treatment, dewatering	0
	K111/K112 Biosludge (NWW)	700				700	off-site incineration	0
Bayer (Mobay) New Martinsville, WV	K111 (WW)	45,833				45,833	on-site neutralization, biotreatment, carbon treatment; NPDES	0
	K112 (WW)	158,333				158,333	on-site neutralization, biotreatment, carbon treatment; NPDES	0
	K111/K112 Biosludge (NWW)	20,000				20,000	on-site incineration	0

EXHIBIT 4-1 (continued)
REQUIRED CAPACITY SUMMARY FOR OTHER NEWLY LISTED WASTES[1] (TONS PER YEAR)

GENERATING FACILITY	WASTE STREAM	TOTAL VOLUME GENERATED	VOLUME SURFACE DISPOSED	DEEP-WELL DISPOSED		VOLUME TREATED	TREATMENT TECHNOLOGY AND DISCHARGE	REQUIRED CAPACITY FOR ATR
				WITH NM VARIANCE[2]	WITHOUT NM VARIANCE			
	K111/K112 Ash (NWW)	1,750	1,750					0[3]
Olin Chemical Lake Charles, LA	K112 (WW)	76,666				76,666	on-site carbon treatment; NPDES	0
	Spent Carbon from K112 (NWW)	150				150	off-site regeneration	0
	K112 CH_4 Column Sidedraw (NWW)	2,682				2,682	on-site incineration	0
	K112 Incineration Scrubber Blowdown (WW)	525,400				525,400	on-site carbon treatment; NPDES	0
	Spent Carbon from K112 (NWW)	20				20	off-site incineration	0

EXHIBIT 4-1 (continued)

REQUIRED CAPACITY SUMMARY FOR OTHER NEWLY LISTED WASTES[1] (TONS PER YEAR)

GENERATING FACILITY	WASTE STREAM	TOTAL VOLUME GENERATED	VOLUME SURFACE DISPOSED	DEEP-WELL DISPOSED		VOLUME TREATED	TREATMENT TECHNOLOGY AND DISCHARGE	REQUIRED CAPACITY FOR ATR
				WITH NM VARIANCE[2]	WITHOUT NM VARIANCE			
Rubicon (ICI) Geismar, LA	K111 (WW)	44		44				0
	K111 Residual (NWW)	<1					off-site incineration	0
	K112 (WW)	46		46				0
	K112 Residual (NWW)	<1					off-site incineration	0
Du Pont Deepwater, NJ	U328 (NWW)	2					unknown	2[3]
	U353 (NWW)	<1					unknown	0

EXHIBIT 4-1 (continued)
REQUIRED CAPACITY SUMMARY FOR OTHER NEWLY LISTED WASTES[1] (TONS PER YEAR)

GENERATING FACILITY	WASTE STREAM	TOTAL VOLUME GENERATED	VOLUME SURFACE DISPOSED	DEEP-WELL DISPOSED: WITH NM VARIANCE[2]	DEEP-WELL DISPOSED: WITHOUT NM VARIANCE	VOLUME TREATED	TREATMENT TECHNOLOGY AND DISCHARGE	REQUIRED CAPACITY FOR ATR
ETHYLENE DIBROMIDE (EDB) PRODUCTION WASTES (K117, K118, K136) AND METHYL BROMIDE PRODUCTION WASTES (K131, K132)								
Ethyl Corp. Magnolia AR	K118 (NWW)	30	30					30
	K131 (NWW)	3,000				3,000	on-site stripping, off-site acid reclamation	0
	K132 (NWW)	8	8			8	on-site stripping	0
Great Lakes Chemical Corp. El Dorado, AR	K118 (NWW)	15				15	off-site incineration	0
	K131 (NWW)	2,100				2,100	off-site acid reclamation	0
	K132 (NWW)	15				15	off-site incineration	0
	K117,K118, K131, K132 (WW)	1,570,833			1,570,833			1,570,833

EXHIBIT 4-1 (continued)

REQUIRED CAPACITY SUMMARY FOR OTHER NEWLY LISTED WASTES[1] (TONS PER YEAR)

GENERATING FACILITY	WASTE STREAM	TOTAL VOLUME GENERATED	VOLUME SURFACE DISPOSED	DEEP-WELL DISPOSED		VOLUME TREATED	TREATMENT TECHNOLOGY AND DISCHARGE	REQUIRED CAPACITY FOR ATR
				WITH NM VARIANCE[2]	WITHOUT NM VARIANCE			
ETHYLENEBISDITHIOCARBAMIC (EDBC) ACID PRODUCTION WASTES (K123, K124, K125, K126)								
Alco Chemical Chattanooga, TN	K123 scrubber (WW)	10,480				10,480	on-site pH neutralization; POTW	0
	K123 evaporator condensate (WW)	388				388	on-site pH neutralization; POTW	0
Vinings Industries Marietta, GA	K123 discharge (WW)	36				36	on-site alkaline chlorination	0
	K125 (NWW)	2	2				off-site stabilized landfill	2

1. Excludes soil and debris.
2. NM Variance: No Migration Variance.
3. Management of ash uncertain but assumed to pass BDAT standard and therefore not require alternative treatment.
4. Current management unknown. As worst case, assumed total volume generated will require alternative treatment.

4.2.1 Unsymmetrical Dimethylhydrazine (UDMH) Production Wastes (K107, K108, K109, and K110)

K107 -- Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines.
K108 -- Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.
K109 -- Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.
K110 -- Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.

UDMH wastes listings were proposed in December 1984 and finalized in May 1990. For UDMH wastes, EPA is promulgating incineration as the method of treatment for nonwastewaters, and incineration or chemical oxidation or biodegradation followed by carbon adsorption as methods of treatment for the wastewaters.

Only one manufacturer, Uniroyal, submitted 3007 Data on UDMH wastes. This company formerly used a proprietary process that generates UDMH wastes, but has ceased UDMH production. Therefore, the Agency has concluded that no UDMH wastes will require alternative treatment or recovery capacity as a result of today's final rule. Based on available data, EPA believes that sufficient capacity exists for treatment of the UDMH wastes; therefore, EPA is not granting a national capacity variance for K107, K108, K109, and K110 wastewaters and nonwastewaters.

4.2.2 2-Ethoxyethanol (U359)

U359 -- 2-Ethoxyethanol

The U359 waste listing was proposed in July 1985 and made final in February 1986. For U359, EPA is promulgating incineration or fuel substitution as methods of treatment for the nonwastewaters; and incineration, or chemical oxidation followed by biological treatment or carbon adsorption, or biodegradation followed by carbon adsorption for the wastewaters.

Three facilities submitted 3007 Data on current U359 waste generation. In addition, one of these facilities provided information in response to the proposed rule. Information on U359 wastes from the three additional facilities is discussed below.

Oxy Petrochemical, Pasadena, TX. This facility reported generating less than one ton of U359 nonwastewaters, which is sent off site for incineration. Because none of these wastes are currently land disposed, EPA concluded that these wastes will not require alternative treatment as a result of today's final rule.

Texas Eastman, Longview, TX. This facility currently generates and incinerates on site approximately 128 tons per year of U359 nonwastewaters. In addition, Texas Eastman occasionally generates unspecified and variable quantities of U359 wastewater (none was generated in 1989), which they send to on-site biological treatment. Because none of these wastes are currently land-disposed, EPA concluded that none of these wastes will require alternative treatment or recovery as a result of today's final rule.

Union Carbide, Seadrift, TX. This facility reported generating less than one ton of U359 nonwastewaters, which is sent off site for incineration. Because none of these wastes are currently land disposed, EPA concluded that these wastes will not require alternative treatment as a result of today's final rule. In addition, Union Carbide reported generating roughly 500 tons of U359 wastewater from a remedial action that potentially will not meet de minimis requirements.

EPA assigned 500 tons to its estimate of required alternative treatment capacity for incineration of U359 wastewaters. EPA has determined that there is sufficient excess incineration capacity to handle additional quantities of U359 if the need arises. Based on the available data, EPA believes that sufficient capacity exists for treatment of the U359 wastes; therefore, EPA is not granting a national capacity variance for U359 wastewaters or nonwastewaters.

4.2.3 Dinitrotoluene and Toluenediamine Production Wastes (K111-K112, U328 and U353)

K111 -- Product washwaters from the production of dinitrotoluene via nitration of toluene.
K112 -- Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.
U328 -- Ortho-toluidine.
U353 -- Para-toluidine.

Dinitrotoluene and toluenediamine production waste listings were proposed in May 1985 and finalized in October 1985. U328 and U353 waste listings were proposed in May 1984 and finalized in October 1985. For K111 wastewaters and nonwastewaters, EPA is promulgating concentration standards based on a transfer of the F039 standards for 2,4-dinitrotoluene and 2,6-dinitrotoluene. EPA is promulgating incineration as the method of treatment for K112, U328, and U353 nonwastewaters; and incineration, chemical oxidation followed by carbon adsorption, or biodegradation followed by carbon adsorption as methods of treatment for K112, U328, and U353 wastewaters.

Four facilities reported generating K111 or K112 wastes in response to the 3007 Data request, and one facility submitted 3007 Data on current U328 waste generation. In addition, the Agency contacted other facilities that were potential generators of these wastes in order to obtain further information concerning waste generation, management practices, and residuals. Finally, information was provided in response to the ANPRM (56 FR 24444) and the proposed rule (57 FR 958).

Three facilities reported that they ceased generating K111-K112 wastes: Olin Corporation's Moundsville, WV facility (closed since 1983); E.I. du Pont in Deepwater, NJ; and Dow Chemical in Freeport, TX. Six facilities reported that they currently generate K111 and/or K112 wastes, and one facility (E.I. Du Pont in Deepwater, NJ) provided data on current generation of U328.* Below is a summary of current generation and management practices at these six facilities.

Air Products and Chemicals, Inc., Pasadena, TX. This facility generates 195,833 tons per year of K111 wastewaters and 87,500 tons per year of K112 wastewaters. A fraction of the K111 wastewater is chemically oxidized with hydrogen peroxide prior to mixing with other wastewaters. All facility wastewaters (including K112, which does not receive on-site treatment) are combined and sent off site for treatment at a POTW facility. Since all of the K111 and K112 wastewaters generated at this facility are discharged to a POTW, EPA has concluded that none of these wastes will require alternative treatment or recovery capacity as a result of today's final rule.

In response to the proposed rule, Air Products and Chemicals (Comment number CD2P-00084), reported generating 3,500 tons of K111 nonwastewater, which will require alternative treatment capacity (i.e., incineration). EPA believes that incinerators are equipped to handle K111 nonwastewaters, but believes that in general facilities manage spent activated carbon by returning it to the supplier for regeneration.

BASF Urethanes, Geismar, LA. This facility generates a K112 wastewater stream and no K111 wastes. The rate of K112 wastewater generation was estimated as the permitted discharge limit of 60,833 tons per year (40,000 gallons/day). The K112 wastewater is currently treated in a distillation tower followed by granular activated carbon beds. Spent carbon is sent off site for regeneration. This company did not report where effluent is discharged, but EPA assumes treated effluent is discharged to a POTW or under a NPDES permit. EPA has concluded that none of these wastes are land-disposed and therefore none will require alternative treatment or recovery capacity as a result of today's final rule.

Bayer (Mobay), Baytown, TX. This facility generates K111 wastewaters at a rate of 54,750 tons per year and K112 wastewaters at a rate of 35,040 tons per year. These wastes are commingled with other wastes (they comprise about 3 percent of the aggregated waste streams) and sent to an on-site biological treatment plant. Biosludge from treatment of aggregated wastewater streams amounts to approximately 700 tons per year. During management of the K111 wastewater stream, dinitrotoluene is recovered from the waste-stream using toluene as an extractant. The water containing residual dinitrotoluene goes to above-ground biological treatment, primary clarification, and carbon absorption prior to discharge under Organic Chemical, Plastic and Synthetic Fibers (OCPSF) guidelines (40 CFR 414.80-91 Subparts H and I [52 FR 42522]). The K112 wastewater stream is first pH adjusted, and then follows the same treatment train as the K111 wastewater stream (excluding the extraction step). Biosludge is treated on site in a filter press and then incinerated off site, as part of a mixed stream. Ash from this incineration is land disposed. Carbon is thermally regenerated on site. Because none of these wastes are land disposed without treatment using a BDAT (incineration), EPA has concluded that none of these wastes will require alternative treatment or recovery capacity as a result of today's final rule.

The Bayer (Mobay), New Martinsville, WV. This facility generates 45,833 tons per year of K111 wastewaters and 158,333 tons per year of K112 wastewaters. K111 and K112 wastewaters are mixed with other production wastes, resulting in a combined wastewater stream of 5,327,000 tons per year that is treated on site. K111 wastewaters comprise 0.5 to 2 percent of the hydraulic loading, and K112 wastewaters amount to 2 to 6 percent of the hydraulic loading to the wastewater treatment system. Wastewater treatment includes neutralization, biological treatment, and carbon adsorption in an NPDES permitted facility. Approximately 20,000 tons of biological sludge is incinerated along with other wastes in an on-site, RCRA-permitted fluidized bed incinerator. As much as 9,600 pounds of incinerator ash are generated per day and shipped off site to a hazardous waste landfill. Because all of the K111 and K112 wastewaters generated at this facility are discharged under a NPDES permit, and all treatment residuals are currently treated using the BDAT (incineration), EPA has concluded that none of these wastes will require alternative treatment or recovery capacity as a result of today's final rule.

Olin Chemical, Lake Charles, LA. This facility generates two K112 wastewater streams and four K112 nonwastewater streams: one primary K112 wastewater stream; one primary K112 nonwastewater stream; two spent carbon nonwastewater streams from treatment of K112; and one wastewater stream resulting from treatment of K112. It generates no K111 wastes.

K112 wastewater, generated at a rate of 76,666 tons per year, is treated in standard carbon beds and discharged under NPDES. As a result of this treatment, 150 tons per year of spent carbon are generated. This spent carbon is returned to its manufacturer for regeneration. Side-draw from the methanol still column, a K112 nonwastewater, is generated at a rate of 2,682 tons per year and incinerated on site. (A small fraction is incinerated off site.) Incinerator scrubber water blowdown, a K112 wastewater, is generated from the on-site incineration of the side-draw (a K112 nonwastewater) at the rate of roughly 525,400 tons per year. This K112 wastewater is treated in standard carbon beds, before discharge under NPDES guidelines. This second spent carbon stream, generated at the rate of 20 tons per year, is incinerated off site.

Because all of the K112 wastewaters generated at this facility are discharged under NPDES guidelines, and K112 nonwastewaters are currently recovered or incinerated, EPA has concluded that none of these wastes will require alternative treatment or recovery capacity as a result of today's final rule.

Rubicon Chemical, Baton Rouge, LA. This facility generates 44 tons per year of K111 wastewaters and 46 tons per year of K112 wastewaters. K111 and K112 wastewaters undergo on-site pretreatment, which includes neutralization and filtration. Residuals from the treatment of these wastewaters carrying the K111 and K112 codes (86 pounds per year of each waste) are incinerated off site. The pretreated K111 and K112 wastewater (with a combined wastewater stream of unknown quantity) is deep-well injected on site; the facility currently has a no-migration variance for this operation. Because the wastewaters are treated on site and the facility has a no-migration variance, EPA has concluded that none of these wastes will require alternative treatment or recovery capacity as a result of today's final rule.

E.I. Du Pont, Deepwater, NJ. This facility reported generating U328 nonwastewater streams totalling 2 tons, but did not specify how the waste was managed. Therefore EPA assumed, as a worst case scenario, that the entire quantity is land disposed and will require incineration as a result of today's final rule.

Based on the facility-specific analysis described above, the Agency has identified less than 3,500 tons of K111 nonwastewaters, less than 100 tons of K112 nonwastewaters, and no K111 or K112 wastewaters requiring alternative treatment or recovery capacity as a result of today's final rule. Most of the K111 and K112 wastes generated are currently treated and discharged under NPDES. Residuals from treatment of K111 and K112 were further treated or recovered before being land disposed. EPA has concluded that sufficient incineration capacity exists to treat 3,500 tons per year of K111 wastes; therefore, EPA is not granting a national capacity variance for K111 and K112 wastewaters or nonwastewaters.

Although available data indicate that considerably less than 100 tons of U328 and U353 nonwastewaters are currently being land disposed, as a worst case scenario, EPA assigned 100 tons of U328 and U353 wastes to incineration for this analysis. Based on the available data, EPA believes that sufficient capacity exists for treatment of the U328 and U353 wastes; therefore, EPA is not granting a national capacity variance for U328 and U353 wastewaters or nonwastewaters.

4.2.4 Ethylene Dibromide (EDB) Production Wastes (K117-K118, and K136) and Methyl Bromide Production Wastes (K131 and K132).

K117 -- Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene.

K118 -- Spent adsorbent solids from the purification of ethylene dibromide via bromination of ethene.

K136 -- Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.

K131 -- Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide.

K132 -- Spent absorbent and wastewater separator solids from the production of methyl bromide.

Ethylene dibromide (EDB) wastes listings were proposed in October 1984 and finalized in February 1986. Methyl bromide wastes listings were proposed in April 1985 and finalized in October 1989. For K117, K118, K136, K131, and K132 wastewaters and nonwastewaters, EPA is promulgating concentration standards based on a transfer of data used to calculate the standards for the brominated U wastes (U029 (bromomethane), U030 (4-bromophenyl phenyl ether), U066 (1,2-dibromo-3-chloropropane), U067 (ethylene dibromide, EDB), U068 (dibromomethane) and U225 (bromoform)), which were promulgated as part of the Third Third Rule; and multi-source leachate (F039) performance for wastewaters. These standards were based on incineration for nonwastewaters; and a variety of industrial wastewater technologies for wastewaters, including steam stripping, activated sludge, and air stripping. Any other forms of waste treatment other than impermissible dilution may be used to achieve numerical treatment standards regardless of which technology served as the basis of the standards.

Two facilities submitted data on generation of these wastes in response to the ANPRM (56 FR 24444) and in response to the proposed rule (57 FR 958): Ethyl Corporation in Magnolia, AR and Great Lakes Chemical Corporation in El Dorado, AR. Ethyl Corporation also submitted 3007 Data on methyl bromide waste generation. Each of these facilities are discussed below.

<u>Ethyl Corporation, Magnolia, AR</u>. In response to the proposed rule, Ethyl Corporation reported generating 30 tons of K118 nonwastewaters, which are currently land disposed off site. EPA determined that this quantity of K118 nonwastewater will require alternative treatment or recovery capacity as a result of today's final rule.

In comments to the ANPRM, Ethyl indicated that the Magnolia, AR facility does not generate any K117. They stated that the aqueous bottoms from the reactor vent scrubber are not a K117 wastewater because they are recycled to the bromine production process on site for acid value and recovery of bromine. In addition, they stated that the stream generated from the recovery process (about 13,000 tons per year), also is recycled and will not require alternative capacity as a result of today's final rule. Because the stream is not currently land-disposed, EPA has concluded that it will not require alternative treatment or recovery capacity as a result of today's final rule.

Ethyl Corporation also generates K131 and K132 nonwastewaters. K131 nonwastewater (spent sulfuric acid) is generated at the rate of 3,000 tons per year. This waste stream is stripped in an enclosed process until methyl bromide concentration is less than 200 ppm, and returned to the acid supplier for reclamation. Because this waste stream is not currently land-disposed, it will not require alternative treatment or recovery capacity as a result of today's final rule.

Ethyl Corporation also generates approximately 67,000 tons per year of an aqueous stream, which potentially carries the K131 code, from its TBBPA/methyl bromide reactor. Ethyl contends that its process is fundamentally different from those covered by the K131 listing, and that therefore it does not generate K131 "wastewater from the reactor". They stated that the aqueous portion of a TBBPA product slurry from Ethyl's TBBPA/methyl bromide co-production process is close-looped recycled to the bromine production process. Because it is not land-disposed, this stream will not require alternative treatment or recovery capacity as a result of today's final rule.

Ethyl Corporation also reported generating K132 nonwastewater (spent alumina adsorbent) at a rate of 7.5 tons per year. Currently, Ethyl uses a closed-loop stripping operation to recover the methyl bromide from this stream, before it is removed from the column to be discarded off site. Ethyl stated that its process can meet BDAT standards for K132. Therefore, EPA has concluded that this stream will not require alternative treatment as a result of today's final rule.

<u>Great Lakes Chemical Corporation, El Dorado, AR.</u> Great Lakes Chemical Corporation generates 2,100 tons per year of K131 nonwastewaters which are sent off site for acid reclamation and 1.5 tons per year of K132 nonwastewaters which are sent off site for incineration. Because these streams are currently being managed to meet the promulgated treatment standard, EPA has concluded that these streams will not require alternative treatment or recovery capacity as a result of today's final rule.

Beginning in 1992, the Great Lakes Chemical facility expects to generate approximately one million tons per year (260 million gallons) of K117 wastewaters from ground-water cleanup activities. This stream also will carry the K131, U067, and possibly TC waste codes. As a result of buried K118 nonwastewaters at two closed landfills on the El Dorado plant site, Great Lakes Chemical currently collects about 13.1 million gallons per year of leachate and ground water, which is aggregated with process wastewater, resulting in disposal of approximately 115 million gallons per year. In addition to K118, this wastewater mixture also carries K131 and K132 waste codes. The stream is currently treated in an on-site wastewater treatment plant (where it undergoes neutralization, equalization, and filtration) before being deep-well injected. The total quantity of the two deep-well disposed wastewater streams to be generated at the Great Lakes Chemical Corporation facility is expected to be greater than 300 million gallons per year. EPA has concluded that there is not adequate treatment capacity for this deep-well disposed quantity of wastewaters carrying the K117, K118, K131, and K132 waste codes. Therefore, the Agency is granting a national capacity variance for deepwell injected quantities of K117, K118, K131, and K132 wastewaters that are deep-well disposed. EPA has identified no quantities of K117, K118, K131, or K132 wastewaters that are currently being surface disposed. Therefore, EPA is not granting a national capacity variance for K117, K118, K131, or K132 wastewaters that are surface disposed.

Great Lakes Chemical Corporation reported that the mixed K117, K118, K131, and K132 nonwastewater quantity they reported in response to the ANPRM will not require alternative treatment capacity as a result of today's rule. In its comment to the ANPRM, Great Lakes Chemical Corporation expressed concern over difficulty in locating treatment capacity for a waste filter cake potentially carrying the K118, K131, and K132 waste codes. Great Lakes Chemical Corporation generates 1,650 tons per year of filter cake currently identified as K118, K131, and K132 nonwastewater. Analyses of the filter cake indicated that the concentrations of the regulated constituents are below the treatment standards being promulgated today, and therefore the waste will not require treatment as a result of today's final rule. In addition, Great Lakes Chemical Corporation has located a sulfuric acid producer that can reconstitute its K131 nonwastewater stream, which is generated at the rate of 2,100 tons per year, to commercial-grade material. Because this waste stream is not currently surface-disposed, it will not require alternative treatment or recovery capacity as a result of today's final rule.

Based on the individual facility analyses discussed above, EPA has identified several EDB and methyl bromide waste streams requiring alternative treatment or recovery as a result of today's final rule. Based on new information received in response to the proposed rule, EPA estimates that less than 100 tons of currently disposed K118 nonwastewaters will require alternative treatment.

As a worst case scenario for the capacity analysis, EPA assigned 100 tons of K118 nonwastewater to incineration. The Agency has identified no K117, K136, K131, or K132 nonwastewaters that will require alternative treatment as a result of today's rule. Therefore, the Agency is not granting a national capacity variance for K117, K118, K136, K131 or K132 nonwastewaters. The Agency has identified no surface-disposed K117, K118, K136, K131, or K132 wastewaters that will require alternative treatment as a result of today's rule. Therefore, the Agency is not granting a national capacity variance for surface-disposed K117, K118, K136, K131 or K132 wastewaters. A total of greater than 300 million gallons of deep-well disposed K117, K118, K131, and K132 wastewaters will require alternative treatment or recovery capacity as a result of today's rule. EPA has determined that there is not adequate treatment capacity for this deep-well disposed quantity. Therefore, the Agency is granting a 2-year national capacity variance for quantities of K117, K118, K131, and K132 wastewaters that are deep-well disposed.

4.2.5 Ethylenebisdithiocarbamic (EBDC) Acid Production Wastes (K123, K124, K125, and K126)

K123 -- Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salt.

K124 -- Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts.

K125 -- Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.

K126 -- Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts.

Ethylenebisdithiocarbamic (EBDC) waste listings were proposed in December 1984 and finalized in October 1986. For EBDC wastes, EPA is promulgating incineration as the method of treatment for nonwastewaters, and incineration or chemical oxidation followed by biotreatment or carbon adsorption as methods of treatment for wastewaters.

Five companies submitted 3007 Data on EBDC wastes. Two companies reported current generation of wastes from EBDC production: Alco Chemical in Chattanooga, TN and Vinings Industries in Marietta, GA. The other three companies, who formerly produced EBDC, currently do not generate the EBDC wastes: Rohm and Haas in Philadelphia, PN, Drexel Chemical in Tunica, MS, and FMC Corporation with facilities in Middletown, NY and Jacksonville, FL. The two facilities that reported current generation of EBDC wastes are discussed below.

Alco Chemical in Chattanooga, TN discharges several wastewater streams that potentially carry the K123 code: 10,480 tons per year of scrubber water and 388 tons per year of evaporator condensate. The streams are treated on site by pH neutralization prior to discharge to a POTW. These discharges are not "supernates, filtrates, or washwaters" and as such the facility does not believe they meet the definition of K123. Because these wastes are discharged to a POTW, EPA has concluded that they will not require alternative treatment or recovery capacity as a result of today's final rule.

Vinings Industries in Marietta, GA discharges 36 tons per year of wastewater that potentially carries the K123 code. The stream undergoes alkaline chlorination on site. EPA assumes that this discharge is either to a POTW or under a NPDES permit, and therefore will not require alternative treatment as a result of today's final rule. In addition, Vinings generates 1.75 tons of a K125 nonwastewater, which is landfilled off site. EPA has concluded that this K125 nonwastewater will require alternative treatment or recovery as a result of today's final rule.

The Agency has identified less than 100 tons of K125 nonwastewaters which are currently land disposed and will require alternative treatment or recovery as a result of today's final rule. As a worst case scenario for this capacity analysis, EPA has assigned 100 tons of K125 nonwastewaters to incineration capacity. Based on the facility-specific analysis discussed above, EPA has concluded that no quantities of K123 wastes are currently being land disposed, and no K125 wastewaters, K124 wastes, or K126 wastes are currently being generated. Therefore, EPA is not granting a national capacity variance to K123, K124, K125, or K126 wastewaters or nonwastewaters.

CHAPTER 5

CAPACITY ANALYSIS FOR SURFACE-DISPOSED MIXED RADIOACTIVE WASTES

Mixed RCRA/radioactive wastes are radioactive wastes that are contaminated with RCRA hazardous wastes. The treatment standards promulgated as part of the Land Disposal Restrictions apply to these RCRA wastes mixed with radioactive wastes.

The Background Document for the Third Third Land Disposal Restrictions[1] provides a detailed analysis of the generation of and available alternative treatment capacity for mixed RCRA/radioactive wastes. Based on this analysis, EPA granted a two-year national capacity variance to all Third Third surface-disposed mixed RCRA/radioactive wastes (from May 8, 1990 to May 8, 1992). Included in the Third Third wastes were both organic and inorganic-containing wastes. In both cases, there was an overall shortage of treatment capacity.

Since granting that variance, EPA is not aware of any new alternative treatment capacity that has become available. EPA's data show that there continues to be a treatment capacity shortfall for all types of mixed RCRA/radioactive wastes, and consequently, EPA is today granting a two-year national capacity variance to all surface-disposed mixed RCRA/radioactive wastes contaminated with F037, F038, K107, K108, K109, K110, K111, K112, K117, K118, K123, K124, K125, K126, K131, K132, K136, U328, U353, and U359.

5.1 BACKGROUND

EPA has defined a mixed RCRA/radioactive waste as any matrix containing a RCRA hazardous waste and a radioactive waste subject to the Atomic Energy Act (53 FR 37045, 37046, September 23, 1988). Regardless of the type of radioactive constituents that mixed RCRA/radioactive wastes contain (i.e., high-level, low-level, or transuranic), these wastes are currently subject to RCRA hazardous waste regulations. In general, the treatment standards for mixed RCRA/radioactive wastes are the same treatment standards in effect for non-radioactive hazardous wastes.

Radioactive wastes that are mixed with spent solvents, dioxins, or California list wastes, or First Third, Second Third, or Third Third scheduled wastes are subject to the land disposal restrictions already promulgated for those hazardous wastes. In the Third Thirds rulemaking, EPA granted a two-year national capacity variance for mixed RCRA/radioactive wastes contaminated with First Third, Second Third, and Third Third wastes because of a lack of available treatment capacity. Although this variance expired

[1] EPA, Background Document For Third Third Wastes To Support 40 CFR Part 268 Land Disposal Restrictions, Final Rule, Third Third Waste Volumes, Characteristics, and Required and Available Treatment Capacity, Volume III, Appendix B, May 1990.

on May 8, 1992, the Department of Energy (DOE) has submitted a case-by-case extension application for certain Third Third mixed RCRA/radioactive wastes generated and stored at 31 of its facilities. DOE requested a one-year extension of the Third Third capacity variance for the mixed RCRA/radioactive wastes addressed in the application.

EPA is reviewing DOE's application and has issued a proposed finding that DOE has made all but one of the demonstrations required by 40 CFR 268.5 for a case-by-case extension (57 FR 22024, May 26, 1992). The remaining demonstration requires DOE to enter into a binding contractual commitment to construct or otherwise provide alternative treatment, recovery, or disposal capacity for the wastes included in the application. EPA will consider granting the case-by-case extension based on its evaluation of the remaining demonstration. In addition, EPA has taken regulatory action to grant a generic, one-year extension of the LDR effective date applicable to all facilities managing hazardous debris (with several exceptions) (57 FR 20766, May 15, 1992), including mixed RCRA/radioactive waste classified as debris. This extension is effective from May 8, 1992 to May 8, 1993.

The proposed rule (57 FR 958, January 9, 1992) presented the results of EPA's preliminary capacity analysis. Based on this analysis, EPA proposed a two-year national capacity variance for mixed RCRA/radioactive wastes contaminated with the newly listed wastes. In response to the proposed rule, seven commenters discussed issues relating to capacity available for the treatment of mixed RCRA/radioactive wastes. Only one commenter, DOE, provided quantitative information on mixed RCRA/radioactive wastes. The commenters addressed the following major issues:

- The two-year national capacity variance for mixed RCRA/radioactive wastes is justified;
- The two-year national capacity variance for mixed RCRA/radioactive wastes is not justified;
- DOE should not be relied on to develop new capacity;
- Non-DOE mixed RCRA/radioactive wastes should be stored under an emergency permit program;
- Treatment capacity for some mixed RCRA/radioactive wastes is increasing;
- Several obstacles exist to the development of new treatment capacity for mixed RCRA/radioactive wastes; and
- EPA should encourage separation of the hazardous and radioactive components of mixed RCRA/radioactive waste.

Information that EPA received in support of the proposed national capacity variance for newly listed mixed RCRA/radioactive wastes is included in the analysis that follows. This analysis presents the rationale for EPA's decision to grant such a variance in today's rulemaking. For a more detailed discussion of the capacity related comments for mixed RCRA/radioactive wastes and the Agency's response to these comments, please refer to the Response-to-Comments document.

5.2 ANALYSIS OF ALTERNATIVE TREATMENT CAPACITY

As part of this capacity analysis conducted to support the final rule on the land disposal restrictions for newly listed mixed RCRA/radioactive wastes, and in response to comments received on the proposed rule, EPA examined the 1991 Report on Hanford Site Land Disposal Restrictions for Radioactive Mixed Wastes, DOE/RL-43, October 1991 (hereinafter cited as 1991 Hanford Site Report). EPA not only used the 1991 Hanford Site Report to refine its initial analysis conducted for the proposed rule, but also to determine if large quantities of previously restricted mixed RCRA/radioactive wastes still exist that require treatment. These mixed wastes would have priority over newly listed mixed RCRA/radioactive wastes for the purpose of assigning treatment capacity. EPA's capacity analysis methodology assigns any new commercial capacity for mixed RCRA/radioactive wastes that becomes available to mixed wastes that were regulated in previous land disposal restriction rulemakings (i.e., radioactive wastes mixed with solvents, dioxins, California list wastes, or First Third, Second Third, or Third Third wastes).

Based on comments received in response to the Advance Notice of Proposed Rulemaking (ANPRM) (56 FR 24444, May 30, 1991), and during previous rulemakings, EPA believes that DOE facilities generate the vast majority of mixed RCRA/radioactive wastes. According to the Background Document for the Third Third Land Disposal Restrictions, non-DOE mixed RCRA/radioactive waste is believed to account for less than one percent of all mixed RCRA/radioactive wastes generated nationwide. Based on DOE comments submitted in response to the ANPRM, DOE generates relatively small quantities of mixed RCRA/radioactive wastes contaminated with newly listed organic wastes and petroleum refining wastes. EPA also believes that there are few, if any, other generators of these wastes.

In addition, based on comments received on the proposed rule, information from the ANPRM, and information received during previous rulemakings, DOE faces major treatment capacity shortfalls for previously regulated mixed RCRA/radioactive wastes that it generates. Consequently, EPA believes that there is currently no available capacity for even relatively small quantities of newly listed mixed RCRA/radioactive wastes, and therefore adequate capacity is not available for newly listed mixed RCRA/radioactive wastes[2].

The 1991 Hanford Site Report was submitted by DOE as part of its comments on the proposed rule, and it illustrates the lack of treatment capacity for newly listed mixed RCRA/radioactive wastes. The Report contains "a detailed description of the generation and management of land disposal restricted waste (mixed waste) generated, treated, and stored at the Hanford Site." The Report also identifies 16 land disposal restricted mixed waste streams and classifies these wastes based on eventual waste treatment methods. Overall, the 1991 Hanford Site Report provides information on the following:

- schedules and methods for characterizing each land disposal restricted waste stream;
- the quantities and types of waste in storage;
- storage capacity;
- waste treatment processes;
- schedules for developing appropriate treatment technologies and capacity; and
- methods to minimize the generation, volume, and toxicity of each waste stream.

Using data characterizing the 16 restricted mixed RCRA/radioactive waste streams identified by the 1991 Hanford Site Report, EPA developed Exhibits 5-1 and 5-2. For each waste stream, Exhibit 5-1 summarizes the quantities of waste in storage, available storage capacity, dates when storage capacities are expected to be full, and future waste generation projections. Exhibit 5-2 summarizes planned waste treatments for each waste stream, the capacity of each treatment type, and the expected dates on which each treatment capacity will be available. The 1991 Hanford Site Report does not identify any mixed RCRA/radioactive wastes affected by the LDRs being promulgated today.

[2] "Available" capacity refers to the amount of treatment capacity that a unit offers beyond any treatment that is currently taking place.

Exhibit 5-1
Quantities of Mixed RCRA/Radioactive Wastes Currently in Storage and Expected to be Generated at the Hanford Site

No.	Waste Stream	Quantity in Storage (m^3)	Total Storage Capacity (m^3)	Date Storage Capacity Will be Reached	Total Generation Projections (1991-1996) (m^3)
1	Double-Shell Tank Waste	73,939	111,800	1993	77,600
2	PUREX Aging Waste	7,245	7,600	1993[f]	0
3	Single-Shell Tank Waste	139,500	357,500	----	0
4	242-A Evaporator Process Condensate	0	49,000	1992	361,000
5	4843 Sodium Storage Facility Waste	1009 kg	84,000 kg	----	1.26
6	PUREX Ammonia Scrubber Waste	5,900	c	----	0
7	PUREX Process Condensate	4,800	c	----	0
8	Hexone Waste	137	151	----	0
9	183-H Solar Basin Waste	128	8,200	----	0
10	PUREX Storage Tunnel No. 2 Waste (Mercury)	0.01[a]	3,080[d]	g	to be determined
11	PUREX Storage Tunnel Nos. 1 and 2 Waste (Lead and Silver)	0.43[a]	3,680[d]	g	to be determined
12	PUREX Canyon Waste Pile (Lead)	0.25	not available	g	to be determined
13	Hanford Central Waste Complex Stored Low-Level, Transuranic and PCB Waste	2,077	14,450	1996	8740
14	Retrievably Stored Low-Level and Transuranic Waste	2,184	15,440	----	0
15	TRUSAF Stored Waste	43	420	g	not available
16	303-K Stored Waste	1,203 kg	42	----	2
	Total	225,254[b]	568,283[e]	----	447,343

a The total quantity of elemental mercury in Tunnel No. 2 is 0.01 m^3, and there are 0.26 m^3 of elemental lead and 0.17 m^3 of silver nitrate in Tunnels 1 and 2.
b Total quantity in storage does not include waste stream nos. 5 and 16, as no density conversion factor was reported.
c This waste is currently stored with waste stream no. 1.
d The capacities of Tunnel Nos. 1 and 2 are 600 m^3 and 3,080 m^3, respectively; the total capacity for waste stream nos. 10 and 11 is 3,680 m^3.
e Total storage capacity does not include waste stream no. 16, as no density conversion factor was reported.
f Waste stream no. 2 is stored in double-shelled tanks, and DOE reported that these tanks will reach their capacity in 1993.
g DOE believes that available storage capacity is sufficient for all future generation of this waste.

Exhibit 5-2
Planned Mixed RCRA/Radioactive Waste Treatment at the Hanford Site

Treatment Facility[a]	Streams Utilizing Treatment Facility	Planned Treatment	Planned Capacity[c] (m^3/year)	Date Available
242-A Evaporator	1, 3, 6, 7	evaporation	174,000	1992[d]
Effluent Treatment Facility (ETF)[f]	4	destruction of organics, removal of inorganics	TBD	October 1994
Grout Treatment Facility (GTF)	1, 2, 3, 6, 7	grout	76,400	1991[e]
Hanford Waste Vitrification Plant (HWVP)	1, 2, 6, 7	vitrification	6,600	December 1999
Incinerator (off-site)[b]	8	incineration	TBD	----
Incinerator (on-site)	13	TBD	TBD	1999
Waste Receiving and Processing Facility (WRAP)	9, 13, 14, 16	TBD	TBD	September 1999
TBD	5, 9, 10, 11, 12	TBD, deactivation for waste stream no. 5	TBD	TBD

a Waste stream no. 15 will not be treated at the Hanford Site, but will be shipped to the Waste Isolation Pilot Plant for permanent storage.
b DOE plans to incinerate waste stream no. 8 off-site at an undetermined facility.
c The planned capacities presented in this column were calculated assuming that the treatment facilities operate 200 days a year, at daily capacities of 870 m^3 for the 242-A Evaporator, 382 m^3 for the GTF, and 33 m^3 for the ETF.
d The condensate from the evaporator will be treated at the ETF.
e Some of waste stream no. 1 can be treated directly at the GTF. Most wastes that are to be treated at the GTF will first have to undergo pretreatment to separate them from other wastes. Pretreatment is expected to begin in 1996.

According to EPA's analysis, approximately 225,000 m^3 of restricted mixed RCRA/radioactive wastes are currently stored at the Hanford Site. The current total storage capacity for these wastes is approximately 570,000 m^3. The Hanford Site plans to implement a waste reduction and minimization program that is expected to reduce the amount of mixed RCRA/radioactive wastes generated at the facility by approximately 100,000 m^3 per year. The majority of the reduction is expected to come through treatment.

Overall, however, EPA's analysis shows that treatment capacity for most of the previously restricted mixed RCRA/radioactive wastes stored and expected to be generated at the Hanford Site will not be available until after October 1994. Although the 1991 Hanford Site Report identifies no mixed RCRA/radioactive wastes affected by the LDRs being promulgated today, the waste stream information presented above serves as an example to confirm the Agency's belief that a lack of available treatment capacity exists for previously regulated mixed RCRA/radioactive wastes. As a result, EPA believes that this information also demonstrates a lack of available treatment capacity for mixed RCRA/radioactive wastes contaminated with the newly listed wastes.

Although there are currently DOE capacity shortfalls for all treatability groups, a considerable number of treatment units are either planned or under construction at DOE facilities. At least 20 different treatment units are expected to come on line at DOE facilities between 1992 and 2012. These units will include several incinerators, solidification units, vitrification and glass/ceramic process units, grout operations, and other treatment units such as evaporators and leaching systems. When operational, these units will provide significant treatment capacity for a number of treatability groups for mixed RCRA/radioactive wastes generated at DOE facilities in the future.

Although DOE does have operational combustion facilities, their capacity is or will be utilized for previously generated mixed RCRA/radioactive wastes containing spent solvents, dioxins, California list and First Third, Second Third, or Third Third scheduled wastes, and is therefore not available for newly listed mixed RCRA/radioactive wastes. For the purposes of this capacity analysis for newly listed mixed RCRA/radioactive wastes, then, available DOE combustion capacity for those wastes is zero. Similarly, there is no other available capacity for newly listed mixed RCRA/radioactive wastes.

5.3 NATIONAL CAPACITY VARIANCE FOR MIXED RCRA/RADIOACTIVE WASTES

Based on the analysis discussed in section 5.2, EPA believes that DOE generates a large majority of mixed RCRA/radioactive wastes affected by this rulemaking and previous LDR rulemakings, and that major treatment capacity shortfalls currently exist for previously regulated mixed RCRA/radioactive wastes generated at both DOE and non-DOE facilities. As a result, EPA has determined that there is currently no BDAT or equivalent available treatment capacity for any newly listed mixed RCRA/radioactive wastes at DOE or non-DOE facilities. Because a treatment capacity shortfall was identified for every mixed RCRA/radioactive waste treatability group, EPA is today granting a two-year national capacity variance for all mixed RCRA/radioactive wastes contaminated with newly listed wastes for which treatment standards are included in this rulemaking.

Chapter 8
Hazardous Debris

CHAPTER 6

CAPACITY ANALYSIS FOR DEBRIS CONTAMINATED WITH NEWLY LISTED WASTES

6.1 INTRODUCTION AND KEY FINDINGS

This document presents the capacity analysis EPA conducted to support the final rule on the Land Disposal Restrictions (LDRs) for debris contaminated with the Newly Listed wastes. The purpose of the capacity analysis is to establish the effective date of the rule. (Please refer to Document 1 for a description of the Newly Listed wastes covered in this rule and for other background information on capacity analysis). Specifically, this document presents the data and methodology used to derive estimates of the quantities of hazardous debris that require alternative treatment and recovery prior to land disposal as a result of the LDRs.

The capacity analysis presented in this document involves a two-step process: (1) estimating all hazardous debris generated that is inherently hazardous or contaminated with previously regulated wastes; and (2) estimating quantities of debris contaminated with the Newly Listed wastes covered under this rule. Estimating the quantities of all hazardous debris, as defined in this rule, is necessary because this rule establishes new treatment standards for all debris, including debris contaminated with previously listed wastes. Therefore, the commercially available treatment capacity for debris contaminated with the Newly Listed wastes is affected by the total volume of hazardous debris generated.

This capacity analysis is based on comments and data received in response to the Proposed Rule (57 FR 958), comments and data received in response to the Advanced Notice of Proposed Rulemaking (ANPRM) for wastes covered in this rule (56 FR 24444), industry roundtable meetings, and the National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR Survey). EPA's central estimate for the total of currently land-disposed debris contaminated with RCRA hazardous wastes is approximately 1 million tons per year. This estimate is based on percentages of the total of all hazardous wastes land disposed that are classified as RCRA hazardous debris. EPA also estimated lower and upper bounds of 700,000 to 2.8 million tons per year, respectively, based on adjustment factors to the TSDR survey data.

In this rule, EPA is requiring that hazardous debris be treated prior to land disposal using one or more of the following families of debris treatment:

- Extraction;
- Destruction; and
- Immobilization.

However, the Agency believes that there are constraints on the management of debris for all three treatment categories. The availability of many extraction, destruction, and immobilization technologies is limited due to a lack of available RCRA permitted treatment capacity. In addition, the use of some destruction and immobilization treatment technologies is restricted by materials-handling problems. These capacity constraints are compounded by the large quantities of debris contaminated with previously listed wastes that would require treatment concurrently with debris contaminated with the Newly Listed wastes. Therefore, in order to minimize disruptions in the management of hazardous debris, the Agency took regulatory action on May 8, 1992 and granted a generic, one-year extension to the LDR effective date for all facilities managing hazardous debris (with several exceptions) (57 FR 20766). In addition, EPA is granting a two-year national capacity variance to debris contaminated with the Newly Listed wastes covered in this rule.

This document is organized in four sections. Following this introduction, the second section summarizes the available information sources on hazardous debris. These sources include comments to the Proposed Rule and ANPRM, roundtable meetings held with representatives of companies generating and managing hazardous debris, data submitted voluntarily to EPA, the TSDR survey, and Superfund Records of Decision. The third section describes the methodology used to derive debris quantity estimates presented in the rule. The final section discusses the available capacity for managing hazardous debris.

6.2 AVAILABLE INFORMATION SOURCES

EPA used a variety of information sources to estimate the quantities of hazardous debris requiring treatment capacity. These sources include information received in response to the Proposed rule for the Newly Listed Wastes (57 FR 958); the ANPRM for the Newly Listed wastes (56 FR 24444); a series of Roundtable meetings held by the Agency with representatives of companies involved in the generation, management and disposal of hazardous debris; and from the National Survey of Treatment, Storage, Disposal and Recycling Facilities (TSDR Survey). The Agency also examined data from Superfund Record of Decisions (RODs), as well as information contained in trade journals and other sources. Finally, the Agency interviewed experts in hazardous debris generation, management, and treatment.

The Agency used these information sources to estimate the quantities and types of hazardous debris that will require treatment at the time this rule becomes effective.

6.2.1 Comments to the Proposed Rule

The January 9, 1992 Proposed Rule (57 FR 958) presented the methodology for and the results of EPA's preliminary capacity analysis. Based on this analysis, EPA proposed a two-year national capacity variance for debris contaminated with Newly Listed wastes. The Agency solicited comments on its approach as well as estimates of available treatment capacity.

EPA received over 100 debris-related comments in response to the Proposed Rule. Of these, 45 comments discussed issues relating to capacity available for contaminated debris. The commenters raised the following major issues:

- Underestimation of the quantity of contaminated debris generated;
- Total volume of debris generated;
- Capacity variances for hazardous debris contaminated with newly listed wastes;
- Capacity variances for hazardous debris contaminated with previously regulated wastes;
- Materials handling problems with hazardous debris;
- Concerns about treatment capacity for hazardous debris; and
- Concerns about storage capacity for contaminated debris.

Several commenters referred specifically to hazardous debris contaminated with F037 and F038 wastes. Generally, these commenters supported the proposed two-year variance for debris contaminated with F037 and F038. Seven commenters provided quantitative debris information. Exhibit 1 presents the quantitative data received in comments to the proposed rule.

For a more detailed discussion of the capacity related comments for hazardous debris and the Agency's response to these comments, please refer to the Response-to-Comments document.

6.2.2 Comments to the ANPRM

The May 30, 1991 ANPRM (56 FR 24444) identified EPA's data requirements for performing a capacity analysis on debris contaminated with the Newly Listed wastes. As such, EPA requested comments and information on the volumes and characteristics of hazardous debris generated and managed. EPA also requested information concerning available or potential treatment technologies, their capacity, performance, and limitations or constraints. EPA also solicited comments and information on other capacity-related issues including the potential treatment difficulties encountered in asbestos-containing debris, PCB-hazardous debris, and debris with inherent contamination.

EPA received 37 debris-related comments in response to the ANPRM. Of these, seven contained quantitative debris information. Some commenters provided information on types of debris (ranging from broad categories of debris to specific quantities of debris

EXHIBIT 1
HAZARDOUS DEBRIS QUANTITIES REPORTED IN PROPOSED RULE COMMENTS

Commenter	Data
Envirosafe	95% of all loads contain debris
Beazer East	22,500 cubic yards of debris at one site
Soil Tech	77,000 tons of contaminated material has been treated
USPCI	69% of remedial projects include a significant amount of debris
Department of the Army	17 million square feet of potentially hazardous demolition debris
Waste Management Model City Landfill	200,000 cubic yards/year of debris
DuPont	10,000 cubic yards of debris from one cleanup

waste streams), but were not able to provide information on the type of contamination. The commenters providing quantitative information ranged from a waste treater/broker managing 340 tons of hazardous debris a year to a large commercial TSD facility handling over 150,000 tons of debris a year, primarily generated by remediation and demolition or construction activities. Each commenter managed or generated different types of debris wastes depending on the region, the industry, or the treatment technology used. EPA normalized these disparate data and incorporated them in the estimates of total debris quantities (see Section 3).

Exhibit 2 summarizes the information received on quantities of hazardous debris in response to the ANPRM.

Commenters also raised capacity-related issues in response to the ANPRM. One issue is the common practice of decontaminating materials on-site. Other commenters noted problems associated with sampling and analysis of debris to determine the extent of contamination. Several commenters pointed out that much of the hazardous debris is only minimally contaminated compared to other hazardous wastes.

EXHIBIT 2
HAZARDOUS DEBRIS QUANTITIES REPORTED IN ANPRM COMMENTS

Commenter	Tons/Year
Chemical Waste Management	150,000
Olin Chemical	750
ThermalKEM	2,000
Chempro	340
DuPont	4,000
Union Carbide	1,000
Canonie	3,000

Several commenters addressed the issue of treatment of mercury-contaminated (D009) wastes. They noted that many items, particularly debris items, were not suitable for thermal treatment which is the BDAT for this group. Additional comments focused on refractory bricks which may be contaminated during their use and are often inherently characteristically hazardous due to their high chromium content. Commenters also expressed concern over debris contaminated with asbestos, and the risk and danger to workers and local air quality effects if asbestos materials were to be fragmented and particularized during treatment.

These issues and concerns are also covered in Appendix B, Contaminated Debris Issues and Concerns.

6.2.3 Roundtable Meetings

As part of the Agency's efforts to gain a more complete understanding of capacity issues associated with the land disposal restrictions for hazardous debris, EPA held three roundtable meetings with representatives of companies that generate or manage these wastes during the months of May and June, 1991. The roundtable meetings covered a broad range of topics, including generation and management of hazardous debris, composition of hazardous debris, and capacity issues:

- The first roundtable meeting included representatives from seven waste management companies who operate commercial landfills, and a representative from the National Solid Waste Management Association;

- The second roundtable meeting was attended by representatives from thirteen companies that generate and primarily manage hazardous debris in on-site landfills; and

- The third roundtable meeting included waste treaters and brokers from seven firms.

6.2.3.1 Quantities and Composition of Hazardous Debris

In these roundtable discussions, industry participants provided information on the quantity and composition of hazardous debris generated and/or managed by their companies. This information was used to update data submitted in response to the 1987 TSDR Survey.

Most participants provided quantity estimates of the proportion of the total waste volumes they manage that could be classified as debris. Of the eleven generators that estimated the volume of waste managed on-site classified as debris, four estimated that debris comprised 10 percent or less of the total waste volume they manage; three estimated that debris accounted for between 10 and 25 percent of the total, three reported that debris contributed to about 50 percent of the waste managed on-site, and one generator estimated that debris comprised almost 80 percent of the total waste landfilled.

One representative of a commercial landfill estimated that 75 to 80 percent of all deliveries to landfills contain some type of debris. Practically all deliveries of wastes from remedial actions are believed to contain at least some debris. A second landfill operator estimated that approximately 30 percent of the wastestream volume received could be classified as debris.

Waste generators noted that debris comprises a large diversity of materials, often generated on an irregular basis. Some of the most common types of debris include construction debris, wood, rocks, bottles, and miscellaneous equipment ranging from laboratory gloves to empty containers, filters, and pipes. Participants also noted that filters come in all sizes and shapes and that, although they are typically made of some type of metal, they also can be made of such materials as polypropylene, dacron, and nylon. In addition, there are also activated carbon filters, caustic filters, and clay filters.

Representatives from commercial landfill companies noted that some types of debris such as personal protective equipment, spill cleanup materials, and contaminated scrap metal and equipment are universally generated, whereas the generation of some other types of debris may vary among the different region of the United States. Participants also remarked that some debris waste streams are recurrent, including asphalt from oil change businesses, oil wax and wicks from train maintenance, and filters from all types of industrial processes.

Overall, the roundtable participants agreed that quantifying debris volumes is difficult because debris is often generated with soil or mixed with other contaminants and separation is not usually possible. Furthermore, TSD facilities have historically classified wastes according to waste code rather than by waste type (i.e., debris). Accordingly, the quantity data on debris wastes are less precise than data for most other hazardous waste streams.

6.2.3.2 Sources of Hazardous Debris

For purposes of this capacity analysis, EPA has divided the universe of hazardous debris into three primary sources: (1) routinely generated debris, (2) demolition/construction debris, and (3) remediation debris. Each of these sources has characteristics that affect the type, quantity, variety, and timing of debris generation. Participants to the roundtable meetings shared their experience with debris from these sources.

Routinely generated debris includes waste items that are generated regularly or continuously from a given "source" or industrial activity. Examples of routinely generated debris include:

- Filters;
- Off-spec manufactured items;
- Spent batteries;
- Lamps and electronic components; and
- Personal protective equipment (PPE).

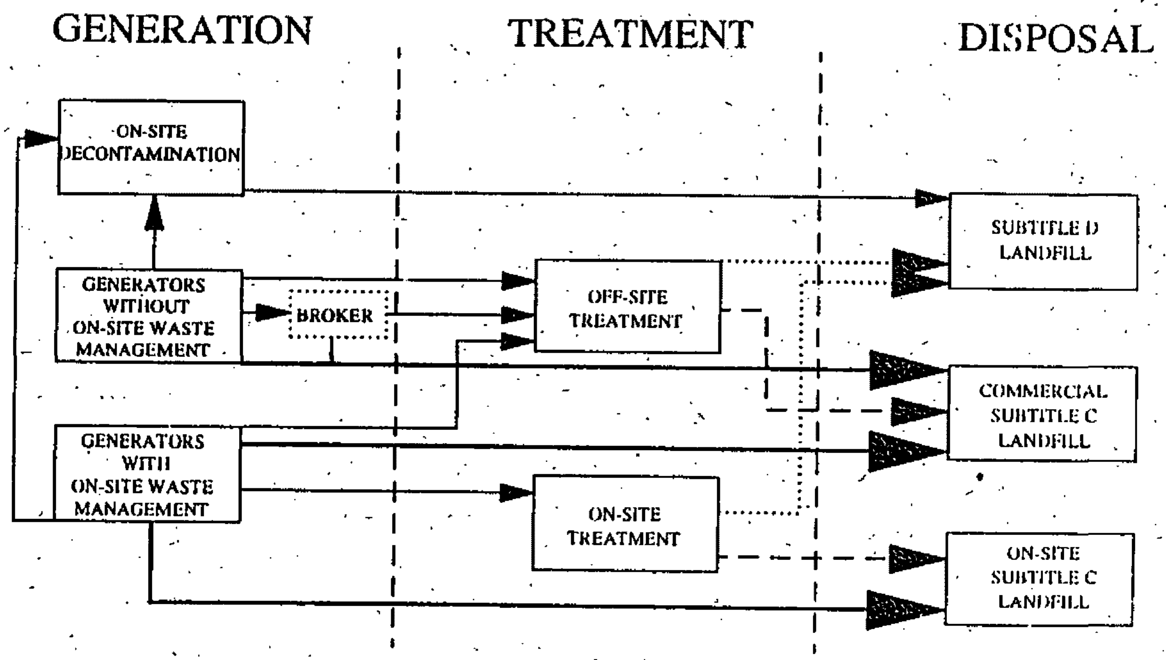
Debris from demolition and construction activities are generated sporadically because construction and demolition tend to be seasonal and non-continuous. Furthermore, the quantities of debris generated vary from site to site. Debris resulting from private party remedial actions that are relatively small in scale are included in the demolition/construction category. The types of materials generated in this category include:

- Concrete and metal construction materials;
- Geologic materials; and
- Durable manufacturing and process equipment.

Remediation debris are generated through Superfund, State CERCLA, and RCRA corrective action activities. This source category is characterized by large quantities of hazardous debris being generated from single locations over a potentially long period of time.

Exhibits 3 through 5 depict the various sources of hazardous debris and subsequent management options.

EXHIBIT 3
ROUTINELY GENERATED DEBRIS

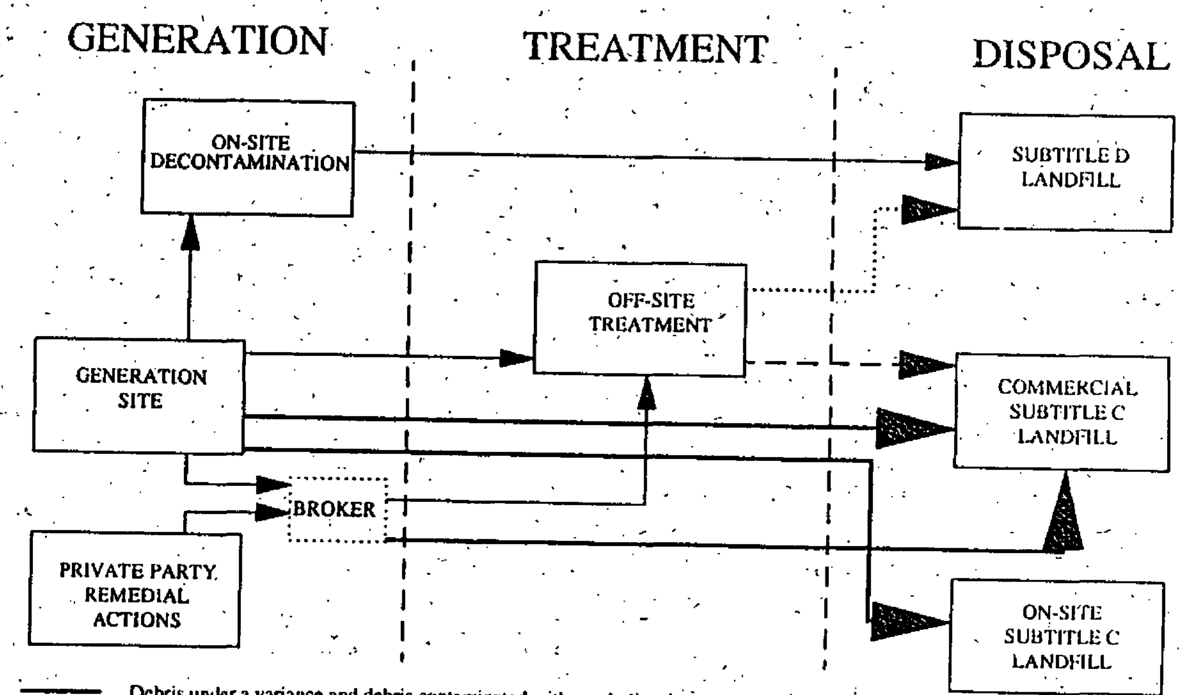


——— Debris under a variance and debris contaminated with newly listed wastes.

– – – Treated debris that exhibits the TC or that has been encapsulated.

········ Treated debris that no longer exhibits the TC.

EXHIBIT 4
DEMOLITION AND CONSTRUCTION DEBRIS

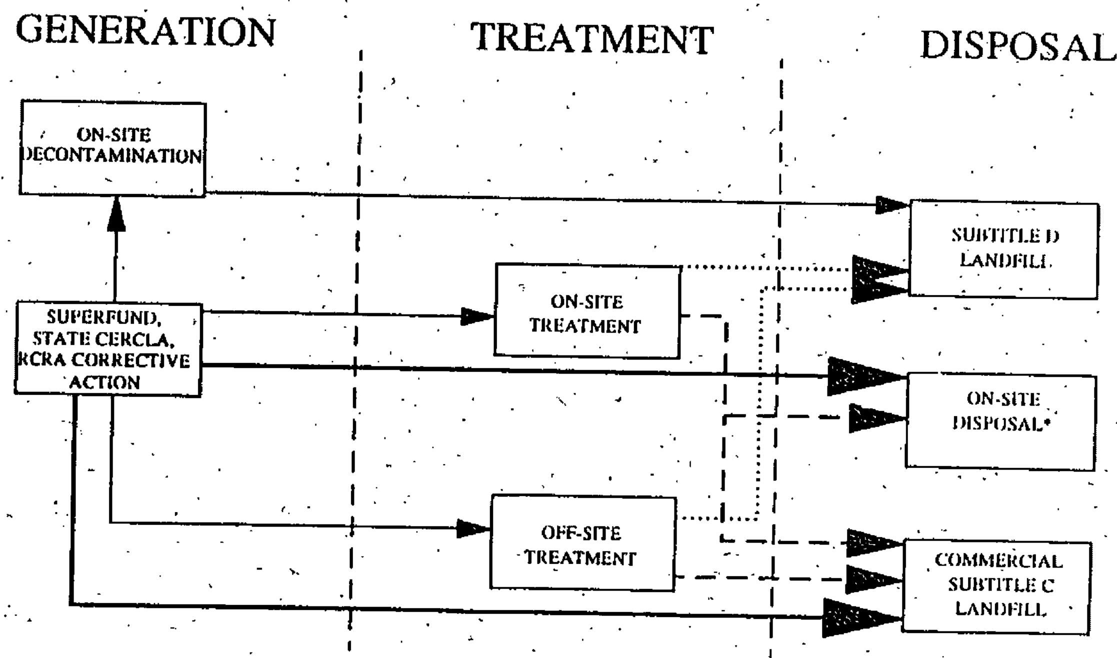


——— Debris under a variance and debris contaminated with newly listed wastes.

– – – Treated debris that exhibits the TC or that has been encapsulated.

········ Treated debris that no longer exhibits the TC.

EXHIBIT 5
REMEDIATION DEBRIS



——— Debris under a variance and debris contaminated with newly listed wastes.

– – – Treated debris that exhibits the TC or that has been encapsulated.

.... Treated debris that no longer exhibits the TC.

*Hazardous waste management landfills at CERCLA sites are exempt from RCRA permitting requirements but are subject to equivalent technical requirements.

The quantity of debris generated through demolition/construction and remediation related activities is estimated to exceed the amount of routinely generated debris by up to a factor of ten. Debris from large remedial actions tend to be managed on-site and therefore do not require off-site commercial treatment capacity. However, debris from demolition or construction and from routine operations are usually sent off-site for management and constitute the most important sources of debris requiring commercial off-site treatment. Exhibit 6 presents the relative volumes of hazardous debris currently going to commercial landfills.

The volumes of debris that are generated also vary depending on the region, the time of year, and economic conditions. For example, more debris is generated in the summer than in the winter due to increased construction activities. In aging industrial areas, a greater quantity of debris is generated from the demolition of older plants, whereas in other areas, a greater proportion of the generated debris may originate from road construction or the cleanup of federal facilities. At many southern sites, approximately 25 percent of the tonnage generated at remediation sites is reported to be wood. Finally, in a depressed economy, industrial waste streams are reduced and plant retrofitting is delayed or cancelled, resulting in smaller quantities of debris generated.

6.2.3.3 Current Management of Hazardous Debris

The management of hazardous debris is often made difficult because of material size and because debris wastestreams are often mixed with other contaminated wastes. Management options currently employed include landfilling debris without treatment, incineration, stabilization, and decontamination through washing and steaming. (Exhibits 3 through 5 show the variety of management options.) Approximately 80 percent of the hazardous debris land disposed off-site is landfilled without treatment. Data received by EPA indicate that, of the land-disposed hazardous debris, approximately 90 percent is contaminated with metals, while the remaining 10 percent contain organics, and are often also contaminated with metals. [1]

Participants to the roundtable meetings estimated that incineration is the predominant treatment method employed for the hazardous debris that are now treated. While stabilization of hazardous debris is also practiced, one constraint to stabilization is the availability of sizing equipment required for pre-treatment. Also, debris contaminated with asbestos is not usually stabilized because of the potential health risks to workers.

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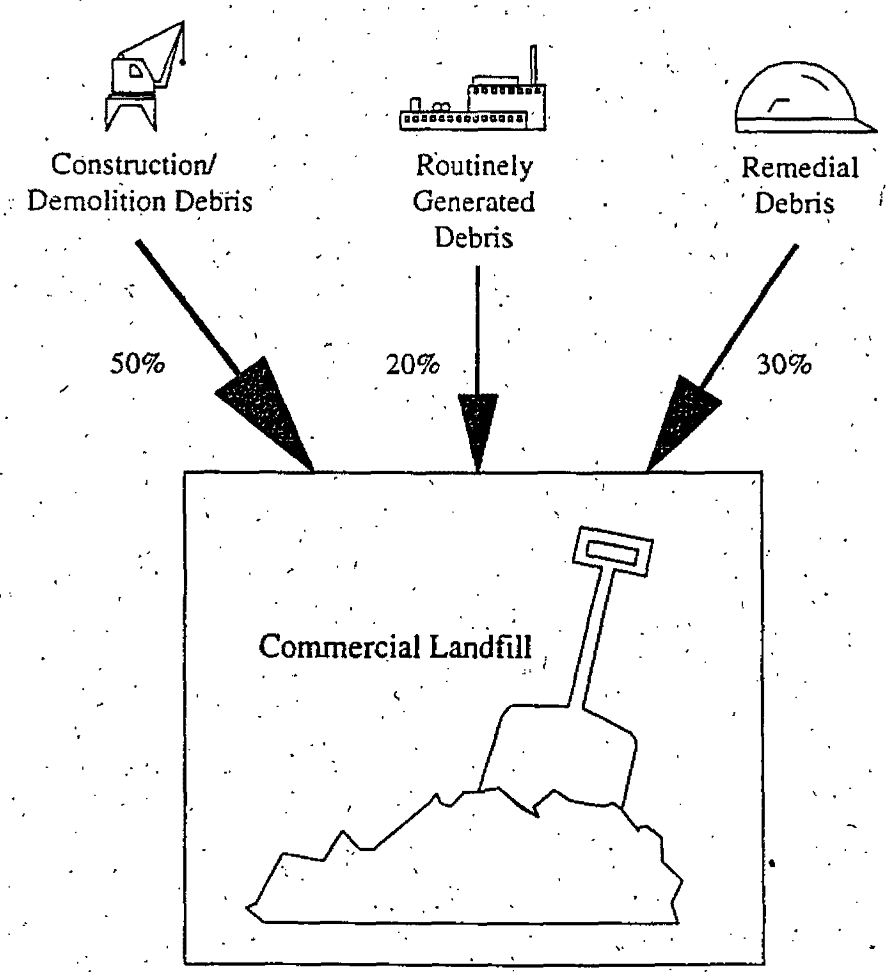
[1] This estimate is skewed towards debris contaminated with inorganics because the national capacity variance granted in the Third Third rule to inorganic solids debris was in effect at the time these data were collected. Furthermore, the impact of the new Toxicity Characteristic (TC) rule is just beginning to be reflected in the data available to EPA.

EXHIBIT 6

Sources of Hazardous Debris Received By Commercial Landfills



A large proportion of hazardous debris could be managed using decontamination processes. Many facilities and treaters are currently performing what they consider to be decontamination of materials on-site, a process whereby the hazardous waste is separated from the debris material, thereby decontaminating the debris material. Roundtable participants argued that EPA needs to recognize these procedures. Commenters also argued that if treatment permits were required for practices currently considered to be decontamination, this would cause severe disruptions in treatment. EPA has taken these comments into consideration in updating its treatment standards. Nevertheless, EPA recognizes that the currently available RCRA permitted capacity for many extraction technologies is very limited.

6.2.3.4 Other Issues of Concern

Other issues of concern brought up by the roundtable participants include permitting and capacity constraints. New treatment capacity is expected to take time to come on-line due to the permit process. Participants said that permit approval for simple technologies, such as shaking or washing may take up to two years. Obtaining a permit for incineration could take even longer or may not be possible at all because of widespread public opposition to this technology. Furthermore, debris treatment may require very large pieces of equipment as part of the pre-treatment process, such as a new grizzly system which could be very expensive. Another issue raised is that because of the time and expense of adding new hazardous waste landfill capacity, landfills may begin to be selective about the wastes they accept, reserving their capacity for highly priced hazardous wastes.

These issues and concerns raised by the regulated community indicate that the available capacity to handle the quantities of previously regulated hazardous debris may be constrained by materials handling and permitting problems. EPA has taken these concerns into consideration in its proposal to grant a national capacity variance to debris contaminated with the Newly Listed wastes. In addition, in order minimize disruptions in the management of all hazardous debris, the Agency took regulatory action on May 8, 1992 and granted a generic one-year extension to the LDR effective date for all facilities managing hazardous debris (with several exceptions) (57 FR 20766 May 15, 1992).

6.2.4 National Survey of Treatment, Storage, Disposal and Recycling Facilities (TSDR Survey)

The TSDR Survey was conducted during 1987 to obtain comprehensive data on the nation's capacity for managing hazardous waste. Types of information collected included data on the quantities of hazardous waste being land disposed, quantities of waste generated, as well as information on waste characterization, and hazardous waste treatment capacity in units exempt from RCRA permitting. The TSDR Survey covers facilities with permitted waste treatment, storage, disposal, and recycling units. Although the TSDR Survey remains the most comprehensive available data source on the total quantity of land-disposed hazardous wastes, it is incomplete and poorly defined for estimating hazardous debris due to the following limitations:

- The TSDR Survey questionnaire did not recognize hazardous debris as a separate waste category. Therefore, the regulated community did not specifically classify their debris wastes.

- In the TSDR Survey, debris were often mixed with other waste streams (e.g., soils), which were frequently contaminated by more than one RCRA waste code.

- The TSDR Survey, conducted in 1987, does not include debris contaminated with the Newly Listed wastes, because many of these wastes were not listed as hazardous at that time.

Despite these limitations, data from the TSDR Survey can be used in combination with more recent data to develop estimates of volumes likely to require commercial treatment. For example, information on debris waste quantities can be extracted from the TSDR Survey using waste descriptor codes. These codes describe in general terms, the physical/chemical characteristics of each wastestream. The descriptor code B43, for example, is used for a wastestream described as empty or crushed metal drums or containers, all of which would fall into the debris category. Exhibit 7 lists waste descriptor codes in the TSDR Survey that relate to hazardous debris. The wastestreams identified as contaminated soil or cleanup residue are assumed to contain 10 percent debris and 90 percent contaminated soil.

6.2.5 Other Information Sources

In addition to the information sources described above, the Agency also reviewed Superfund Records of Decisions (RODs) for data on hazardous debris at Superfund sites. Superfund RODs, in general, specify the recommended course of action for remediating a Superfund site, describe types of contamination present, and estimate cleanup costs and time required to complete remediation. RODs vary greatly in the level of detail provided regarding volumes of hazardous waste, including hazardous debris. RODs signed prior to 1988 contain few data on waste volumes, whereas those signed during 1988 and 1989 contain more complete and detailed information on contaminated volumes. However, even among the more recent RODs that do provide volume information, no distinction was made between contaminated soil and debris in the reported volume figures. Also, many facilities combine their contaminated soil and debris volumes with other soil wastes, which can result in an overestimate of the debris volume.

Of the 287 RODs (for the years 1988 and 1989) examined by the Agency, only 62 provided information on contaminated soil and debris. The other RODs either contained no quantitative information or indicated zero volumes of hazardous debris. The Agency

EXHIBIT 7
TSDR SURVEY HAZARDOUS DEBRIS WASTE DESCRIPTOR CODES

Debris Descriptor Code	Debris Description
A06	Contaminated soil or cleanup residue
A08	Concentrated off-spec or discarded product
AEA	Other untreated wastes
B38 and B39	Other "dry" ash, slag, or thermal residue
B42	Metal scale, fillings, or scrap
B43	Empty or crushed metal drums or containers
B44	Batteries, battery parts, casing, cores
B45 and BIM	Spent solid filters or adsorbents
B54 and B87	Lab pack or debris
B56	Other inorganic solids
B85	Empty fiber or plastic containers
BEM	Lead contaminated floor debris
BIQ and BIR	Acid or caustic spill cleanup waste
BIU	Used mercury lamps
BJC	Grit blasting residues, metal dust
BJD	Arsenic contaminated waste solids
BJS	Contaminated trash
BJT	Other debris
BJW	Paint pigment solids
BXB	Lab cleanup material
BXJ	Paper paint filters with heavy metals

estimates that approximately 300,000 metric tons of hazardous debris will be generated at these 62 Superfund sites. However, the RODs also indicate that the primary means of managing debris at Superfund sites is on-site treatment and disposal. Therefore, these volumes will have a limited impact on commercial treatment capacity.

As part of its data collection efforts, EPA reviewed various background documents, and data bases prepared for earlier regulatory actions such as the Land Disposal Restrictions. The Agency also reviewed trade journals that contained data on hazardous wastes received by commercial landfill facilities. EPA used these data to estimate hazardous debris volumes for facilities not included in the TSDR Survey.

EPA also solicited estimates of volumes of hazardous debris from experts. For previously regulated hazardous debris, EPA relied on two contractors, one an expert in hazardous debris generation and the other an expert in hazardous debris treatment. For newly regulated hazardous debris, EPA conducted its analysis based on the quantified judgements of experienced and qualified environmental management personnel at facilities affected by this rule.

6.3 CURRENT GENERATION OF HAZARDOUS DEBRIS WHICH WILL REQUIRE TREATMENT CAPACITY

Today's rule includes a new definition of hazardous debris and establishes management options for its treatment and disposal. These management options are applicable not only to debris contaminated with the Newly Listed wastes, but also to debris contaminated with previously regulated wastes (e.g., Third Third wastes). Under the Third Third Rule, contaminated soil and debris were grouped into a single waste category, and treatment standards were set based on the contaminant waste codes rather than on the intrinsic characteristics of the waste matrix (i.e., the physical characteristics of debris). In previous rulemakings, EPA granted national capacity variances to hazardous debris. These previously regulated debris waste streams will also have a significant impact on the available treatment capacity for debris contaminated with the Newly Listed wastes since all debris is subject to the treatment standards established in this rule. These factors compelled the Agency to reexamine previous capacity analyses for hazardous debris. Hence, today's capacity analysis encompasses all debris requiring treatment capacity, not just the debris contaminated with the Newly Listed wastes.

In this rule, EPA has revised the definition of debris. Debris is now defined as solid material exceeding 60 mm particle size that is (1) a manufactured object; (2) plant or animal matter; or (3) natural geological material. Excluded from the definition of debris is any material for which a specific treatment standard has been set (e.g., lead-acid batteries) and process residuals and residues from the treatment of hazardous wastes (e.g., smelter slag). Under the proposed rule, solid material above 9.5 mm that net one of the above criteria was considered debris, as were some process residuals such as slag.

However, EPA does not believe that this change in definition significantly alters its estimates of the volume of hazardous debris.

6.3.1 Estimates of Total Hazardous Debris

Because of the uncertainties associated with the available data, the Agency developed estimates of hazardous debris using two methods that validate each other. For Method 1, adjustment factors were derived by comparing TSDR Survey data on hazardous debris for specific facilities with more recent data submitted in response to the Proposed Rule and the ANPRM, or in the roundtable discussions for the same facilities. The adjustment factors were applied to the total quantity of hazardous debris reported in the TSDR Survey to estimate a range for the quantity of land-disposed hazardous debris. In Method 2, the Agency used the hazardous debris quantity as a percentage of the total hazardous waste quantity land disposed to estimate the total volume of land-disposed hazardous debris.

The volume of land-disposed hazardous debris that may require treatment is estimated to range from 700,000 to 2.8 million tons per year using Method 1. Using Method 2, the estimated quantity of hazardous debris that may require treatment is approximately 1 million tons per year. The methods described above are discussed in greater detail in the following sections.

6.3.1.1 Method 1: Approach and Results

Method 1 updates the hazardous debris quantity estimate from the TSDR Survey with data submitted in roundtable meetings and in response to the Proposed Rule and the ANPRM. As noted earlier, the TSDR Survey data on hazardous debris is limited. Because the survey was conducted in 1987, it does not include most of the Newly Listed wastes covered in today's proposal. The survey requested data according to waste code and did not distinguish debris and soil from industrial waste streams.

Using descriptive information on the waste streams for which quantity information was submitted, EPA, however, was able to apportion quantities to the debris category. For waste codes describing waste streams that contain soil and debris, the Agency assumed that debris comprise 10 percent of these waste streams. This assumption is based on information provided in the roundtable discussions on the approximate proportion of debris in soil and debris mixtures.[2]

From the TSDR Capacity Data Set (a database containing TSDR Survey data), EPA extracted the quantity of hazardous debris reportedly land disposed in 1986 by using

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[2] While several companies reported that debris is about 10 percent of their soil and debris mixture, other companies reported a higher proportion. Therefore, this assumption may underestimate the quantities of debris generated.

the waste descriptor codes shown in Exhibit 7. Exhibit 8 provides an example of the types of data extracted from the TSDR Survey. The total quantity of hazardous debris reported in the TSDR Survey is approximately 330,000 tons. However, this quantity is likely to be an underestimate of the actual amount land disposed due to the potential misinterpretation of the hazardous debris definition, the resultant misclassification of the wastes, and limitations of the TSDR Survey mentioned above.[3]

To derive total quantity estimates, the Agency compared the TSDR Survey data to debris/contaminant descriptions in the recently submitted data for specific facilities.[4] Exhibits 9 through 12 compare recently submitted data with TSDR Survey data for five landfill facilities.[5] The comparisons suggest that, in most cases, facilities in the TSDR Survey may have under reported hazardous debris quantities. Exhibit 13 shows that hazardous debris quantities reported by facilities that recently submitted data are approximately two to ten times higher than quantities reported in the TSDR Survey. Adjusting the total hazardous debris quantity of 330,000 tons/year from the TSDR Survey by factors of two and ten, results in an estimate of total hazardous debris quantity ranging from 660,000 tons/year to 3,300,000 tons/year, respectively.

Exhibit 14 summarizes the data provided by facilities that recently submitted hazardous debris data, but did not report debris quantities in the TSDR Survey. Since these debris waste streams were not reported in the TSDR Survey, they were not included in the estimated total debris quantity calculated by adjusting the 1986 total debris quantity. EPA then added the estimated debris quantity at these facilities to the range estimated above. Thus, the estimated total debris quantity land disposed that results from this adjustment ranges from 880,000 tons/year to 3,500,000 tons/year.

Land disposal facilities that participated in roundtable meetings with EPA indicated that approximately 80 percent of the hazardous debris they receive is under a national capacity variance and has not been treated prior to land disposal. Thus, the total debris quantity that may require alternative treatment is estimated to range from 700,000 tons/year to 2.8 million tons/year.

[3] Some TSDFs were unsure of what should be classified as hazardous debris and may have classified hazardous debris as the listed waste itself.

[4] In some cases, engineering judgement was used to match waste descriptor codes with hazardous debris descriptions in the submitted data.

[5] To maintain confidentiality, facilities that did not formally submit data to EPA in response to the ANPRM are identified using letters (e.g., Landfill A).

EXHIBIT 8
CHEMICAL WASTE MANAGEMENT (EMELLE, AL)

The exhibit below, based on data from the TSDR Survey, presents the types of hazardous debris landfilled in a commercial landfill.

Debris Descriptor Code	Debris Description	Quantity (tons/yr)
BEM	Lead contaminated floor debris	85,909
BJT	Other debris	13,644
BJS	Contaminated trash	4,110
B45 and BIM	Spent solid filters or adsorbents	3,849
B43	Empty or crushed metal drums or containers	3,326
B42	Metal scale, filings, or scrap	1,843
A06[1/]	Contaminated soil or cleanup residue	1,097
B44	Batteries, battery parts, casing, cores	724
BJD	Arsenic contaminated waste solids	656
B39	Other "dry" ash, slag, or thermal residue	314
A08	Concentrated off-spec or discarded product	254
BXB	Lab cleanup material	179
BJC	Grit blasting residues, metal dust	153
BIQ and BIR	Acid or caustic spill cleanup waste	112
BJW	Paint pigment solids	97
B54 and B87	Lab pack of debris	91
B85	Empty fiber or plastic containers	37
AEA	Other untreated wastes	29
BXJ	Paper paint filters with heavy metals	22
BIU	Used mercury lamps	10

[1/] Assumed that the debris quantity is 10 percent of volume reported in the TSDR Survey.

EXHIBIT 9
COMPARISON OF RECENTLY SUBMITTED DATA WITH TSDR SURVEY DATA FOR LANDFILL A

Data Recently Submitted to EPA			TSDR Survey Data		
Debris Description	RCRA Contaminant	Quantity (tons/yr)	Debris Description	RCRA Contaminant	Quantity (tons/yr)
Contaminated soil or clean up residue	Not Specific*	1,269 1/	A06	U & F codes	386.8 1/
Concentrated off-spec or discarded products	P & U codes	930	A08	U codes	910
Ash, slag or thermal residue	D codes	3,591	B38 & B39	D codes	23,532
Sand blast waste	D codes	2,700	Not reported		
Glass and picture tubes	D & F codes	1,552			
Weathered coal tar and asphalt	Not Specific	1,442			
Spent paint wastes	D codes	1,332			
Spent filters	D & K codes	1,030			
Concrete	Not Specific	920			
Other debris	Not Specific	5,060			
TOTAL DEBRIS QUANTITY		19,826			24,828

*Not Specific: Debris contaminated with several contaminant codes.
1/ Assumed that the debris quantity is 10 percent of volume submitted by the facility.

EXHIBIT 10
COMPARISON OF RECENTLY SUBMITTED DATA WITH TSDR SURVEY DATA
FOR UNION CARBIDE FACILITY

Data Recently Submitted to EPA			TSDR Survey Data		
Debris Description	**RCRA Contaminant**	**Quantity (tons/yr)**	**Debris Description Code**	**RCRA Contaminant**	**Quantity (tons/yr)**
Filters	Unknown	35	B56 1/	D007, D008	119
Concrete Rubble	Unknown	5 to 150			
Wood	Unknown	50	Not reported		
Asbestos Insulation	Unknown	100 to 750			
Scrap Metal/Equip.	Unknown	2.5 to 25			
Misc. (incl. clothing)	Unknown	2.5			
TOTAL DEBRIS QUANTITY		195 to 1,012			119

1/ Waste descriptor code B56 classifies a wide range of inorganic solids, which may contain debris.

EXHIBIT 11
COMPARISON OF RECENTLY SUBMITTED DATA WITH TSDR SURVEY DATA FOR DUPONT FACILITY

Data Recently Submitted to EPA			TSDR Survey Data		
Debris Description	**RCRA Contaminant**	**Quantity (tons/yr)**	**Debris Description Code**	**RCRA Contaminant**	**Quantity (tons/yr)**
Construction debris	D codes	4,026	Not reported		
Dismantlement debris	D codes	1,099			
Clean up/remediation debris	Not specific	1,406			
Not reported			A08	P & U codes	26
			A09	P codes	19
TOTAL DEBRIS QUANTITY		6,531			45

EXHIBIT 12

COMPARISON OF RECENTLY SUBMITTED DATA WITH TSDR SURVEY DATA FOR LANDFILLS B AND C*

Facility B

Recently Submitted to EPA			TSDR Survey Data		
Debris Description	RCRA Contaminant	Quantity (tons/yr)1/	Debris Description	RCRA Contaminant	Quantity (tons/yr)1/
Unknown	P & U codes	241	A06	U codes	41 2/
Unknown	D codes	2,060	B44	D codes	952
			B56	D codes	11
TOTAL DEBRIS QUANTITY		2,301			1,004

Facility C

Data Recently Submitted to EPA			TSDR Survey Data		
Debris Description	RCRA Contaminant	Quantity (tons/yr)1/	Debris Description	RCRA Contaminant	Quantity (tons/yr)1/
Unknown	P & U codes	2,820	A06	P & U codes	482 2/
			A08	P & U codes	259
			B85	P & U codes	19
Unknown	D codes	6,350	B45	D codes	93
TOTAL DEBRIS QUANTITY		9,170			853

* One company owns both landfills.

1/ Data for the facilities are for 8/8/90 to 6/16/91. Quantities in exhibits are adjusted to one year.

2/ Assumed debris quantity is 10 percent of volume reported in the TSDR. Because of variability in debris types among facilities, relative proportion of different types of hazardous debris could not be determined.

EXHIBIT 13
SUMMARY OF COMPARISON BETWEEN RECENTLY SUBMITTED DATA AND TSDR SURVEY DATA

Facility Name	TSDR Survey Debris Volume (tons/yr)	Debris Volume from Recently Submitted Data (tons/yr)	Change in Debris Volume from TSDR Survey Data to Recently Submitted Data (multiple)
Commercial Landfills			
Landfill A	24,828	19,800	0.8[1/]
Landfill B	1,004	2,301	2.3
Landfill C	853	9,170	10.8
Company-Captive Landfill			
Union Carbide	119	195 to 1,048	1.6 to 8.8
Dupont	45	6,531	145[2/]

[1/] This quantity contains 23,532 tons of ashes and slags. The large amount of ashes and slags may be a one-time disposal quantity from remediation activities. By eliminating the ashes and slags quantity from both the TSDR Survey data and the recently submitted data, the quantity of debris in the recently submitted data is larger than the TSDR Survey data by a factor of 12.5.

[2/] Because the data submitted comprised only building, demolition, or clean-up debris, the Dupont data were not used in estimating the total volume.

6.3.1.2 Method 2: Approach and Results

In Method 2, the Agency calculated the total quantity of debris land disposed at commercial facilities in three steps:

Step 1: The Agency used the total debris quantities provided by commercial landfills that submitted data directly to the Agency and calculated the percentage of hazardous debris as a proportion of total waste receipts in 1990 for these facilities.

EXHIBIT 14
SUMMARY OF FACILITIES THAT RECENTLY SUBMITTED DATA BUT DO NOT REPORT DEBRIS IN THE TSDR SURVEY

Facility Name	Facility Type	Quantity (tons/yr)
CWM (Model City, NY)	Commercial Landfill	200,000[1/]
Landfill B	Company-Captive Landfill	12,500
Olin	Company-Captive Landfill	756
Chempro	Waste Treater	340
CyanoKEM	Waste Treater	4,080[2/]
TOTAL DEBRIS QUANTITY		218,000

[1/] Quantity in the recent data submission is for February to May 1991. The quantity in the exhibit has been adjusted to a period of one year using linear extrapolation.

[2/] Quantity in the recent data submission is for one month (May to June, 1991). The quantity in the exhibit has been adjusted to a period of one year using linear extrapolation.

<u>Step 2:</u> For facilities that provided an approximate percentage of their total waste receipts that can be classified as hazardous debris, this percentage was multiplied by the total quantity of waste landfilled at the facility in 1990 to estimate the total hazardous debris quantity.
<u>Step 3:</u> A weighted average percentage of hazardous debris as a proportion of total wastes was calculated based on the results of Steps 1 and 2. This percentage was then applied to the total quantity of waste received by facilities that did not provide any data to EPA.

Exhibit 15 shows hazardous debris as a percentage of total waste quantity disposed at facilities that recently submitted data to EPA. Between 9 and 63 percent of the total wastes land disposed at these landfills is classified as hazardous debris. This range is between 15 to 50 percent for the company captive landfills that submitted data.

Exhibit 16 shows how EPA calculated the total quantity of land-disposed hazardous debris that may require alternative treatment. As with Method 1, EPA

EXHIBIT 15
HAZARDOUS DEBRIS AS PERCENTAGE OF TOTAL WASTE VOLUME AT SELECTED LANDFILLS

Facility Name	Debris Volume (tons/yr)	Total Volume (tons/yr)	Debris as Percentage of Total
Commercial Landfills			
CWM (Emelle, AL)	116,000	290,000[1]	40
CWM (Model City, NY)	200,000[2]	375,000[1]	53
Landfill A	20,000	156,000[1]	13
Company-Captive Landfills			
Union Carbide	200 to 1,050	400 to 2,050	50
Dupont	6,500	120,000	5
Landfill D	12,500	73,000	17
Waste Treaters			
Chempro	340	14,000	2
CyanoKEM	340	173,000	< 1

Debris volumes from information submitted in roundtable meetings and in response to the ANPRM, except as otherwise mentioned in a footnote.

[1] Smith, J., "Hazardous Waste Landfills Facility Information", *E. I. Digest*, February 1992.

[2] First quarter 1991 hazardous debris quantity from response to the ANPRM. The quantity in the exhibit has been adjusted to one year.

EXHIBIT 16
ESTIMATION OF DEBRIS QUANTITY REQUIRING TREATMENT AT COMMERCIAL LANDFILLS

Facility	Debris as Percentage of Total	Total Quantity of Waste (tons/yr)	Debris Quantity Requiring Treatment (tons/yr)
CWM Landfill (Model City, NY)	53%	375,000	159,000
CWM Landfill (Emelle, AL)	40%	290,200	93,000
CWM Landfill (Other)	30%	1,907,000	458,000
Landfill A	13%	156,000	11,000
Landfill E	20%	30,000	5,000
Landfill F	10%	43,000	3,000
Landfill G	30%	270,000	65,000
Landfill H	20%	250,000	40,000
Landfill I	18%	150,000	22,000
Other	29%	171,000	40,000
Total	23%	4,067,450	940,755

Total Quantity of Waste taken from Smith, J., "Hazardous Waste Landfills Facility Information," *E. I. Digest, February 1992.*

assumed that 80 percent of the hazardous debris received at commercial facilities is under a national capacity variance and has not been treated. As Exhibit 16 shows, approximately 940,000 tons of hazardous debris requiring treatment were land-disposed in 1990 at commercial facilities. By adding the quantities of hazardous debris reported by a few company captive facilities, EPA estimates that the total quantity of hazardous debris requiring treatment is approximately 1 million tons. This quantity may be an underestimate because it does not account for all company captive facilities, and because a large number of demolition/construction and remedial actions could generate large volumes of hazardous debris in any given year.

The total quantity of hazardous debris that may require treatment is estimated to be between 700,000 tons/year and 2,800,000 tons/year using Method 1, and is estimated at approximately 1 million tons using Method 2. Variability in the estimates results from extrapolation using hazardous debris data from a very limited number of facilities that are different in the quantity (and type) of hazardous debris they land dispose.

6.3.2 Debris Contaminated with the Newly Listed Wastes

Of the total quantity of hazardous debris that will require off-site commercial treatment, EPA estimated in the proposed rule that approximately 10,000 tons were contaminated with wastes covered in this rule. Debris contaminated with F037 and F038 petroleum refining wastes were estimated to be generated at a rate of 8,000 tons per year and were the most prevalent of these Newly Listed wastes. This estimate was based on the assumption that debris contaminated with F037 and F038 petroleum refinery wastes have similar characteristics and are generated in similar quantities to debris contaminated with K048-K052 petroleum refinery wastes. In the TSDR Survey, 40,000 tons of soil and debris contaminated with K048-K052 petroleum refinery wastes were reported. The Agency assumed that 20 percent of these mixtures would be debris. Thus, EPA's estimate for debris contaminated with F037 and F038 wastes was 8,000 tons per year (.20 * 40,000).

EPA's estimate in the proposed rule for debris contaminated with the remainder of the wastes covered in this rule was less than 2,000 tons per year. Because these wastes were listed recently, EPA did not receive primary data on the quantities of debris contaminated with the Newly Listed wastes covered in this rule other than F037 and F038. EPA derived its estimates of the debris contaminated with the Newly Listed wastes covered in this rule based on the relative proportion of the Newly Listed wastes to total wastes, and best professional judgement. EPA identified 15 facilities generating these wastes (see Document 1). EPA estimated that each of these facilities would typically generate less than 100 tons of hazardous debris. Therefore, EPA estimated that fewer than 2,000 tons of debris contaminated with these wastes would require commercial treatment.

Several commenters to the proposed rule felt that EPA had significantly underestimated the quantity of debris contaminated by Newly Listed wastes covered in this rule. Therefore, EPA solicited experts' estimation of quantities of debris contaminated with Newly Listed wastes.[6] EPA reviewed the information that was already available and then focused on large debris contributors. EPA obtained several experts' estimates for the largest-volume waste types, and focused on debris contaminated with four categories of wastes: F037 and F038 wastes; U359 wastes, K111 and K112 wastes; and K118, K131, and K132 wastes. EPA focused on these wastes groups alone because the volumes of the Newly Listed wastes covered in this rule that were excluded were expected to be so small that their contribution to the total would have been insignificant and indistinguishable from the uncertainty in estimates associated with the larger-volume wastes. EPA developed an interview protocol and conducted structured interviews with the identified experts. For each set of estimates, the experts were asked to consider uncertainties that could cause the levels to be significantly higher or lower than their estimates. The information gathered from the interviews was then used as input for a probabilistic model.

Using the information gathered from the experts, EPA estimates that the quantity of hazardous debris contaminated with Newly Listed wastes covered in this rule ranges from 18,000 tons per year to 120,000 tons per year, with a median of 33,000 tons per year. The estimated quantity of hazardous debris contaminated with Newly Listed wastes consists of two basic categories of debris: (1) debris contaminated with F037 and F038, and (2) debris contaminated with the remainder of the wastes covered in this rule. EPA estimates that the quantity of debris contaminated with F037 and F038 ranges from 13,000 to 24,000 tons per year, with a median volume of 17,000 tons per year. The estimated quantity of debris contaminated with the remainder of the wastes covered in this rule ranges from 3,000 tons to 98,000 tons with a median of 13,000 tons per year.

6.4 AVAILABLE CAPACITY FOR MANAGING HAZARDOUS DEBRIS

As noted earlier, EPA is establishing a number of technologies as BDAT for hazardous debris, but leaving the choice of technology up to the generator and or treater of the debris.[7] The treatment methods include extraction, destruction, and immobilization technologies. The Agency expects a shortfall in available treatment capacity for hazardous debris in all families of debris treatment. The time required to engineer, build, and permit new technologies is like to constrain the availability of many

[6]For a full discussion of EPA' approach to updating the estimated quantity of debris contaminated with the Newly Listed wastes, please refer to Cost and Economic Impact Analysis of Land Disposal Restrictions for Newly Listed Wastes and Hazardous Debris.

[7]Under this rule, EPA also allows generators and/or treaters the alternative of treating hazardous debris to the existing waste-specific treatment standards, as long as the generator and/or treater can comply with those standards (i.e., can perform the necessary sampling and analysis required to demonstrate compliance).

of these technologies. Material-handling problems are also expected to limit the available destruction and immobilization capacity.

6.4.1 Current Treatment of Debris

Under the Third Third LDR standards, hazardous debris must be treated to meet BDAT standards for the waste or wastes with which it is contaminated. According to hazardous waste management industry sources, most hazardous debris was being land disposed without treatment under a national capacity variance until May 8, 1992. Because of the regulatory action taken by EPA to grant a generic one-year case-by-case extension to facilities managing hazardous debris (57 FR 20766), this practice is expected to continue in the near term. Of the debris that is currently being treated, a variety of technologies are being used, including stabilization, incineration, acid washing, and metals extraction. However, some of these treatment technologies are not available commercially as permitted RCRA treatment.

6.4.2 Materials Handling Problems

Current treatment of debris is limited by the characteristics of the debris itself. For example, many types of debris cannot be directly stabilized because of their particle size, and require shredding or grinding prior to stabilization. The ability to incinerate debris is also limited because some incinerators may not be able to handle debris, depending on the type of debris, the size od the debris, and the incinerator feed system. In most cases, large-sized debris need some form of pretreatment (e.g., shredding or sizing) prior to incineration. This could require large and specialized equipment.

6.4.3 Available Treatment Capacity

EPA used the data sources described in previous sections to assign quantities of hazardous debris to specific treatability groups. Exhibit 17 shows the quantities of debris by debris type and contaminant types. The data used for this table are based on voluntary data submissions from: Chemical Waste Management (Emelle, AL and Model City, NY), Union Carbide, Dupont, Laidlaw Environmental, Envirosafe Services of Ohio, Chempro, CyanoKEM, U.S. Ecology, and Ashland Chemical.

EPA used the following methodology to assign debris and contaminant types:

- Step 1: All wastes with known debris type and contaminant type were fitted into the table.
- Step 2: All wastes of known debris type but unknown contaminant were divided among the six predominant contaminant types.

- Step 3: Debris of unknown type and unknown contaminant were divided proportionally among the types of debris (based on the proportions of known debris type) and equally among the contaminant types.

The table shows that the predominant types of debris are brick, concrete, rock and pavement (approximately two-thirds of the total), which is consistent with the finding that the biggest source of hazardous debris is through demolition and construction activities. Most reported debris (approximately 80%) were contaminated with metals (both non-volatile and volatile). However, this finding may be influenced by the fact that debris volumes analyzed for this analysis were generated in 1990 or earlier, and do not reflect the effect of the organic TC rule.

Participants in the three roundtables on hazardous debris and commenters to the Proposed Rule and ANPRM state that many of the debris treatment options such as vitrification and macroencapsulation are not currently available in significant quantities. EPA also recognizes that facilities will require some time to design, test, and install engineered treatment technologies and pre-treatment systems. Exhibit 18 presents EPA's estimate of the commercially available capacity for the various extraction destruction, and immobilization technologies.

For debris contaminated with the Newly Listed wastes, the large quantities of debris contaminated with previously listed wastes that will require off-site commercial treatment after the one-year extension expires in May 1993 will compound the lack of available capacity due to the problems described above. Hence, to minimize the disruption of the available treatment capacity for debris contaminated with previously listed wastes, EPA is granting a two-year national capacity variance for debris contaminated with the Newly Listed wastes covered in this rule. This variance will allow sufficient time for the installation and permitting of the treatment systems necessary to handle the quantities of hazardous debris affected by this rule.

Capacity Analysis

Exhibit 19 presents the assignment of hazardous debris quantities to applicable treatment technologies. Because this rule provides several management options for different categories of hazardous debris, precise assignments of debris quantities to each technology could not be made. EPA assigned quantities of hazardous debris to treatment technologies in two ways:

(1) EPA apportioned the quantities of debris of a specific debris type and contaminant type to all applicable treatment technologies equally (e.g., if there are five applicable technologies for a specific combination of debris type and contaminant type, one-fifth of the total quantity was assigned to each technology).

(2) EPA estimated the quantities of hazardous debris that could be assigned to each specific technology under a "worst case" scenario (i.e., by assigning to each technology all the hazardous debris quantities that could possibly go to that technology).

The assignment of hazardous debris quantities to specific technologies can be used to draw general conclusions about trends and patterns that may occur in the treatment of hazardous debris given the new debris treatment standards. The following observations can be made from the exhibit:

- The wide range of possible debris quantities requiring treatment capacity for each technology reflect the uncertainties associated with the assignment of debris quantities to technologies given the number of debris management options.
- Large quantities of hazardous debris may need to be treated using extraction technologies (especially water washing, acid washing, abrasive blasting, and vibratory finishing), and immobilization technologies (macroencapsulation, microencapsulation, and sealing).
- Approximately 200,000 tons of hazardous debris may require thermal treatment (if all debris for which thermal treatment is possible used this technology). This quantity is likely to be underestimated because the data used in this analysis do not reflect, for the most part, hazardous debris contaminated with the newly identified organic TC wastes.

The results of this analysis are subject to several important caveats: (1) the analysis does not reflect the possible combinations of technologies that may be used in conjunction with each other; (2) the analysis is based on partial data and extrapolation and reflects all of the data uncertainties discussed in previous sections; (3) because of the lack of precision in much of the data available to EPA, the assignment of hazardous debris quantities to treatment technologies is based largely on data extrapolation and professional judgement; and (4) the estimates provided in this exhibit differ from the Regulatory Impact Analysis (RIA) estimates because they were derived using different methodologies.

This analysis is useful in indicating trends about the potentially required capacity for treatment technologies for hazardous debris that can be used by both the regulated community and EPA in planning for the future management of hazardous debris.

EXHIBIT 17
QUANTITIES* OF HAZARDOUS DEBRIS BY DEBRIS TYPE AND CONTAMINANT

	Metal	Brick, Concrete, Rock, Pavement	Glass	Wood	Paper Cloth	Rubber Plastic	Total
Halogenated Pesticides and Aromatics (CC01)	70	81	0	126	0	0	277
Dioxins, Furans, and Their Precursors (CC02)	0	0	0	0	0	0	0
Halogenated Aliphatic Compounds (CC03)	8,440	27,890	6,280	1,010	4,130	3,100	50,850
Nitrated Aromatic and Aliphatic Compounds (CC04)	8,440	27,890	6,280	1,010	4,080	3,100	50,800
Non-polar Aromatics, Heterocycles, and Other Organic Compounds (CC05)	8,440	27,890	6,290	1,010	4,080	3,100	50,810
Polynuclear Aromatics (CC06)	0	0	0	0	0	0	0
Other Non-Halogenated Polar Organic Compounds (CC07)	1,040	21,430	2,870	1,010	150	3,000	29,500
Non-Volatile Metals (CC08)	88,100	162,150	55,920	7,630	4,730	0	318,530
Volatile Metals (CC09)	53,810	361,320	18,540	7,630	3,080	0	444,380
Non-Metal Inorganics (CC10)	0	0	0	0	0	0	0
Total	168,340	628,651	96,180	19,426	20,250	12,300	945,147

*In Tons.

EXHIBIT 18
REQUIRED AND AVAILABLE CAPACITY FOR DEBRIS TREATMENT TECHNOLOGIES

Treatment Technology	Available Capacity (tons)
Extraction Technologies	
Abrasive Blasting	None[1]
Scarification, Grinding, and Planing	None[1]
Spalling	None[1]
Vibratory Finishing	None[1]
High Pressure Stem and Water Sprays	None[1]
Water Washing and Spraying	None[1]
Solvent Extraction	None[1]
High Temperature Metals Recovery	160,000[2]
Thermal Desorption	None[1]
Destruction Technologies	
Biological Destruction	188,000[2]
Chemical Oxidation	29,000
Chemical Reduction	46,000
Thermal Destruction	171,000[3]
Immobilization Technologies	
Macroencapsulation	None[1]
Microencapsulation	1,204,000[2]
Sealing	None[1]

Note: Available capacity numbers based on TSDR data, data received in response to LDR notices, and voluntary data submissions.
[1] Technology is not commercially available.
[2] Materials handling and preprocessing requirements may limit capacity.
[3] Cement kiln and incineration capacity for bulk solids, dry solids, and containerized solids. Materials handling and preprocessing requirements may limit capacity.

EXHIBIT 19

ASSIGNMENT OF DEBRIS QUANTITIES TO TREATMENT TECHNOLOGIES *

		Total Quantity (tons)	Abrasive Blasting	Acid Washing	Electro-polishing	L. Solvent Extraction	Scarif. & Grinding	Extraction Spalling	Thermal Desorption	Vibratory Finishing	V. Solvent Extraction	Water Washing
CC01 Halogenated	Metal	70	5 - 70	5 - 70	5 - 70	5 - 70			5 - 70	5 - 70	5 - 70	5 - 70
Pesticides	Brick	81	5 - 81	5 - 81		6 - 81	6 - 81	6 - 81	6 - 81	5 - 81	5 - 81	5 - 81
and Aromatics	Wood	126	13 - 126	13 - 126		13 - 126	13 - 126		13 - 126	13 - 126	13 - 126	13 - 126
CC03	Metal	8,440	703 - 8,440	703 - 8,440	703 - 8,440	703 - 8,440			703 - 8,440	703 - 8,440	703 - 8,440	701 - 8,440
Halogenated	Brick	27,890	2,145 - 27,890	2,145 - 27,890		2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890
Aliphatic	Glass	6,280	523 - 6,280	523 - 6,280		523 - 6,280		523 - 6,280	523 - 6,280	523 - 6,280	523 - 6,280	523 - 6,280
Compounds	Wood	1,010	101 - 1,010	101 - 1,010		101 - 1,010	101 - 1,010		101 - 1,010	101 - 1,010	101 - 1,010	101 - 1,010
	Paper/Cloth	4,130		690 - 4,130		690 - 4,130			690 - 4,130		690 - 4,130	590 - 4,130
	Rubber/Plastic	3,100		344 - 3,100		344 - 3,100			344 - 3,100	344 - 3,100	344 - 3,100	344 - 3,100
CC04	Metal	8,440	703 - 8,440	703 - 8,440	703 - 8,440	703 - 8,440			703 - 8,440	703 - 8,440	703 - 8,440	703 - 8,440
Nitrated	Brick	27,890	2,145 - 27,890	2,145 - 27,890		2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890
Aromatic	Glass	6,280	523 - 6,280	523 - 6,280		523 - 6,280		523 - 6,280	523 - 6,280	523 - 6,280	523 - 6,280	523 - 6,290
and Aliphatic	Wood	1,010	101 - 1,010	101 - 1,010		101 - 1,010	101 - 1,010		101 - 1,010	101 - 1,010	101 - 1,010	101 - 1,010
Compounds	Paper/Cloth	4,080		583 - 4,080		583 - 4,080			583 - 4,080		583 - 4,080	583 - 4,080
	Rubber/Plastic	3,100		344 - 3,100		344 - 3,100			344 - 3,100	344 - 3,100	344 - 3,100	344 - 3,100
CC05	Metal	8,440	703 - 8,440	703 - 8,440	703 - 8,440	703 - 8,440			703 - 8,440	703 - 8,440	703 - 8,440	703 - 8,440
Non-Polar	Brick	27,890	2,145 - 27,890	2,145 - 27,890		2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890	2,145 - 27,890
Aromatics,	Glass	6,290	524 - 6,290	524 - 6,290		524 - 6,290		524 - 6,290	524 - 6,290	524 - 6,290	524 - 6,290	524 - 6,290
Heterocycles,	Wood	1,010	101 - 1,010	101 - 1,010		101 - 1,010	101 - 1,010		101 - 1,010	101 - 1,010	101 - 1,010	101 - 1,010
and other	Paper/Cloth	4,080		583 - 4,080		583 - 4,080			583 - 4,080		583 - 4,080	583 - 4,080
Organic Compou	Rubber/Plastic	3,100		344 - 3,100		344 - 3,100			344 - 3,100	344 - 3,100	344 - 3,100	344 - 3,100
CC07	Metal	1,040	95 - 1,040		95 - 1,040	95 - 1,040			95 - 1,040	95 - 1,040	95 - 1,040	95 - 1,040
Other	Brick	21,430	1,786 - 21,430			1,786 - 21,430	1,786 - 21,430	1,786 - 21,430	1,786 - 21,430	1,786 - 21,430	1,786 - 21,430	1,786 - 21,430
Non-Halogenated	Glass	2,870	261 - 2,870			261 - 2,870		261 - 2,870	261 - 2,870	261 - 2,870	261 - 2,870	261 - 2,870
Polar Organics	Wood	1,010	112 - 1,010			112 - 1,010	112 - 1,010		112 - 1,010	112 - 1,010	112 - 1,010	112 - 1,010
Compounds	Paper/Cloth	160				25 - 160			25 - 160		25 - 150	25 - 150
	Rubber/Plastic	3,000				375 - 3,000			375 - 3,000	375 - 3,000	375 - 3,000	375 - 3,000
CC08	Metal	88,100	11,012 - 88,100	11,012 - 88,100	11,012 - 88,100					11,012 - 88,100		11,012 - 88,100
Non Volatile	Brick	162,160	18,017 - 162,160	18,017 - 162,160			18,017 - 162,160	18,017 - 162,150		18,017 - 162,160		18,017 - 162,150
Metals	Glass	65,920	6,990 - 65,920	6,990 - 65,920				6,990 - 65,920		6,990 - 65,920		6,990 - 65,920
	Wood	7,630	1,272 - 7,630	1,272 - 7,630			1,272 - 7,630			1,272 - 7,630		1,272 - 7,630
	Paper/Cloth	4,730		1,577 - 4,730								1,577 - 4,730
CC09	Metal	53,810	6,726 - 53,810	6,726 - 53,810	6,726 - 53,810					6,726 - 53,810		6,726 - 53,810
Volatile	Brick	361,320	51,617 - 361,320	51,617 - 361,320			51,617 - 361,320	51,617 - 361,320		51,617 - 361,320		51,617 - 361,320
Metals	Glass	18,540	2,318 - 18,540	2,318 - 18,540				2,318 - 18,540		2,318 - 18,540		2,318 - 18,540
	Wood	7,630	1,272 - 7,630	1,272 - 7,630			1,272 - 7,630			1,272 - 7,630		1,272 - 7,630
	Paper/Cloth	3,080		770 - 3,080		770 - 3,080						770 - 3,080
	TOTAL	945,147	111,918 - 912,597	114,799 - 915,647	19,947 - 168,340	16,862 - 186,317	80,832 - 848,077	88,899 - 724,831	15,862 - 182,237	113,415 - 924,897	15,972 - 182,237	117,543 - 945,147

* Quantities in each treatment category are presented as ranges. The first number in the range was derived by apportioning the quantities of debris equally among technologies; the second number represents a "worst case" scenario (i.e., assumes that the entire debris quantity is applied to one technology.)

EXHIBIT 19 (continued)

ASSIGNMENT OF DEBRIS QUANTITIES TO TREATMENT TECHNOLOGIES

		Total Quantity (tons)	Destruction: Biodeg.	Destruction: Chem. Ox.	Destruction: Chem. Red.	Destruction: Photochem Treatment	Destruction: Thermal Destruct.	Immobilization: Macro-encapsul.	Immobilization: Micro-encapsul.	Immobilization: Sealing
CC01 Halogenated Pesticides and Aromatics	Metal	70	6 - 70	6 - 70	6 - 70	6 - 70	6 - 70			6 - 70
	Brick	81	6 - 81	6 - 81	6 - 81	6 - 81	6 - 81			6 - 81
	Wood	126	13 - 126				13 - 126			
CC03 Halogenated Aliphatic Compounds	Metal	8,440	703 - 8,440	703 - 8,440			703 - 8,440			703 - 8,440
	Brick	27,890	2,145 - 27,890	2,145 - 27,890			2,145 - 27,890			2,145 - 27,890
	Glass	6,280	623 - 6,280	623 - 6,280			623 - 6,280			623 - 6,280
	Wood	1,010	101 - 1,010				101 - 1,010			
	Paper/Cloth	4,130	690 - 4,130				690 - 4,130			
	Rubber/Plastic	3,100	344 - 3,100	344 - 3,100			344 - 3,100			
CC04 Nitrated Aromatic and Aliphatic Compounds	Metal	8,440	703 - 8,440	703 - 8,440			703 - 8,440			703 - 8,440
	Brick	27,890	2,145 - 27,890	2,145 - 27,890			2,145 - 27,890			2,145 - 27,890
	Glass	6,280	623 - 6,280	523 - 6,280			523 - 6,280			523 - 6,280
	Wood	1,010	101 - 1,010				101 - 1,010			
	Paper/Cloth	4,080	583 - 4,080				583 - 4,080			
	Rubber/Plastic	3,100	344 - 3,100	344 - 3,100			344 - 3,100			
CC05 Non-Polar Aromatics, Heterocycles, and other Organic Compou	Metal	8,440	703 - 8,440	703 - 8,440			703 - 8,440			703 - 8,440
	Brick	27,890	2,145 - 27,890	2,145 - 27,890			2,145 - 27,890			2,145 - 27,890
	Glass	6,290	524 - 6,290	524 - 6,290			524 - 6,290			524 - 6,290
	Wood	1,010	101 - 1,010				101 - 1,010			
	Paper/Cloth	4,080	583 - 4,080				583 - 4,080			
	Rubber/Plastic	3,100	344 - 3,100	344 - 3,100			344 - 3,100			
CC07 Other Non-Halogenated Polar Organics Compounds	Metal	1,040	95 - 1,040	95 - 1,040			95 - 1,040			95 - 1,040
	Brick	21,430	1,786 - 21,430	1,786 - 21,430			1,786 - 21,430			1,786 - 21,430
	Glass	2,870	261 - 2,870	261 - 2,870			261 - 2,870			261 - 2,870
	Wood	1,010	112 - 1,010				112 - 1,010			
	Paper/Cloth	150	75 - 150				75 - 150			
	Rubber/Plastic	3,000	375 - 3,000	375 - 3,000			375 - 3,000			
CC08 Non-Volatile Metals	Metal	88,100						11,012 - 88,100	11,012 - 88,100	11,012 - 88,100
	Brick	162,150						18,017 - 162,150	18,017 - 162,150	18,017 - 162,150
	Glass	55,920						6,990 - 55,920	6,990 - 55,920	6,990 - 55,920
	Wood	7,630					1,272 - 7,630			
	Paper/Cloth	4,730					1,577 - 4,730			
CC09 Volatile Metals	Metal	53,810						6,726 - 53,810	6,726 - 53,810	6,726 - 53,810
	Brick	361,320						51,617 - 361,320	51,617 - 361,320	51,617 - 361,320
	Glass	18,540						2,318 - 18,540	2,318 - 18,540	2,318 - 18,540
	Wood	7,630					1,272 - 7,630			
	Paper/Cloth	3,080					770 - 3,080			
	TOTAL	945,147	16,872 - 182,237	13,873 - 165,631	10 - 312	10 - 151	20,773 - 206,307	96,680 - 739,840	96,680 - 739,840	106,946 - 893,171

* Quantities in each treatment category are presented as ranges. The first number in the range was derived by apportioning the quantities of debris equally among technologies; the second number represents a "worst case" scenario (i.e., assumes that the entire debris quantity is applied to one technology.)

Chapter 7
K061, K062, and F006

CHAPTER 7

K061, K062, AND F006 WASTES

7.1 BACKGROUND

This rule removes the low and high zinc subcategories for K061 and establishes the same numeric treatment standards based on High Temperature Metals Recovery (HTMR) for all K061 nonwastewaters. This rule does not preclude the use of any treatment technology that can meet the numeric treatment standards for K061, K062, and F006. Since the treatment standards established in this rule for K062 and F006 are alternative treatment standards, any technology the can meet the previously promulgated treatment standards for K062 and F006 may continue to be used to treat these wastes.

In conducting the capacity analysis for K061 wastes, EPA has estimated the volume of K061 that must be treated and has determined that there is sufficient available treatment capacity for these wastes.

EPA believes that there is currently sufficient treatment capacity to treat K062 and F006 wastes under the previously promulgated standards. The Agency has not received information from generators of these wastes that treatment capacity is not available. EPA did not conduct a formal capacity analysis for K062 and F006, since the alternative standards promulgated by this rule can only increase the available treatment capacity.

7.2 K061 WASTE GENERATION

In the capacity analysis for the August 19, 1991 (56 FR 41164) final high-zinc K061 rule, the Agency estimated the current generation of K061 wastes (both high-zinc and low-zinc wastes).[1] The Agency used data form the TSDR survey to estimate that approximately 86,000 tons of low-zinc K061 would require LDR treatment. Two other sources provided information on the generation of K061 wastes. The Horsehead Resource Development Company (HRD) estimated that 50,000 to 100,000 tons of low-zinc K061 wastes were generated each year. The American Iron and Steel Institute estimated that 67,000 tons of low-zinc K061 is generated annually. Since there is a discrepancy in the estimates of the volume of low-zinc K061 generated, for the purposes of this capacity analysis, the highest figure (100,000 tons) was used to estimate the volume of low-zinc K061 requiring treatment.

[1]Although the subcategories of high-zinc and low-zinc K061 have been removed, for the sake of clarity we will refer to the additional volume of K061 wastes now subject to the numeric treatment standards based on HTMR as low-zinc K061 wastes.

7.3 AVAILABLE TREATMENT CAPACITY FOR K061 WASTES

EPA conducted an analysis of HTMR capacity for the August 19, 1991 (56 FR 41164) final rule for high-zinc K061. This analysis concluded that 573,000 tons of HTMR capacity was available as of August 1991. The analysis also concluded that up to 415,000 tons of high-zinc K061 could require HTMR. Therefore, based on data available to EPA, almost 160,000 tons of excess HTMR capacity was available in August 1991.

In response to the proposed rule, Conversion Systems, Inc. (CS) submitted a comment and data indicating that its stabilization process can achieve the treatment standards for K061 wastes. CS also states that they currently treat over 100,000 tons of K061 wastes and that their stabilization capacity is currently unlimited. In the capacity analysis for the August 19, 1991 (56 FR 41164) final high-zinc K061 rule, EPA identified another company, Michigan Disposal, that claims its stabilization process can meet the K061 treatment standards.

EPA notes that other technologies such as extractive metallurgy processes may also be able to meet the treatment standards. One commenter to the proposed rule, Recontek, claims that it can process F006 or K061 wastes in its hydrometallurigical process. Recontek has over 240,000 tons of permitted capacity.

7.4 CAPACITY IMPLICATIONS

EPA has determined that sufficient HTMR capacity exists to treat the additional K061 wastes subject to the numeric treatment standards based on HTMR. The highest estimate of low-zinc generation is 100,000 tons. There are 160,000 tons of HTMR capacity available. The Agency also notes that K061 generators are in no way required to use HTMR to treat their waste. Therefore, if there were to be a shortage of HTMR capacity, K061 waste could be treated by another technology such as stabilization which is widely available.

Appendix A
Organic Waste Phone Logs

CD2F-S0045.A

APPENDIX A: ORGANIC WASTE PHONE LOG

Contact: Morgan French

Company: Olin Chemical Corp., Lake Charles, LA

Phone: 318-491-3107

Date: June 20, 1991

Callers: Gary Light and Frances Steinacker.

Subject: ONL Capacity Analysis

Report of Discussion:

Olin Lake Charles currently generates several forms of K112:

FORM:	1989 (lb)	1990 (lb)
Wastewaters	125,748,800	153,332,340
Spent Carbon from WWT	327,430	300,340
Methanol Column Sidedraw	4,294,680	5,364,180
Incinerator Scrubber Blowdown (estimated)	1,050,840,000	1,050,840,000
Spent Carbon from Incinerator Blowdown Treatment	40,000	40,000
Soil and Debris	0	63,660

Olin Lake Charles does not currently generate:

U328, U353: Does not produce o or p-toluidine.

K107-K110: Uses different process in UDMH production.

K111: Does not make DNT.

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MANAGEMENT

Wastewater is treated in standard Calgon Carbon beds and discharged under NPDES.

Spent carbon from WWT is returned to Calgon Carbon for regeneration (in Catlettsburg, KY or Pittsburgh, PA).

The sidedraw from the methanol still column is considered a nonwastewater (whose primary hazardous constituent is methanol). All sidedraw was incinerated on site in 1990. In 1989, a small amount (71,870 lb, or 1.67%) was incinerated offsite. The Olin Lake Charles TDI residue incinerator receives several million pounds of TDI residue, plus the K112 (liquid injection; can't handle solids).

Incinerator scrubber water blowdown coming in contact (mixed) with K112 streams is treated in standard Calgon Carbon beds, then discharged under NPDES. (The generation volume above is based on an estimated 250 gpm; the actual flow rate is not measured). Practically no organics are in the input stream to the carbon beds.

Spent carbon from incinerator blowdown treatment is believed to be incinerated offsite (the carbon being replaced no more than once a year). Calgon does not want the carbon back if it is contaminated with a lot of solids, and there are no sand filters in front of the carbon beds (so that they trap a significant amount of solids).

Soil and debris was probably landfilled.

OTHER ISSUES DISCUSSED/COMMENTS:

Olin expressed concern over the consideration of setting the BDAT standard for K112 as a method: chemical oxidation followed by carbon adsorption. Tremendous treatment capacity would be required. Olin claims to get good results with carbon adsorption alone.

Contact: Don Lierman

Company: BASF, Urethanes, Geismar, LA

Phone: (504) 339-2529

Date: May 21, 1991

Caller: Frances C. Steinacker

Subject: ONL Capacity Analysis

Report of Discussion:

The plant currently generates K112, no K111. The K112 is much cleaner than the listing "typical stream description", ("mostly distilled water"), with TDA, the main contaminant, in the ppb range. The Wastewater Permit water balance gave the maximum permitted values for this stream as 40,000 gallons/day.

MANAGEMENT:

K112 is currently carbon treated (Calgon), and the facility has installed a separate distillation tower for the water.

In the future, a new above-ground biological treatment plant will be built to treat the K112, replacing the current bio-plant, which is only permitted for TC (in accordance with regulations to be effective March 1994, requiring above-ground treatment tanks).

The carbon is sent back to Calgon for regeneration, to Neville Island facility in Pittsburgh, PA or to Catlettsburg, KY. Lierman has visited the facilities himself.

Contact: Richard Mergenhagen in TDI plant

Company: Dow Chemical, Freeport, TX

Phone: (409) 238-0000

Date: May 21, 1991

Caller: Frances C. Steinacker

Subject: ONL Capacity Analysis

Report of Discussion:

The plant does not generate K111 or K112. TDA is purchased from Air Products and the products do not enter into the wastewaters.

Contact: Jim Myers

Company: Bayer (Mobay), New Martinsville, WV

Phone: (304) 455-4400

Date: July 2, 1991

Caller: Frances C. Steinacker

Subject: ONL Capacity Analysis

Report of Discussion:

K111 and K112: The company generates 400,000 tons total wastewaters, which is incinerated on-site. Very little ash is generated from these 2 wastes. The residual ash from incineration go to a hazardous landfill.

The K111-K112 is at most 0.1% ash, so the residual is only about 5-10 lbs, out of the 2.7 million lbs total (in 1990) from incineration at the facility. Most of the ash is from wastewater treatment sludge.

OTHER:

Mentioned K027 (distillate bottoms from manufacture of TDI) -- 10 million lbs.

Contact: Phil Shotts

Company: Bayer (Mobay), New Martinsville, WV

Phone: (304) 455-4400

Date: July 2, 1991

Caller: Frances C. Steinacker

Subject: ONL Capacity Analysis

Report of Discussion:

Combined waste streams:

Process about 5,327,000 tons annually total WW (of which K111 and K112 make up about 4%).

Incinerate in a fluidized bed incinerator (ONSITE) about 16,000 tons mixed WWT clarifier sludge, biosludge (a small stream), waste liquids from plant, and solid wastes annually.

The highest ash content in the WWT stream would be about 1%. The highest ash content of the WW treatment sludge would be about 7%.

Permit limits: 9,600 pounds/day of ash. This ash is shipped offsite for landfilling and is most likely not stabilized. It is considered nonhazardous except for its nickel content. The company has considered delisting, but doesn't think it's worth it. Probably Rollins or TSX is the offsite recipient.

Contact: Joe Perrigi

Company: Bayer (Mobay), Baytown, TX

Phone: (713) 383-2411

Date: July 2, 1991

Caller: Frances C. Steinacker

Subject: ONL Capacity Analysis

Report of Discussion:

Should talk to Harry Heilein tomorrow (ext. 4805).

Joe Perrigi says they might generate K111 and K112; they do have DNT and TDA units. The wastewaters are treated with bacteria and aeration, and discharged through NPDES permits. All sludges go to incineration (offsite?)

GENERATION:

Contact: Harry Heinlein (will be out until July 11)

Company: Bayer (Mobay), Baytown, TX

Phone: (713) 383-2411 ext 4865

Date: July 8, 1991

Caller: Frances C. Steinacker

Subject: ONL Capacity Analysis

Report of Discussion:

GENERATION:

All information should be in the survey sent to OSW Information Management (Lisa Jones). If not complete, call back.

MANAGEMENT:

K111: DNT is extracted using toluene and returned to the unit. The water containing residual DNT goes to above-ground biotreatment, carbon absorption after primary clarification, prior to discharge under CPSF guidelines.

K112: pH adjusted, then follows same treatment train (but no extraction step)

Biosludge is treated in a filter press to about 50% water (a quasi-solid cake is produced), then incinerated offsite, as part of a mixed stream. Ash goes to land treatment. The ash is primarily from the inorganic lime used for enhancement of filter press operation.

Total biosludge 365-700 tons/year. This contains primarily silt and sand from the clarifier, along with the minor volume of biosludge.

Carbon is regenerated onsite in a BIF unit.

OTHER:

Very concerned about BDAT being set up in the wrong way. Feel their method is very successful in cleaning up problems.

Will fax copy of 3007 response.

Contact: Mary Ann Smith

Company: Rubicon Chemical, Baton Rouge, LA

Phone: (504) 383-7771

Date: July 2, 1991

Caller: Frances C. Steinacker

Purpose: ONL Capacity Analysis

Report of Discussion:

GENERATION:

The facility generates K111 and K112 (see MANAGEMENT). The facility injects roughly 46 tons/year of K111 and 44 tons/year of K112 within a combined wastewater stream.

Treating K111 and K112 generates 86 pounds/year of nonwastewater residuals from each waste stream. These residuals currently are sent off site for incineration.

MANAGEMENT:

Residuals are incinerated off site, usually by Rollins. K111 and K112 wastewaters undergo pretreatment, which includes neutralization and filtration. The pretreated K111 and K112 wastewaters (with a combined wastewater stream of unknown volume) are deep-well disposed on site. The facility currently has a no-migration petition for this operation.

Contact: Bill Hampton

Company: Carbolabs, Bethany, CT

Phone: (203) 393-3029

Date: July 2, 1991

Caller: Frances C. Steinacker

Subject: ONL Capacity Analysis

Report of Discussion:

GENERATION:

Carbolabs purchases TDA from Aldrich Chemical rather than making it themselves. Everything they sell is for laboratories (therefore small amounts).

Contact: John Knatts
Al Pogamo (609-540-4106) is on vacation until 7/10

Company: Du Pont, Deepwater, NJ

Phone: (609) 540-2938

Date: July 2, 1991

Caller: Frances C. Steinacker

Subject: ONL Capacity Analysis

Report of Discussion:

GENERATION:

John Knatts is not very familiar with K111-K112, but tried to assist. He only located a remediation report of a ditch system from the process, where a waste stream with 8 or so codes, including K111 (but not K112) were grouped together. In 1989 this total volume was 800,018 lb. In 1990, zero was recorded, but 428,000 lb was shipped offsite, presumably from the previous year's 800,018 lb total.

MANAGEMENT:

The facility has its own WWTP (using biotreatment and aeration) and Subtitle C landfill for residual sludges (i.e., no wastewater or residual is being shipped offsite).

Appendix B
Debris Issues and Concerns

APPENDIX B

Hazardous Debris Issues and Concerns

The Capacity Programs Branch of the Waste Management Division of EPA held three roundtables on hazardous debris on May 14, June 18, and June 27, 1991. During the roundtables, the participants shared their practical experience with the management of debris and provided an understanding of the critical capacity issues related to the land disposal restrictions for hazardous debris. EPA held the roundtables to gather information on the current management practices for hazardous debris. In order to get a complete picture of the management of debris, each roundtable concentrated on a different group of facilities that manage hazardous debris: participants in Roundtable One represented commercial landfills; participants in Roundtable Two represented hazardous waste generators with on-site landfills; and participants in the Roundtable Three represented hazardous waste brokers and treatment facilities.

The quotes used here illustrate in the participants' own words *their views and opinions on hazardous debris.*[1] *We have taken these concerns and comments into consideration in the capacity analysis for hazardous debris.* All quotes are in plain text; *notes by the Agency are in italics.*

ROUNDTABLE PARTICIPANTS

Roundtable One	***Commercial Hazardous Waste Landfills***
Roundtable Two	***Hazardous Waste Generators with On-Site Landfills***
Roundtable Three	***Commercial Hazardous Waste Brokers and Treaters***

[1]*Although these quotes relate issues raised in the roundtable meetings, they are also reflective of the issues and concerns raised in the ANPRM in connection with hazardous debris. The term "contaminated debris" is often used by the particpants instead of the term "hazardous debris."*

I. The Problem of Hazardous debris

> *During the three roundtables, the participants discussed whether hazardous debris was a major problem. All the participants agreed that the answer was "yes". The participants in all three roundtables indicated that, to them, hazardous debris posed different challenges than did usual industrial hazardous waste streams. The quotes below explain some of the reasons why hazardous debris can be a major problem.*

Debris is a scary topic...Debris is a frightening subject because it's so open to interpretation that you're subject to enforcement actions at any time. – *Roundtable 1 Participant*

[*In classifying hazardous debris*] you go conservative...It's a fear factor.
– *Roundtable 3 Participant*

When I used the word paranoia...I wasn't kidding about that. We will err on the side of conservatism rather than take [*hazardous debris*] material. One load is not worth your permit. One customer is not worth your permit. – *Roundtable 1 Participant*

How are you going to sample the material anyway? ... Duct work, for example, that is potentially contaminated with chrome, duct work is that thick, you know. How do I draw my sample? Do I get a wipe sample? Is that valid?...So you go conservative. Say yeah, I've got a TC problem.
– *Roundtable 3 Participant*

It's difficult to really pin down [*what is RCRA hazardous debris*] because if people are going to go the conservative route, then a Tivex suit when someone walks by a lead-contaminated filter then becomes a contaminated material...that's RCRA hazardous. Would we do an actual TCLP on it? No. – *Roundtable 3 Participant*

I think there's a perception by the people who have to sign on the line when they're sending stuff out for disposal that they'd rather not make a mistake because they'll get in trouble. So they'll go the most rigorous way, because that makes their life easier...You know, they're not going to make the fine distinction if it saves them trouble and it saves them a potential fine.
– *Roundtable 3 Participant*

[*If we have a debris contaminated with a listed waste*]...we have a problem.
– *Roundtable 3 Participant*

Sure, [*hazardous debris*] is a big problem for us. It's filling up our landfill.
– *Roundtable 2 Participant*

The refiners and the whole chemical coast is worried about [*having to replace their*] sewer systems [*which would then be considered hazardous debris*]. I mean, hundreds and hundreds of miles of piping systems. – *Roundtable 3 Participant*

The kinds of contamination we have in [*remediation*] is everything. Acids, bases, PCBs, mercury. That's one reason people like to decontaminate plants, because of mercury contamination, cyanides, phosphorous, carbon disulfide, organics, pesticides, the whole gamut...Any given project can generate a lot of stuff, one decontamination of a chemical plant, a small one in Rhode Island, 25,000 tons [*of hazardous debris*]. -- *Roundtable 3 Participant*

We have a principal smelting facility...and in the filter line, we have a bag house [*for hazardous dust*]...This bag house contains approximately 600 and some odd bags per chamber. Each bag [*is contaminated with hazardous waste and*] is about 18 to 20 feet long and 18 inches in diameter and is basically of dacron fabric. There are eight chambers. We change out two chambers every year. The nature of the fabric material does not lend itself well to stabilization, even as an indirect mode. – *Roundtable 2 Participant*

II. Data Concerns for Hazardous debris

> *In estimating data on volumes and characteristics of hazardous debris, the participants indicated that they did not keep data in a form that could easily yield that information. The participants added that the Agency was likely to encounter many data and analytical problems due to the nature of hazardous debris and the lack of a clear definition of hazardous debris. The quotes below describe some of these data and analytical problems.*

-- you know, [*trying to get a complete picture from the available data is like*] somebody said, patching up an airplane with chewing gum, something like that. But here we're talking about a significant regulation...and we don't even know how to ask the questions, so we're kind of at the end of the finishing line and we didn't know what race was on. – *Roundtable 2 Participant*

You know, this concept of taking a big universe and trying to apply some universal putty to it to fix it [*or regulate it*] usually doesn't work. – *Roundtable 2 Participant*

Evaluating or assessing the availability of capacity is going to be more difficult because now you are going to have to figure out how this waste is going to be generated over time, when capacity is going to become available under the current regulatory program, who's going to opt to permit that capacity...what disincentives are there going to be for people to permit that capacity, what incentives are there going to be. – *Roundtable 1 Participant*

It's such an enormous package of unknowns in developing numbers. I don't know what to give you in the way of the numbers. I don't know how to give you a number of what constitutes what we're going to have to be doing over the next two to five years. – *Roundtable 2 Participant*

We can certainly begin to appreciate the corner that EPA is in, in trying to come up with data on [*hazardous debris*]. – *Roundtable 2 Participant*

A lot of the regulations were considerably different [*during the TSDR Survey*], so what we're doing with materials and what we thought we were going to do with materials then versus what we're doing now is completely different. I would have thought at the end of doing the survey, personally, I would have thrown it in the garbage because by '87 when the survey was done, the information was already out of date. – *Roundtable 3 Participant*

[*Much contaminated*] debris is sub-surface. You're going to have a 30 foot lagoon and all of a sudden a trunk appears or steel that was in there, are all sorts of various problems you didn't know were in there. Or they are literally underground. A lot of debris ends up being debris you didn't know was buried...You might be looking at the end of a freight car on its nose. So you have to realize that a lot of that data can't be gotten. – *Roundtable 3 Participant*

But I think the problem [*EPA is*] having is that we ourselves don't even know how to define the basis for which the numbers are to be calculated. – *Roundtable 2 Participant*

I know why [*EPA*] wants to [*separate debris out*] but why would I want to do it in my records now? – *Roundtable 2 Participant*

[*Hazardous debris volumes are*] not measured really, at the facilities. Not as accurately as [*EPA*] would like. -- *Roundtable 3 Participant*

Not really knowing what questions are going to be asked, you don't keep the data available the way the folks at EPA really need it, and that's part of our problem. But once you get the questions -- I mean we don't have a lot of the data. -- *Roundtable 2 Participant*

Well, you know, contaminated...debris almost by definition is unlike industrial [*hazardous waste streams*] and it's impossible to say what the generation is because it varies so much...it's almost impossible to estimate what [*the volume of hazardous debris is*] going to be. I think all you can do is look at the current rates and say 'there's no reason to think that next year is going to be substantially different from this year.' Who knows when Superfund is going to start generating stuff or Defense? -- *Roundtable 1 Participant*

I can give you numbers [*on hazardous debris*] that would be huge over certain periods of time, and then we go through nothing. I don't know what the future holds, I don't know if the past has anything at all to say about the future. That's your big problem.
-- *Roundtable 2 Participant*

Another corollary to this story is if you generate all this data and the de minimis rule comes out, the amounts and numbers you get may be way off. We've got a lot of stuff that is de minimis, a lot of stuff. -- *Roundtable 2 Participant*

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III. Regulatory Issues for Hazardous debris

During the roundtables, participants pointed out a variety of regulatory issues related to hazardous debris. Participants in all three roundtables noted that it is difficult to define hazardous debris, particularly because there is no way to sample debris. The participants in the second and third roundtables (generators with on-site landfills and brokers/treaters) also discussed the difference–in their minds--between decontamination of debris and treatment. The quotes below illustrate their views on these regulatory issues.

You know, I guess it comes down to, is [*the debris*] a waste or not a waste?
– *Roundtable 3 Participant*

Let's put it this way, debris is...waste to a very small extent and commodity to a large extent. It's a commodity. It's a commodity that happens to be tainted. Don't look at it as a very high volume [*situation*], but rather as a very high problem situation. -- *Roundtable 1 Participant*

If you spill material...and it goes on a wooden floor, did you spill waste or did you spill good product? Does it have to carry an F listing or [*do*] you just have to look for the characteristic codes?...I would say it's only a waste when you want to get rid of the floor, that's when it becomes [*a waste*] -- it's just like any spill into soil and you could claim the contained in theory, I guess so, maybe not. -- *Roundtable 3 Participant*

I'm sort of concerned with the numbers like 9.5 millimeters [*i.e., the lower size limit on geologic debris*]...who's going to be measuring these particles? You know, when you're actually dumping a filter or you're taking your bag house and you're going to separate, those are 9.5 and these are 9.3 and this goes that way and that goes [*there*]. That's not the way the real world operates. You've got a whole pile of junk called debris, and you say 'that's debris'.
– *Roundtable 2 Participant*

We have contaminated debris, we have uncontaminated debris...We get the regulations to be so darn specific that we're cutting our own throat...I think we need to forget about all these what is it, .3 millimeters or .5 millimeters, and say we're trying to regulate a chemically made waste...not the pipe that is handling that waste, you know. Let's do something else with the pipe; let's do something else with the filter that filters that K waste. Give me a handle that I can say, 'I can do something with the pipe and to heck with it, contaminated, derived from or whatever. The pipe is a pipe, it's not the waste. You are regulating the waste.' And if I can do something, let's do it. – *Roundtable 2 Participant*

Right now, I have K011 and K013 [*debris*]. That's doomed forever because of the genes [*by the mixture rule*]. If the genes in K011 and K013 are there. And nobody tells me, says, 'Well, yes, but if you can prove that it's got less than point triple 0 million parts per trillion or whatever,'...So I've got all this stuff...just because it carries those genes. – *Roundtable 2 Participant*

I think of the debris that we pull off of -- forget the bricks and the boulders and the rocks -- the continuous debris that we make, like boards out of our API separators, fly boards, or the hard hats and coffee cups and whatever that comes up on our bar screen, how do you sample a hard hat? – *Roundtable 2 Participant*

One of the things that we found is that sampling is a big problem with contaminated debris. You can take a piece of piping and you can sample six inches apart and you might get mercury a magnitude different. – *Roundtable 2 Participant*

It's very difficult to have a good representative analysis of debris. You may have a piece of debris that's going to have something [*on it*] but the other piece you took the sample of may not. So in one case you may have something that isn't contaminated that's being treated as contaminated, but on the other hand you might have [*something that*]...is contaminated, but the piece that they're [*testing*] from isn't, and so then you're going to have a mystery waste. You're going to have like a lesser of two evils. – *Roundtable 3 Participant*

One of the problems...is that EPA has a definite position on what constitutes treatment and it's fairly broadly construed and then the States just construe the hell out of it...so now everything needs a permit. – *Roundtable 1 Participant*

If we need treatment permits when we decon debris, we're not going to do any work.
– *Roundtable 3 Participant*

I think we never considered [*de-con*] to be treatment. And this [*ANPRM*] is sort of the first thing I've read that said it would be treatment. It is a separation process and in that sense it is treatment, but we've never viewed it that way. – *Roundtable 3 Participant*

Well, I'm fairly certain all the decon work we do is done without permits. If the rules now will specify that this is treatment and we have to obtain permits, it will basically shut down our decon business...I don't think we're aware how upset we would be...But if we have to get permits to scour concrete or to sandblast a ship, it's going to be very difficult for us.
– *Roundtable 3 Participant*

[*Any treatment for debris*] that we can do on concrete pad, and that includes about half of the things included in extraction--water washing, hydro blasting, sand blasting, steam cleaning--we would probably take the position that that is not subject to a permit. We might be challenged.
– *Roundtable 2 Participant*

I think there is something the Agency can do; if they can define for us decontamination and the concept of decontamination -- being something totally different from treatment, that you can decontaminate without a RCRA permit, we could certainly decontaminate and do the right thing. And define 'decontamination' as applied only to debris. – *Roundtable 2 Participant*

[*Testing the rinsate is*] extremely difficult to do when you're decontaminating debris – you've got to now have a container, you've got to build facilities that you've got to store all this rinsate in. Now you've got this rinsate, you know, you've got to store this rinsate from a large facility, you've got to sample it, you've got to send it out, three weeks later you get back the results and then you can drain it into your process sewer. [*It's*] just not going to happen in the real world. I see it as being a real problem. – *Roundtable 2 Participant*

I mean, just because something is stained doesn't mean that it's contaminated. We had recently a concrete tank...the tank was clean, even though it was stained. We found no hazardous...constituents for which the waste was listed...You can decontaminate things like concrete with steam – and that's all we did, we steamed it. No problem. It will still look like hell, though. – *Roundtable 2 Participant*

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Every job we do where we de-con a plating room or material -- [*the entire room*] isn't necessarily de-coned. Debris is generated, that still carries codes. Our goal is to de-con it, but that doesn't happen all the time. -- *Roundtable 3 Participant*

IV. Capacity Issues for Hazardous debris

> *In discussing capacity issues, all the participants stated that there could be capacity problems for debris when the variances expire in May, 1992. Participants in roundtables one and three (commercial landfills and brokers/treaters) also made the point that they might decide not to manage hazardous debris.*

We have a horrendous number of things known as debris. And we find out that there are very few commercial businesses really wanting to make [*hazardous debris*] a bread and butter practice. -- *Roundtable 3 Participant*

The problem is that you don't know, you're going to promulgate a regulation but you won't know when you do it when the capacity is going to become available. By the time the capacity becomes available there may be a better thing...to do with that waste. You know, we lock ourselves into yesterday. -- *Roundtable 1 Participant*

Well, I think that the general consensus [*is*] that more than the technical issues associated with treating debris, it's the procedural, the policy, the regulatory issues that are going to determine whether or not there actually is any capacity and whether or not we will all choose to be participants in the treatment of debris and not leave you guys stuck with a gigantic problem out there. -- *Roundtable 1 Participant*

[*Waste treatment is*] a finite universe. It's not expanding. People hate to hear about waste disposal sites, they hate to hear about incineration...We've got...to figure out how to recycle and conserve...Until we do that, there is going to be a capacity problem. -- *Roundtable 2 Participant*

I think it would be foolish to start messing around with incinerator ash and calling it contaminated debris. The way to control that is of course, control of what goes in the incinerator.
– *Roundtable 2 Participant*

The processing part of [*our*] facility, the pre-processing before incineration, ... [*is*] actually quite larger than the actual incineration operation. Getting the [*debris*] prepared to feed to the incinerators is a very important part of the overall processing. -- *Roundtable 3 Participant*

I think, too, it's maybe not necessarily that one tree [*that's causing the problem*]...[*It's*] the cumulative effect of all these materials...you say you don't have a problem with [*contaminated*] wood, we don't have a problem with this, we don't have a problem with that. Put them all together and we've got a capacity problem. -- *Roundtable 3 Participant*

Basically our biggest constraint is the ability to get equipment and do the processing.
– *Roundtable 3 Participant*

There is the unknown, what kind of quantity am I looking at in this type material? What kind of standards am I going to have to meet when I finish [*treating*]? Is it worth paying this much money for this equipment to process a waste stream when I really don't know what kind of volume I'm going to get. I have to recover my capital cost. If I assume I've got 200 yards and I've got to recover my capital costs of $200,000 -- it doesn't take a lot of math to know that I'm going to have to turn some customers around. So it gets difficult on even deciding what you're going to permit and how you're going to put it in. -- *Roundtable 3 Participant*

What are we going to do with this waste that's going to be coming on? I'd say about 30 to 60% of our major waste streams are debris contaminated. Well, what are you going to do? Along with everybody else, what are you going to do with it? -- *Roundtable 3 Participant*

We need systems like [*the one's described in the ANPRM*] today, but we don't have them. No one's out there doing this on a commercial basis. We have landfills and incinerators [*but*] we have very few people who are trying these levels of encapsulation or immobilization or extraction. All of these will be a TSD activity, all will be a RCRA license. -- *Roundtable 3 Participant*

...if you started stretching the derived-from rule or the contained-in rule to extremes, there's a lot of things that don't really need the treatment that could choke capacity. We should limit the capacity that is available for things that really need the treatment. -- *Roundtable 3 Participant*

...it doesn't have anything to do with whether or not you can manage [*debris*], but it has a lot to do with whether or not you will. --*Roundtable 1 Participant*

...these regulations aren't considering whether or not a facility will take a [*hazardous debris*] waste. When it becomes a health and safety risk for us to take a waste, we don't care what it is and we don't care how much you'll pay. We don't want it...the bottom line on a waste like that is there is probably not anybody...who could do anything with it. --*Roundtable 1 Participant*

...if I have a feeling like this [*hazardous debris*] is a marginal revenue waste stream, and I'm not real sure whether or not it's going to be reactive or not reactive, or how should I treat it, I'm not going to take it. I'm going to say, go to [*another company*], let them lose money on you.
-- *Roundtable 1 Participant*

The one thing that there's never been in the world is a problem getting waste streams. We pick and choose. The impact [*of the LDRs for hazardous debris*] is not going to be on us.
-- *Roundtable 1 Participant*

. . . if we feel that somewhere down the road we're going to have a problem, we just won't take it. If we can't take his [*hazardous debris*] waste, we can't take his waste. We don't work, generally speaking, as a consultant to make sure that his waste is handled properly. [*The generator is*] out on his own. -- *Roundtable 1 Participant*

...we're a conservative company, we're waiting for somebody else to stick their neck out [*in trying new methods to decontaminate debris*] and if they don't get it chopped off then maybe it's okay for us to do it. -- *Roundtable 2 Participant*

...I'm going to protect my larger customers, whatever material I can get in will be for the larger customers. The smaller customers, the ones that are incinerating 2, 3, 4, 5 drums a month or something like that, they'll be left out in the cold, and 90 days after that time, the Department of Ecology in Washington is going to come knocking on their door, and I'm not going to be able to help them. – *Roundtable 3 Participant*

V. New Capacity for Hazardous debris Treatment

> *The participants in all three roundtables stated that the two major reasons that capacity for treating debris would not be available in May 1992 when the variance expires were the specialized equipment that would be required and the length of the permitting process. In the quotes below, the participants express their views on these two issues.*

We're out there in life boats. -- *Roundtable 1 Participant*

...the only type of relief that we can hope for is regulatory relief that would allow us the opportunity to get into the business to provide that capacity. Because unless it's existing now, or its been permitted now, it won't be on line by May of '92 and maybe by May of '93.
-- *Roundtable 1 Participant*

God help us if we got to crush and do a lot of fancy extraction because there is no way in hell you're going to be able to find all the contractors, all the engineers, and all the designers to [*build*] it in such a short period of time. -- *Roundtable 2 Participant*

Even without permitting,...many of these systems in [*the ANPRM*] for destruction and extraction [*are*] going to have to be engineered systems, because they're tricky to operate or because they involve materials which have some hazard in them, and you're not going to be able to do that in the time frame that says 'go' on May 8th [*1992*]. -- *Roundtable 2 Participant*

Even if we went right now and said, 'ok, we're going to put in a shredder', there's no one piece of equipment out there that could do the job. -- *Roundtable 1 Participant*

[*In the permit process*] a lawyer, ten lawyers is no match for one citizens group...A fleet of 80 Cadillac lawyers is no match, no match for one concerned Alabama land owner.
-- *Roundtable 1 Participant*

There's two issues on permitting; one is the time and the other is, I'm not sure that we can get a permit to do anything with the label of hazardous waste on it. You're going to have them lined up, you're going to have them chaining themselves to the front gate and everything else. Reasonable is still two years to get a permit sometimes. -- *Roundtable 2 Participant*

Assuming you're doing something that is going to emit, or if we're going to do, let's say, a solvent wash or some kind of situation like that for some debris, and you're going to emit something, you're going to need [*an air*] control device and/or a permit. And if [*RCRA*] won't get you, the Clean Air Act will, anyway. -- *Roundtable 2 Participant*

It's the RCRA [*permit*] that's the killer. -- *Roundtable 3 Participant*

But my experience is that major [*permit*] modifications aren't any fun, either, on the federal level because of the public comment period. -- *Roundtable 3 Participant*

I don't do air permitting, but I do do RCRA permitting, and RCRA permitting is a bear...It's generally when you map out permitting processes that the RCRA permit is going to take the longest, I can tell you that. -- *Roundtable 3 Participant*

I was just thinking emergency response and all the fire departments, what a bad precedent to start...Contractors aren't the only people that decon, there are certain circumstances where firemen get involved in it as well...Permitting [*applies to*] that as well, the whole emergency response function. -- *Roundtable 3 Participant*

There's nothing simple about getting a permit. It may be a very simple process, but getting a permit is not simple. -- *Roundtable 1 Participant*

Depending on where you are going to live in this country, the states [*in their permitting process*] are going to cause [*you*] more or less grief than the EPA themselves. – *Roundtable 2 Participant*

One thing we have found that helps is if something is a HSWA provision and we have gone after modifications for a HSWA provision, we have found that it's easier to get that permitted because you we're in the federal program, until the state adopts the rule. – *Roundtable 3 Participant*

Everybody knows that states are erecting barriers and they're trying their best not to allow you to add on capacity. But I would say in the case of debris, to the extent that you do...allow simple equipment to be added as a HSWA provision, that will help to expedite the permitting of additional capacity. -- *Roundtable 3 Participant*

There's no consistency [*in permitting*] and that's the problem I see because we're dealing with different States and different regions and each State and each EPA has its own personality.
-- *Roundtable 1 Participant*

Right now, we face the prospect in many states of getting the specific permits...for states. That is a major problem. What it leads to is this, all the [*hazardous debris*] gets sent to a central treatment facility, few of which are getting permitted, and then you really have a capacity problem. -- *Roundtable 3 Participant*

In some states, if [*the regulations are*] ambiguous, they will err on the conservative side. Because that way they can never be wrong. And then the work doesn't get done. I would prefer not to have it ambiguous because...depending on who's running the job, [*they*] will be more or less stringent in enforcing regulations of States. [*If there are*] discrepancies all over the country, how would we work? – *Roundtable 3 Participant*

VI. Generation, Management, and Treatment of Hazardous debris

Participants in the roundtables discussed the generation, management, and treatment of hazardous debris. They discussed debris from continuous sources, debris from remediation actions, and debris from demolitions. The quotes below characterize their views on these subjects.

Gee, how do you manage all this stuff? Because it's a problem of a lot of little things. Some manufacturing plants have a different situation; they've got a few things, but they've got a lot of it. And distribution and handling this stuff – the logistics [*are*] a big concern. We don't have the answers, we're trying to define the problems. – *Roundtable 2 Participant*

We're cleaning up the past 100 years of sins. – *Roundtable 3 Participant*

What you're hearing I think is – everybody's mentioned that a lot of this debris is going to be episodic. It's already there. There aren't going to be any waste minimization efforts that can be taken to reduce this material...it's there now, and there's nothing that can be done about it. For streams that are continuous, yes, waste minimization will be an important factor...but when we're talking about debris, we're talking about no reduction today or in the future of how much debris is going to be generated in a real sense. – *Roundtable 2 Participant*

...a big problem is dealing with this point of generation [*for debris*], separation of the components kind of idea, because the landfill has no control over that...the regulations kind of squarely place the burden of compliance with the land disposal restrictions upon us and...often times we don't have any control as to whether or not we're able to comply. – *Roundtable 1 Participant*

...this whole question of remediation is going to increase by leaps and bounds for all of us and others who are not here, and the amount and volume of what we have to deal with is going to get larger every year – *Roundtable 2 Participant*

[*The volume of hazardous debris generated at remediations is*] still going to be awfully hard to estimate, because there's a million varieties of them out there. We have them going officially under corrective action, you know, some under Superfund...most of them are under some sort of state authorities, many of them are strictly voluntary...those are going to be awfully hard to estimate...I would guarantee you they're going to overpower everything else we have. – *Roundtable 2 Participant*

My point is that yes, maybe you should treat [*hazardous debris*] separately, but the trouble is the non-remediation related are going to be fairly trivial [*volumes*] compared to the remediation related things. But the non-remediation related things are the one's you could get a handle on. – *Roundtable 2 Participant*

I think filters [*may be considered hazardous debris and are*] a real big wild card for everybody. Nearly every piece of equipment that operates and handles...fluid had some type of filter associated with it. – *Roundtable 1 Participant*

[*The routine things are*] a very small portion of our hazardous debris...It's the corrective action things that make up by far the largest percentage part. By corrective action, again, I want to point out that I don't mean just necessarily formal corrective action. I mean all kinds of clean up -- self initiated, state initiated, on and on. -- *Roundtable 2 Participant*

We'll hear that a certain [*hazardous waste contaminated*] material is a problem; and when you look at it, it's a problem because whoever has that material has a nice little definition of how it should be treated and how much it should cost to be treated. Well, all it takes is money. -- *Roundtable 3 Participant*

There's always going to be a place for us [*to send hazardous waste to*]. -- *Roundtable 3 Participant*

There's always a home for something. Send half of it up to Stablex...and some of the stuff to Ensco or some of the stuff to Thermalkem. -- *Roundtable 3 Participant*

You remember that the generator for the most part is not going to have the direct contact with a disposal site per se and if they go through a [*broker*], they're going to have what they call generic profiles into places where they can usually have three or four slots a month. It's going to be cheaper for them to send it to [*a broker*] than it is for direct incineration. If they only get a one-shot deal, incinerators aren't going to offer them a [*good*] deal...With us they know they're going to get it cheaper. So they'll come to us. -- *Roundtable 3 Participant*

The military is probably in the same place that industry was in 1981 or something like that, when the 55 gallon drum was a garbage can. It was less expensive to get rid of hazardous waste in 1981, and we would find soda cans, baseball caps, cigarette butts. -- *Roundtable 3 Participant*

Well, you've got your DOD installations...you have people constantly changing, changing-of-the-guard, and you've got people managing the waste on those sites that the Sergeant will tell them to 'put that sandblast grit into the drums and then anything else that you see around the area, just load it up into those drums.' You end up getting a myriad of different components...An industrial generator,...they know that you don't put paint filters in with the sandblast grit, you don't put the respirator cartridges, the Tivex, the gloves, the boots in with any of the above...But with DOD, DOE...it's not consistent. -- *Roundtable 1 Participant*

The Corps of Engineers is keeping all of our water ways. They're constantly dredging [*debris*] materials...that have chemical contamination. -- *Roundtable 3 Participant*

I guess what we're saying is the metals are never isolated by themselves, whether they're from cleanup or they're debris that are generated by specific customers, or it's our own debris. It's a collection over a period of time of everything that has been added to that debris batch. A lot of times it's wire and everything else, and it's tied all in with plastic pieces, pipes...To try to break that down into uniform discreet types of materials that are going to have different treatment standards would be very difficult, cost prohibitive. -- *Roundtable 3 Participant*

VII. Potential Hazardous debris Problems

The participants noted various types or categories of debris that could be potential problems. The quotes below describe some of those problems.

All [*the*] service stations have the mini based car filter, and...we're finding that we have a wide variety of those kind of filters -- from automobiles all the way to large size equipment. We have a great deal of filters that are...elements that we put into process equipment; these filters, they could be paper, they can be polypropylene...and we have to deal with those filters as debris, and we have to dispose of them as debris, as contaminated debris. -- *Roundtable 2 Participant*

If you do some excavation in an area and you dig up old buildings, especially for those of us who are involved in older sites, as you work through this whole situation of corrective action or remedial type actions of RCRA facilities, as you dig up old facilities, how do [*you*] separate?...I don't know how to separate the concrete from the brick from the pipe from the grass from the plastic from the wood necessarily, because normally the guys go in and dig out this whole thing and [*you*] have this great big pile. -- *Roundtable 2 Participant*

I'm thinking to myself I bust a building, I go down below grade and here I have all this concrete, now I'm going to backhoe in there and it's tough to dig this stuff out, and out it comes with concrete, rebar, and everything in great big chunks, and that's all listed waste contaminated, possibly...what can you now do to deal with those various chunks of concrete which are this big and this big and you've got bars sticking out of them? How can you practically deal with that? -- *Roundtable 2 Participant*

It's hard to do demolition, you can't take [*a building*] apart piece by piece. You do have to take bulldozers in, you know, move stuff around, pile it up. You know, we wouldn't want to get trapped, especially non permitted facilities, in creating waste piles that then could become RCRA regulated by a zealous regulator of same sort. It's the same problem you have with digging a ditch and digging up some soil that is potentially contaminated...you're doing an excavation just to uncover a pipe, to change a valve or something like that, and that material potentially contaminated -- is that or is that not a waste, is it hazardous, is it non hazardous, how much do you have to pile up before it becomes a waste pile? You have some of those same problems with the contaminated debris, and right now that's all grey area... -- *Roundtable 2 Participant*

Radios, I don't think you can wash them off, and [*lead*] painted glass [*i.e., windshields*], I don't think we can wash that off, chrome refractory bricks, I don't think you can wash that off. -- *Roundtable 2 Participant*

And there is specialized equipment needed, yes. [*For example, contaminated trees*] still need -- logging, special handling equipment; and you have to have special equipment added on, particularly [*for*] boulders. -- *Roundtable 3 Participant*